

Effectiveness of Using Traditional Plants on Antibiotic Residues and Egg Quality of Laying Hens

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ABSTRACT: To get quality eggs, breeders can try traditional ingredients as an alternative to caring for chickens. Because traditional plants are also considered to have efficacy as antibiotics. In getting positive results, it is necessary to test plant species that are in accordance with the standards of chicken needs. In this case, it has been determined through the feasibility of herbal medicines such as herbs and papaya leaves as Antibiotic Residues and improving egg quality. The results showed that the addition of papaya leaf extract in drinking water (P2) could increase the thickness of the shell, the addition of papaya leaf extract in combination with herbal medicine (P3) could increase the value of the egg yolk colour index, and there was a tendency to increase the colour of the shell in the P2 and P3 treatments. In addition, there were no antibiotic residues in chicken eggs in all treatments which indicated that the eggs were healthy and safe for consumption.

Keywords: Effectiveness, Use of Herbs and Papaya Leaves, Antibiotic Residues and Chicken Egg Quality.

1. INTRODUCTION

The chicken farming industry in Indonesia cannot be separated from the use of antibiotics to produce quality eggs. Administration of low or high doses of antibiotics can be used as feed additives to stimulate growth to increase egg production (Spellberg et al., 2013; Gustafson and Bowen, 1997). Because antibiotics are very important as chemotherapeutic agents in controlling diseases such as bacteria (Stockwell & Duffy, 2012; Barton, 1998). In addition to the benefits of using antibiotics, there are also negative impacts if they are not in accordance with the dosage, such as leaving residues on tissues and organs, including eggs. Because the use of antibiotics in the room is not used for the treatment of infections, but only as a growth promoter (Oliver et al., 2011; Nurhayati et al., 2022). So, antibiotics do not cause changes to growth, even on the contrary can reduce growth with increasing levels of ginger (Sinurat et al., 2009; Septinova, 2006). The negative impact of antibiotic residues can be suppressed by using some herbal ingredients to replace the role of drugs.

Traditional medicine is a medicine made from natural plant ingredients that focus on symptoms that are used for generations (Dwiyanto & Prijono, 2007; Qiu, 2007). Even the majority of the population still relies on traditional medicine to meet their health care needs (Che et al., 2017; Mukherjee, 2001; Ferrer, 2017). In general, medicinal plants contain rhizomes, leaves, stems, roots, flowers, and fruits that contain active compounds. The components of these active compounds are useful for maintaining the freshness of the body and improving blood circulation. There are so many medicinal plants that can be used as traditional medicines, including turmeric, modern ginger and ginger whose effects include preventing coccidiosis (Murdiati, 2002; Gurib-Fakim, 2006). The use of several medicinal plants that are blended into herbs that are very useful for livestock. Local poultry farmers generally always provide additional medicinal ingredients such as turmeric, temulawak, temu ireng, kencur, papaya leaves and noni leaves mixed with drinking water (Zaenuddin & Wakradiharja, 2001; Nugraha et al, 2020). Giving traditional medicine such as the kencur plant will work so that the immune system of chickens increases and prevents digestive diseases.

Kencur (*Kaempferia galanga* L) is a medicinal plant that is widely used as a raw material for traditional herbal medicine, phytopharmaceuticals, and the cosmetics industry (Zini et al., 2021). The essential oil in the rhizome of kencur contains ethyl cinnamate and methyl p-methoxy cinnamate, which are widely used in the cosmetic industry and are used as asthma and antifungal drugs (Rios & Recio, 2015). Production, quality and content of active

ingredients in kencur rhizome are determined by the variety used, the method of cultivation and the environment in which it grows (Rostiana & Effendi, 2007; Syamsafitri et al., 2023). The addition of 2.0% red ginger and 0.6% turmeric flour in the feed also had a relatively good effect on body weight gain, total feed consumption, chicken feed conversion, intestines and endogenous secretions (Herawati, 2006; Cross, 2007).

2. MATERIEL AND METHODS

The composition of the making of Jamu Ayam in this study consisted of several traditional ingredients which can be seen in table 1 below:

Table 1. Making herbal medicine for chicken

Materials needed	40 liter	10 liter
1. Kencur	: 1 ½ kg : 0,375	
2. Bawang putih (White bottom)	: 1 ½ kg : 0,375	
3. Jahe (Ginger)	: ½ kg	: 0,125
4. Lengkuas (Galangal)	: 1/4 kg	: 0,0635
5. Kunyit (Turmeric)	: 1 kg	: 0,250
6. Daun sirih (Betel leaf)	: 1/4 kg	: 0,635
7. Temulawak	: 1 kg	: 0,250
8. Mahkota dewa Leaf	: 1/4 kg	: 0,0635
9. Molasses	: 1 liter	: 0,250
10. EM-4	: 1 liter	: 0,250

How to make:

The ingredients are peeled, washed and then ground/blended until smooth with additional clean water to taste (clean water use well water and do not use tap water / PAM). If the blender process is complete, just filter and squeeze. Then the juice + 1 liter of sugar cane/molasses. If it is mixed then + with Bio-plus as much as 1 liter, stir until smooth and brown then add clean water until the volume reaches 40 liters.

3. RESEARCH IMPLEMENTATION

The cages used during the study were in the form of units made of iron with the size of each unit being 40 x 40 x 40 cm and the height from the floor surface being 40 cm. Each unit of the cage is equipped with a place to eat and drink made of plastic and given a treatment code and a random code repetition. The cage is given a lighting device in the form of a lamp for lighting. Lighting especially at night and when it is cloudy during the day. In the cage room, a thermometer and hygrometer were placed to measure the temperature and humidity of the cage space during the study. Plastic bags of various sizes were used to accommodate rations, both daily rations and treatment rations, as well as for mixing rations, metered plastic was used as the base.

3.1. DISEASE PREVENTION

A week before the chickens are put into the cage, the cage room is cleaned and then sprinkled with lime and cleaned with disinfectant. Five days before the chickens are placed in the coop, the units of the cage and the place to eat and drink are also cleaned with the same disinfectant. During the study, the drinking water container was washed every day before giving drinking water in the morning. All measures are taken to prevent health problems

caused by inadequate sanitation.

3.2. PARAMETERS MEASURED

The parameters observed are as follows:

Antibiotic residue testing was carried out in the laboratory using the filter test method (screening test/Bioassay) against 4 classes of antibiotics Penicillin (PC's), Makrolida (ML's), Aminoglikosida (AG's) and Tetrasiklin (TC's).

1. Egg production (Hen Day, %)

Egg production or Hen Day is obtained from the percentage of the number of eggs produced from the number of chickens that exist at that time.

2. Shell Thickness

The thickness of the egg shell was obtained by measuring the thickness of the shell with the egg membrane (mm). The egg shell thickness was measured on the egg shell after it was cracked. Shell thickness was calculated using a micrometer. Sampling on the thickness of the shell was carried out every week.

3. Shell Color

Determination of eggshell color intensity brown eggshell color was divided into 3 groups, namely eggs with light brown (1), brown (2), and dark brown (3).Warna Kuning Telur

Mengamati dan menentukan skor warna kuning telur dengan menggunakan yolk colour fan yang terdiri dari 15 seri warna (Stadelman and Cotterill, 1977).

3.3. Data analysis

The study used an experimental design with a completely randomized design (CRD) consisting of 4 treatments and 4 replications, so 16 units of cages where needed, and in each cage, unit was placed 4 chickens. So the total number of chickens is 64 tails. The treatments provided consist of:

R0 = No treatment

R1 = Giving herbal chicken to drinking water

R2 = Giving Papaya leaves to drinking water

R3 = Giving chicken herbs and papaya leaves in drinking water

The data obtained were analyzed by analysis of variance and continued with Duncan's Multiple Distance Test, namely on the parameters that there were significant differences between treatments.

4. RESULT AND DISCUSSION

4.1 RESULT

The combination of herbs and papaya leaves in laying hens drinking water had a significant effect ($P < 0.05$) on the eggshell thickness and egg yolk colour, but not on eggshell colour ($P > 0.05$). It can be seen in tables 2 and 3 below:

Table 2. The results of antibiotic residue testing by giving herbs and papaya leaf extract

Parameter	Treatment				Average
	P0	P1	P2	P3	
Residu Antibiotik	Positif	Negatif	Negatif	Negatif	4

P0 = No treatment

P1 = Giving herbal chicken to drinking water

P2 = Giving Papaya leaves to drinking water

P3 = Giving chicken herbs and papaya leaves in drinking water

Table 3. Average shell thickness, shell color and egg yolk color with the provision of herbs and papaya leaf extract.

Parameter	Treatment				Average
	P0	P1	P2	P3	
gshell (mm)	0,48 ^a	0,48 ^a	0,53 ^b	50 ^{ab}	0,5
shell Color	3,7	3,45	4,43	4,8	4,19
g Yolk Color	7,63 ^a	7,75 ^{ab}	7,63 ^a	8,45 ^b	7,9

P0 = No treatment

P1 = Giving herbal chicken to drinking water

P2 = Giving Papaya leaves to drinking water

P3 = Giving chicken herbs and papaya leaves in drinking water

4.1.1 Residu Antibiotik

The results related to the content of antibiotic residues in chicken eggs, both control (P0) and treated (P1, P2, and P3) can be seen in Table 3 above. The results above indicate that chicken eggs in all treatments did not contain antibiotic residues which were indicated by negative results (-). While the P0 treatment was marked with a positive (+) result.

4.1.2. Shell Thickness (mm)

The effect of giving papaya leaves, herbal plants, or a combination of both on shell thickness can be seen in Table 2 above. These results indicate that the shells of chicken eggs that were given the addition of papaya leaves in drinking water (P2) were thicker than chicken eggs without treatment (Control/P0) and those given the addition of herbal medicine (P1) ($P < 0.05$), but not different from the combination treatment of papaya leaves and herbs (P3) ($P > 0.05$). As for the thickness of the egg, shell P1 showed no difference with P0, or P3. The highest shell thickness value is at P2. The range of shell thickness values in all treatments is 0.48 – 0.53 mm.

4.1.3. Shell Color

The colour of eggshells given drinking water with the addition of papaya leaves, herbs, or a combination of the two can be seen in Table 2 above. The table above shows no significant effect of all treatments on shell colour ($P > 0.05$). However, there is a tendency for higher values in P2 and P3 with the colour index range being at level 4, while P0 and P1 are at level 3.

4.1.4. Egg Yolk Color

The effect of offering papaya leaves, herbs, or a combination of the two on egg yolk colour can be seen in Table 1 above. These results showed that the yolk colour index of chicken eggs that were given the addition of papaya leaves combined with herbs in drinking water (P3) was significantly higher than that of chicken eggs without treatment (Control/P0) and those given the addition of papaya leaf extract (P2) ($P < 0.05$), but not different from the addition of herbal medicine (P1) ($P > 0.05$). The yolk colour of P1 did not show any difference with P0, or P2. The highest egg yolk colour index was at P3. The range of egg yolk colour index values in all treatments was 7.5-8.5.

4.2 DISCUSSION

4.2.1. Residu Antibiotik

In stimulating growth, antibiotics are usually added as feed additives which are generally useful because they indirectly affect nutrient-destroying microorganisms in feed and the growth of amino acid-forming microorganisms (Dewi et al., 2014). However, the role of antibiotics can be supported by other, more natural ingredients, such as what happened to chicken. The laying hens that were the experimental animals in this study were rarely given commercial antibiotics since the beginning of the pullet rearing. The reason is, that the antibiotics used to come from natural ingredients such as ginger, garlic, and similar materials. This may be the cause of the negative results of all the experimental chickens. Of course, this indicates that chicken eggs in these animals are safe and healthy for consumption. Eggs are indeed an important nutrient that helps maintain growth (Zaheer, 2015).

Antibiotics are still allowed to be used as medicine in livestock because they will work to control disease (Etikaningrum & Iwantoro (2017)). Therefore, regulations are made regarding limits on the use of antibiotics in livestock, known as the provisions of the Maximum Residue Limit (BMR) in livestock products. for each antibiotic based on the Indonesian National Standard (SNI) No. 01-6366-2000. The provisions of SNI include a list of types of antibiotics and their metabolites, followed by the BMR value in each livestock product (meat, milk and eggs). With this provision, it is possible to know the presence of residue in livestock products, whether it is still safe for consumption if it is below the BMR value or harmful to human health if the residue has passed the BMR value.

4.2.2. Shell Thickness

The results showed that the administration of papaya leaf extract in drinking water (P2) was able to provide better shell thickness. The thickness of the shell of a good chicken egg is between 0.33 - 0.35 mm, while in this study the thickness of the shell has a higher range of 0.48-0.53 (Yuwanta, 2004). This indicates that the thickness of the shell in this study includes a good and sturdy shell. The shell is a very important part of the egg because it is the outermost protector of the egg to avoid damage. According to Haryono (2000), thinner egg shells are relatively more porous and larger, thus accelerating the decline in quality and resulting in high early mortality in egg embryos (Coleman & McDaniel, 1975).

The higher shell thickness in P2 treatment could be caused by the nutritional content in papaya leaves which are rich in calcium. The calcium content in papaya leaf extract is 1086 mg/100g (Ugo et al., 2019). A high enough calcium content will certainly have a positive effect on laying hens, especially on the quality of the egg shell. With the quality of thick-shelled eggs, the hatchability of eggs will be higher (Bennett, 1992; McDaniel et al., 1979; Axelsson, 1932).

4.2.3. Shell Color

The tendency of the shell colour value above corresponds to the higher thick shell P2 and then followed by P3. Previous studies conducted by Duman et al. (2016) found that higher shell thickness and shells in standard-shaped eggs, compared to round-tapered eggs, were also similar to higher shell colour. The role of calcium cannot be separated from this. Calcium which is able to increase the thickness of the eggshell will also improve the colour of the shell and the colour of the faded eggshell can also be influenced by the age of the chicken. Because in general

the age of chickens, chicken strains, stressors, diseases, breeds and food in chickens also greatly affect egg colour (Samiullah et al., 2015; Mori, 2020; Ingram, 2008).

4.2.4. Egg Yolk Color

Environmental and genetic factors most influence the quality of chicken egg production (Goto and Tsudzuki, 2017; Wilson, 2017; Roberts, 2004). From the results of the study showed that the average score of egg yolk colour was 7.9. This value includes the normal value. The standard value for a good yolk colour is in the range of 7-12 (Hou et al., 1995). The higher the colour of the egg yolk, the better the quality of the egg (Muharlieni, 2010). The color of the egg yolk was the highest in the combination of herbs and papaya leaves (P3) due to the content of herbal medicine in the form of curcumin which is widely found in turmeric and temulawak. This greatly affects the absorption of carotene in the digestive tract, so it is clear that there is a difference without treatment (P0). This is supported by Amo (2013) who states that the effect of egg yolk colour is influenced by the chemical content in turmeric, namely curcumin which can provide natural yellow colour to the skin. egg yolk. Egg yolk with a high value is also influenced by the papain enzyme contained in papaya. Good ration absorption can maximize egg quality, including egg yolk colour.

CONCLUSION

Through experiments and in-depth studies related to research, it was found that the addition of papaya leaf extract in drinking water (P2) could increase the thickness of the shell, and the addition of papaya leaf extract in combination with herbs (P3) could increase the value of the egg yolk colour index, and there was a tendency to increase the colour of the egg yolk. shells on P2 and P3 treatments. In addition, there were no antibiotic residues in chicken eggs in all treatments which indicated that the eggs were healthy and safe for consumption.

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