

Training of Adding Turmeric and Curcuma as Food Additives for Laying Hens

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Abstract:

The use of bioactive plants to replace antibiotics is now widely used. The program's purpose is to provide a solution for natural feed additives to laying hens in Ngaliyan as a substitute for Antibiotics Growth Promotor (AGP), which is prohibited by the government, and provide knowledge to farmers about the use of medicinal plants to improve the productivity of livestock. The target was laying hens farmers in Ngaliyan. The problem was chicken feed is made without AGP and egg prices fell while feed prices had risen. The solution offered to the partner was adding food additives from turmeric and Curcuma. Turmeric and Curcuma will improve immunity to increase livestock productivity, feed efficiency, and egg quality. Based on this reason, we conducted community services for laying hens farmers in Ngaliyan. Community service activities were carried out using the PAR method for two months through socialization, training, assistance in providing additional natural feed, and evaluation. Giving turmeric and Curcuma flour can improve the quality of eggs. The result of the community service showed an understanding of partners to formulate and produce feed additives in raising laying hens was improved. In addition, farmers were able to formulate and produce herbal feed based on requirements.

Keywords: *Animal feed; curcuma; laying hens; PAR; turmeric*

Introduction

World Health Organization (WHO) has banned the use of Antibiotic Growth Promoter (AGP) in cattle production to reduce the occurrence of antibiotic resistance. The goal of this community service was to prohibit the use of antibiotics in animal feed. The use of AGP for animal feed additives whose products were consumed by people has

been formally forbidden by the Indonesian government through Minister of Agriculture Regulation of the Republic of Indonesia Number 14/PERMENTAN/PK.350/5/2017. As a result, many studies these days focus on discovering alternatives to AGP (Emanuel Manggotu Nahak et al. 2021). One approach to solving this problem is by using natural growth promoters (NGPs). NGPs generated from plants are referred to as phytobiotic (Marwi et al., 2021).

Chicken eggs become a daily consumption for Indonesian people because they have high nutritional value, protein content, and affordable prices. Chicken egg nutrition consists of 150 calories, 12.5 grams of protein, 1 gram of carbohydrates, and 10 grams of fat (Arulnathan et al., 2022). Therefore, many breeders are cultivating laying hens to produce eggs every day currently. The business opportunity in laying hens is favorable for profit (Ratna Ika Putri, Mila Fauziyah, Muhammad Rifa'i, Supriatna Adhisuwignjo 2021).

According to BPS 2019 data, the population of laying hens was 530.220,19 tons and produced eggs 17,69 tons (BPS, 2019). Partners in the service program lay hens located in Gondoriyo and Podorejo, Ngaliyan District, Semarang City. The potential of the two villages was quite a lot and varied.

The capacity of the breeder's cage was between 3500 and 4000 laying hens. Partners in this activity gained new knowledge and skills in making feed with turmeric and ginger. The addition of turmeric and curcuma was expected to increase the productivity of chickens and the condition of healthy chickens. This service activity aims to provide information on feed formulations by giving herbal feed additives (phytogenic) to the community in the Ngaliyan sub-district, Semarang City. Laying chickens are one of the most common types of chickens kept by breeders to lay hens (Saefulhadjar et al., 2021). As a result, the opportunity for farmers to suffer losses due to the expenditure on enormous feed costs is very high. However, behind the existing problems, laying hens continues to be developed to meet the needs of

the community's eggs, as was done by laying hens in Ngaliyan sub-district, Semarang city.

For maximum growth and production, the amount and content of nutrients needed by livestock must be adequate. Action is taken to find other alternative ingredients that can become feed ingredients for chicken. The requirements for selecting feed ingredients that can be used as chicken rations are easy to obtain and affordable prices, non-toxic and contain nutrients needed by the livestock themselves. One such alternative is to use turmeric and ginger (Anedea et al., 2021).

In general, the animal husbandry center at this institution is developing well. However, developments still refer to the use of feed with additives in the form of antibiotics or chemicals to eliminate caustic odors. As previously explained, using AGP cause adverse effects on consumers and the environment (Cheng et al., 2022). It is necessary to disseminate information to the community around the livestock center. Judging from the technological aspect, most of the laying hens group members are middle-class people, where people can reach manual or straightforward technologies.

There were several solutions offered based on the problems. The solution offered in the form of coaching associated with feed formulation based on needs, knowledge about the management of raising broiler chickens right and good to improve livestock productivity. The solution was to do training of adding turmeric (*Curcuma longa*) and curcuma (*Curcuma zanthorrhiza*) herbal feed ingredients; information about turmeric and curcuma ingredients can be used as a feed additive. Partner got knowledge n how to extract a variety of local herbal feed ingredients that can be used as a feed additive on livestock business.

Previous research by giving turmeric and ginger has a significant effect on the water holding capacity of broiler chicken meat (Ansah et al., 2020). Community service has been done to laying hens by processing manure into biogas (Widiansyah & Rahayu, 2019). Community service by using herbal plants has been done before to

prevent broiler chicken disease in the farmer group of Noelbaki village (Ni Sri Yuliani, Gerson Yohanes Imanuel Sakan, 2020) and herbal medicine to anticipate Newcastle disease in poultry (Sahara, 2020). Community service training on adding turmeric and curcuma to laying hens has never been done before. Therefore, it is necessary to carry out socialization and community service programs to make animal feed additives based on turmeric and curcuma in powder. The powder contains bioactive compounds that play a role in solving the problems of chicken farming in Gondoriyo and Podorejo, Ngaliyan, in the form of concerns about the use of antibiotics and environmentally unfriendly chemicals.

Method

These community service activities were carried out using the PAR method (Participatory Action Research) for two months. This method is applied through socialization, training, assistance in providing additional natural feed, and evaluation. It is a method of doing social research that emphasizes involvement and action. Participatory Action Research (PAR) according to Kemmis and McTaggart (1990, p. 8) is an action research activity as the result of the research process, namely research that begins with planning, carrying out actions or actions, and evaluation of the results of the action. The research process is an act of understanding and transforming social practice and engaging practitioners at research stages (McKernan, 1991, p. 10). This strategy allows researchers to watch and respond to the actors' reactions in the setting where the event is practically and realistically.

Result

The community service activity was held in August-October 2021, which was located in the laying hen's farm area in Ngaliyan District, Semarang City. The partner was laying hens farmers in Ngaliyan. The program was carried out in Gondoriyo and Podorejo, Ngaliyan District, Semarang City. Several lay hen's farmer participated in the community service. Socialization and training on making animal

feed additives based on turmeric and ginger in powder form containing bioactive compounds play a role in solving the laying hens in the Ngaliyan sub-district. The community gained new knowledge on how to make feed powder with the addition of natural ingredients that can function as antibiotics without reducing the productivity of chickens. A feed powder with the addition of turmeric and ginger was expected to increase the production and quality of chicken eggs and help to reduce the smell of feces.

Data collection was done by giving questionnaires, interviews, and observations. The service team acts as planners, implementers, assistants, and evaluators of the given program. Data collection techniques in PAR service were interviews, FGD, observation, and documentation. This devotion searched for practical solutions to problems and issues requiring joint action while contributing to practical theory. The role of the service team as a facilitator. Community service was carried out in Gondoriyo, Ngaliyan District, Semarang City, Central Java, 5 km from UIN Walisongo. The PAR method emphasizes active participation and action with a community research approach. Aspects that need to be integrated in PAR were community participation, actions related to experience and history, and research. PAR is not a collection of ideas that are just one thought but rather a thorough knowledge.

The current community services are based on participatory action research. Action research is defined by the interaction between researchers and participants, enabling those involved in the study process to address real-world problems. PAR offers an environment for all people involved in the problem to interact. A cycle of planning, implementing the intervention, and assessing the outcome was engaged in the process (Sudgen et al., 2021). PAR, a planned, learning-centred activity in which participants collaborate to solve common issues and respond to common questions. (Hadian et al., 2021).

The European Union's ban on AGP compounds in chicken diets, as well as recent initiatives in North America to reduce or eliminate

AGP, have put pressure on the poultry sector to find viable replacements that can increase performance, safeguard animal health, and retain profit margin. Phytogetic feed additives (PFA) have recently attracted much attention because of their capacity to boost performance by maintaining a healthy gut environment (Murugesan et al., 2015). PFA have recently attracted much attention because of their capacity to boost performance by maintaining a healthy gut environment (Maria Cardinal et al., 2019).

First, the team was looking for information about laying hens. The team visited laying hens' farms in Gondoriyo and Podorejo. The team discussed the chicken feed given. Breeders make a mixture of ingredients for chickens ranging from corn and concentrate. The second step was to socialize the supply of additional turmeric and curcuma feed additives to be added to chicken feed to overcome the partners' problems. The socialization provided information about the benefits of turmeric and curcuma, so they must be mixed into chicken feed. Participation can be seen from partners and service teams discussed additional information needed in mixing herbal plants.

After the socialization was training for making animal feed, the main ingredient for laying hens was *Comfeed* (livestock feed brand), then turmeric and ginger powder are added. The first step was washing the turmeric and ginger clean, then thinly sliced, and dried in the sun for 3-5 days. Slices of dried turmeric and ginger can be ground using an herb grinder. The finished powder can be directly mixed with chicken feed.

This program was not completed until implementation; after training chicken farmers were given assistance in feeding. During mentoring, the service team also received consultation results from the progress made previously, including if there were deficiencies and obstacles. The last stage was the evaluation of several parameters, such as chicken weight and egg quality. There were 4000 and 3500 laying hens. Animal feed is a crucial factor that increases egg productivity. It is essential to use natural ingredients that contain the nutrients needed by livestock.

Figure 1.

Preparation for drying turmeric and curcuma



The steps of making powder to be mixed into chicken feed are drying turmeric and ginger. Before drying, the turmeric and ginger washed thoroughly, then wait 5 minutes. After that, slice thin to speed up the drying process. Preparations for drying turmeric and curcuma can be seen in Figure 1. Drying is carried out in the sun for 3-5 days. Drying activities can be seen in Figure 2.

Figure 2.

Drying process



The following process was making powder. The purpose in powder form was to make it more homogeneous and easier when mixed with feed. Step to make the powder was to put the dried turmeric and ginger into the herb grinder for 30 seconds. The powder obtained was 200 grams from 1 kg of turmeric or ginger. The powder grinding process can be seen in Figure 3.

Figure 3.

Powder Grinding Process of Turmeric and Curcuma



The service team provided all the tools and materials used by farmer partners. Training activities can be seen in Figure 4. The next step is monitoring and assisting. The development of chickens given turmeric and ginger continue to be monitored at this step. Turmeric and curcuma were safe for livestock to consume every day if the dose is correct and did not exceed the daily dose threshold. Turmeric and

curcuma were not used as main feed but as additives. The main feed remains comfeed and corn.

Figure 4.

Training activities



The reason using turmeric and curcuma because it was not used by the community. As we know that they were rich in benefits for livestock health. Some breeders still do not know the use of turmeric and ginger. From mentoring activities and laying hens, farmers gained knowledge and experience adding feed additives with turmeric and curcuma. In addition, farmers also implement giving turmeric and curcuma feed additives without the need for further assistance. Changes in behaviour can be seen from adding turmeric and ginger to the feed. Turmeric and curcuma were solutions for AGP and

antioxidant substances, which the government has banned since January 2018.

This change in attitude must continue to be accompanied by providing new information and other types of herbs to be practised by farmers to become independent breeders. Changes in attitudes and knowledge of farmers also about experienced development. The addition of chicken feed with turmeric and curcuma can make this spice more useful for farmers. Adding of turmeric and curcuma feed additives can increase the knowledge of farmers and the productivity of laying hens.

Turmeric and curcuma were two therapeutic herbs that breeders frequently use. These plants' curcumin and essential oils include bioactive chemicals that can aid in weight growth, fat loss, and cholesterol reduction. One of the functions of medicinal herbs is immunomodulation. Turmeric, ginger, galanga, ginger, garlic, betel leaves, and other herbal plants can help chickens' bodies be more resilient and perform better. Herbal plants have been shown in previous research to have a beneficial effect. As a result, efforts are being made to supply herbal herbs in the poultry health management in the villages of Gondoriyo and Podorejo so that the community's earnings from livestock performance can be improved.

Discussion

The program was strengthening the management of chicken feed through mentoring the completion of animal feed by adding turmeric and ginger. The program was increasing human resource knowledge in the management of feed according to the agreement and initial survey with the target group from the survey results and FGD.

The purpose of this activity was to train farmers to provide additional chicken feed with turmeric and ginger. The methods used were counselling, practicing, and monitoring. Practical activities include the practice of feed formulation and the manufacture of complete feed with herbal additives. The conclusion drawn from this activity was that

counselling and practice can improve the knowledge and skills of farmers in preparing quality feed for the development of laying hens' business.

Antibiotic resistance is a great source of concern all around the world. However, due to a lack of understanding on the part of certain farmers and the neglect of monitoring authorities, antibiotic residues in chicken meat exceeded the maximum allowable levels. At this moment, the widespread use of AGPs in livestock is a key route for antibiotic-resistant bacteria to spread from animal products to people. As a result, eliminating or reducing the usage of AGPs in poultry production is always an essential task for poultry farmers. Various bioactive substances (prebiotics, antioxidants) have been extensively studied in laying hens as alternatives to AGPs for poultry production (Ekore et al., 2022).

The ongoing and growing controversy over antibiotics as a feed additive and growth promoter in animal feed has sparked interest in alternative products and fueled the quest for herbal medicines made from medicinal plants. These therapeutic herbs are inexpensive, safe, and help boost output while lowering mortality and improving production performance. They can ensure that livestock animals develop to their full potential. Herbal medications are used as a therapy for livestock producers because they include phytochemicals or bioactive substances. It is found as antioxidant, antidiarrheal, anti-stress, anti-inflammatory, antioxidant, antibacterial, anticoagulant, and anticancer properties. Plants have been employed as an alternative to synthetic medications in cattle production for many years. It was also said to promote nutritional digestion, metabolism, and illness prevention in agricultural animals (Adebisi et al., 2021).

These bioactive substances' antioxidant, anticarcinogenic, anti-inflammatory, nematocidal, and antihepatotoxic properties are yellowish turmeric pigments. It also protects against aflatoxin-induced mutagenicity and hepatocarcinogenesis. The benefits of turmeric for broiler chicken productivity, nutrition, and health (Ribeiro et al., 2021).

The service program was carried out after seeing the potential and problems faced by laying hens in Ngaliyan, namely: strengthening chicken feed quality through training in the addition of feed additives with turmeric and ginger. The form of training and assistance is in the form of introductions and socialization. The first thing to do is to prepare for the purchase of materials used in training. Animal feed additives start from preparing turmeric and curcuma powder. The next step is to mix turmeric and curcuma into the feed.

Turmeric and curcuma are typical Indonesian spices that have a myriad of benefits. One of them can be used as a natural antibiotic for animal feed additives. The mechanism of antibiotics is to reduce the population of bacteria in the digestive tract, increasing the availability of nutrients so that their absorption is more optimal and ultimately can stimulate livestock growth. Curcumin from turmeric and xanthorrhizol from curcuma are two active substances that provide antibacterial activity.

Curcuma xanthorrhiza Roxb, also known as "temulawak" in Java, Indonesia, is rich in curcumin and essential oils. *C. xanthorrhiza* contain antibacterial, anti-cancer, anti-tumor, and antioxidant properties. *C. xanthorrhiza* also includes essential oils, including limonin, which can kill bacteria, and flavonoids to treat inflammation. Curcumin can reduce the acid cycle in the stomach and speed up the release of blood sugar from body cells. In hens, a low blood sugar level causes a quicker cycle of hunger, which helps to lower stress risk. Hunger-stimulating chickens should increase the efficiency of chicken feeding, allowing them to achieve a more significant percentage of carcass weight in less time than usual maintenance time. If this scenario succeeds, the farmer can solved over feed costs (Rahayu et al., 2010).

Curcuma given as a supplement serves to increase appetite because the substance of essential oils can increase the population of beneficial rumen microbes and suppress the growth of pathogenic microbes so that the stomach is emptied quickly, resulting in increased consumption and digestive processes (Dai et al., 2022). Since ancient

times, *C. xanthorrhiza* has been widely used as a component in herbal medicine (Indonesian herbal supplement and medicine) or to treat and regulate a variety of illnesses and disorders, including lack of appetite, stomach ailment, and indigestion (Rahmat et al., 2021).

The initial socialization material is the importance of feed in livestock—furthermore, the practice of mixing feed additives from turmeric and ginger. Farmers directly practice to get hands-on experience and better understand. Direct practice makes farmers have skills in adding animal feed with added turmeric and ginger. Assistance is carried out in service by explaining and giving examples of feeding laying hens. The explanation is about weight of laying hens, the nutrients needed, the ingredients and content of the feed given, the formulation of the feed, and the amount and method of giving it to the chickens. Breeders become aware of how to feed laying hens properly. Breeders also become aware of the mistakes that have been made in feeding laying hens. Farmers are also assisted with disease problems that are often found in livestock and solutions for handling if the chickens are sick. The change is that the chicken that was originally sick can recover after being given herbal medicine.

The focus of this service is that by adding turmeric and curcuma to the feed, a grinding machine is needed to make turmeric and curcuma powder. The grinding machine allowed farmers to make their own powder. The implementation of community service using the PAR method for laying hens in Ngaliyan has been carried out with the stages of activities including:

1. Preparation for the implementation (Designing Communication)

At the beginning of the implementation, the implementing team made plans and rundowns for the socialization event and prepared administrative completeness in the form of activity permits, attendance, and questionnaires given to socialization participants.

2. Coordination with Partners

Coordination with Partners will be held on August 29, 2021. The coordination results are socialization activities, and trials carried out in October 2021 in the livestock area. The activity used 100 laying hens. The community service implementation team coordinates with the management and the community in the husbandry centre area to implement community development activities. Similar coordination will also be carried out with the Village Head so that all activities are well coordinated. Technical preparation activities consist of licensing for the place of guidance, preparation of materials and equipment for activities, locations, and everything else needed to implement the program.

3. Survey

The field survey aims to determine the profile of the community in the laying hens farming area in Gondoriyo, Ngaliyan. The survey activity was carried out in August-early September 2021. A Survey of laying hens area can be seen in Figure 5.

Figure 5.

survey in laying hens area



4. Implementation of Socialization

The training materials were the introduction and benefits of the activity, an overview of the potential of turmeric and ginger when added to chicken feed, and the procedure for giving turmeric and ginger in chicken feed to partner communities. The way to deliver the material was with lectures, presentations, and demonstrations of adding turmeric and ginger to animal feed.

Submission of materials and socialization aims to provide material and conduct socialization or introduction of programs using turmeric and ginger as a substituent for antibiotics and chemicals on chicken farms in Gondoriyo, Ngaliyan. Turmeric and curcuma are spices that are easily found around us. The substance of bioactive compounds from herbal plants can be function as antibiotics, anti-inflammatory, and good for chicken digestion. The

provision of herbal compounds is expected to increase the productivity and quality of the eggs produced.

On Monday, October 4, 2021, the socialization was carried out at the chicken farm belonging to Mrs Muslihah, located in Gondoriyo, Ngaliyan. This activity started at 11.00 WIB and was attended by laying hens in Ngaliyan District and the team. Socialization was also carried out with FGDs so that partners can have a discussion. The service team prepared facilitators to direct discussions that led to a commitment to giving turmeric and curcuma. Socialization can be seen in Figure 6.

Figure 6.

Socialization of natural feed additives



The rundown of events in this socialization activity includes the opening, remarks from the service team leader, socialization of the PKM team, question and answer session, and closing. The PKM team leader delivered a presentation and socialization by explaining things related to PKM and animal feed additives.

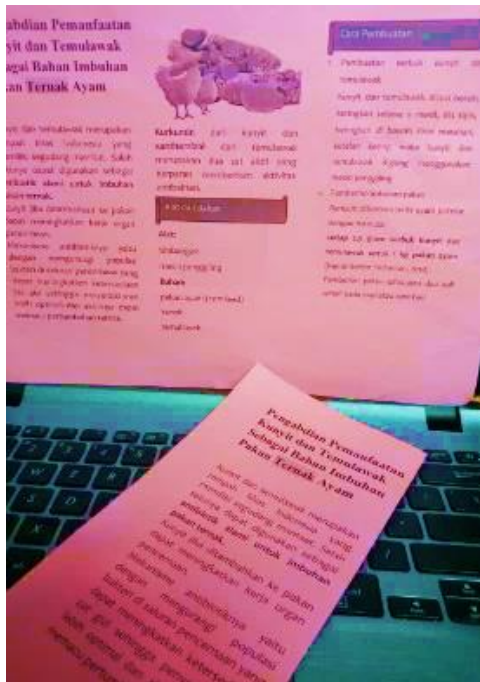
Discussions and questions and answers aim to enable coaching participants to play an active role in this activity so that the activity can take place actively in both directions. In addition, participants can ask things related to the material that has been

delivered if there are things that are not clear. There were two questions, including the reasons for using turmeric and curcuma and how long this natural feed additive is given. In this activity, the PKM team distributed 20 questionnaires. Socialization activities was done at 1 p.m.

The chicken farmer group received education on giving turmeric and curcuma to practice to the mentoring stage. Knowledge of turmeric and curcuma's content and dosage increases capacity, and behavior changes are expected. The result of the activity is that the community understands the benefits of turmeric and curcuma powder for chicken feed. The brochure given to partners can be seen in Figure 7.

Figure 7.

Pamflet of introduction and procedure natural feed additives



5. Implementation/ Training

Implementation is the practice of education that has been implemented. One of the stages of learning is the direct experience of seeing so that we can apply the methods already known from guided education (Anugrah & Ramadhan, 2019). The community is provided with the necessary equipment facilities for activities. The implementation activity of giving turmeric and ginger affixes was carried out Monday, October 4, 2021, at 13.00 WIB in the laying hen's farm area of Gondoriyo. The activities gave the lectures, practices, and discussions of feed mixing. This activity was attended by 20 people who are members of the breeder. An explanation of the dose of added feed was given, followed by a discussion and question and answer. The interviewees were interested in trying to add turmeric and ginger to chicken feed. The training in question is training on how to add turmeric and curcuma to chicken feed.

Other activities in this trial include mixing animal feed with ginger and turmeric powder. At this stage, the procurement of a grinding machine is carried out to make turmeric and curcuma powder itself. The dedication fund is used to procure a grinding machine for stimulation. Laying hens began to use the machine and use it to increase feed nutrition. In addition, the initial weight of the chickens was also weighed so that data were obtained that laying hens had an average weight of 20 grams/head.

Figure 8.

Training to make feed additives



Tools used were scales and grinding machine. Materials used were chicken feed (*comfeed*), turmeric, and curcuma. The procedure was as follows: making turmeric and ginger powder, turmeric and ginger are washed, dried for 5 minutes, thinly sliced, dried in the sun, after drying the turmeric and ginger were grounding using a grinding machine, feeding supplement, the ration was given to laying hens with the formula: every 25 grams of turmeric and curcuma powder for 1 kg of chicken feed (Ministry of Agriculture, 2014). Feeding was done twice a day in the morning and evening.

6. Monitoring and Assistance

The community would continue to assist for a month after the implementation of the program. This mentoring activity aims to make the program sustainable after training and assess success in implementing service. The function of mentoring is to evaluate the partner's ability to implement the resulting product (Ningsih & Rahayu, 2021).

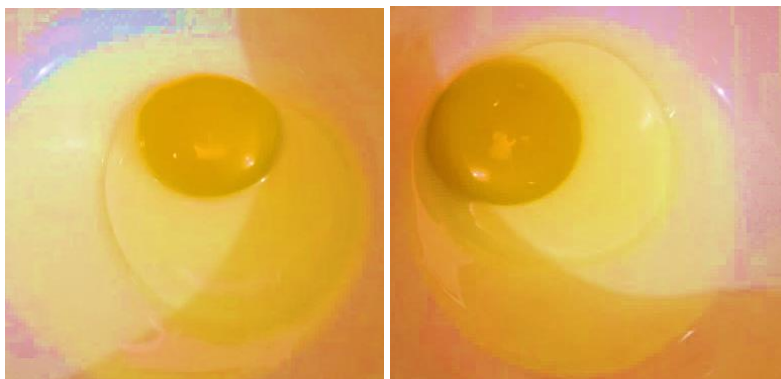
7. Reflection and Evaluation

After three weeks program, we evaluated some parameters. There was 0% mortality. Egg yolk was larger and more orange. Before and after treatment, there was no difference in the number of egg production (every 100 laying hens produce 100-120 eggs/day on average). No difference before and after treatment on egg weights (57-63 grams). After treatment, there was a slight difference in body weight (1.6 – 1.8 kg) and increased appetite. The actual effect was chicken healthier and also cure the sick chicken.

The physical and chemical state of the eggs was reflected in egg quality. Egg yolk before and after treatment can be seen in Figure 9. Egg features such as egg weight, egg yolk, and white egg percentage were influenced by nutrition. Turmeric is a spice that can help increase egg quality by boosting the liver's activities, which include nutrition metabolism and the production of vitellogenin (Ribeiro et al., 2021).

Figure 9.

Egg yolk before and after adding of turmeric



Based on previous research adding 5% turmeric rhizome powder to the diet enhanced body weight gain, egg production percentage, feed conversion ratio, egg yolk color, and yielded a greater return on investment. As a result, adding turmeric rhizome

powder to the quail's feed is indicated to improve egg yolk color, boost egg output, and raise net revenue (Ribeiro et al., 2021).

The primary goal of adding feed additives to chicken feed is to improve animal performance by boosting growth rate, improving feed conversion efficiency, enhancing livability, and lowering mortality. These feed additives are referred to as "growth promoters" or "non-nutrient feed additives." Feed additives are non-nutrient chemicals that improve feed utilization and accelerate growth. Feed additives are advantageous to the animals' health and nutrition metabolism (Nagar, 2021).

The service team continues to communicate with partners and continues to monitor the education that has been provided after the program is complete. The follow-up to the activity is to focus on planting turmeric and curcuma seeds so that the program can continue to be sustainable.

The change in attitude by adding turmeric and curcuma was one of the changes. This success must continue to be assisted by providing new information and other types of herbs for breeders to practice, so they can become independent breeders. Changes in attitudes and knowledge of breeders also experienced developments. The addition of chicken feed with turmeric and curcuma can make this spice more beneficial for farmers. Devotion can also help chicken farmers in self-development of existing innovations. Devotion of turmeric and curcuma feed additives can increase farmer knowledge and productivity of laying hens.

The service team continues to communicate with partners and continues to monitor the education that has been provided after the program is over. The follow-up of the activity is to focus on planting turmeric and curcuma seeds so that the program can continue to be sustainable. One of the partner problems was made chicken feed without Anti-Growth Promoter Hormone, egg prices continued to fall while feed prices rose. The solution offered to partners was adding turmeric and ginger. Turmeric and curcuma will

increase immunity to increase livestock productivity, feed efficiency and egg quality. Giving turmeric and curcuma flour can improve egg quality. The results of community service show that partners' understanding of formulating and producing feed additives for laying hens has increased. In addition, farmers can formulate and produce herbal feed as needed.

Conclusion and Suggestion

Turmeric and curcuma, which have antibacterial and anti-inflammatory properties, can be used as feed additives for laying hens. In this service, farmers gained knowledge and can use turmeric and ginger powder to be added to chicken feed. The skills of breeder partners in the use of herbs were the initial stage to assist in increasing the laying hens' productivity. The implementation of training in the provision of turmeric and curcuma in animal feed would develop so that farmers can become independent. In implementing the training, the nutritional needs of livestock can be met using natural ingredients.

The method using PAR effectively motivates chicken farmers to add additives from natural ingredients that have many benefits, namely turmeric and curcuma, to show farmers play a role in the service stage. The partner participants in the chicken farmer group in Ngaliyan participated with enthusiasm and seriousness in the training. It can be seen from the many feedback responses to service activities. Layers breeders in Ngaliyan still need assistance and information. The role of academics is essential in providing the latest technology information and transforming it into real action. The collaboration between the community as program implementing partners and academics as companions has proven to be a force to encourage the progress of laying hens.

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