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Innovative Technical Guidance: Processing Corn Straw into Quality Feed for Beef Cattle for Veterinary Medicine Students at UNDIKMA with an Entrepreneurship Focus

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Abstrak
This study aims to improve the knowledge and skills of Veterinary Medicine students at UNDIKMA in processing corn straw into quality beef cattle feed through entrepreneurship-focused technical guidance. Our partners included local beef cattle farmers and student groups from the Faculty of Veterinary Medicine, UNDIKMA. We utilized a technology demonstration method showcasing four corn straw processing technologies: hay making, wet ammoniation, dry ammoniation, and haylage making. Results from pretest and posttest assessments of 41 students showed significant improvements in knowledge (average increase of 46.9%) and skills (average increase of 70.8%). Participants also demonstrated high willingness and readiness to apply and disseminate the techniques learned. We recommend the expansion of this training model to include more innovative processing methods and wider dissemination through various extension methods to effectively address the feed challenges in the beef cattle industry.

Keyword: Corn Straw Processing, Beef Cattle Feed, Veterinary Medicine Education, Entrepreneurship

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INTRODUCTION

The beef cattle industry in Indonesia faces significant challenges in terms of feed availability, a prominent and recurring issue highlighted by studies such as those conducted by Mashur (2021). As a vital commodity in the livestock industry, the demand for beef continues to rise in conjunction with population growth and improvements in the standard of living. However, the limited availability of feed presents a major obstacle, particularly in small-scale beef cattle farms in arid areas like West Nusa Tenggara, as demonstrated in research by Mashur (2017). This highlights the importance of finding feed sources that are not only inexpensive but also sustainably available throughout the year.

Corn straw, as a potential solution, is an abundant and economical source of ruminant feed. Traditionally, this straw is a by-product of corn harvesting that is often either burned or discarded, despite its production in Indonesia reaching a significant volume of approximately 80 million tons per year (Nugroho et al., 2018). Although it has low nutritional content, particularly in protein and energy—which are insufficient to meet the optimal

needs of beef cattle (Yanuartono et al., 2017)—corn straw has substantial potential if processed correctly.

The processing of corn straw can be accomplished through various proven methods that enhance its quality, such as fermentation, ammoniation, and chopping. Fermentation with microorganisms like lactic acid bacteria has been shown to increase the crude protein content and digestibility of corn straw (Putri et al., 2019). Ammoniation with urea also enhances the crude protein and dissolved nitrogen content, while chopping increases the surface area of the straw, facilitating digestion by cattle. With these quality improvements, corn straw can become a nutritious alternative feed, helping to increase cattle weight and meat quality, which ultimately enhances farmers' profits (Atmaka et al., 2017).

On the other hand, the role of students, particularly from the Faculty of Veterinary Medicine at Undikma with an interest in entrepreneurship, can be highly significant in addressing this issue. They have the potential to contribute to improving the quality of life for farmers through innovative uses such as corn straw processing. These students can provide technical guidance and training to farmers on how to process corn straw into high-quality feed and even assist in establishing a straw processing business. This step can not only increase farmers' income but also create new job opportunities in the rural livestock sector.

However, to maximize this potential, further technical guidance for students is necessary. Through community service activities, they can be trained in technologies for processing corn straw into beef cattle feed with various technological innovations. Research by Mashur (2022) shows significant improvements in the knowledge and skills of participants following technical guidance in hay-making technology, wet ammoniation, and dry ammoniation. This increase in knowledge and skills, ranging from 25% to 29%, proves the effectiveness of the technical guidance activities and demonstrates how the dissemination of this technology can assist farmers in overcoming feed challenges during the dry season in arid lands.

IMPLEMENTATION METHOD

Technical guidance (bintek) for the processing of corn straw into cattle feed for groups of students from the Faculty of Veterinary Medicine at Undikma who have chosen entrepreneurship as their field of interest is conducted using the technology demonstration method (show case technology). This method aligns with the findings of Mashur et al. (2020) and Mashur (2021) that technology demonstration is the most effective method of extension among 17 methods in disseminating new innovations to the community. Technology demonstration is a method of introducing new, proven technologies from research and evaluation in terms of technical, social, and economic aspects, conducted by farmer groups or their members under the technical guidance of professors, researchers, or field officers. Professors, researchers, and field officers act as mentors, with all technology demonstration activities performed by the farmer groups themselves. This allows technical guidance participants to directly observe and assess the advantages of the applied technology.

The goals of technology demonstration are: (1) to provide hands-on experience to students participating in technical guidance to work with the recommended corn straw processing technology themselves, enabling them to share their experiences with other students or livestock farmers so they know, want, and are able to implement the technology in their farming practices, (2) to show the technical guidance participants the advantages of the recommended corn straw processing technology compared to existing or commonly applied corn straw processing innovations by farmers, (3) to give examples to the technical guidance participants of the new recommended innovations, so they can subsequently perform them correctly and effectively, (4) to provide an opportunity for students to assess the suitability of the recommended technology based on the needs of the farmers, the availability of capital, and human resources, (5) to demonstrate to policy makers the opportunities for using the showcased corn straw processing technology in regional farming development (Mashur, 2015).

Four (4) types of corn waste processing technologies are showcased in this technical guidance activity: the production of corn straw hay, wet ammoniated corn straw, dry ammoniated corn straw, and corn straw haylage (Gaina et al., 2017).

Steps for Implementing Technical Guidance

1. Conducting a Pretest
   The pretest is carried out before the technical guidance activities to determine the level of knowledge, skills, and attitudes of the participants regarding the five corn straw processing technologies that will be showcased. The pretest involves asking five questions related to the knowledge, basic skills of corn straw processing, and the willingness of participants to disseminate the technology information showcased. The results of the pretest for each showcased innovation are presented in Table 1.
2. Conducting Direct Face-to-Face Extension Activities
   The extension activity for processing corn straw into beef cattle feed is conducted face-to-face after the pretest to provide theoretical information about corn straw processing.
3. Preparing Materials and Tools for Technical Guidance
   The materials and tools prepared for the technical guidance activity on processing corn straw into beef cattle feed and the steps for making wet ammoniated corn straw hay, dry ammoniated corn straw, and corn straw haylage are outlined as follows:

Making of Corn Straw Hay

1. Check the moisture content of dry corn straw to ensure it is completely dry. If not, it needs to be dried again under the sun or evenly to prevent mold during storage.
2. Then, the dry corn straw is chopped into 2-3 cm pieces using a machete or a grass chopper.
3. The chopped corn straw is packed into thick plastic bags (brand Semar) until full and compacted, then tied tightly to keep out air for storage (Agricultural Information Center Ciawi, 2020).

Implementation of Post-Test Technical Guidance

A post-test is conducted to assess changes in knowledge, skills, and attitudes of the participants regarding the processing of corn straw into cattle feed. The post-test questions are the same as those given during the pretest. The results of the post-test are displayed in Tables 1 and 2.

This structured approach not only enhances the learning experience but also directly contributes to sustainable agricultural practices by providing innovative, economically viable solutions for livestock feed.

RESULTS AND DISCUSSION

Before the technical guidance (bintek) on processing corn straw into cattle feed, a pretest was administered to 41 students from the Faculty of Veterinary Medicine at Undikma who have an interest in entrepreneurship and are participating in the technical guidance. The pretest was designed to gather initial information on the participants' level of knowledge, skills, and attitudes towards the technology of processing corn straw into beef cattle feed using four types of corn straw processing technologies: hay making, dry ammoniation, wet ammoniation, and haylage. Following the technical guidance, a posttest was conducted to assess changes in the participants' knowledge, skills, and attitudes towards the four showcased technologies. The results of the pretest and posttest are displayed in Tables 1 and 2.

1. Technology of Corn Straw Hay Making

The data in Table 1 indicates that the knowledge level of the participants regarding corn straw hay making was moderately satisfactory. The pretest results showed that 58.5% of the participants were previously unaware of the technology. After participating in the technical guidance, 92.7% of participants reported being aware of the technology, representing a 34.3% increase in awareness among participants. This study's findings differ from those of Mashur (2022), which showed a 55.17% increase in awareness among participants about hay processing technology after technical guidance. Additionally, this data suggests that the technology of processing corn straw was more widely known among the community, especially among cattle farmers, before the technical guidance compared to rice straw processing.

According to data in Table 1, the skill level of the participants in making corn straw hay was initially low. Only 17.1% of participants stated they could make corn straw hay in the pretest. After the technical guidance, 92.7% of participants felt skilled in making corn straw hay for cattle feed, an increase of 75.8%. This study's findings differ from those of Mashur (2022), which reported a 67.24% increase in participants skilled in making rice straw hay before and after technical guidance. This study also indicates that corn straw processing technology was more widely practiced among the community, especially by farmers, before the technical guidance compared to rice straw processing.

In terms of attitude changes, the participants exhibited a very high willingness (100%) and a great interest (100%) in making corn straw hay, demonstrating a very high readiness (100%) to disseminate information on the technology to the community, especially to cattle farmers. This is reflected

in the data from the pretest compared to the posttest results for the participants of the corn straw processing as cattle feed, as shown in Table 1. These findings align with those of Mashur (2022), indicating that the attitudes of participants in processing rice straw as cattle feed were also very high both before and after the technical guidance.

2. Technology of Wet Ammoniation of Corn Straw

Data from Table 1 shows that the knowledge level of participants in the technology of wet ammoniation of corn straw was very low initially. The pretest results showed that only 24.4% of participants were aware of the technology. After participating in the technical guidance, 85.4% of participants stated they were aware of the technology, a 61.0% increase in knowledge. This study's findings differ from those of Mashur (2022), which reported a 67.24% increase in awareness among participants about wet ammoniation of rice straw after technical guidance. This data also indicates that the technology of wet ammoniation of corn straw was more widely known among the community, especially among cattle farmers, before the technical guidance compared to wet ammoniation of rice straw.

The skill level of participants in making wet ammoniated corn straw was very low initially, as indicated by only 17.1% of participants in the pretest claiming they could perform this technique. After the technical guidance, 85.47% of participants stated they were skilled at making wet ammoniated corn straw as cattle feed, an increase of 68.3%. This contrasts with the findings of Mashur (2022), where the increase in participants skilled at making wet ammoniated rice straw was 67.24%. This study shows that the practice of wet ammoniation of corn straw was less common among the community, especially cattle farmers, before the technical guidance compared to rice straw.

In terms of attitude changes, the participants showed a very high willingness (97.6%) and a great interest (97.6%) in performing wet ammoniation of corn straw, with a very high readiness (97.6%) to disseminate information on the technology to the community, especially to cattle farmers. This is reflected in the data from the pretest compared to the posttest results for the participants of the wet ammoniation of corn straw making, as shown in Table 1. These findings align with those of Mashur (2022), indicating that the attitudes of participants in making wet ammoniated rice straw as cattle feed were also very high both before and after the technical guidance.

Table 1. Changes in Behavior (knowledge, skills and attitudes) of Participants in the Technical Guidance on Processing Corn Straw as Beef Cattle Feed Before and After the Technical Guidance

Technology	Question	Pretest (%)	Posttest (%)	Change (%)
I. Corn Straw Hay Making				
Heard of the technology	58.5	92.7	+34.3	
Can now make the product	17.1	92.7	+75.8	
Willing to make the product	100	100	0	
Interested in the technology	100	100	0	

Willing to disseminate the technology	95.1	100	+4.9	
Average Change	74.1	97.1	+23.0	
II. Wet Ammoniated Corn Straw				
Heard of the technology	24.4	85.4	+61.0	
Can now make the product	17.1	85.4	+68.3	
Willing to make the product	97.6	97.6	0	
Interested in the technology	97.6	97.6	0	
Willing to disseminate the technology	95.1	97.6	+2.5	
Average Change	66.4	92.7	+26.3	
III. Dry Ammoniated Corn Straw				
Heard of the technology	29.3	95.1	+65.8	
Can now make the product	17.1	95.1	+78.0	
Willing to make the product	97.6	97.6	0	
Interested in the technology	95.1	100	+4.9	
Willing to disseminate the technology	90.0	97.6	+7.6	
Average Change	65.8	97.1	+31.3	
IV. Corn Straw Haylage				
Heard of the technology	31.7	80.5	+48.8	
Can now make the product	9.7	70.7	+61.0	
Willing to make the product	92.7	92.7	0	
Interested in the technology	95.1	100	+4.9	
Willing to disseminate the technology	92.7	97.6	+4.9	
Average Change	64.4	88.3	+23.9	

3. Dry Ammoniation of Corn Straw Technology

Data in Table 1 indicates that the knowledge level among participants regarding dry ammoniation of corn straw was initially very low. The pretest results showed that only 29.3% of participants were aware of this technology. After participating in the technical guidance, this awareness increased to 95.1%, representing a 65.8% increase in participants' familiarity with dry ammoniation of corn straw. This result contrasts with Mashur's (2022) study, which recorded a 63.79% increase in awareness of dry ammoniation of rice straw after similar training. This study also indicates that prior to the technical guidance, the dry ammoniation of corn straw was more widely known among the community, especially cattle farmers, than wet ammoniation of rice straw.

Regarding skill level, initially only 17.1% of participants claimed they could perform dry ammoniation of corn straw. Post-technical guidance, this figure rose dramatically to 95.1%, showing a 78.0% increase in participants skilled in this method. This finding aligns with Mashur's (2022) results, where there was a 60.35% increase in participants skilled in dry ammoniation of rice straw after the guidance. This study suggests that the practice of dry ammoniation of corn straw was less common among the community, particularly among cattle farmers, compared to dry ammoniation of rice straw

In terms of attitude changes, there was a very high willingness (97.6%) and interest (100%) among participants in learning and applying dry ammoniation of corn straw, with a readiness of 97.6% to disseminate the technology within the community, especially among cattle farmers. This attitude shift is evident in the data comparing pretest results with posttest results for participants of the dry ammoniation of corn straw, as displayed in Table 1. These findings are consistent with Mashur's (2022) results, indicating similarly high attitudes towards the dry ammoniation of rice straw as cattle feed both before and after the technical guidance.

4. Corn Straw Haylage Making Technology

The knowledge level about corn straw haylage making among technical guidance participants was low according to the pretest data, with only 31.7% of participants initially aware of this technology. Following the guidance, 80.5% of participants reported familiarity with the process, marking a 48.8% increase in knowledge. This differs from Mashur's (2022) study, which noted a 75.86% increase in knowledge about haylage making of rice straw. The current study also suggests that corn straw haylage making was more familiar to the community, especially cattle farmers, prior to the technical guidance compared to rice straw haylage making

The skill level for making corn straw haylage was also initially very low, with only 9.7% of participants confident in their ability to make haylage from corn straw at the outset. After the guidance, this number increased to 70.7%, representing a 61.0% improvement. This outcome is in line with Mashur's (2022) findings, which showed a 74.35% increase in skill level for making rice straw haylage after similar interventions. This study suggests that haylage making from corn straw was more frequently practiced among the community, particularly by cattle farmers, prior to the guidance compared to rice straw haylage making

Regarding attitude changes, participants showed very high willingness (92.7%) and interest (100%) in learning and applying corn straw haylage making techniques, with a readiness of 97.6% to spread this technology among the community, particularly among cattle farmers. These results, depicted in Table 1, echo the high attitudes observed in Mashur's (2022) study on the making of rice straw haylage before and after technical guidance.

5. Preferences of Technical Guidance Participants Towards the Four Corn Straw Processing Technologies as Cattle Feed

According to data in Table 2, among the four corn straw processing technologies, the preferred methods by technical guidance participants, based on ease of execution and cost-effectiveness, are ranked as follows: (1) hay making from corn straw at 51.0%, (2) dry ammoniation of corn straw at 26.0%, (3) wet ammoniation of corn straw at 14.0%, and (4) making haylage from corn straw at 9.0%.

Table 2. Level of Preference of Technical Guidance Participants for Corn Straw Processing Technology as Beef Cattle Feed

No	**Type of Corn Straw Processing Technology as Cattle Feed**	**Number of Respondents (%)**
1	Hay Making Technology from Corn Straw	18 (51%)

No	Type of Corn Straw Processing Technology as Cattle Feed	Number of Respondents (%)
2	Wet Ammoniation Technology of Corn Straw	5 (14%)
3	Dry Ammoniation Technology of Corn Straw	9 (26%)
4	Haylage Making Technology from Corn Straw	3 (9%)

The results of this study are in accordance with the research results of Mashur et al. (2021a) that the local wisdom-based extension method is the most effective method with a group approach, direct communication and using a combination of the senses of reception (sight, hearing, touch, taste and smell). Furthermore, Mashur et al. (2021b) said that in order to increase the capacity of Bintek participants, efforts are needed to increase extension and training activities through various media and extension methods that are most appropriate to the needs of farmers.

CONCLUSION

Based on the results or achievement of community service targets, it can be concluded that technical guidance activities for processing corn straw as beef cattle feed with a combination of technology degree extension methods and direct face-to-face meetings can improve the knowledge and skills of participants in the Undikma Faculty of Veterinary Medicine student technical guidance in the field of entrepreneurship in making hay, wet ammoniation, dry ammoniation and corn straw haylage as well as changes in the attitudes of technical guidance participants in disseminating the results of their technical guidance to the community, especially beef cattle breeders, so that it can be used as a solution to overcome the difficulties in providing beef cattle feed, especially during the dry season.

RECOMMENDATION

Things that need to be done for further community service are to improve and develop technical assistance activities for processing corn straw in various processed forms with various combinations of extension methods that are appropriate to the needs of beef cattle farmers.

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