

# pH of Broiler Small Intestine with the Addition of Onion Peel Powder in Feed

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## Abstract:

pH was one of the indicators used to determine the condition of the small intestine in a study aimed at assessing the effects of feed supplemented with onion peel powder on broilers. A total of 189 broilers were utilized in the study, and they were reared for a duration of 35 days. The study employed a field experiment design, utilizing a completely randomized design with nine treatments and three replicates included T0(-) (Basal feed); T0(+) (Basal feed + 0.1% zinc bacitracin); T1 (Basal feed + 0.5% garlic peel powder); T2 (Basal feed + 0.5% shallot peel powder); T3 (Basal feed + 0.5% onion peel powder); T4 (Basal feed + 0.25% garlic peel powder + 0.25% shallot peel powder); T5 (Basal feed + 0.25% garlic peel powder + 0.25% onion peel powder); T6 (Basal feed + 0.25% shallot peel powder + 0.25% onion peel powder); and T7 (Basal feed + 0.17% garlic peel powder + 0.17% shallot peel powder + 0.17% onion peel powder). The study variables included duodenum pH, jejunum pH, and ileum pH. The results showed that the addition of onion peel powder had no significant effect ( $P > 0.05$ ) on the pH of the duodenum, jejunum, and ileum of broilers. It was concluded that the addition of onion peel powder at the level of 0.5% as an additive in feed gave the best results in reducing the pH of the small intestine in broilers.

**Keywords** —Broiler, onion peel powder, pH, small intestine

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## I. INTRODUCTION

Broilers are fast-growing meat-producing breeds of chicken. Broiler productivity is influenced by breeds, feed, and maintenance management. Additionally, broiler productivity is also affected by animal health. Broiler body weight gain can increase if the livestock is in a healthy condition and not attacked by disease. Farmers use antibiotics to prevent disease. Antibiotics are additives added to feed with the aim of killing microorganisms in the digestive tract of livestock to optimize the absorption of feed nutrients. However, the use of antibiotics over a long period of time can cause side effects, namely antibiotic residues in carcasses and viscera organs and bacterial resistance in humans [1]. Therefore, there is a need for an alternative to

antibiotics, namely the use of phytobiotics. One type of herbal plant that can be used as a phytobiotic is garlic peel, shallot peel, and onion peel.

Onion peel is a waste from onions that has not been utilized by the community even though it contains chemical compounds that play an important role for the health of the body. Onion peel contains compounds that are antibacterial and antioxidant as in garlic peel, namely flavonoids, alkaloids, saponins, quinones, and polyphenols [2], shallot peel, namely alkaloids, flavonoids, terpenoids, saponins, polyphenols, and quercetin [3], and onion peel, namely flavonoids, tannins, saponins, and phenols. Antibacterial compounds in onion peel can inhibit the growth of pathogenic bacteria, promoting the growth of non-pathogenic

bacteria such as lactic acid bacteria in the digestive tract. According to [4], lactic acid bacteria can produce lactic acid and acetic acid to reduce the pH of the small intestine to 4-5. [5]state that the addition of onion skin flour to poultry feed has the potential to increase livestock productivity at a relatively low price. This is because onion skin can inhibit the growth of harmful microorganisms in the digestive tract, allowing optimal utilization of food substances by broilers and promoting increased growth.

Based on the background description, this study aims to determine the pH of the small intestine of broilers fed with feed with the addition of onion peel powder.

## II. MATERIALS AND METHODS

### A. Research Materials

This study involved 189 broilers housed in open house-type cages. The broilers were fed with commercial starter and finisher period feed supplemented with garlic, shallot, and onion’s peel powder. Vaccines, medicines, and cage equipment were also utilized.

### B. Research Methods

The study method employed a field experimental approach designed using a Completely Randomized Design (CRD). The study comprised nine treatments and three replicates, resulting in 27 experimental units, with each experimental unit consisting of 7 broilers. The treatments administered were T0(-) (Basal feed); T0(+) (Basal feed + 0.1% zinc bacitracin); T1 (Basal feed + 0.5% garlic peel powder); T2 (Basal feed + 0.5% shallotpeel powder); T3 (Basal feed + 0.5% onion peel powder); T4 (Basal feed + 0.25% garlic peel powder + 0.25% shallotpeel powder); T5 (Basal feed + 0.25% garlic peel powder + 0.25% onion peel powder); T6 (Basal feed + 0.25% shallot peel powder + 0.25% onion peel powder); and T7 (Basal feed + 0.17% garlic peel powder + 0.17% shallot peel powder + 0.17% onion peel powder).

### C. Research Procedures

The following steps were taken to make the peel powder for shallot, garlic, and onions: fresh onion

peel was chosen, cleaned by running water, and then aerated. The onion peel was then dried for 24 h at 50°C in an oven. After that, the dried onion peels were ground and put through a 100 mesh sieve to create a powder.

### D. Research Variables

The observed variables were duodenum pH, jejunum pH, and ileum pH of broilers. Each experimental unit's single chicken was chopped in order to conduct the sampling. The chickens' digestive tracts were removed, and they were dissected after being killed. Subsequently, the small intestine's duodenum, jejunum, and ileum were separated to measure the pH of the small intestine. The pH of the small intestine was measured by removing the digesta in each part of the small intestine and placed into a film pot. The pH was then measured using a pH meter [6].

### E. Data Analysis

An analysis of variance (ANOVA) with a completely randomized design was used to examine the collected data. If the results obtained had different effects, they were then continued with Duncan's Multiple Range Test.

## III. RESULTS AND DISCUSSION

TABLE I  
DUODENUM PH, JEJUNUM PH, AND ILEUM PH OF BROILERS

Treatments	Variables		
	Duodenum pH	Jejunum pH	Ileum pH
T0(-)	6.27	7.37	6.80
T0(+)	6.07	6.57	6.47
T1	5.87	6.63	7.10
T2	5.77	5.57	5.90
T3	6.10	6.80	6.17
T4	5.67	6.83	6.30
T5	6.10	6.57	6.53
T6	5.90	6.60	6.37
T7	5.87	6.13	6.20

The results of the study on the pH of the small intestine of broilers, given the addition of onion peel powder in feed, are shown in Table 1. The results of statistical analysis show that the addition of onion peel powder in feed does not give a significant difference ( $P>0.05$ ) in the pH of the duodenum, jejunum, and ileum of broilers. The insignificant effect on the pH of the duodenum,

jejunum, and ileum is due to the relatively small level of onion peel powder when compared to 1 kg of basal feed so that the results obtained are not significantly different. This is in accordance with research conducted by [7], which reports that the provision of garlic herbs in feed does not affect the pH of the small intestine of broilers.

According to [6], the normal digesta pH range in the duodenum is 5-6, the jejunum is 6.5-7, while the ileum is 7-7.5. The average pH value of digesta produced in this study, the duodenum section ranges from 5.67-6.27, jejunum 5.57-7.37, and ileum 5.90-7.10. These results indicate that the pH value of small intestine digesta is lower than the normal range.

The study's findings indicate that the duodenum, jejunum, and ileum become more acidic when onion peel powder is consumed. This is due to the antibacterial substances found in shallot peel, including phenols, saponins, tannins, alkaloids, and flavonoids, which can inhibit the growth of harmful bacteria and increase the number of lactic acid bacteria. The production of organic acids increases due to a high population of lactic acid bacteria, resulting in a low pH in the small intestine [8]. In their study, [9] find that a lower pH causes the digestive tract, particularly the small intestine, to become more acidic. This, in turn, inhibits the growth of harmful bacteria like *Salmonella* and *Escherichia coli*, improving the digestive tract's condition and nutrient digestibility, which, in turn, improves the rate at which feed passes through the small intestine during the process of nutrient absorption. According to [10], low pH also signals the gastrointestinal immune system and the production of mucus, which coats the digestive tract's surface to act as a barrier against the entry of pathogenic bacteria into the bloodstream.

The pH of the small intestine of broilers decreases when the chickens hatch until 7 days old and increases when the chickens are 14 days old. The increase in small intestine pH after 14 days of age is due to an increase in feed consumption with a neutral pH that exceeds the activity of digestive enzymes, namely hydrochloric acid. The pH of the small intestine is influenced by several factors such as the health of the chicken, the type of nutrients

obtained, and the type and amount of microflora present in the digestive tract [11].

#### IV. CONCLUSIONS

The addition of onion peel powder at the level of 0.5% as an additive in feed gave the best results in reducing the pH of the small intestine in broilers.

#### V. SUGGESTION

The addition of shallot peel powder at the level of 0.5% is recommended to be applied to broiler feed as an additive to replace antibiotics.

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