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Farmers Response to Herbal Therapy Using Guava Leaf and Turmeric Powder for Treating Sheep Diarrhea in Gumelem Village Pakis District

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A B S T R A C T

This study investigates the response of farmers to the use of guava leaf (Psidium guajava) and turmeric (Curcuma domestica) powder therapy for the treatment of sheep diarrhea in Gumelem Village, Pakis District. Thirty respondents from the Women Farmers Group "Pakarti Utomo" participated in an extension program using a One Group Pre Test–Post Test design. Findings indicated a remarkable enhancement in knowledge, attitudes, and skills: extension effectiveness was 82.7% (very effective) and behavioral change effectiveness 66.4% (effective). Regression analysis showed that farming experience significantly affected responses, but age, education, and family dependents had no impact. These results demonstrated the promising outcomes of herbal therapy and extension projects to foster practical, low-cost innovative strategies for livestock health management

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INTRODUCTION

Sheep farming can be managed through extensive, semi-intensive, or intensive systems depending on land availability, financial resources, and farmers' skills. Intensive management, where animals are kept in pens and provided with forage and concentrates, is considered effective for productivity, while semi-intensive systems combine grazing with supplemental feeding (Gonzalez-Ronquillo et al., 2025; Karthik et al., 2021). Regardless of the system, success in sheep farming is strongly influenced by genetics, nutrition, housing, reproduction, and health management. Among health problems, digestive disorders such as diarrhea are common and can reduce productivity or even cause mortality if untreated (Geh et al., 2024).

Diarrhea in sheep is often caused by moldy feed, immature forage, or contamination by bacteria, viruses, and protozoa. Clinical signs include watery feces, changes in fecal color, and weakness, which can lead to death if not managed properly (Liu et al., 2024). Farmers traditionally rely on chemical drugs, but herbal alternatives are increasingly recognized for their accessibility, affordability, and safety. Guava leaves (Psidium guajava) contain flavonoids and tannins with antidiarrheal and antibacterial properties (Liu et al., 2024), while turmeric (Curcuma domestica) contains curcumin and tannins that act as anti-inflammatory and astringent agents (Budiarji et al., 2023). The combination of guava leaf and turmeric powder is therefore a promising herbal therapy for diarrhea in sheep.

Agricultural extension plays a crucial role in bridging scientific innovation with farmers' practices. Effective extension activities can enhance farmers' knowledge, attitudes, and skills, thereby increasing adoption of new technologies (Bash, 2025; Andersen & Nielsen, 2024). In rural communities such as Gumelem Village, Pakis District, where sheep farming is a major livelihood, extension on herbal therapy for diarrhea is expected to improve animal health management and reduce dependence on chemical drugs.

Based on these considerations, this study aims to analyze farmers' responses to the use of combined guava leaf and turmeric powder therapy for treating sheep diarrhea, to evaluate the effectiveness of extension activities, and to examine the influence of farmers' characteristics on their responses. The findings are expected to contribute to the development of practical, low-cost, and sustainable innovations in livestock health management.

LITERATURE REVIEW

Animal Health and Sheep Farming

Lands, capital and skill of farmers determine the production and intensive and semi-intensive shepherding systems (Gonzalez-Ronquillo et al., 2025). In sheep production success is not just about feed and genetics but also how well health management and disease prevention are achieved. Many health consequences can be found in food. Digestive diseases, especially diarrhea, which is also one of the most common problems affecting productivity and increasing the risk of death. The most common disease affecting productivity and survival rates is digestive disorders.

Diarrhea

In small ruminants, diarrhea is usually caused by dirty feed, bacteria and viruses, or protozoa (Liu et al., 2024). The clinical signs are watery faeces, weakness, reduced feed intake — all of which can lead to a death if untreated. Conventional treatment is chemically based, however herbal replacement are being recommended more than ever for their availability, lower cost, and lower dose of side effects (Budiarji et al., 2023).

Guava Leaf (*Psidium guajava*) as Herbal Therapy

Flavonoids, tannins, and quercetin found in guava leaves are antidiarrheal agents which can reduce intestinal motility and prevent bacterial growth (Liu et al., 2024). Guava leaf extract has proven effective against Escherichia coli and Salmonella infection, and its application is an herbal therapy for livestock diarrhea (Geh et al., 2024).

Herbal therapy through turmeric (*Curcuma domestica*)

Turmeric is loaded with curcumin, tannins and essential oils that exhibit antibacterial, anti-inflammatory, and antioxidant benefits (Jikah & Edo, 2025; Katsa, 2024; Budiarji et al., 2023). Curcumin used may benefit gut health and reduce diarrhea severity in humans and animals. It improves your therapeutic effects through synergistic action when used in combination with guava leaf powder.

Agribusiness Extension and Farmers' Response

Agricultural extension acts as a connector between scientific advancement and farmers' practice. Good extension activities can enhance farmers' knowledge, attitudes, and skills which can lead to increased adoption of technologies (Bash, 2025; Andersen & Nielsen, 2024). External factors such as institutional assistance and availability of resources influence farmers' responses to extension, as do internal factors such as age, education, experience, and family responsibilities (Sarwono, 2013).

Hypotheses

The following hypotheses are introduced based on the literature :

H1: Guava leaf and turmeric powder therapy has a favorable effect on farmers´ knowledge, attitudes and skills to managing sheep diarrhea.

H2: Farmers' traits (age, educational attainment, experience, family dependents) have a significant impact on farmers' responses to extension activities.

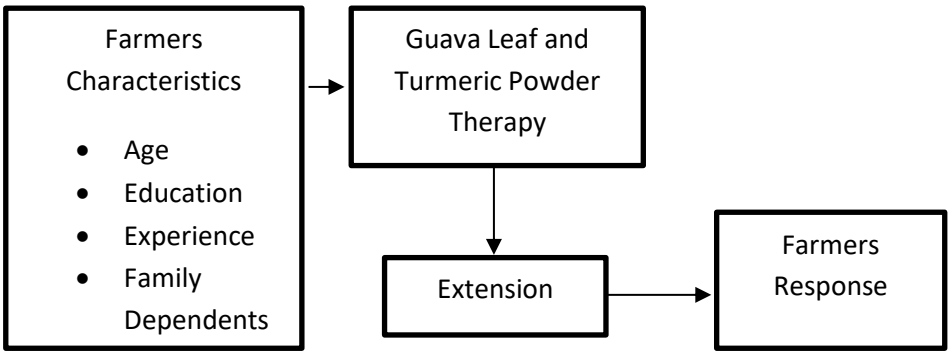

Figure 1. Conceptual Framework

METHODOLOGY

The study was conducted in Gumelem Village, Pakis District, Magelang Regency. The location was chosen because sheep farming is one of the dominant livestock activities, and diarrhea is a common health problem among sheep in the area.

Research Design

This research employed a quantitative approach using a pre-experimental design with the One Group Pre Test–Post Test Design. The design was structured as (Sugiyono, 2015):

O_1-X-O_2

- O_1 (Pre-test): Observation and questionnaire before extension.
- X (Treatment): Extension activity on herbal therapy using guava leaf (Psidium guajava) and turmeric (Curcuma domestica) powder.
- O_2 (Post-test): Observation and questionnaire after extension.

This design was chosen to measure changes in farmers' responses (knowledge, attitude, and skills) before and after receiving extension.

Population and Sample

The population consisted of members of the Women Farmers Group "Pakarti Utomo" in Gumelem Village. Sampling was conducted using the saturated sampling method, where all 30 members were included as respondents. This method ensures high accuracy because the entire population was studied.

Data Sources

Primary Data: Obtained directly from respondents through interviews, questionnaires (pre-test and post-test), and observation of extension activities. Secondary Data: Derived from village monographs, agricultural and livestock statistics, and institutional records related to Gumelem Village.

Data Collection Techniques

1. Interview: Structured questionnaires were distributed to measure farmers responses across cognitive, affective, and conative dimensions.
2. Observation: Direct observation of sheep farming practices and demonstration of herbal therapy preparation and administration.
3. Documentation: Recording of activities, including photos, attendance lists, and extension materials.

Research Instruments

The instrument used was a questionnaire with items designed to measure:

- Knowledge (Cognitive): Understanding of diarrhea, symptoms, tools, materials, and therapy steps.
- Attitude (Affective): Agreement, willingness to participate, and acceptance of herbal therapy.
- Skills (Conative): Ability to prepare tools, materials, make powder, and administer therapy.

Responses were measured using a Likert scale (1–5), ranging from "Strongly Disagree/Not Skilled/Not Know" (score 1) to "Strongly Agree/Very Skilled/Strongly Know" (score 5).

Data Processing

Data were processed through several stages:

- Editing: Checking completeness and consistency of responses.
- Coding: Assigning numerical codes to categorical answers.
- Scoring: Converting responses into numerical values based on the Likert scale.
- Tabulation: Summarizing data into tables for analysis.
- Cleaning: Ensuring accuracy and consistency of processed data.

Data Analysis

Descriptive Analysis: Used to describe farmers' responses in cognitive, affective, and conative dimensions. Continuum scales were applied to categorize responses into five levels: Very Low, Low, Moderate, High, and Very High. Index values were calculated as:

a = *lowest score* x *number of items* x *respondents*
b = *highest score* x *number of items* x *respondents*

$$c = \frac{b-a}{5}$$

Effectiviness of Extension (EE):

$$EE = \frac{post\ test\ score}{maximum\ score} \times 100\%$$

Categorized as: Very Effective (80.01–100%), Effective (60.01–80%), Moderately Effective (40.01–60%), Less Effective (20.01–40%), Not Effective (0–20%).

Effectiveness of Behavioral Change (EBC):

$$EBC = \frac{post\ test\ score - pre\ test\ score}{maximum\ score - pre\ test\ score} \times 100\%$$

Regression Analysis : To examine the influence of farmers' characteristics (age, education, farming experience, family dependents) on responses, multiple linear regression was applied:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + e$$

Y : Farmers response (composite score)
X1 : Educational level
X3 : Farming experience
X4 : Family dependents
a : constant
e : error term

Prior to regression, data were transformed from ordinal to interval using the Method of Successive Intervals (MSI). Assumption tests included normality, homoscedasticity, and multicollinearity. Significance was tested using F-test (simultaneous) and t-test (partial), with Adjusted R^2 used to measure explanatory power.

RESULT

Overall Farmers Response

The overall response of farmers to the extension program on the use of guava leaf (Psidium guajava) and turmeric (Curcuma domestica) powder therapy for sheep diarrhea in Gumelem Village was positive. Most respondents showed good responses, while only a small proportion expressed hesitation.

Table 1. Overall Farmers response

Farmers Response	Number of Respondents	Percentage (%)	Median	Total Score
Good	26	86.67	82.7	2481
Not Good	4	13.33		
Total	30	100.00		

Source : Processed Data, 2026

This result indicates that 86.67% of farmers responded positively to the extension, showing willingness to understand, accept, and apply the herbal therapy innovation.

Cognitive Response (Knowledge)

The cognitive aspect measured farmers' knowledge about sheep diarrhea, its symptoms, tools, materials, and therapy steps. After the extension, knowledge scores increased significantly.

Table 2. Cognitive Response

Knowledge Response	Number of Respondents	Percentage (%)	Median	Total Score
Good	25	83.33	120	843
Not Good	5	16.67		
Total	30	100.00		

Source: Processed Data, 2026

On the continuum scale, the pre-test score of 569 was categorized as Moderate Knowledge, while the post-test score of 843 was categorized as High Knowledge, approaching Very High.

Affective Response (Attitude)

The affective aspect assessed farmers' attitudes, including agreement, willingness to participate, and acceptance of herbal therapy.

Table 3. Affective Response

Attitude Response	Number of Respondents	Percentage (%)	Median	Total Score
Good	27	90.00	126	1004
Not Good	3	10.00		
Total	30	100.00		

Source: Processed Data, 2026

The pre-test score of 559 placed farmers in the Low–Moderate Agreement category, while the post-test score of 1004 showed a strong shift to High Agreement, close to Very High Agreement.

Conative Response (Skills)

The conative aspect measured farmers' skills in preparing tools, materials, making powder, and administering therapy.

Table 4. Conative Response

Skills Response	Number of Respondents	Percentage (%)	Median	Total Score
Good	24	80.00	129	634
Not Good	6	20.00		
Total	30	100.00		

Source: Processed Data, 2026

The pre-test score of 327 was categorized as Low–Moderate Skills, while the post-test score of 634 indicated High Skills, very close to Very High Skills. This improvement was largely due to the demonstration method used during the extension.

Evaluation of Extension Effectiveness

To evaluate the effectiveness of the extension program, the scores from pre-test and post-test across all response dimensions were compared.

Table 5. Evaluation of Extension

Farmers Behavior	Pre-Test Score	Post-Test Score
Cognitive	569	843
Affective	559	1004
Conative	327	634
Total	**1455**	**2481**

Source: Processed Data, 2026

From these results, two effectiveness indicators were calculated:

- Extension Effectiveness (EE):
  To measure how effective the extension program was overall, the following formula was applied:

$$EE = \frac{post\ test\ score}{maximum\ score} \text{ x } 100\%$$
$$= \frac{2481}{3000} \text{ x } 100\%$$
$$= 82{,}7\% \text{ (Very effective category y)}$$

- Effectiveness of Behavioral Change (EBC):
  To measure the extent of behavioral change, the following formula was used:

$$EBC = \frac{post\ test\ score - pre\ test\ score}{maximum\ score - pre\ test\ score} \text{ x } 100\%$$
$$= \frac{2481 - 1455}{3000 - 1455} \text{ x } 100\%$$
$$= 66{,}4\% \text{ (Effective)}$$

Statistical Analysis of Influencing Factors

Finally, regression analysis was conducted to examine the influence of farmers' characteristics (age, education, farming experience, and family dependents) on their responses.

Table 6. Statistical Analysis Results

Variable	Coefficient	Sig.	Interpretation
Adjusted R Square	0,220		
F-test (overall)	3,045	0,036	Significant
Constant	73333,44	0,000	
Age	1424,039	0,191	Not Significant
Education	1,996	0,113	Not Significant
Farming Experience	3752,001	0,007	Significant
Family Dependents	1437,371	0,358	Not significant

Source: Primary Data, 2026

The results show that farming experience significantly influenced farmers' responses, while age, education, and family dependents did not have a significant effect. The adjusted R^2 value of 0.220 indicates that 22% of the variation in farmers' responses was explained by these variables, while the remaining 78% was influenced by other factors not included in the model.

DISCUSSION

Farmers Cognitive Response (Knowledge)

The cognitive aspect describes the level of farmers' understanding of sheep diarrhea and the herbal therapy introduced. Based on the results, 83.33% of respondents were categorized as having a good response in knowledge after the extension, while 16.67% were still in the not good category. The increase in scores from 569 (pre-test) to 843 (post-test) shows that farmers gained new insights regarding the causes, symptoms, tools, materials, and steps of therapy using guava leaf and turmeric powder.

This improvement occurred because the extension materials were practical and directly related to farmers' daily problems. Farmers in Gumelem Village had previously relied on chemical drugs or traditional practices without clear guidance. The introduction of herbal therapy provided a simple, affordable, and locally available solution. Similar findings were reported by Fernanda et al., (2025), who stated that practical knowledge delivered through extension significantly increases farmers' understanding. Thus, the cognitive response of farmers can be categorised as good, moving from "Moderate Knowledge" to "High Knowledge".

Farmers' Affective Response (Attitude)

The affective aspect reflects farmers' attitudes toward the innovation. Results showed that 90% of respondents expressed positive attitudes, while only 10% remained hesitant. The score increased from 559 to 1004, indicating that farmers agreed with the therapy and were willing to participate in extension activities.

The positive attitude was influenced by the affordability and accessibility of guava leaves and turmeric, which are widely available in the village. Farmers perceived the therapy as beneficial and culturally acceptable, aligning with their traditional use of herbal remedies. According to Suharyanto et al., (2017),

attitudes are shaped by perceived benefits and ease of access. The continuum analysis confirmed that farmers shifted from "Low–Moderate Agreement" to "High Agreement", close to "Very High Agreement".

This finding is consistent with Rogers' theory of innovation diffusion, which emphasises that compatibility with existing values and practices accelerates adoption. In this case, the therapy was compatible with farmers' beliefs and practices, leading to strong acceptance.

Farmers' Conative Response (Skills)

The conative aspect measures farmers' skills in preparing and applying the therapy. Results showed that 80% of respondents demonstrated good skills, while 20% were still categorised as not good. Scores increased from 327 to 634, indicating that farmers became more capable of preparing tools and materials, making powder, and administering therapy.

The improvement was largely due to the demonstration method used during the extension. Farmers practised directly, which enhanced their confidence and ability. Mariyono et al., (2021) emphasised that hands-on training is essential for improving farmers' technical skills. The continuum analysis showed that farmers moved from "Low–Moderate Skills" to "High Skills", very close to "Very High Skills."

This result confirms that extension activities not only improve knowledge and attitudes but also provide practical skills necessary for adoption. Farmers who are skilled are more likely to apply the innovation consistently.

Evaluation of Extension Effectiveness

Evaluation of the extension programme showed that the total score increased from 1455 (pre-test) to 2481 (post-test). The effectiveness of extension (EP) was calculated at 82.7%, categorised as 'very effective'. This indicates that the extension successfully improved farmers' knowledge, attitudes, and skills. The effectiveness of behavioural change (EPP) was 66.4%, categorised as 'effective'. This shows that farmers' behaviour changed positively after the extension, although not yet reaching the maximum level. According to Kule et al., (2025), behavioural change often requires repeated reinforcement. The results suggest that follow-up activities are needed to sustain and strengthen behavioural change.

Influence of Farmers' Characteristics

Farmers' responses ($p = 0.007$) were significantly affected by farming experience according to regression analysis, while age, education, and family dependents did not demonstrate significant effects. Experienced farmers were more receptive to the innovation because they could relate it to their previous practices. In addition, the adjusted R^2 of 0.220 suggests that 22% of the variation in farmers' responses was explained by the studied variables and that other variables were accounting for 78% including institutional support, peer influence, and resource availability. This observation corroborates with Sen et al., (2025), as experience improves farmers' assessment and acceptance of new technologies. As a result, farming experience is the most significant factor that shapes farmers' responses and the remaining traits make less of a difference.

CONCLUSIONS AND RECOMMENDATIONS

The study showed that farmers' responses to guava leaf and turmeric powder therapy for sheep diarrhea improved significantly in knowledge, attitude, and skills after extension activities. Extension effectiveness was categorized as Very Effective (82.7%), while behavioral change effectiveness was Effective (66.4%). Farming experience was the only factor that significantly influenced responses, while age, education, and family dependents had no significant effect. These findings confirm that herbal therapy is a practical and acceptable innovation for farmers in Gumelem Village.

It is recommended that extension programs continue to emphasize practical demonstrations, involve experienced farmers as role models, and provide follow-up activities to sustain behavioral change. Local institutions should support the dissemination of herbal therapy using locally available resources, and further research is needed to evaluate its long-term impact on livestock productivity and farmers' welfare.

FUTURE STUDY

Farmers' responses to herbal therapy applied with guava leaf and turmeric powder were positive and effective as stated. However, more research is needed to corroborate and broaden these results. The long-term effects of the adoption of herbal therapy on sheep health and productivity (e.g., conception rates, growth performance, and mortality reduction) should be assessed in future studies. Also, we need to examine the economic gains to farmers, for example, whether there is a cost saving in comparison to chemical drugs and, if so, whether income is improved. Moreover, it is recommended to investigate the social aspects of adoption in the future by exploring peer influence, institutional support, and gender roles in farmer groups. Comparisons with other locally available herbal plants might also shed light on more comprehensive sustainable management of health in livestock. Finally, incorporating herbal therapy into policy and extension curricula could widen access and promote uniform treatment among farming communities.

ADVANCED RESEARCH

For example, this research has shown that farmers' responses to herbal therapy using guava leaf and turmeric powder were positive and effective. But, sophisticated studies are needed, so that we could gain a better understanding and expand the adoption of innovation. Future studies should not only assess farmers' responses but also combine biological and physiological variables in sheep, including outcomes such as recovery rates, reproductive performance, and long-term health outcomes. Such a result means greater scientific justification for the efficacy of herbal therapy versus traditional chemical approaches. In advanced research, multivariate and longitudinal designs may also help support the analysis of farmers' responses over time and across socio-economic status classes.

Generalizability will be enhanced through larger sample sizes and heterogeneous farmer populations. In addition, the inclusion of economic analyses including cost-benefit analyses and profitability comparisons would underscore the economic viability of herbal therapy. An obvious alternative is to examine social and institutional context in the context of the persistence of behavior change (e.g., farmer groups, extension institutions, and peer associations). Mixed research might also be undertaken, such as incorporating quantitative questionnaires but also qualitative interviews for obtaining additional information on farmers' motivations and constraints.

Lastly, it is important to integrate advanced research with policies enabling the implementation of herbal therapy innovations at regional and national levels in livestock health management programs. This would build up institutional support and speed up generalization towards sustainable production systems of livestock.

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