



Application of appropriate technology for feed supplements in Sukanagalih Village, Tasikmalaya Regency

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ABSTRACT

Feed supplement is useful as a growth promoter, increasing efficiency and feed consumption, helping digestion and metabolism, and improving the quality of livestock products. The aim of this community service is to apply appropriate technology to utilize mangosteen peel and turmeric as feed supplement for poultry in Sukanagalih Village, Tasikmalaya Regency, as well as produce quality feed supplement and improve the skills of farmers in processing the supplement feed. This community service activity is one of the Kosabangsa programs between the Universitas Perjuangan Tasikmalaya as implementation team and the IPB University as accompanying team. This activity started from September to December 2023 in Sukanagalih Village, Rajapolah District, Tasikmalaya Regency. The method for implementing this activity consists of counseling, training, and assistance to livestock groups. The target partners for this activity were Kelompok Megar Bebek Cihateup and the Berdikari Village-Owned Enterprise (Bumdes Berdikari) with a total of 20 participants each, so the total participants are 40 people. The level of community empowerment increased to 80 – 85% in the knowledge, skills, accessibility, and income categories. The results of this activity are very beneficial for the community, where the application of appropriate technology for processing mangosteen peel and turmeric as feed supplement can increase the added value and selling value of agro-industrial waste products in Tasikmalaya Regency. The application of appropriate technology for the use of supplement feed is able to increase the knowledge and skills of the community in Sukanagalih Village, Tasikmalaya Regency in processing feed supplement.

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1. INTRODUCTION

The village of Sukanagalih in Tasikmalaya Regency is a site for both the domestication process and the development center of Cihateup ducks, which are highly prospective for meat and egg production to support local food self-sufficiency. However, Cihateup ducks face challenges, notably the low feed

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efficiency, despite feed being the largest production cost component in livestock farming, accounting for up to 80%. Feed poses a significant issue for Cihateup duck development, which is further declining in the Cihateup duck development center. Additionally, another issue is the low feed efficiency (high feed conversion ratio) of Cihateup meat ducks, reaching 5.03-5.24 (Kusmayadi et al., 2019), while broiler chickens only reach 1.76-1.89 (Zuprizal et al., 2015). This condition indicates that producing 1 kg of duck meat requires 5 kg of feed, significantly less efficient compared to broiler chickens, which consume only 1.8 kg. This is due to the characteristic slower growth rate of Cihateup ducks, similar to other local poultry, resulting in a longer meat formation process. To enhance livestock productivity, farmers in this region often use synthetic antibiotics (antibiotic growth promoters) to accelerate growth and disease resistance. However, the use of synthetic antibiotics has been prohibited by the Indonesian Government since 2018 due to the potential residues left in food products (meat and eggs), posing significant risks to human consumption. Thus, the need for herbal-based supplementary feed is essential to increase livestock productivity. Supplementary feed is a mixture of feed ingredients used to enhance the nutritional adequacy of small amounts of dry feed ingredients, aiming to significantly influence livestock productivity by supporting growth and development (Tripuratapini et al., 2015). Supplementary feed is added to livestock feed to improve the nutritional content, aiding in the digestion and absorption of feed nutrients, metabolism processes, antioxidant supply, immunity enhancement, and livestock health improvement, consequently increasing livestock production (Saputra et al., 2022). The addition of mangosteen peel in feed acts as an antioxidant that reduces stress in broiler chickens. The reduction in stress levels and decrease in pathogenic bacteria growth result in increased productivity of broiler chickens, consequently reducing production costs. The administration of mangosteen peel increases chicken body weight gain and reduces feed conversion ratio (Candra, 2015).

The addition of mangosteen peel extract to livestock feed serves as a natural supplement and antioxidant, reducing stress levels in broiler chickens, thus enhancing livestock productivity (Maradon et al., 2023). The use of turmeric in poultry rations has many benefits, such as improving digestive organ performance by stimulating the release of pancreatic juice containing amylase, lipase, and protease enzymes, thus enhancing the digestibility of protein, fat, and carbohydrate-containing feed ingredients (Wirawati & Putri, 2015). The bioactive compound contained in turmeric is curcumin, which enhances palatability and appetite, thereby increasing chicken production and body weight (Adha et al., 2016). Moreover, the essential oil content in turmeric is beneficial in increasing bile secretion, as well as feed consumption and poultry body weight gain (Wirawati & Putri, 2015). Mangosteen peel contains bioactive compound xanthone, serving as an alternative feed additive for poultry, functioning in determining blood urea levels, combating cancer cells, controlling diabetes, reducing LDL cholesterol, and preventing tissue damage due to free radicals (Maker, 2018; Monajjemi et al., 2011). The application of a combination of herbal ingredients from mangosteen peel and turmeric as poultry supplementary feed is highly promising in improving poultry health, especially in balancing intestinal microflora populations. Mangosteen peel is reported to contain xanthenes with high antioxidant content (Gondokesumo et al., 2019) and antibacterial properties (Saepudin et al., 2019). Furthermore, Natsir et al. (2016) added that turmeric contains bioactive compounds capable of suppressing pathogenic microbes in broiler chickens. The curcumin compound in turmeric is reported to have antimicrobial (Basak et al., 2018) and antibacterial properties (Feghali et al., 2018). In addressing the highly complex feed problem in Sukanagalih Village, the implementation of appropriate technology programs is necessary by processing supplementary feed using mangosteen peel and turmeric as raw materials to produce affordable, efficient, and safe supplementary feed for livestock and humans as consumers. Good quality and quantity feed intake by livestock will be reflected in the resulting food products, both meat and eggs. The technology application that can be developed involves utilizing feed processing technology to produce antibiotic and environmentally friendly duck

supplementary feed, ensuring that food products are free from antibiotic residues. The resulting supplementary feed products are not only potential for application to Cihateup duck groups but also marketable to other poultry farmers since Tasikmalaya Regency is a poultry production center in West Java, thus there are many poultry farmers in need of such feed products. The aim of community service is to improve knowledge, skills, accessibility, and income of partners in supplementary feed processing in Sukanagalih Village, Tasikmalaya Regency.

2. METHODS

The international cooperation program involves Perjuangan University of Tasikmalaya as the executing team consisting of 3 lecturers and 6 students from three different study programs: animal husbandry, management, and information technology, as well as IPB University as the supporting team consisting of 4 lecturers. The partners in this international cooperation program are Sukanagalih Village, Rajapolah District, Tasikmalaya Regency. The target partners consist of 2 entities, the Megar Bebek Cihateup Group and the Village-Owned Enterprises (Bumdes) Berdikari, Sukanagalih Village. The location of this community service activity is in Sukanagalih Village, Rajapolah District, Tasikmalaya Regency. The number of participants in this activity is 40 people, comprising 20 members from the Megar Bebek Cihateup Group and 20 members from Bumdes Berdikari. A description of the activities, methods, and partners involved in the application of appropriate technology program is presented in Table 1.

Table 1. Description of activities, methods, and partners involved in the application of appropriate technology program

Description of Activities	Methods	Involved Partners	Goals
Survey to target partner locations	Surveys and focus group discussions	Megar Bebek Cihateup Group and Berdikari Bumdes	Analyze situations and problems at partner locations
Community Practices in Livestock Development and Horticulture	Socialization	Megar Bebek Cihateup Group and Berdikari Bumdes	Increasing partners' knowledge in livestock and horticulture development
Potential of mangosteen peel and turmeric as feed supplements	Socialization	Megar Bebek Cihateup Group and Berdikari Bumdes	Increase partners' knowledge about supplement feed
Marketing strategy and digitalization of feed supplement products	Socialization	Megar Bebek Cihateup Group and Berdikari Bumdes	Increase partners' knowledge and income regarding digitalization of marketing of supplement feed products
Utilization of social media and e-commerce to promote feed supplement products	Socialization	Megar Bebek Cihateup Group and Berdikari Bumdes	Increasing partners' knowledge and income regarding marketing media for supplement feed using social media and e-commerce
Training on supplement feed processing	Training and mentoring	Megar Bebek Cihateup Group and Berdikari Bumdes	Improving partners' skills in processing supplement feed
Assistance with supplement feed processing activities	Mentoring	Megar Bebek Cihateup Group and Berdikari Bumdes	Increasing partner accessibility in processing supplement feed

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Training on packaging of supplement feed products	Training and mentoring	Megar Bebek Cihateup Group and Berdikari Bumdes	Increasing the skills and accessibility of partners in packaging feed supplements
Training and assistance in marketing supplement feed products using digital marketing and e-commerce technology	Training and mentoring	Megar Bebek Cihateup Group and Berdikari Bumdes	Increasing the skills and accessibility of partners in the use of digital marketing for supplement feed products
Monitoring and evaluating the processing and marketing of supplement feed products	Mentoring	Megar Bebek Cihateup Group and Berdikari Bumdes	Monitor and evaluate the marketing process of supplement feed products

Three ways to evaluate the success of an appropriate technology implementation program are as follows: (1) Evaluate the adoption of technology transfer by means of pre-test and post-test assessments, to determine the participant's level of interest and understanding of the material that has been presented. The program is considered successfully adopted by participants if the post-test score shows a score of 80 percent; (2) Evaluation of demonstrations, by assessing participants' participation in practical activities. The program is considered successful if at least 80 percent of participants are involved in and able to adopt the innovative technology provided; (3) Evaluation of the impact of activities is carried out by looking at the number of participants who have practiced the innovative technology provided and its impact on their economic life (family income).

3. RESULTS AND DISCUSSION

The community service activity started with a preliminary survey to Megar Bebek Cihateup Group and the Berdikari Village-Owned Enterprises (BUMDes) in Sukanagalih Village, to assess the potential of the area, both in terms of natural resources and human resources, which are showing potential for development. Both target partner groups, the Megar Bebek Cihateup Group and the Berdikari Village-Owned Enterprises (BUMDes) in Sukanagalih Village, represent productive economic groups with promising business sector development potential. Prior to the survey of the target partner locations, permissions were obtained from the head of Sukanagalih Village, the chairperson of the Megar Bebek Cihateup Group, and the chairperson of the Berdikari Village-Owned Enterprises (BUMDes) in Sukanagalih Village. Documentation of the preliminary survey activities for community service is presented in Figure 1.

Following the completion of the survey activity, various activities were conducted by both the implementing team and the supporting team. The first activity commenced with a presentation on the community of practice in livestock and horticulture development. This activity aimed to establish communication and assess the business evaluations conducted by both target partners in their livestock and horticulture businesses, as strategic sectors to be developed in this area. The application of the community of practice in this activity is intended to incorporate three elements: (1) Domain, creating a sense of identity similarity to encourage active participation and contribution from the participants; (2) Community, fostering social networks during the outreach activities to encourage interaction, trust-building, and mutual respect; and (3) Practice, comprising a framework of thinking, ideas, language style, information tools, stories, and documents about knowledge sharing among group members (Prasetyawan, 2018). Documentation of the outreach activities and discussions on livestock and horticulture development is presented in Figure 2.



Figure 1. Preliminary community service survey activities
Figure 2. Discussions on livestock and horticulture development

The next activity focused on the potential of mangosteen peel and turmeric as supplementary feed for poultry, considering that Sukanagalih Village is a center for the development of Cihateup duck poultry. This activity aimed to establish an integrated agricultural system between agriculture (mangosteen peel and turmeric) and livestock farming (poultry) in Sukanagalih Village. Subsequent included discussions on marketing strategies and the application of digital marketing, as well as the utilization of social media and e-commerce for promoting feed supplement products.

In addition, other activity methods included training and mentoring on the processing of locally sourced herbal feed supplements, namely mangosteen peel and turmeric. During the training and mentoring sessions, there was a high level of enthusiasm among the community members, actively engaging with the training team. These training and mentoring activities were conducted continuously, thereby enhancing the community's skills in processing feed supplements. Participants were able to proficiently process feed supplements by adhering to the procedures outlined in the x-banner and brochures distributed by the organizers. An overview of the training and mentoring activities for feed supplement processing is presented in Figures 3 and 4.



Figure 3. Turmeric drying process
Figure 4. The process of grinding turmeric and mangosteen peel
Figure 5. Training on making supplement feed

The procedure for making supplementary feed from both mangosteen peel and turmeric follows the same steps: (1) Sorting: Mangosteen peel and turmeric are individually sorted based on characteristics such as color, size, shape, and texture; (2) Washing: The selected mangosteen peel and turmeric are washed thoroughly with clean water to remove any dirt or impurities; (3) Cutting: The mangosteen peel

and turmeric are then cut into small pieces, approximately 1-2 cm in size; (4) Drying: The cut mangosteen peel and turmeric are dried using either an oven or sunlight until the moisture content is reduced to less than 10%; (5) Grinding: Once dried, the mangosteen peel and turmeric are ground into powder using a grinding machine; (6) Sieving: The resulting mangosteen peel and turmeric powder are sieved to ensure uniform particle size and obtain fine particles; (7) Packaging: The powdered mangosteen peel and turmeric are then packaged in feed packaging and labeled to make them attractive and compliant with feed commercialization standards; (8) Marketing: The supplementary feed products are marketed offline at the Berdikari Village-Owned Enterprises store and the Megar Bebek Cihateup Group's saung (traditional shelter), as well as online through marketing websites, Shopee, Tokopedia, Instagram, and WhatsApp. Documentation of the community service activities is presented in Figure 5.

Discussion

The community service activity aims to enhance the knowledge, skills, accessibility, and income of partners in the processing of supplementary feed in Sukanagalih Village, Tasikmalaya Regency. This activity has the potential to increase the value of community empowerment, consisting of skills, knowledge, accessibility, and income. Changes in the values of skills, knowledge, accessibility, and income of partners before and after the activity are presented in Figure 6.

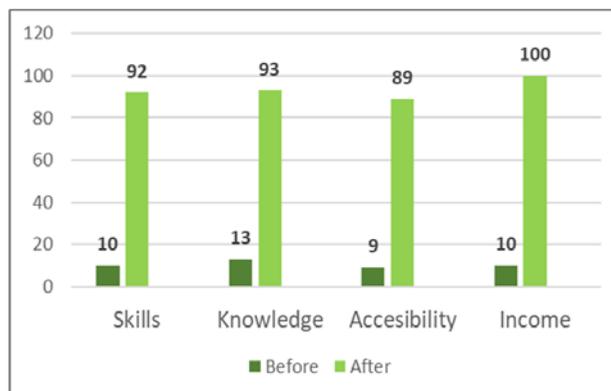


Figure 6. Partners' skills, knowledge, accessibility, and income (before and after the activity)

The measurement of the skills, knowledge, accessibility, and income of the partners, before and after the activity, was conducted through evaluation methods based on pre-tests before the activity and post-tests after the activity. Based on the results of the pre-tests and post-tests conducted with the partners, there was perceived empowerment improvement, including:

Skill Enhancement: Partners were able to improve their skills in processing supplementary feed from 10% to 92%. This enhancement was achieved through training sessions on supplementary feed processing conducted by experts in the fields of nutrition and animal feed. The training sessions were carried out continuously over a period of 4 months. Partners were trained in operating various appropriate technology tools for processing supplementary feed, including choppers for cutting and reducing the size of turmeric rhizomes and mangosteen peel, ovens for drying the raw materials, and grinding machines for grinding turmeric and mangosteen peel into powder.

Knowledge Improvement: Partner knowledge improved in utilizing the potential of natural resources to create high-value products from 13% to 93%. To enhance partner knowledge, outreach

sessions were conducted. These sessions aimed to educate farmers and livestock breeders on utilizing all available potentials and disseminating new innovations to them. This aligns with the view that outreach plays a strategic role in increasing the adoption of appropriate technology in integrated agricultural and livestock systems. The use of mangosteen peel and turmeric as supplementary feed has significant potential in enhancing poultry productivity. Mangosteen peel is reported to contain xanthone compounds, acting as immunomodulators that stabilize cells in the body and bind free radicals, thereby inhibiting cell degeneration or damage. Moreover, turmeric is known to contain curcumin compounds, essential oils, bisdemethoxycurcumin, and demethoxycurcumin, which effectively reduce the population of pathogenic bacteria, leading to increased livestock productivity.

Accessibility Enhancement: There was an increase in accessibility from 9% to 89% through periodic mentoring activities. Mentoring was conducted over a 4-month period to assist partners in producing supplementary feed products, enabling them to become proficient in processing. Mentoring activities proved effective in increasing accessibility by 80%.

Income Increase: The activity successfully increased partner income in processing supplementary feed from 10% to 100%. This significant increase in partner income, by 90%, was attributed to outreach, training, and mentoring in marketing strategies. Outreach was conducted by socializing supplementary feed marketing strategies. This is crucial as marketing strategies aim to market a product using specific plans and tactics to increase sales targets by maximizing limited resources to achieve competitive advantages. Additionally, marketing training and mentoring in digital marketing technology application were conducted. Digital marketing is considered one of the most effective marketing techniques, utilizing digital media such as websites, social media, email marketing, and video marketing to reach a wider market area via the internet. The application of digital marketing has proven to increase sales rates in stores.

In conclusion, the community service activity effectively improved partner empowerment in terms of skills, knowledge, accessibility, and income, leading to significant advancements in poultry farming practices and economic sustainability in the Sukanagalih Village, Tasikmalaya Regency.

4. CONCLUSION AND RECOMMENDATIONS

The community engagement program aims to provide training in new skills and knowledge to the target partners, namely the Megar Bebek Cihateup Group and the Berdikari Village-Owned Enterprises (Bumdes Berdikari), regarding the processing of supplementary feed for poultry using raw materials such as mangosteen peel and turmeric. The implementation of this program utilizes several methods, including outreach, training, and mentoring to the partner groups to enable them to independently process supplementary feed until the marketing of the products, both at the Bumdes Berdikari store and through digital marketing. The impact of this activity lies in the production of high-quality supplementary feed products and the ability to increase the value of agro-industrial waste to high-value products, thus enhancing community income.

The processing of supplementary feed for livestock can utilize other herbal raw materials besides mangosteen peel and turmeric to produce natural and environmentally friendly feed additives. Herbal processing as a raw material for supplementary feed can be initially extracted to produce or isolate bioactive compounds for enhanced effectiveness. The extraction process can be carried out using methods such as maceration or soaking to ensure simplicity and ease of application by the community.

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