

# Pegagan and cinnamon bark flours as a feed supplement for quail growth rate (*Coturnix coturnix*)

*by* Sunarno Sunarno

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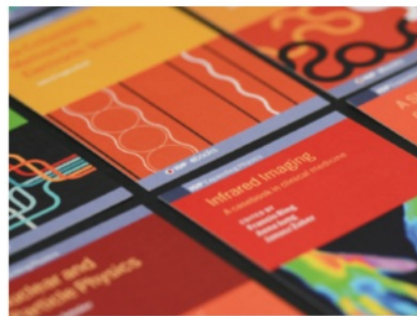
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## Pegagan and cinnamon bark flours as a feed supplement for quail growth rate (*Coturnix coturnix*)

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### 1. Introduction

People's need for animal protein from year to year is increasing. Data of the Dinas Peternakan dan Kesehatan Hewan [6] shows that quail egg consumption needs for the last three years increased significantly, respectively in 2009 by 0.040 kg, 2010 by 0.043 kg, and 2011 by 0.052 kg. The condition is sustained by the presence of quail populations *Coturnix coturnix japonica* or Japanese quail in Indonesia is very high. Since 2010 the quail population has increased to 7.053.576, in 2011 as many as 7.356.648 fish and in 2012 as many as 7.840.880 tails.

Quail (*Coturnix coturnix japonica*) is one of the poultry that continues to be developed to meet the needs of animal protein and improving the quality of public health. This type of quail has been widely cultivated in Indonesia to produce meat and eggs as a source of animal protein. Research on growth and productivity as well as the impact of consuming quail eggs has been done but not many who study quail originating from Australia (Australian strain). Based on this, research needs to be done to get information about growth and other variables related to growth, including feed consumption rate, body weight gain, relative growth/growth rate, and feed conversion ratio in this Australian quail.



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Quail growth in addition to being affected by the feed given is also influenced by the supplements administered into the diet, either from the type of vitamins, minerals, organic herbs, or other types of supplements. However, it is necessary to find the type of supplements that have the criteria, available easily, can be obtained at a low price, can improve quail body's defenses, quail products are safe for consumers, and can enhance the growth and productivity of this Australian quail. Supplements that have these criteria are substances containing polyphenolic compounds. These compounds are known to be found in many medicinal plants, such as cinnamon (*Cinnamomum sp*), and Centella asiatica (*Centella asiatica*) which are expected to increase the health of quail and consumers can also increase the growth and productivity of this type of quail.

Cinnamon is one of the many plants used by traditional and modern society as a cooking spice and as medicine. The results have proved that cinnamon contains many polyphenolic compounds that have antioxidant activity that is useful for maintaining health. Cinnamon stem flour added to the feed can increase the appetite and live weight of poultry cultivation, such as broiler chicken [10]. The cinnamon contains proxeronine, which is one of the phytochemical compounds contained in plants that function as growth spur. It is further stated that proxeronine can increase the effectiveness of protein absorption in the intestine and the body will be converted into xeronine which play a role in activating enzymes that play a role in the growth process. The result of research stated that giving cinnamon extract through drinking water can increase carcass weight, carcass percentage, and broiler chicken body weight. Polyphenols in the cinnamon tree stems, consisting of 90.1% routine, 1.9% catechin, 0.2% quercetin, 0.02% kaempferol 0.02%, and 0.103% isorhamnetin [14].

*Centella asiatica* also has very important benefits for improving the quality of health and growth of Japanese quail through the increase of antioxidant content in the body [9]. Pegagan (*C. asiatica*) contains a wide variety of active compounds, including asiaticoside, asiatic acid, madecassoside, madecassic acid and brahmoside [2]. Januwati and Yusron [8] stated that *C. asiatica* plants are known to contain essential oils, such as citronellal, linalool, neral, menthol and linalyl acetate. Herlina *et al.* [7] state that pegagan contains amino acids, flavonoids, and terpenoids. These compounds act as antioxidants that are very beneficial for body health and growth. Therefore, Pegagan leaf is one of the ingredients that can be used as a dietary supplement as well as a source of natural antioxidants that can improve the health and productivity of quail because of its flavonoid content [1]. Tribudi and Nurfianti [13] stated that 1.5 percent of pegagan leaf supplements added to the diet could increase productivity, decrease feed consumption, and feed conversion.

Based on the potential and evidence of the study indicated that cinnamon bark flour and Pegagan leaf could be used to improve health, growth, and productivity in Australian quail strains. Research on the utilization of both materials has not been done in the quail of Australian strains, especially the influence of both materials on the growth rate. Therefore, in this research will be conducted research on the utilization of both materials in the form of flour (as a dietary supplement) and observed its effect on the growth rate in quail strain Australia along with parameters associated with growth, such as feed consumption, drinking water consumption, body weight, and feed conversion ratio.

## 2. Material and Methods

The research will be carried out in the Biological Laboratory of Animal Structures and Animal Function and Animal Trial in the Department of Biology, Faculty of Science and Mathematics of Diponegoro University. The research will be carried out in the year 2017.

The tools used in the study are the experimental animal cage, acclimation cage, thermometer, oven, digital scales, grinder, large tray, small tray, strainer, cardboard styrofoam, beaker, stirrer, mask and

nitrile glove. The materials used are a husk, 70% alcohol, aluminum foil, disinfectant, rodalon, and label paper.

This study used a complete randomized design (RAL) consisting of 8 treatments with 3x replicates. Treatment consists of P0: Control (feed without supplementation of cinnamon bark flour and pegagan leaf), P1 and P2: Feed with cinnamon bark flour supplementation 5% and 10%, P3 and P4: Feed with pegagan leaf flour supplementation 5% and 10%, P5, P6, and P7: respectively feed with cinnamon bark flour supplementation and pegagan leaf (5%:5%), (5%:10%), and (10%:5%). Treatment of cinnamon bark flour supplementation and pegagan leaf given for 30 days since quail is declared matured. The main variables observed were feed consumption, drinking water consumption, body weight, and final body weight.

### 2.1. Collection, Drying Test Material and Flour Making

Part of cinnamon leaf and pegagan leaf collected from Semarang region. The ingredients are separately cut into 3cm, washed, drained, and then dried in sunlight repeatedly for 72 hours or dried by oven with a temperature between 40-60°C for 30-36 hours until obtained dry matter with 10% moisture content. In addition to evaporating the water content, heating can lower levels of compounds that have negative effects. The cinnamon bark or dried glycerol leaf is then squeezed and put into the grinder and ground until the flour is obtained. The flour of both ingredients is ready to be used as a quail feed supplement.

### 2.2. Making Feeding Supplements Flour and Cinnamon Leaf Flour

Standard feed supplement for quail is made by adding flour from both materials (either separately/in combination) to quail standard feed as per required percentage (grade according to formula). The cinnamon bark flour or pegagan leaf that has been determined by weight is mixed with quail feed that has been weighed as needed. The feed that has been mixed with the supplement ingredients is then stirred until homogeneous, put in place of feed in the quail cage. Supplementary feed gave ad libitum every morning at 07.00 and evening at 16.00.

### 2.3. Preparation Cage Preparation

A good quail cage (battery) has a maximum length of 80 cm and a maximum width of 60 cm. With the size of the quail population in the cage is 24 tails. The smaller the size of the cage the better the production. To get a good home circulation then the material for the battery cage wall is best using a streaming wire or material from the bamboo hemisphere. Cage pedestal using a hollow material with dirt goal from quail can directly descend to shelter of dirt and do not come into direct contact with quail.

Place feed and drink placed together with the cage. Placement outside the cage to avoid wasted feed due to clamped and reduce the feed or drink dirty because mixed with quail dung. Place feed is made along the length of the cage and placed in front. This is done so that consumption of food for quail can be evenly distributed in addition to technically facilitate the provision of feed. Another purpose is to save in lighting during the night. While the drinking place can be placed next to or behind the cage.

### 2.4. Preparation and Acclimation of Test Animal

The test animal used in this study was Quail (*Coturnix coturnix japonica*) which was 42 days old (genital cook). Before acclimation, the selection of test animals, namely selecting good seeds with the same weight, disease-free, and normal. The cage for the quail is not crowded with adequate lighting and well maintained by cleaning the cage regularly. Furthermore, acclimation was done for seven days in individual cages before being used in the study. During acclimation, test animals are fed and drunk in ad libitum and performed in health care, such as routine checkups, vitamin addition, and vaccination.

### 2.5. Treatment of Food Feeding Skin Cinnamon and Leaf Pegagan

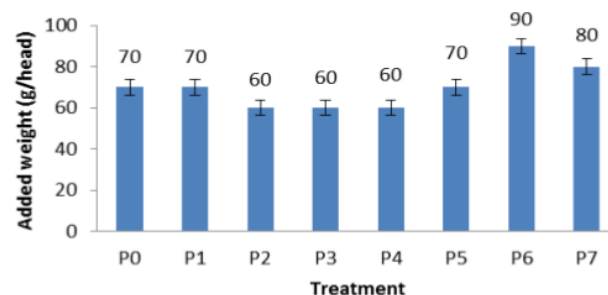
Feed supplements cinnamon bark flour and kacamagan leaf given to quail since cooking sex (age 42 days) for 30 days. Feed is given given ad libitum 2x a day, ie, morning at 07.00 and afternoon at 16.00. Every day, the room temperature and humidity measurements were taken during the study. Daily egg collection followed by weighing using digital scales. At the end of the treatment weighing the body weight of the end of the quail. Initial and final body weight data, total feed consumption, and treatment time were used to calculate body weight gain, growth rate, relative growth rate, and feed conversion ratio

### 2.6. Data analysis

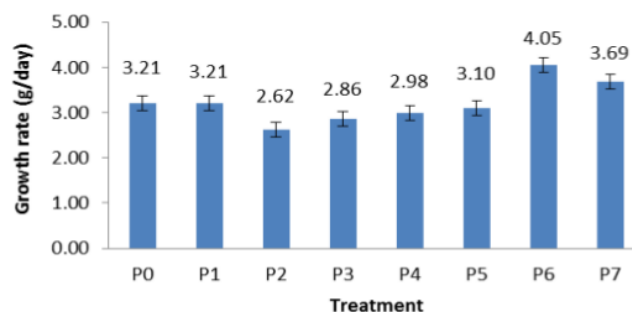
The data obtained were tested for distribution pattern and homogeneity, followed by Analysis of Varian (ANOVA) followed by Duncan Multi-Range Test (DMRT), each with 95% confidence level.

## 3. Results

The result of this research is the effect of supplements of cinnamon bark flour and pegagan leaf powder in the feed to the research variables, that is the increase of body weight can be seen in Figure 1. Supplements of cinnamon bark flour and Pegagan leaf in the feed give influence to the increase of quail body weight. The highest quail weight gain was found in the treatment of P6 (cinnamon flour and pegagan with a ratio of 5%: 10%), which was 90 g / head with treatment for 21 days. The quail parameter values differ significantly with controls (P0), P1, P2, P3, P4, P5, and P7. The lowest quail weight gain was found in P2, P3, and P4 which was 60 g/tail and the three treatments were significantly different with controls (P0), P1, P5, P6, and P7. Controls, P1, and P5, have the same weight gain of 70 g/day.



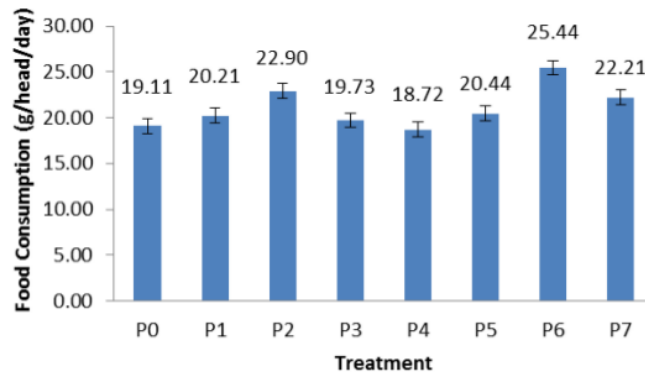
**Figure 1.** Added quail weight after supplementation of cinnamon bark flour and pegagan leaf powder in the feed



**Figure 2.** Growth rate of quail after supplementation of cinnamon bark flour and pegagan leaf powder in the feed

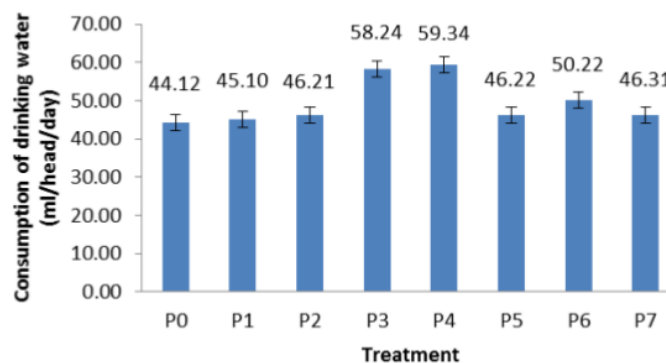


An increase in quail weight is an important indicator of productivity and has a positive correlation with growth rate. Quail with large weight gain enables faster growth rate. Based on the data as shown in Figure 2, the quail with the fastest growth rate was shown in P6 and P7, respectively 4.05 g/head/day and 3.69 g/head/day, significantly different from the controls and other treatments. P1, P3, P4, P5, did not differ significantly with control, while P2 was significantly different and lower than control.



**Figure 3.** Food consumption of quail after supplementation of cinnamon bark flour and pegagan leaf powder in the feed

The increase of body weight and the growth rate of quail have a strong correlation with feed consumption and drinking water (Figure 3). The consumption of feed and quail drinking water is also influenced by the type and color of feed given. The higher feed intake will affect the greater body weight gain and faster quail growth rate. The consumption of quail feed was mostly found in P6 treatment, which was 25.44 g / head/day, followed by P2, P7, and P5, respectively (22.90, 22.21 and 20.4) g/head/day.

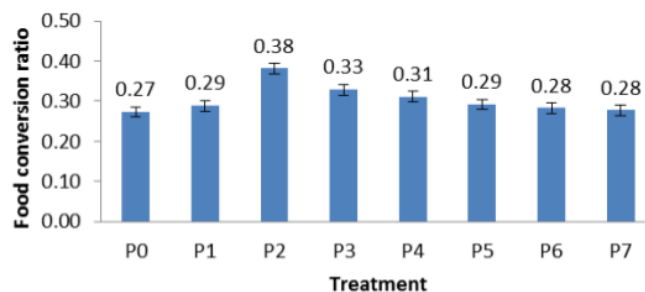


**Figure 4.** Consumption of drinking water of quail after supplementation of cinnamon bark flour and pegagan leaf powder in the feed

Feed consumption is related to the consumption of drinking water. Quail with dietary supplement from pegagan leaf flour both concentration of 5% and 10% and combination of cinnamon bark flour supplement: pegagan leaf (5%: 10%) has the highest consumption value of drinking water,

respectively (58.24; 59.34; 50.22) ml/head/day, significantly different from control and higher than other treatments. Other treatments, including P1, P2, P5, and P7 are not significantly different from each other and with control.

Figure 5 shows that the value of feed conversion at various treatments varies from one to another. The feed conversion values of P1, P5, P6, and P7 were not significantly different from the controls, 0.29, 0.29, 0.28, and 0.28, respectively. As for P2, P3, and P4 the value of feed conversion was significantly different with control and P2 showed the higher value. Low feed conversion values indicate better metabolic process efficiency than high feed conversion rates. This is shown in the treatment of P1, P5, P6, and P7 (Figure 5).



**Figure 5.** Food conversion of quail after supplementation of cinnamon bark flour and pegagan leaf powder in the feed

#### 4. Discussion

Fig. 1 also shows that a 5% (P1) powdered cigar flour supplementation supplement in the diet has no significant effect on quail-weight gain or is not significantly different from the control. Provision of this supplement with an increased concentration of 10% (P2) showed a negative effect, namely the increase of quail body weight becomes lower and significantly different with the control. This condition is also seen in P3 and P4, which is the supplemental leaf of a pegagan leaf at concentration 5% and 10% which gives effect to quail weight gain with the same value as P2 that is 60 g/day, lower and significantly different with control. Different conditions appear on P5, P6, and P7 that is in combination treatment of cinnamon bark flour with pegagan leaf flour. The combination of cinnamon bark flour with pegagan leaf at 5%: 5% ratio had not significantly effect to quail weight gain (not significantly different with control), but combination treatment at 5%:10% and 10%:5% ratio was able to increase quail weight gain with the highest value compared to control and other treatments, respectively 90 g/day and 80 g/day with treatment for 21 days.

Some data obtained from the results of this study indicate that supplements of cinnamon bark flour or leaf of the pegagan leaf by administering separately did not have an effective effect on quail weight gain even this supplement with an improved concentration had a negative effect on quail growth as indicated by the increase of body weight quail becomes lower. This is thought to be related to tannin and cinnamaldehyde content in both materials. Tanin and cinnamaldehyde are polyphenolic compounds having hydroxyl phenol groups. This group will form complex compounds with proteins, carbohydrates, minerals, vitamins, and metal ions [4]. As a result, some nutrients cannot be absorbed effectively by duodenal cells in the small intestine and have an impact on the decrease in metabolic products resulting in lower body weight gain. In contrast, cinnamon bark flour supplements combined with pegagan (gotu kola) leaf flour give a very effective effect on the increase of quail body weight. It is possible that the compounds and nutrients contained in both materials can work effectively that support the process of nutrient absorption, distribution to the target tissue, metabolic increase, and metabolic products. It is shown that the combination of cinnamon bark flour supplements with flour of pegagan leaf can produce higher quail weight than control and other treatment. Anfiandi [1] and



Herlina *et al.* [7] states that pegagan (*Centella asiatica*) contains terpenoids, flavonoids, vitamins and minerals that can increase quail productivity. Astrini [4] also states that flavonoids and terpenoids in cinnamon can increase the activity of cellular enzymes that affect the improvement of metabolic processes and metabolic products. The positive effects of the important compounds contained in both of these ingredients have an important role in improving metabolic processes and productivity as reflected by higher body weight gain than controls and other treatments.

Another factor that may have an important role to the role of weight loss is the presence of proxeronine compounds contained in cinnamon bark flour and pegagan leaf. This compound can increase the absorption of amino acids in the cells of the small intestinal duodenum. The absorbed amino acids will be circulated throughout the body and used as feedstocks for metabolism to generate energy and growth. Inside the body proxeronine will be converted to xeronine and this compound has an important role in activating enzymes involved in metabolic processes that support growth and productivity.

Some of these data indicate that the combination of both supplements (cinnamon: gotu kola) in a row with the ratio (5%:5%), (5%:10%), and (10%:5%) can increase the rate of growth (Figure 2). It is thought to be related to the content of antioxidant compounds and important compounds such as flavonoids and terpenoids contained in both materials, as well as the content of vitamins, minerals, and proxeronine compounds. Proxeronine will be converted into xeronine in the small intestine by proxeronase enzymes that play an important role in the effectiveness of nutrient absorption. Xeronine is then distributed throughout the body's cells to activate enzymes that play a role in the metabolic process. Some of these compounds together in the optimal concentration can synergize effectively the process of absorption of nutrients in the small intestine, improve metabolic processes and metabolic products that ultimately impact on increasing body weight. Body weight that increases unity of time will increase the rate of quail metabolism ([1], [4], [7]). Pegagan leaf flour supplements of 5% concentration affected the lowest quail growth rate compared to control and other treatments. This is possible about the role of flavonoid, terpenoid and proxeronine compounds in the quail body that has not been optimal. As a result, supplements with this concentration have an effect on the growth rate of quail with a lower value than other supplements.

All of these treatments were able to increase consumption of quail feed with markedly different values with controls and other treatments. The other treatments, such as P1, P3, and P4 affect feed consumption value which is not significantly different from control (Figure 3). Some of these data suggest that a combination supplement between cinnamon bark flour and glycerol yields a different color than if the two supplements are administered separately. This will give effect not only in the color of feed but also the level of availability of flavonoids, terpenoids, proxeronine, vitamins, and minerals in the feed become more complete. Consequently, the feed with the color combinations of these two supplements is preferably quail compared to the supplements administered separately. Sturkie (2000) states that feed consumption in poultry is more influenced by the color of feed and poultry including quails prefer yellow, red, and green.

From some data indicated that supplements of pegagan leaf flour increased the consumption of drinking water quail (Figure 4). This is allegedly related to the nature and characteristics of pegagan leaf flour. This material in addition to having much crude fibers also contains many polyphenol compounds that give the effect of thirst on the quail. As a result, quail will consume lots of drinking water to help simplify the transportation of feed consumed.

Conversion of feed is one indicator of success in the cultivation of poultry, such as quail. Conversion of feed is a comparison between the feed consumed with the added weight of the resulting body. High feed conversion value means that food can be processed efficiently in the body which affects the height of weight gain [12]. With complete ingredients such as flavonoids, terpenoids, proxeronine, vitamins, minerals, and crude fiber are fewer, 5% cinnamon supplements and the three supplement combinations can increase the weight of quail bodies higher than quail that received wood supplements sweet 10% and gotu kola (5% and 10%).

Sunarno and Djaelani [12] suggest that low feed conversion values indicate that feed can be efficiently digested during the digestion process in the duodenum to produce metabolic raw materials. Furthermore, metabolism raw materials can be absorbed effectively and distributed to all body cells. Through the cellular respiration process will produce optimal energy used to increase cell mass, especially in muscle cells either through the addition of extracellular and intracellular matrix. Arifah *et al.* [3] also stated that the value of low feed conversion has a significant effect on the increase of network mass. As a result, quail will experience a higher body weight increase with the amount of feed consumed more efficiently. Conversely, larger feed conversion values indicate the metabolic processes and resulting products are more inefficient. As a result, the weight gain of the quail body becomes lower. This can be due to nutrients in incomplete feed or the amount of crude fiber contained in the feed.

### 5. Conclusions and Recommendation

Supplements of cinnamon bark flour combined with wheat pegagan in the diet can increase feed intake, weight gain, and quail growth rate of Australian strains. The combination of the two supplements with the cinnamon ratio: pegagan (5%: 10% and 10%: 5%) gave the best results from all three indicators analyzed.

The use of a combination of cinnamon supplements: pegagan (5%: 10% and 10%: 5%) is recommended for application in Australian quail and quail cultures in order to accelerate the growth rate and increase quail productivity.

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