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RESEARCH PAPER

Potential of Pandanus Odorifer (Sea Pandan) Fruit as a Supplement to Increasing Chicken Appetite

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Abstract: *Pandanus odorifer* (sea pandanus) is a plant that is commonly found in Bengkulu coastal areas, and research on this plant has not been done much. The results of previous studies show that sea pandanus with *Pandanus tectoricus* species contains primary and secondary metabolite compounds, especially in fruit that can be used as antioxidants, anti-bacteria, and others. This study aims to utilize unused *P.odorifer* fruit as a supplement to increase the appetite for Broiler chicken. Test animals used in the research are 7-day-old Broiler chickens. The *P.odorifer* samples used as supplements were obtained on the Sungai Suci Bengkulu Tengah Coast. Chickens were given four treatments, P0 control (1mL aquades/day), P1 supplement dose (0.5g/10mL), P2 dosing supplements (1g/10mL), and P3 dose supplement (1.5g/10mL). In general, the study results showed that *P.odorifer* fruit has the potential to be used as a supplement to increase the appetite of Broiler chicken, with a fat content of 3.92%, carbohydrate of 58.08%, and protein of 2.13%. The study results showed a significant effect of supplementation *P.odorifer* on Broiler chicken appetite, which was characterized by increasing body weight and eating portions. T-test results of the body weight and portion of the control group and the treatment group, the value of sig (2-tailed) ρ: 0.021 and sig (2-tailed) ρ: 0.016 and with value (α): 0.05, value ρ <α. And based on the results of the Completely Randomized Design analysis, the increase in the effect of *P.odorifer* supplements on Broiler chicken appetite is maximum at a concentration of 1.5gr/10mL weighing the 20 days of treatment with an F value <0.05.

Keywords: Appetite supplement, Pandanus odorifer, chicken appetite.

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INTRODUCTION

Food is one of the basic human needs that must be fulfilled. The primary food sources can be biological, animal, and water sources, both processed and unprocessed. Food is intended as food or drinks for the consumption of living things, including food additives and other materials used in preparing, processing, or making food or drink [1]. One example of a food additive is a supplement, i.e., a product that contains nutrients that are believed to have beneficial effects on health [2]. Supplements are usually used to complement food intake, not interpreted as a substitute for food.

Appetite-enhancing supplements function to increase metabolism and suppressor inhibit stomach acid. It stimulates the secretion of food to increase appetite [3]. Supplements are usually in the form of capsules, tablets, powders, or liquids that are used as a complement to the nutrients needed so that the body's vitality remains excellent. Supplements can be made from substances found in animals or plants [4].

Indonesia is a country located in the tropics, making Indonesia a center for biodiversity, especially plants. The community uses various plants as clothing, food, boards, and even medicinal plants. Indonesia, thus making Indonesia one of the potential drug-producing countries [5].

Each plant has metabolites in it, namely primary and secondary metabolites. Secondary metabolites do not play an active role in plant growth. Secondary metabolites have various functions, including attracting pollinating insects, protecting against environmental stress, protecting against pests/diseases (phytoalexins), protecting against ultraviolet, as plant regulators, and competing with other plants (allelopathy) [6]. Primary metabolites are molecules with high molecular weight and have relatively the same structure in every organism, such as carbohydrates, fats, proteins, and vitamins that plants usually use for growth [7]. Plants that contain metabolites can be exemplified, such as Pandanus (Pandanaceae).

The genus Pandanus (Pandanaceae) plants are distributed throughout Africa, Australia, Borneo, India, Madagascar, Malaya, Mauritius, New Caledonia, Papua, the Philippines, Sao Tomé Island, Seychelles, Solomon Islands, and Thailand and consist of about 600 species [8]. Several research results on the Pandanus genus have been carried out, including Pandanus conoideus Lam, which can lower the blood LDL of diabetic rats (Rattus norvegicus L.) [9]. Pandanus tectorius from the pulp and fruit core showed high total phenolic content and chemical elements (flavonoids, steroids, triterpenoids, saponins, and glycosides) that contributed to the antioxidant capacity antibacterial activity against B. subtilis, S. aureus, E. coli., and P. aeruginosa [10].

It was also reported that the P.tectorius fruit contains quite high nutrients including protein 2.42-3.66%, fat 4.46-4.86%, ash 6.19-7.56% and carbohydrates 56.8-63, 6%, and contains calcium (742-864 mg/100g), iron (16.9-21.8 mg/100g), and -carotene (108-456 ppm) [11].

P.odorifer fruit also contains vitamin C, thiamine, riboflavin, and niacin and 4.46% fat [12]. P.odorifer can be consumed by living things. Residents in the Pacific Islands and Micronesia use fruits as food by consuming them fresh or as meat. Fruit is extracted and cooked or preserved [13].

P.odorifer plants in Indonesia grow wild along the northern coast of Java, Sumatra, and other islands [14], especially in tropical and subtropical coastal vegetation where it can withstand drought and wind tight and can be found at altitudes up to 3,300 m above sea level. The distribution of P.odorifer is found throughout the world in various forms. This tree is found in Polynesia, South Asia, Northern Australia, the islands of Madagascar and Seychell [15]. Pandanus plants are commonly found in Bengkulu coastal areas, especially on the coast, which is generally P.odorifer, but many Bengkulu people still do not know the benefits.

Research on this P.odorifer plant has not been found, most of which are P.tectorius species that have been proven to contain chemical compounds, antioxidant activity, vitamin content, fat, carbohydrates, and protein. Therefore, researchers are interested in researching the potential of P.odorifer fruit as a supplement to increase appetite in broiler chickens.

MATERIALS AND METHODS

The research was conducted from January to March 2020 at the Chemistry Education Laboratory, FKIP, and in the Basic Science Laboratory, Bengkulu University, Indonesia.

Material.

The sample used was the Pandanus odorifer fruit which was taken in the Sungai Suci in Central Bengkulu. Ripe fruit was cleaned, cut into small pieces, mashed, added distilled water, and filtered.

Preparation.
In the injection of chicken made into several treatments:
P0 (control) = 1 mL of distilled water
P1 (Treatment) = 0.5 g of sample dissolved in 10 mL of distilled water
P2 (Treatment) = 1 g of sample dissolved in 10 mL of distilled water
P3 (Treatment) = 1.5 g of sample dissolved in 10 mL of distilled water [16]

Data Analysis.

Collecting data obtained from the test of the effect of suspension on the bodyweight of mice was analyzed by the Oneway ANOVA (Analysis of Variant) test. Paired sample t-test results obtained values of sig (2-tailed): 0.000 and: 0.05, meaning that there is an effect of Pandanus odorifer Pandan Laut fruit on chicken appetite with an influence strength of 95% and a positive direction [17]. T-test measurements were carried out using the SPSS (Statistical Package for the Social Sciences) application.

Collecting the data obtained, analyzed by randomized design test, the RAL test obtained the results of sig F-count > F-table or sig value < (0.05), seeing the effect of chickens that were given supplements and not given [18].

RESULTS AND DISCUSSION

Determination of fat, carbohydrate and protein levels in *Pandanus odorifer fruit*.

In this study, the determination of fat, carbohydrate, and protein levels in *P.odorifer* aims to determine whether this plant can be used as a food supplement to increase appetite and weight. Dietary supplements are products used to complement the nutritional needs of foods, containing one or more ingredients in carbohydrates, fats, proteins, vitamins, minerals, or other materials (both derived from plants and non-plants) that have good nutritional value [19].

Table 1. Results of Determination of *P.odorifer* Fruits Fat Content

Sample Weight (g)	Container weight (g)	Container weight + weight Sample (g)	Fat content (w/w) %
5.2689	118.5761	118.7825	3.92

Determination of fat content was carried out on January 14, 2020, at Bengkulu University Basic Science Laboratory. The sample was obtained at Sungai Suci Beach, Central Bengkulu and the preparation was in the form of a mashed sample.

Measurement of fat content was carried out by soxhletation method using n-Hexane as solvent. The results of determining the fat Content of *P odoriferi* fruit can be seen in Table 1.

Based on the results of determining the fat content in *P.odorifer* fruit, there is a difference in the fat content in *P.tectorius* fruit. The difference is due to the different species of fruit used, and the influence of the environment in which the fruit grows is very influential. The development of fruit ripening greatly affects the chemical composition and active components of the fruit, so it can be used in determining the optimal harvest time to prevent deterioration in fruit quality before processing [2].

The advantages of using this soxhletation method are that the amount of solvent used is relatively small, and the components to be extracted can be separated perfectly because they are circulated many times. The number of samples used is only small.

Determination of carbohydrate content was carried out on January 15, 2020, at Bengkulu University Basic Science Laboratory, done using the Luff School method. The first process carried out was sample preparation. The *P.odorifer* fruit sample was hydrolyzed using 25% HCl with the help of heating at 100° using reverse cooling for 3 hours. The results of determining the carbohydrate content of *P.odoriferi* can be seen in Table 2.

Table 2. Results of Determination of *P.odorifer* Fruit Carbohydrate Content

Sample Weight (g)	Titrant Volume (ml)		Carbohydrate Content % (v/w)
	Blank	sample	
2041.2	54.30	34.30	58.08

The carbohydrate content of *P.odorifer* fruit at 58,08% was different from that of *P.tectorius*, which was 71.6%. The difference is the same as the fat content due to the different species used, the influence of the environment in which the fruit grows, and the optimization of different fruit collection times.

Protein content was determined on January 16, 2020, in Bengkulu University Basic Science Laboratory, performed using the Kjeldahl method with three stages: destruction, distillation, and titration. The results of determining the carbohydrate content of *P.odoriferi* can be seen in table 3.

Based on the results of the determination of the protein content of *P.odorifer*, it turned out that there were not far enough differences in *P.tectorius*. The protein content of *P.tectorius* fruit was 2.8% [20]. This difference was the same as fat and carbohydrates due to different fruit species, the influence of the environment where the fruit grew, and the optimization of different fruit picking times.

Table 3. Results of Determination of *P.odorifer* Fruit Protein Content

Sample Weight (g)	Titrant Volume (ml)		Protein Content % (v/w)
	Blank	sample	
0,5	38,30	43,20	2,13

This method has the advantage that it is the most commonly used method for determining crude protein content, is accurate, can be applied to all types of food, and is relatively simple and economical.

This test was conducted to determine the effect of giving a *P.odorifer* suspension which is thought to be a dietary supplement because it contains 3.92% fat, 58.08% carbohydrates, and 2.13% protein. Dietary supplements are finished products used to help supplement the daily diet. Dietary supplements contain one or more ingredients such as vitamins, minerals, amino acids, secondary metabolites, carbohydrates, plants, or materials derived from plants [21].

The study was conducted on January 16, 2020, on Jl. Cempaka X Kebun Beler , Bengkulu . Dietary supplements were tested on animals in the form of 7-day-old broiler chickens (DOC), which were obtained from PT. Japfa has been vaccinated at the hatchery. There were 20 DOC chickens used in this test, consisting of 4 treatments P0 (given aquadest), P1 (given a supplement of 0.5gr/10mL), P2 (given a supplement of 1gr/10mL), and P3 (given a supplement of 1.5gr/ 10mL). Each chicken is given the same conditions, the same amount of food, and the same conditions. The food given to chickens is BR I for chickens under 20 days old and BR II for chickens over 20 days with a Gold brand.

Chickens are given food twice a day; on the first day, 3.75g/feed. On the fourth day, 7.5g/feed, on the eighth day, 10g/feed, the twelfth day is given 12.5g/feed, the sixteenth day is given 20g/feed, and on the twentieth day, 25g/gift. The provision of food follows the development of the chicken's weight. As the weight of the chicken's increases, the food provided also increases. Seeing the effect of supplementation on the weight and appetite of the chickens, the weight and food portions were weighed once every 4 days.

It can be seen in the data on the average increase in food portions and weight of chickens per day for 20 days in Table 4.

Tabel 4. Average Increase in Food Portions and Weight of Chickens per Day

Repetition	Average Weight Gain (gr)			
	control group	Treatment		
		0.5 g/mL	1 g/mL	1.5 g/mL
1	0.04	0.05	0.06	0.17
2	0.03	0.09	0.12	0.09
3	0.09	0.14	0.13	0.13
4	0.06	0.07	0.1	0.14
5	0.07	0.08	0.07	0.17
Repetition	Increase in Average Meal Portions (gr)			
	control group	Treatment		
		0.5 g/mL	1 g/mL	1.5 g/mL
1	0.81	0.91	1.93	4.92
2	0.38	0.79	7.38	5.36
3	0.66	6.33	2.7	3.48
4	0.16	4.57	3.99	5.82
5	0.27	0.46	4.34	5.1

Based on the data in Table 4 in the control group, it is known that the average

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increase in food portions is 0.09 g/day with a maximum average weight increase of 0.81 g/day. In the treatment group with 0.5 g/10mL suspensions the maximum increase in meal portions is 0.14 g/day. A maximum increase in body weight of 6.33 g/day in the treatment group with 1g/10mL suspension, a maximum increase in meal portions of 0.13 g/day with a maximum weight increase of 7.38 g/day and the treatment group with 1.5 g/10mL suspension, an increase in portion eat a maximum of 0.17 g/day and a maximum weight gain of 5.82g/day. From these data, it can be said that in the control group, there was an increase in the portion of eating that was smaller, so the increase in body weight was also small. The influence of the supplements given can cause an increase in body weight and appetite. Appetite-enhancing supplements function to increase metabolism and stimulate food secretion so that there is an increase in appetite.

The average increase in body weight and food portions was carried out by statistical tests, namely the T-Test Two Sample Paired Paired Effects of *P.odorifer* on chicken body weight. In the data analysis of the Two-Sample Paired T-Test, the effect of *P.odorifer* fruit on chicken body weight can be seen in Table 5.

Table 5. T-Test Results of Two Paired Samples on Body Weight

Variable	Sample	α	Significant Value (ρ)
The average weight score of the control group and the average weight score of the treatment group	20	0.05	0.021

The analysis table from chicken weight shows that data analysis using paired sample t-test on the weight of chickens in the control and treatment groups obtained the results of sig (2-tailed): 0.021 and error level (α): 0.05. So the value of < α. It was proven that there was an effect of *P.odorifer* fruit on chicken body weight.

The paired sample t-test value with a 95% confidence level obtained a difference range of -4.83 to -0.44. The value of the difference range is not far enough but is in a positive direction, meaning that the more often chicks consume *P.odorifer* fruit supplements, their appetite will increase, marked by increased weight.

The results of the Two-Sample Paired T-test of the effect of *P.odorifer* fruit on chicken appetite can be seen in Table 6.

Table 6. T-Test Statistical Test Table of Two Paired Samples of Meal Portions

Variable	Sample	α	Significant Value (ρ)
The average score of the control group's meal portions and the average score of the treatment group's meal portions	20	0.05	0.016

From the table of chicken meal portion analysis, it is known that data analysis using paired sample t-test on the weight of chickens in the control group and the treatment group obtained the results of sig (2-tailed): 0.016 and error level (α): 0.05, so that the value of < so that it is proven that there is an effect of *P.odorifer* fruit on the portion of food or appetite of chickens.

The paired sample t-test value with a 95% confidence level obtained a difference of -0.08 to -0.01. The value of the difference range is not far enough but in a positive direction, meaning that the more often chicks consume *P.odorifer* fruit supplements, the appetite will increase, marked by increased food portions.

The conclusion from the data can be said that *P.odorifer* fruit has the ability as a supplement to increase appetite, which is characterized by significant differences in increasing food portions and body weight based on T-test analysis with a value of <0.05. Completely Randomized Design data was also tested using the Statistics application to determine the effect of supplements on body weight. The value of F<0.05 on the 20th day of weighing was obtained.

P.odorifer fruit, based on testing, contains carbohydrates, fats, and proteins with a total content of 64.13%. The content of *P.odorifer* is not much different from *P.tectorius* which contains carbohydrates, protein, fat, minerals (iron and calcium), beta carotene, and vitamins (Pro-vitamins A, B, B3, and the highest is vitamin C)., so it can be said

that the rest of the content that is not tested has the same probability.

The nutrients contained in this fruit cause an increase in better metabolism in chickens. It causes an increase in appetite, which is characterized by body weight. Measurement of fat content in chicken meat after treatment can be seen in Table 7.

Table 7. The fat content of chicken meat after treatment

Treatment	Fat level %
P0 (Control)	10.21
P1 (Suplement 0,5g/10mL)	5.86
P2 (Suplement 1g/10mL)	3.05
P3 (Suplement 1,5g/10mL)	0.91

This test shows that chickens given supplements have less fat content in meat than those not given supplements. The fat content in chickens given the largest dose of supplements had less fat in the meat, so it can be said that the chicken feed eaten is absorbed into energy and undergoes a good metabolism.

Fat synthesis in chicken occurs in hepatic and non-hepatic. Usually, it occurs hepatically (directly) in the liver, capable of forming 95% fat, but non-hepatic fat formed can be reduced by 10% because it combines with cholesterol and vitamins to form mixed micelles that are activated by bile salts. Mixed micelles are fats that can be absorbed, usually in the intestines (jejunum and ileum). These mixed micelles can be broken down into cholesterol, vitamins, mono glycerol, FFA, and short-chain free fatty acids (SCFFA) and go to the lymphatic ducts to be metabolized into energy. [21].

The fat absorption process in the intestine is influenced by the probiotics contained in the chicken intestine. Probiotics can inhibit fat absorption in the intestinal lumen, thereby reducing fat absorbed and circulated by the blood [22]. Supplements in microbial cells can be beneficial for animals that consume them and function as a balancer for the digestive tract.

P.odorifer fruit has antioxidant ability and antibacterial activity, such as *B. subtilis, S. aureus, E. coli, and P. Aeruginosa*. This causes the addition of probiotics and balance in the digestive tract in the chicken intestine so that the chicken absorbs little fat, and low-fat chicken is formed as research has done. Likewise, with protein and carbohydrates, the digestive tract will reflect the ability of the small intestine to absorb protein [23]. Protein digestibility will be illustrated from the feed given because chickens can digest crude protein by 75-90% [24].

Chickens will absorb carbohydrates through the small intestine, digestion begins in the crop, there is an enzyme sucrase which is able to break down sucrose into glucose and fructose, maltase converts maltose into glucose, mechanically and hydrolysis occurs, followed by pancreatic enzymes, bile, and intestinal juices.

The digestive process can only hydrolyze simple carbohydrates, while crude fiber cannot be degraded on a large scale. Some of the crude fiber passing from the main digestive organs enters the organs at the end of the digestive tract (cecum, rectum, colon) in the miles section; fermentation occurs [25].

This suspension-shaped supplement contains solids in it that cannot be dissolved. These solids are in the form of fiber derived from *P.odorifer* fruit. Fiber can be digested by broilers, as stated [26], because chickens can digest crude fiber, especially broilers, by 5-7.5%.

CONCLUSION

In general, *Pandanus odorifer* (Pandan Laut) fruit has the potential as an appetite-increasing supplement. The test results for the content of primary metabolites of *P.odorifer* fruit showed that it contained 3.92% fat, 58.08% carbohydrates, and 2.13% protein. Based on the results of the statistical analysis of the T-test of body weight and meal portions of chickens in the control group and the treatment group, it was found that the value of sig (2-tailed) for chicken body weight with value: 0.021 and meal portion: 0.016 < (α): 0.05. In conclusion, the increase in the effect of supplements on chicken appetite was maximum at a concentration of 1.5g/10mL weighing on day 20 of treatment with an F value < 0.05.

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