



Evaluation of Proximate and Flavonoid Test of Shallot Peel (*Allium ascalonicum* L) Nanoparticles as Poultry Feed Additives

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Abstract. This research aims to evaluate the nutritional content and flavonoid phytochemical compounds. The research material used in this study is shallot peel with blue lancor varieties from Probolinggo obtained from the center of fried onion production in the Street Muharto, Malang City. The method used is proximate analysis with chemical analysis techniques to identify the nutritional content of a feed material. Test the flavonoid content using UV-Vis spectrophotometry to determine the total quantitative flavonoid content in shallot peel. The results of the proximate analysis show that shallot peel nanoparticles contain nutrients that have the potential to be used as a feed supplement for poultry. Shallot peel have contains dry matter (94.44%), ash content (9.43%), crude protein (7.12%), crude fiber (30.98%), and fat (2.40%). The quantitative test results for total flavonoid content indicate that shallot peel nanoparticles contain flavonoids with a relatively high value of 14.01% b/b. The conclusion of this study is that shallot peel nanoparticles have the potential to be used as a feed additive that can enhance health and productivity, as well as serve as an antibiotic alternative in poultry.

Keywords: poultry, feed additive, shallot peel, flavonoids.

1 Introduction

The consumption of protein source food is increasing every year along with the increase in the population in a country and the increasing awareness of the public about the importance of meeting their protein needs. Chicken is one of the largest contributors to food sources of protein. The average value of chicken meat consumption per capita per week of Indonesian people has continued to increase in the last three years, namely 0.142 in 202, 0.153 in 2022, and 0.158 in 2023 [1]. The consumption value of chicken meat is higher when compared to the consumption value of other animal protein sources such as beef, goat, buffalo and fish. The fulfillment of chicken meat needs in Indonesia is still dominated by broiler chickens.

Broiler breed chickens are a superior breed that is the result of crossing from chicken nations that have high productivity. The characteristics of rapid growth of broilers must be balanced with effective and efficient feeding and both in quality and

quantity. Efforts that can be made to improve feed efficiency and reduce production costs in the broiler farming business are to add feed additives in feed. Phytobiotics are one type of feed additive that is widely developed and used.

Shallots are one of the herbal plants that are widely used as phytobiotics. Shallots are a plant that is widely known and used by the community as a medicine and antibiotic. The use of shallots is not only the bulb, the peel of shallots, which is widely discarded and considered waste, is known to contain phytochemicals that also have many benefits. One of them is flavonoids that have a positive role for broilers. Flavonoids can act as antibacterial and can improve the quality of intestinal morphology in broilers, so that they can inhibit the growth of harmful microorganisms in digestion, maximize the absorption of feed nutrients, and can optimize broiler productivity. This study aims to evaluate the content of food substances and the effectiveness of flavonoids from shallot peel nanoparticles as broiler feed additives, as well as their impact on the health and production performance of broilers.

2 Materials and Methods

This study is about the evaluation of proximate and flavonoid tests to determine the content of food substances and total flavonoids from shallot peel nanoparticles (*Allium ascalonicum L*) as poultry feed additives. The complete research stages are as follows:

2.1 Location and Research Authority

Research locations include:

1. The manufacture of shallot peel nanoparticles (*Allium ascalonicum L*) was carried out in the Biochemistry Laboratory, Faculty of Animal Husbandry, Universitas Brawijaya.
2. Proximate analysis was carried out at the Laboratory of Nutrition and Animal Feed, Faculty of Animal Husbandry, Universitas Brawijaya.
3. The total flavonoid test was carried out at the Integrated Research and Testing Laboratory, Gadjah Mada University.

2.2 Research Materials

The research material used in this study is shallot peel with blue lancor varieties from Probolinggo obtained from the center of fried onion production in the street. Muharto, Malang City. The shallot peel is then processed into nanoparticles to be used as a broiler feed additive.

2.3 Research Procedures

Making Shallot Peel Nanoparticles. The manufacture of shallot peel flour is carried out with the following steps: Shallot peel obtained from fried onion production houses

are then sorted and then aerated to reduce moisture content, then shallot peels are dried in the oven at a temperature of 50°C for 24 hours until the moisture content is below 10%, then continued with grinding using grinding until it has a powdery texture. Shallot peel powder is filtered using a filter measuring 100 micro mesh so that it is in the form of a powder and the filtering results are used as feed additives [2]. The scheme of making shallot peel nanoparticles can be seen in Figure 1.

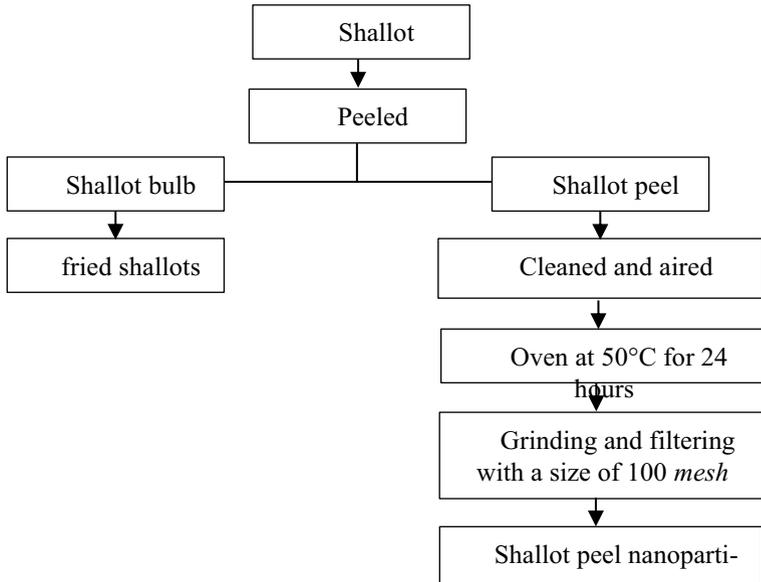


Fig. 1. Scheme for Making Shallot Peel Nanoparticles

Proximate Test. Proximate analysis is a method of chemical analysis of feed ingredients based on their chemical composition and use, from the proximate analysis it can be known that dry materials, ash content, crude protein content, fat content and crude fiber content. The procedure for proximate analysis is as follows [3].

Flavonoid Content Test. The flavonoid content in shallot peel nanoparticles was tested using the UV-Vis Spectrophotometry method. This test aims to determine the total quantitative content of flavonoids in shallot peel nanoparticles. The flavonoid level test procedure is as follows:

1. A total of 0.5 grams of shallot peel nanoparticles are dissolved in 10 ml of methanol and incubated for 30 minutes. The solution is then filtered to separate the solids.
2. Add 0.1 ml of 10% AlCl₃, 0.1 ml of 1M sodium acetate (C₂H₃NO₃), and 2.8 ml of aquadest.
3. Incubated for 30 minutes and then read the absorption by UV-Vis Spectrophotometry at a wavelength of 510 nm.

4. Total flavonoid content expressed in ppm.

Observation Variables. The variables observed in this study were the content of nutrients which included dry matter, ash content, crude protein content, fat content and crude fiber content as well as the total quantitative content of flavonoids from shallot peel nanoparticles (*Allium ascalonicum L.*).

Data Analysis. The data from the study were analyzed descriptively regarding the content of food substances and the total quantitative content of flavonoids from shallot peel nanoparticles (*Allium ascalonicum L.*).

3 Results and Discussion

3.1 Proximate Analysis of Shallot Peel Nanoparticles (*Allium ascalonicum L.*)

Sample of shallot peel nanoparticles (*Allium ascalonicum L.*) Proximate analysis was carried out to determine the content of nutrients including dry matter, ash content, crude protein, crude fiber and fat. Results of proximate analysis of shallot peel nanoparticles (*Allium ascalonicum L.*) can be seen in Table 1.

Table 1. Results of proximate analysis of shallot peel nanoparticles (*Allium ascalonicum L.*)

Sample	Nutrient Content				
	Dry Matter* (%)	Ash* (%)	Crude Protein* (%)	Fat* (%)	Crude Fiber* (%)
Shallot Peel Nanoparticles	94.44	9.43	7.12	2.40	30.98

Source: *Results of analysis by the Laboratory of Nutrition and Animal Feed, Faculty of Animal Husbandry, Universitas Brawijaya (2023)

Based on the data from the analysis of the proximate nanoparticles of shallot peel, the dry matter content value is (94.44%). Dry matter is the material that is left behind after the overall evaporation of water present in the feed material. Feed ingredients that have a high percentage of dry matter, can be assumed that the greater nutritional content is contained in the feed ingredients [4]. The ash content contained in shallot peel nanoparticles was (9.43%). Ash content is an inorganic substance in the material that does not burn completely and does not evaporate in the combustion process. The ash content reflects the amount of minerals and inorganic elements in shallot peel flour. Protein has an important role in the formation of body tissues. Shallot peel nanoparticles contain crude protein of (7.12%). The shallot peel nanoparticles contain fat of (2.40%). Fats are organic compounds found in nature and are insoluble in water but soluble in non-polar organic solvents such as diethyl ether, chloroform, benzene, hexane and other hydrocarbons [5]. Based on the data from the proximate analysis, the values of crude protein and fat contained in shallot peel nanoparticles tend to be

low. Shallot peel is the outer tissue that protects shallots and has a relatively short cell lifespan. Tissues that have a short cell lifespan tend to have lower nutrient content compared to tissues that are active in growth [6]. The crude fiber content in shallot peel nanoparticles has a fairly high value of (30.98%). Shallot peel has a more dominant structural function than nutritional function, the structure of shallot peel is closely related to the crude fiber content in shallot peel. The high crude fiber content in shallot peel is due to the fact that the peel is the outermost part of the shallot which functions to protect the bulb from oxidative damage due to environmental influences and consists of cellulose, hemicellulose, and lignin [7].

Based on the data from the results of the proximate analysis which can be seen in Table 1. It shows that shallot peel nanoparticles have a low content of crude protein and fat, but shallot peel nanoparticles have a high content of dry matter and crude fiber. This result is in line with previous research which stated that shallot peel has a low crude protein and fat content of 2.47% and 0.42%, and has a high content of crude and crude fiber which is 36.64% and 41.45% [8]. Although shallot peel nanoparticles have a low crude protein and fat content, shallot peel nanoparticles have phytochemical content that can provide health benefits and increase productivity for livestock.

3.2 Analysis of Flavonoid Content of Shallot Peel Nanoparticles (*Allium ascalonicum L.*)

Sample of shallot peel nanoparticles (*Allium ascalonicum L.*) Flavonoid content analysis was carried out to determine the total quantitative content of flavonoids in shallot peel nanoparticles. Results of flavonoid content analysis from shallot peel nanoparticles (*Allium ascalonicum L.*) can be seen in Table 2.

Table 2. Results of analysis of flavonoid content of shallot peel nanoparticles (*Allium ascalonicum L.*)

Test Parameters	Result	Unit	Method
Total Flavonoids	14,01	% b/b	UV-Vis Spectrophotometry

Source: *Results of analysis by the Laboratory of Nutrition and Animal Feed, Faculty of Animal Husbandry, Universitas Brawijaya (2024)

Flavonoids are one of the chemical substances that can be found in plants, including in shallot peel. The total value of flavonoid content contained in shallot peel nanoparticles can be seen in Table 2. The results of laboratory analysis showed that the shallot peel nanoparticles contained total flavonoids with a high value of 14.01% b/b. The high content of flavonoids in shallot peel nanoparticles is also influenced by the high content of dry matter in shallot peel nanoparticles. Feed ingredients that have a high percentage of dry matter, can be assumed that the greater nutritional content is contained in the feed ingredients [9]. The high content of flavonoids in shallot peel nanoparticles has the potential to provide health and productivity benefits to livestock.

Flavonoids contained in shallot peel nanoparticles can act as antibacterial and improve the quality of intestinal morphology. Flavonoids act as antibacterial through various mechanisms such as inhibiting nucleic acid synthesis, inhibiting cell membrane function and inhibiting energy metabolism [10]. Flavonoid compounds can increase the height of the small intestine villi so that the absorption of feed nutrients is faster [11]. Flavonoid compounds can help the digestion process and absorption of nutrients contained in feed so that these nutrients can be beneficial to livestock [12].

4 Conclusion

These findings show that shallot peel nanoparticles are a rich source of flavonoids, with a high flavonoid content of 14.01% b/b. This high concentration of flavonoids is due to the sizable dry matter content of nanoparticles, which reflects their high nutrient density. The flavonoids in shallot peel nanoparticles offer a wide range of health and productivity benefits for livestock, acting as antibacterial agents through mechanisms such as inhibiting nucleic acid synthesis, disrupting cell membrane function, and disrupting energy metabolism. In addition, flavonoids improve intestinal morphology by increasing the height of the villi in the small intestine, thereby increasing the efficiency of nutrient absorption. This facilitates better digestion and maximizes the nutritional benefits of the feed. These properties highlight the potential of onion skin nanoparticles as valuable natural feed additives to support livestock health and productivity.

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

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