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by Ade Sukma

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The Antioxidant Activity, Total Phenolic Content, Fiber Content, Color, and Sensory Evaluation of Chicken Meatball with Addition of Pennywort Powder (*Centella asiatica* L.)

The Antioxidant Activity, Total Phenolic Content, Fiber Content, Color, and Sensory Evaluation of Chicken Meatball with Addition of Pennywort Powder (*Centella asiatica* L.)

S Melia[1], A Sukma[1], A Rakhmadi[1], F W Wati[1], L P Ani[1]

[1] Faculty of Animal Science, Universitas Andalas. Padang, Indonesia

Corresponding author's email address: srimelia75@ansci.unand.ac.id

Abstract. The purpose of this study was to find out the effect of pennywort powder fortification (*Centellaasiatica* L.) on antioxidant activity, total phenolic content, fiber content, and color of chicken meatball. The meat substance had used in this study was taken from egg-post-production chicken in LubukMinturun, Padang, and the pennywort powder made from pennywort leaves (*Centellaasiatica* L.). The experimental method had use 5 treatments 0% (control), 1%, 2%, 3% and 4% pennywort powder fortification. All treatments were conducted with four replications. The result shown utilize Pennywort Powder (*Cantellaasiatica L*) on post-production-leghorn meatball up to 4% increased antioxidant activity to 71.165%, phenolic content 457.05 mg GAE/Kg and fiber 15.35 %. However, the color pennywort powder decreases the value of L* (50.71 - 33.40), a* (1.08 - (-2.01)) and b* (11.15 - 10.18). To sum up, chicken meatball with pennywort powder fortification is still favored by consumers.
Keywords: Pennywort Powder; Chicken Meatball; Antioxidant Activity; Fiber.

1. Introduction

Processed meat products are most favored by Indonesians, such as meatball, rendang, sausage, jerky, and others. Various additives are used to improve quality and shelf life. [1] added 10% perilla seed, which improved the texture, polyunsaturated fatty acids (PUFAs), fat, and protein of meatball. [2] added tannin extract from gambier on rendang to extend shelf life. [3] added hemicellulose B to increase fiber content and decrease the fat of meatball.

This study used pennywort (*Centellaasiatica*) in the meatball. Pennywort has several nutritional properties.These properties have functional activities such as:enhancing blood purification, improving blood circulation, antipyretic activity [4]. Pennywort contains phytochemical components such as triterpenoids, saponins, flavonoids, tannins, steroids, and glycosides. Based on the preliminary study, pennywort powder has 33.76% antioxidant activity and 47.04 mg GAE/kg total phenolic content. The total phenolic content of pennywort powder is higher than the total phenolic content of dragon fruit. [5] found that dragon fruit had 9.09 mg GAE/kg total phenolic content, while the red beet was 16.15 mg GAE kg.

The nutritional contents of the meatball are dominated by protein, fat, and carbohydrates. On the other side, dietary fiber, β-carotene, other flavonoid compounds are deficient. Fat serves to improve flavor, texture, taste, and consumer acceptance [3]. To improve nutrition, taste, and palatability, several ingredients are added. This process is called fortification. Pennywort powder fortification in

rejected egg-laying chicken meatball is expected to make rejected egg-laying chicken meatball a functional food because of its antioxidant activity and high fiber content.

Functional food ingredients can be consumed with sensory characteristics in appearance, color, texture, and taste that are acceptable to consumers. Besides, the ingredients should not provide a contradiction and should not cause side effects on other nutrients [6]. The purpose of this study was to find out the impact of pennywort powder fortification (*Centellaasiatica*L.) on antioxidant activity, total phenolic content, fiber content, and color of chicken meatball.

2. Materials and Methods

This study used egg-post-production chicken from LubukMinturun farm, pennywort powder from pennywort leaves in the Faculty of Animal Husbandry, Universitas Andalas, tapioca flour, garlic, pepper powder, salt, and shaved ice.

Figure 1. Pennywort Leaf (*Centellaasiatica* L.)

2.1. Method

This study used Completely Randomized Design (CRD) with 5 treatments and 4 replications namely 0% (control), 1%, 2%, 3%, and 4% pennywort powder fortification.Data were analyzed statistically using analysis of variance and Duncan's Multiple Range Test (DMRT) with SPSS.

2.1.1. Measurement of antioxidant activity

One gram of sample was put into a test tube, dissolved in 10 ml of methanol, then stirred to make it homogeneous. After that, 2 ml of the sample was put into a test tube, added 1 ml of DPPH, and left for 15 minutes in a dark room. Finally, the sample was measured using a spectrometer with a wavelength of 117.

2.1.2. Measurement of total phenolic content

One gram of sample was put into a test tube, dissolved in 10 ml of methanol, then stirred to make it homogeneous, then extracted by ultrasonic for 15 minutes at 30 ° C. After that, 1 ml of the sample was put into a new test tube, added 2 ml of distilled water, 1 ml of folin, 1 ml of Na_2CO_3, stirred to make it homogeneous, the left for an hour in a dark room.Finally, the sample was measured using a spectrometer.

2.1.3. Measurement of the dietary fiber content

The ADF (Acid Detergent Fiber) analysis was carried out by weighing the crushed 1 gram of sample (a gram) and put it into 600 ml beaker. 100 ml of acid detergent solution was extracted using the electric heater for 1 hour after boiling. The extract was filtered using b gram of filter paper with the help of a vacuum pump. The residue was rinsed with 300 ml of hot water for ± 3 times. Then, the residue was dried in an oven at 105ºC for 8 hours. Finally, the residue was cooled in a desiccator for

30 minutes and weighed (c gram). The percentage of fiber content can be calculated by the following equation.

$$\text{Fiber content} = \frac{\text{ash weight} - \text{paper weight}}{\text{sample weight (gr)}} \times 100\% \quad (1)$$

2.1.4. Measurement of color

This analysis used Hunter lab color Flex EZ spectrophotometer. The measurement of color used Hunter L* (white), a* (red), and b* (yellow) color scale. The chromameter was first calibrated with white as standard. The result of measurement was in the form of L*, a*, and b *.

2.1.5. Sensory evaluation

The consumer acceptance of chicken meatball with pennywort powder was evaluated on its taste, flavor, and texture on 30 staff of the Faculty of Animal Husbandry, UniversitasAndalas. There are five-point hedonic scale used namely(1 = extremelydislike; 2 = slightly dislike; 3 = neither like nor dislike; 4 = slightly like; 5 = extremely like).

3. Results and Discussion

3.1. Antioxidant activity

Table 1. Antioxidant activity of chicken meatball

Pennywort powder (%)	Antioxidant activity (%)
Kontrol	34.15[b]
1	67,14[a]
2	80,90[a]
3	71,10[a]
4	71,16[a]

Description: Different superscript letters indicate a significant difference (P<0.05).

Based on Table 1, the antioxidant activity of chicken meatball with pennywort powder (Centellaasiatica L) was ranged from 34.15 - 80.90%. The highest antioxidant activity was found in 2% pennywort powder is 80.90%, while the lowest was found in the control or meatball without pennywort powder is 34.15%. Pennywort powder chicken meatball had a significant effect on (P <0.05) antioxidant activity.

The lowest antioxidant activity in control was caused by the absence of pennywort powder. The antioxidant activity content of the controls was only affected by the antioxidant activity of tapioca flour and pepper. According to [7], the antioxidant capacity of pepper was 200-500 mg EVC 100 g-1.

The highest antioxidant activity was found in 2% pennywort powder is 80.90%. However, antioxidant activity was insignificant in 1%, 3%, and 4% pennywort powder. According to [8], pennywort contains antioxidants both in antioxidant enzymes and antioxidant vitamins. The antioxidant enzymes in pennywort include superoxide dismutase, catalase, and glutathione peroxidase. While the antioxidant vitamins in pennywort are vitamins E and C. Apart from these compounds, pennywort also contains flavonoids. Based on the preliminary study, pennywort powder had a 33.86% antioxidant activity.

Pennywort is rich in antioxidants and can cure liver disorders including hepatitis; besides that, pennywort can also treat measles, fever, and sore throat because it has high anti-inflammatory anti-infection content. The extract of pennywort leaves can function as a hepatoprotector because it can increase antioxidant enzymes such as superoxide dismutase (SOD), catalase, glutathione peroxidase, and antioxidant glutathione (GSH). These enzymes are mostly found in the liver, responsible for detoxifying and binding harmful substances to the bod [9].

3.2. Total phenolic content

Table 2. Total phenolic content of chicken meatball.

Pennywort powder (%)	Mean of mg GAE/Kg
0	121,21[d]
1	162,78[cd]
2	255,36[bc]
3	331,15[b]
4	457,05[a]

Description: Different superscript letters indicate a significant effect (P<0.05)

Based on Table 2, the total phenolic content of chicken meatball with pennywort powder (Centellaasiatica L) was ranged from 121.21 – 457.05 mg GAE/Kg. The highest total phenolic contentwas found in 4% pennywort powder, 457.05 mg GAE/Kg,while the lowest was found in the control or meatball without pennywort powder is 121.21 mg GAE/Kg. Pennywort powder in chicken meatball had a significant effect on (P <0.05) total phenolic content.

The lowest total phenolic content in control was caused by the absence of pennywort powder. Phenolic content that can be produced from simple molecules is phenolic compounds to complex molecules is tannins, which can dissolve in methanol solvent [10]. The highest total phenolic content was found in 4% pennywort powder is 457.05 mg GAE/Kg. The increase in total phenolic content for rejected egg-laying chicken meatball was due to the phenolic compounds in pennywort powder. Phenolic or polyphenolic compounds are in the form of flavonoids. The ability of flavonoids as antioxidants have been widely studied, where flavonoids can convert or reduce free radicals and also as anti-free radicals. [11] added that flavonoids from the types of flavones, flavonols, isoflavones, and chalcones are bioactive compounds for anti-cancer because they have antioxidant activity. Based on the preliminary study, pennywort powder had a 47.04 mg GAE/Kg total phenolic content.

3.3. Fiber Content

Table 3. The fiber content ofrejected egg-laying chicken meatball.

Pennywort powder (%)	Mean (%)
0	9, 33[b]
1	10,03[b]
2	10,17[b]
3	13,02[ab]
4	15,35[a]

Description: Different superscript letters indicate a significant difference (P<0.05)

Based on Table 3, the fiber content of chicken meatball with pennywort powder (Centellaasiatica L) was ranged from9.33 % - 15.35 %. The highest fiber content was found in 4% pennywort powder,15.35%,while the lowest was found in the control or meatball without pennywort powder,9.33%.Pennywort powder in rejected egg-laying chicken meatball significantly affected (P <0.05) fiber content.

Three percentage pennywort powder was still not able to affect the fiber content of rejected egg-laying chicken meatball, so that the fiber content of rejected egg-laying chicken meatball was almost the same. However, 4% of pennywort powder could increase fiber content. [12] stated that 10% -30% pennywort in the crackers increased 1.34% -1.77% fiber content.

The increase in fiber content occurred in line with the decrease in tapioca flour and the increase in the percentage of pennywort powder. This is because pennywort powder contains relatively high fiber content. As stated by [12], pennywort had 8.89% crude fiber content, while tapioca flour was only 0.4% [13]. With a decrease in the percentage of tapioca flour and an increase in the rate of pennywort powder, there was an increase in fiber content due to higher crude fiber content.

Dietary fiber is different from crude fiber. Dietary fiber consists of complex carbohydrates from plant cell walls that cannot be digested by digestive enzymes and cannot be absorbed by the human digestive system. Meanwhile, crude fiber cannot be hydrolyzed by chemicals such as H_2SO_4 and

NaOH. Although it cannot be digested and absorbed by humans, dietary fiber has a function for health to prevent various degenerative diseases [14].

3.4. Measurement of color

Table 4. L*, a*, and b* of chicken meatball

Pennywort powder (%)	L (Lightness)	a* (Redness)	b*(Yellowness)
0	50,71[a]	1,08[a]	11.15[a]
1	41,32[b]	-1,38[b]	10,95[a]
2	35,95[c]	-1,42[b]	10,50[b]
3	35,63[c]	-2,05[c]	10,54[b]
4	33,40[d]	-2,01[c]	10,18[b]

Description: Different superscript letters indicate a significant difference (P<0.05)

Based on Table 4, the L value (*Lightness*) of chicken meatball with pennywort powder (Centella asiatica L) was ranged from 50.71 – 33.40.The highest lightness was found in control is 50.71,while the lowest lightness was found in 4% pennywort powder, 33.40. Pennywort powder in chicken meatball decreased the lightness (P <0.05).

The color of the controlwas the brightest because there was no pennywort powder. This is in line with a statement by [15] that the lower the reading of the tool, the darker the color will be, while the higher the task of the instrument, the brighter the color will be. 4% pennywort powder was the darkest due to chlorophyll in pennywort. This is in line with a statement by [16] that pennywort has 831.5 mg/kg chlorophyll.

The a* (*Redness*) value of chicken meatball with pennywort powder (Centella asiatica L) was ranged from 1.08 – (-2.01). The highest a* value was found in control is1.08,while the lowest was found in 3% pennywort powder is -2.05. Pennywort powder in rejected egg-laying chicken meatball decreased the a*(P <0.05). The meatball with 3% pennywort powder was blackish green. This is in line with a statement by [15] that the readings from the chromameter are in the form of negative to positive number intervals. Numbers in the positive (+) interval indicate an object is getting redder, while numbers in the negative (-) interval indicate an object is getting greener.

The b* (*Yellowness*) value of chicken meatball with pennywort powder (Centellaasiatica L) was ranged from 10.18 – 11.15.The highest b* (*Yellowness*) value was found in control is11.15,while the lowest was found in 3% pennywort powder is 10.18. Pennywort powder in chicken meatball decreased the b*(*Yellowness*).

The b* (*Yellowness*) pada chromameter showed the intensity color of the yellowof the product.The readings from the chromameter are in the form of negative to positive number intervals. Numbers in the positive (+) interval indicate an object is getting more yellow, while numbers in the negative (-) interval show an item is getting more blue [15]. The highest b * (Yellowness) in control was due to the absence of pennywort powder on the meatball so that the dominant color came from tapioca flour and chicken meat.

[17] reported that in Malaysia, the meatball had 69.61-77.96 (L*), -2.02-0.33 (a*), and 15.66-19.70 (b*). Ran et al. (2020) found that perilla seed in meatball decreased L* and b*. In this study, decreasing L* was caused by chlorophyll in the pennywort that affects the L* of the meatball.

3.5. Sensory Evaluation

Sensory evaluation of chicken meatball with pennywort powder can be seen in Figure 1. Pennywort powder fortification had no significant influence on (P>0.05) the consumer acceptance of taste, aroma, and texture. The average consumer acceptance of taste was 2.40 - 2.96, the flavor was 2.04 - 2.92, and texture was 2.04 - 2.92.

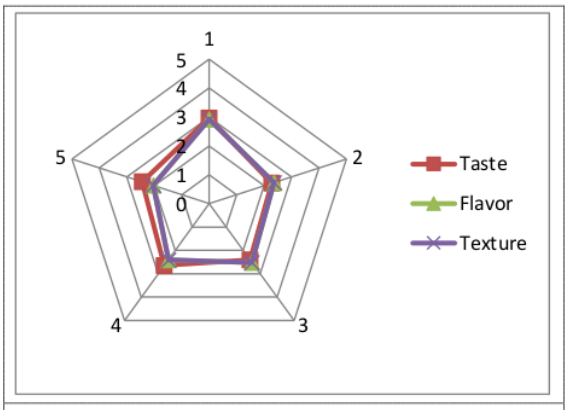

Figure 2. Consumer acceptance of chicken meatball

4. Conclusion

Up to 4% pennywort powder (Centellaasiatica L.) in chicken meatball increased 71.165% antioxidant activity, 457.05 mg GAE/Kg total phenolic content 15.35% fiber. Based on the measurement of color, pennywort powder decreased the L * (50.71 - 33.40), a * (1.08 - (-2.01)) and b * (11.15 - 10.18) values. Consumers still favor chicken meatball with pennywort powder.

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