



## Evaluation of Onion peels as Feed Additive on Blood Profile Broiler

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**ABSTRACT:** The purpose of this study was to assess how adding garlic peel (*Allium sativum L.*), shallot peel (*Allium ascalonicum L.*), and onion peel (*Allium cepa L.*) as additives to the blood profile. The material used was 189 one-day-old commercial broiler chicken (unsexing) and assigned to nine treatment T0(-): basal diet, T0(+): basal diet + antibiotic (zinc bacitracin 0.1%), T1: basal diet + 0.5 % garlic peel, T2: basal diet + 0.5 % shallot peel, T3: basal diet + 0.5 % onion peel, T4: basal diet + 0.25 % garlic peel and 0.25% shallot peel, T5: basal diet + 0.25 % garlic peel + 0.25% onion peel, T6: basal diet + 0.25% shallot peel + 0.25% onion peel, T7: basal diet + 0.167% garlic peel + 0.167% shallot peel + 0.167% onion peel. The observed variables are hemoglobin, hematocrit, erythrocytes, and leukocytes. The data are analyzed using Analysis of Variance (ANOVA). The study results show that adding three garlic powders has no effect ( $P>0.05$ ) on hemoglobin, hematocrit, erythrocytes dan leukocytes. In summary, Onion peel flour can be used as a feed additive to enhance the immune system.

**KEYWORDS:** Blood profile, Garlic peel, Onion peel, Shallot peel.

### INTRODUCTION

The demand for poultry traders in Indonesia is increasing every year as the population increases as well as public awareness of the importance of meeting animal protein needs. One of the efforts made by farmers to increase the productivity of chicken traders is the addition of growth promoters such as synthetic antibiotics. Antibiotic administration in feeding stuffs must take into account several aspects including expensive prices, the antibiotic's working system can disrupt the balance of the intestinal microflora, and is resistant to microorganisms and can cause negative residual effects on the merchant's chicken carcass when used continuously (Abd El-Hack et al., 2022). But with the advances of science and technology in various fields including farming and animal health, there are technologies that lead to the efficiency of the use of synthetic antibiotic replacement. An effort can be made to optimize the use of feed and the production of chicken traders is by adding feed additives. Phytobiotics are feed supplements derived from plant derivatives used in feed and aim to improve digestion, nutrient absorption and balance the microorganisms present in the digestive tract.

Potential feed additives of local ingredients can use poorly exploited market waste and still have a fairly good nutritional content, including garlic peel (*Allium sativum L.*), shallot peel (*Allium ascalonicum L.*), and onion peel (*Allium cepa L.*). Garlic peel (*Allium sativum L.*) contains active compounds such as alkaloids, flavonoids, saponins, polyphenols, and essential oils. These active compounds work synergistically as antibacterials by destroying cell walls and pollinating bacterial cells. On shallot peel extract contains active compounds polyphenols, flavonoids, alkaloids, saponins, steroids and triterpenoids. Flavonoid compounds as antioxidants can prevent the growth of free radicals in the body as well as repair damaged body cells (Rahayu et al., 2015). Onion peel contains flavonoid compounds, glycosides, steroids, tannins and saponins. Onion peel contains quercetin, which is one of the flavonoids, part of the polyphenol group that has the potential to counter free radicals and heavy metals by inhibiting lipid peroxidation (Gawlik-Dziki et al., 2013). The active compounds found in shallot peel, garlic peel and onion peel added to livestock feed can act as an antibacterial agent that can balance bacteria in the digestive tract so that it can improve broiler production.

### MATERIALS AND METHODS

#### Determination of onion peel powder

The procedure for producing onion peel powder involved the following steps: the sorted onion peels were cleaned using flowing water, after that, the onion peels were dried for 24 hours at 50°C in the oven, reducing the amount of water to less than 10% then proceed with grinding using a grinder until it had a powder texture. The onion peel powder was filtered using a 100-micro mesh



sieve to form a powder and then the total flavonoid content and antioxidant activity were analyzed. Nutritional content of garlic peel, shallot peel and onion peel can be seen at Table 1.

**Table 1. Nutritional content of Garlic Peel, Shallot Peel and Onion Peel**

Parameters	Items		
	Garlic Peel	Shallot Peel	Onion Peel
Dry Matter (%)	36.34	81.24	56.22
Ash (%)	7.38	2.72	3.25
Crude Protein (%)	2.47	6.94	0.99
Crude Fat (%)	0.42	1.64	0.72
Crude Fiber (%)	41.45	34.67	38.89
Flavonoid (ppm)	311.256	348.213	351.223
Antioxidant (mg/L)	0.762	0.773	0.723

**Experimental Design and Treatment**

The materials used in this study are the Day-Old-Chick (DOC) chickens of the *Lohmann* strain (unsexing). The chickens were grouped in nine treatments of three replications, so there were 27 test cages. Each test cage had 7 chicks which were reared for up to 35 days. Shallot peel (*Allium ascalonicum L.*), Garlic peel (*Allium sativum L.*) and Onion peel (*Allium cepa L.*). The diet used is divided into nine treatments:

- T0(-) : basal diet + free antibiotic
- T0(+) : basal diet + antibiotic (zinc bacitracin 0.1%)
- T1 : basal diet + 0.5 % garlic peel
- T2 : basal diet + 0.5 % shallot peel
- T3 : basal diet + 0.5 % onion peel
- T4 : basal diet + 0.25 % garlic peel + 0.25% shallot peel
- T5 : basal diet + 0.25 % . garlic peel + 0,25% onion peel
- T6 : basal diet + 0.25% shallot peel + 0.25% onion peel
- T7 : basal diet + 0.167% garlic peel + 0.167% shallot peel + 0.167% onion peel

**Blood Profile**

Blood samples for haematological examination were obtained from 35-day-old chickens. The birds are fasted for eight hours before blood collection. Using a 3 ml disposable syringe (BD syringe), blood is collected through the brachial vein and transferred directly into a sterile tube containing the anticoagulant ethylene diamine tetra acetic acid (EDTA) (Adeyemi et al., 2021). Blood samples were taken to the laboratory in a refrigerated tray containing ice gel in less than two hours from collection. Haematological parameters were analysed, such as hemoglobin, hematocrits, erythrocytes, and leukocytes. The haematological analysis is performed automatically with the ABX Micro 60 reagents and the Vet Auto Haematology Analyzer M-HEMA100.

**Statistical analysis**

Data obtained during the research was tabulated using the Microsoft Excel program and analysed using Analysis of Variance (ANOVA) from RAL, which has nine treatments with three replications each. If the resulting values are significantly different or very significantly different, then it will continue with Duncan's Multiple Range Test.

**RESULTS AND DISCUSSION**

**Nutritional content of Garlic Peel, Shallot Peel and Onion Peel**

The nutrient and active chemical composition of garlic peel (*Allium sativum L.*), shallot peel (*Allium ascalonicum L.*), and onion peel (*Allium cepa L.*) is shown in Table 1. garlic peel (*Allium sativum L.*), shallot peel (*Allium ascalonicum L.*), and onion peel (*Allium cepa L.*) have a significant amount of crude fiber, specifically 41.45% in garlic peel, 34.67% in shallot peel, and 38.89% in onion peel. Three of peels is abundant in raw fiber, which serves as a barrier to prevent external factors from causing oxidative

damage to the bulbs. According to (Salawu et al., 2021), the nutritional composition of garlic (*Allium cepa L.*) comprises the following: crude fat 1.11%, total protein 2.96%, carbohydrate 3.51%, fibre 2.51%, and ash 2.55%. Shallot has a raw fat content crude fat 2.81%, total protein 2.33%, carbohydrate 24.55%, fibre 2.74%, and ash 2.55%. The garlic peel has more antioxidant activity compared to the bulb due to its increased phenolic and flavonoid content (Kumar et al., 2022).

The total flavonoid content in onion peel was 351.223 ppm, shallot peel total flavonoid 348.213 ppm, and garlic peel 311.256 ppm. Total flavonoid analysis results are shown in Table 2. Flavonoids act as antibacterials and antioxidants. According to the results of the analysis, onion peel had the highest flavonoid content. The type of flavonoid that many onion peels contain is quercetin, which has strong antioxidant properties and improves a role in protecting body cells from damage caused by free radicals (Gawlik-Dziki et al., 2013). Based on the results in Table 2. the analysis, the antioxidant activity of garlic peel is (*Allium sativum L.*) 0.762 mg/L, shallot peel (*Allium ascalonicum L.*) is 0.773 mg/L, and onion peel (*Allium cepa L.*) is 0.723 mg/L. The highest antioxidant activity in shallot peel (*Allium ascalonicum L.*), garlic peel (*Allium sativum L.*) and onion peel (*Allium cepa L.*). Research by (Mardiah et al., 2017), several plants from the Family Alliaceae have antioxidant activity, such as shallot peel extract (*Allium ascalonicum L.*) has an  $IC_{50}$  is 15.44 ppm which proves that shallot peel has strong antioxidant content. Varietal differences are one of the major reasons for the different compositions of bioactive compounds in onion peels. Thus, different varieties cultivated in different regions show variations in antioxidant capacity (Kumar et al., 2022).

### Blood Profile

**Table 2. Effect of feed additive from three garlic peels on Blood Profile Broiler**

Treatments	Variable			
	Hemoglobin (g/dl)	Hematocrit (%)	Erythrocytes ( $\times 10^6/\text{mm}^3$ )	Leukocytes ( $\times 10^6/\text{mm}^3$ )
T0 (-)	13.47 $\pm$ 1.15	54.33 $\pm$ 4.03	10.53 $\pm$ 0.95	19.77 $\pm$ 4.76
T0 (+)	22.70 $\pm$ 3.21	54.67 $\pm$ 5.31	10.92 $\pm$ 0.50	22.53 $\pm$ 4.51
T1	18.03 $\pm$ 7.52	57.70 $\pm$ 0.00	10.65 $\pm$ 0.57	22.75 $\pm$ 9.26
T2	18.50 $\pm$ 4.50	55.93 $\pm$ 2.49	10.76 $\pm$ 0.19	18.63 $\pm$ 2.40
T3	18.27 $\pm$ 6.48	55.37 $\pm$ 0.57	10.31 $\pm$ 0.31	18.40 $\pm$ 8.17
T4	16.17 $\pm$ 1.69	58.00 $\pm$ 2.95	10.96 $\pm$ 0.75	15.27 $\pm$ 2.64
T5	19.43 $\pm$ 6.23	58.20 $\pm$ 5.07	10.45 $\pm$ 0.42	28.70 $\pm$ 2.42
T6	15.23 $\pm$ 1.66	56.17 $\pm$ 2.87	10.56 $\pm$ 0.34	23.33 $\pm$ 5.17
T7	15.00 $\pm$ 1.40	59.57 $\pm$ 2.25	10.63 $\pm$ 0.32	15.16 $\pm$ 4.18

T0(-): basal diet + free antibiotic; T0(+): basal diet + antibiotic (zinc bacitracin 0.1%); T1: basal diet+ 0.5 % garlic peel; T2: basal diet + 0.5 % shallot peel; T3: basal diet + 0.5 % onion peel; T4: basal diet + 0.25 % garlic peel + 0.25% shallot peel; T5: basal diet + 0.25 % . garlic peel + 0,25% onion peel; T6: basal diet + 0.25% shallot peel + 0.25% onion peel; T7: basal diet + 0.167% garlic peel + 0.167% shallot peel + 0.167% onion peel.

### Hemoglobin

The result showed that treatment not had a significant impact ( $T > 0.05$ ) on hemoglobin. The effect of this no-difference treatment is attributed to the inclusion of garlic peel, shallot peel and onion peel, which does not modify the nutritional value of the basal feed used. The body uses the nutrients it receives to carry out the hemopoiesis process. According to (Garcia-Santos et al., 2017), the process of hemopoiesis is controlled by the nutrient content of the feed, and the production of hemoglobin requires minerals and proteins as precursors of succinyl Co-A to produce the hemoglobin molecule. Forum is essential for the formation of hemoglobin in red blood cells, including erythrocytes. This study measured hemoglobin levels ranging from 13.47-2.70 g/dL, which fell within the expected range except for T5 and T0(+). According to Williams and Wilkins (2000), the hematologic reference value in *Gallus domesticus* was 12.7–18.4 g/dL. High hemoglobin levels in poultry dealers can be produced by a variety of variables, including the environment in which they are kept, the nutritional composition of their feed, and the health of their chicks. According to Astuti et al., (2020) a normal hemoglobin condition signifies that none of the three onion peel flours comprise toxic substances that have the potential to cause red blood cell smoothing or impede the growth of red blood cells. A normal level of hemoglobin can



be used to ensure that chickens' protein and amino acid requirements are met. The high flavonoid content of three onion peel flours is capable of maintaining the condition of the chicken's digestive system so that it may increase the process of nutrient absorption, particularly the protein and Fe content, which play a vital role in the synthesis of hemoglobin.

## Hematocrit

The result showed that treatment not had a significant impact ( $T > 0.05$ ) on hemoglobin on hematocrits. According to Williams and Wilkins (2000), the hematocrit values in *Gallus domesticus* range from 49.60 to 66.00%. This implies that providing garlic, shallot, and onion peel powder does not disrupt the equilibrium of erythrocytes and blood plasma volumes, allowing the hematocrit value in chicken traders to be maintained under normal settings. Giving three types of garlic harvest flour can improve hematocrit in chick numerically. The purpose of the hematocrit measurement is to determine the proportion of red blood cells needed to calculate the concentration of erythrocytes. The percentage of hematocrit created can be used to measure blood viscosity; the higher the percentage of hematocrit, the thinner the blood because the density in the blood is lower, and vice versa (Lestari and Ismoyowati, 2013).

## Erythrocyte

The result showed that treatment of garlic, shallot, and onion powder as feed additives not had a significant impact ( $T > 0.05$ ) on erythrocytes. In this study, the average erythrocyte value is  $10.31 \times 10^6/\text{mm}^3$ – $10.96 \times 10^6/\text{mm}^3$ , indicating that erythrocyte values are within the normal range. According to Williams and Wilkins (2000), the erythrocyte value in *Gallus domesticus* ranges from  $8.83 \times 10^6/\text{mm}^3$  to  $11.72 \times 10^6/\text{mm}^3$ . Erythrocyte concentrations within the normal range can be utilized to determine whether protein and amino acid requirements are met (Mozin., 2015). Erythrocyte readings in the normal range are attainable in this study because the bioactive content of garlic peel, shallot peel, and onion peel powder can activate the hormone erythropoietin to make significant amounts of erythrocyte cells. The flavonoid content in onion skin functions as an antibacterial agent, balancing intestinal microbes so that nutrients in food can be absorbed optimally as well as regulating erythrocyte metabolism through homeostatic processes (Sulistiyono et al., 2018). The skin of garlic, shallot, and onion contains active chemicals that function as antioxidants. Antioxidants protect body cells from free radical damage, helping to lessen the impact of oxidative stress on hens and strengthening the chicken's immune system by protecting cells from oxidative damage (Bouhenni et al., 2021).

## Leukocytes

The result showed that treatment of garlic, shallot, and onion powder as feed additives not had a significant impact ( $T > 0.05$ ) on leukocytes. Leukocytes contribute to the immunological response. All leukocyte levels in this study fall within the normal range numerically, except for T6 and T5, which had higher values. According to Williams and Wikins (2000), the leukocyte count in *Gallus domesticus* ranges from  $3.10 \times 10^6/\text{mm}^3$  to  $23.04 \times 10^6/\text{mm}^3$ . The increase and decrease in the total amount of leukocytes in the blood is a reaction mechanism of the body to the attacking pathogen (Sjofjan et al., 2020). When the quantity of leukocytes falls below the usual range, chicken must be monitored for disease transmission (Astuti et al., 2020). The intake of phytobiotic is predicted to improve the immune system by increasing of leukocytes, which will defend the body against disease-causing bacteria. The increase in leukocyte count further confirms the effectiveness of the cellular immune system as an immunological reaction (Kim et al., 2022). Phenols and other bioactive chemicals with immunomodulatory properties influence both immune system responses. The phenol molecule functions as an immune modulator by transmitting intracellular signals to the cell receptor. This enhances cellular functionality by increasing the rate at which leukocytes and macrophages operate, ultimately instigating immune responses (Syawal et al., 2021).

## CONCLUSION

In summary, onion peel flour can be used as a feed additive and to enhance the immune system, without any adverse effects.

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**Cite this Article: Saadatin Nurul Jannah, Edhy Sudjarwo, Osfar Sjöfjan (2024). Evaluation of Onion peels as Feed Additive on Blood Profile Broiler. International Journal of Current Science Research and Review, 7(1), 784-788**