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Flavonoid content analysis of brebes red onion skin waste flour as a low-cholesterol duck fodder mixture

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ABSTRACT

Brebes is one of the district regency in Central Java province which is famous for the production of red onions and salted eggs. This affects the percentage of onion waste produced and the need for duck fodder which is always increasing in price. The aim of this research is to make flour from raw material of red onion skin as a mixture of duck fodder. The research was done experimentally by testing the flavonoid content in red onion skin, making red onion skin flour, and testing the flavonoid content of red onion skin flour. The results showed that the flavonoid content of red onion skin was 3.54% and the flavonoid content of red onion skin flour was 4.35%. So, it can be concluded that red onion skin flour is suitable for mixed with duck fodder to get low-cholesterol duck.

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1. INTRODUCTION

Brebes is well known as the biggest regency in producing red onion in Indonesia. The contribution of Brebes Regency in red onion production is 18.5% of the total national production and 57% of the total production of Central Java province. The production of red onion in Brebes Regency in 2020 is 3.8 million quintals with an harvested land area of 38.9 thousand hectares. This states that there was an increase in production by 26.6% compared to the previous year with a total production of 3.03 million quintals [1].

The large production of red onion also affects the amount of red onion waste stockpiles which, if not managed properly, will have an impact on the surrounding environment. Based on observations in the field, most of the onion skin waste in Brebes Regency is just thrown away, even though if it is processed properly it can still be used for various things. Red onion in the form of tubers that have the outermost part which is usually called the skin still have food reserves containing flavonols of 3.82 mg/kg from the flavonoid group which has antioxidant activity [2].

The raw of red onions contain lots of antioxidants, such *asmethylallyl sulfideor* often referred to as sulfur compounds containing amino acids. The sulfur in the onion skin functions as a substance to reduce Low Density Lipoprotein (LDL) levels and increase High Density Lipoprotein (HDL) in the blood. In addition, red onion also contains flavonoids which are included in the group of natural

polyphenolic compounds *quercetin*. *Quercetin* is a natural polyphenolic flavonoid which is believed to have widespread health benefits due to a combination of its properties. Quercetin (Que), a widely distributed flavonoid in the human diet, exerts neuroprotective action because of its property to antagonize oxidative stress [3].

The benefit of quercetin is that it can be used as an HDL enhancer which functions as a prevention of constriction of blood vessels due to fat and suppresses LDL which is one of the causes of narrowing of blood vessels [4]. Flavonoids have the ability to coordinate metal ions to interact with peptidases whose catalytic activity has important effects on health [5]. Red onion contains *anthocyanin* type *cyanidin* which gives a red or purple color and flavonols (quercetin) produce a brown color [6]. Quercetin (5,7,30,40-flavon-3-ol) is one of the most numerous flavonoids occurring in the world of plants. Quercetin as a ubiquitous plant compounds occurs widely in vegetable food products such as tea, fruit juices, wine and honey [7].

Besides red onions, Brebes Regency is also well known in producing salted egg processed foods. Salted eggs are mostly developed from duck farms that are widely developed here. Duck farming has become an agribusiness commodity that is quite familiar and well known in Brebes. Ducks farming in Brebes Regency are still cultivated traditionally in general and still very influential on income also people's productivity and earnings [8]. Besides duck eggs, the meat is also widely used as processed foods such as satay and rica-rica. Duck meat is relatively much liked by the public. The limited supply of meat for broilers opens up opportunities for breeders to raise male ducks of the laying type to be used as meat producers. Currently, people tend to like low-fat duck meat, so it is necessary to make efforts to reduce the fat content in duck meat [9].

The number of ducks circulating in the community both processed duck meat and eggs which indirectly affects cholesterol level in the body when continuously consumed. Cholesterol is a part of the fat component, which is the most calorie-dense energy. In addition, cholesterol is also a source of essential fatty acids, as a solvent for vitamins A, D, E, and K. A quarter of the cholesterol contained in the blood comes from the digestive tract which is absorbed by food, and the rest is produced by the body by liver cells [10].

Cholesterol is distributed by lipoproteins with the type of LDL through the blood and circulated throughout the body. Cholesterol is not directly soluble in the blood because it bonds with proteins so that it becomes a compound that can dissolve in the blood, so it is often referred to as lipoprotein as a carrier of cholesterol in the blood. If there is excess cholesterol in the body, it will be transported back by a lipoprotein called HDL to the liver where it will then be broken down and thrown into the gallbladder as bile acids. HDL contains less fat than LDL so that LDL floats in the blood and has the potential to cause cholesterol to stick to blood vessel walls. While LDL in the process functions as a cleanser of excess cholesterol from the walls of blood vessels and transports it back to the liver [10]. Based on this, it is very relevant to conduct a research on the manufacture of onion skin flour which is rich in flavonoids as a feed mixture as a lowering cholesterol level in ducks.

2. RESEARCH METHOD

Flavonoid content analysis research in Brebes red onion skin waste was used experimental method. The red onion skin flour was made by drying as much as 5 kg of onion skin in direct sunlight for two weeks until the water content is reduced by 90%. Furthermore, it is milled with a grinding machine and sieved to obtain fine onion skin flour, after that it is ground again to get a smooth and homogeneous onion skin flour.

The flavonoid content test was carried out on samples of onion skin before and after being processed into flour. The flavonoid content test aimed to determine the levels of flavonoids in onion skin with onion skin flour. The level of flavonoids testing was used the UV-Vis spectrophotometer method. Determination of maximum wavelength *quercetin* performed with running solution on range wave length between 400-450 nm. These results indicate the maximum wavelength is 435 nm. This wavelength was used to measure the absorbance of samples of dried onion skin and onion skin flour.

3. RESULTS AND DISCUSSIONS

The expected result of this study is to know the contents of flavonoids (quercetin) which will be used as the basis for mixing low-cholesterol duck fodder. The first step used in the flavonoid analysis was making a standard quercetin.curve, carried out by weighing 25 mg of the standard quercetin then dissolved in 25 mL of ethanol. The stock solution was pipetted 1 mL and the volume was made up to 10 mL with ethanol to obtain a concentration of 100 ppm. From the quercetin solution then divided into several concentrations, namely 6 ppm, 8 ppm, 10 ppm, 12 ppm, and 14 ppm. Determination of the total flavonoid content was carried out by weighing 15 mg of the sample then dissolved in 10 mL of ethanol to obtain a concentration of 1500 ppm. From each standard solution and sample solution, 1 mL was taken and 1 mL $AlCl_3$ 2% as added 3 2% and 1 mL of 120 nm potassium acetate. Furthermore, the onion skin samples were incubated at room temperature. The absorbance was determined using a spectrophotometric method with a maximum wavelength of 435 nm [10]. Meanwhile, samples were made in 3 replications for each analysis and the average value of absorbance was obtained.

Based on the result of the study, the content of flavonoids (*quercetin)* is shown in Tabel 1 as follow:

Table 1. The content of flavonoids (quercetin) in the red onion skin and red onion skin flour

Sample	The content of quercetin in red onion skin (% b/b)	The content of quercetin in red onion skin flour (% b/b)
I	3,54	4,35
II	3,53	4,34
III	3,56	4,35
Total	3,54	4,35

Based on the data above, it can be concluded that the flavonoid content (quercetin) in red onion skin flour are greater than the skin dry red onion, which is 4.35% b/w, this is because all of the quercertin in the flour can be homogeneously dissolved in the solution used in the absorbance measurement process. With the presence of flavonoids in shallot flour, it can be concluded that onion skin flour can function as a lowering of cholesterol levels in ducks when it mixed with the duck fodder that is consumed. This is because cholesterol is a metabolite containing sterol fats which are found in cell membranes and circulated into plasma. Basically cholesterol is a type of lipid which is a fat molecule or something similar and is a special type of lipid called a steroid. Cholesterol is the most important steroid from animal organs and makes up 17 percent of the dry matter of the brain, and is present in all animal cells, so that it is widely distributed in the body, blood and bile. Apart from lowering cholesterol in the body, flavonoids are also able to erode cholesterol deposits on the walls of coronary blood vessels. The high flavonoid of the red onion skin has strong antioxidant activity because it has a hydroxyl group. Red onion skin has flavonoids containing quercetin glycosides and is an effective antioxidant to prevent oxidative stress [12]. Quercetin as a natural flavonoid also exhibits the anti-hypercholesterolemic property by modulating the expression of ABCA1, a major regulator of reverse cholesterol transport, and may also reduce the accumulation of cholesterol in macrophages [13].

The erosion of cholesterol in the walls of blood vessels can help prevent the emergence of various other diseases caused by cholesterol. In addition, the high content of fiber and other content in the skin of shallots has strong antioxidant benefits that can prevent free radicals and anti-inflammation that helps prevent diseases such as anti-diabetic, anti-diarrhea, anti-allergy [14]. Various systematic reviews and meta-analysis have recorded the potential of quercetin as anti-inflammatory, anti-obesity, anti-diabetic, anti-hypertensive, anti-fibrinogen agent along with its role in regu-lating cholesterol metabolism [15,16,17].

Quercetin holds promise as broad-spectrum“add-on”anti-cholesterol as well as an anti-inflammatory agent [13]. Genetically, ducks have relatively different abilities in synthesizing cholesterol. The ability of cholesterol synthesis in ducks which is influenced by genetic factors (Pengging ducks, Tegal ducks, Magelang ducks) and environmental factors determined by feed. The availability of cholesterol in the duck's body is very influential on the feed consumed. Giving real feed

can increase growth and carcass quality, and reduce duck serum cholesterol so that it can be concluded that a decrease in blood cholesterol levels will have an impact on lower meat cholesterol [11]. Based on this, the flavonoid content in red onion skin flour has the potential to reduce cholesterol levels in duck.

4. CONCLUSION

Based on the result, it can be concluded that the flavonoid content of the red onion skin is 3.54% and the flavonoid (quercetin) content of the onion skin flour is 4.35%. Since the presence of flavonoids (quercetin) contained in the red onion skin flour which is mixed with the duck fodder, it is potentially effective can produce low cholesterol ducks.

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REFERENCES

[1] Biro Pusat Statistik, Produktivitas Bawang Merah, "https://brebeskab.bps.go.id/indicator/55/70/1, 2020

[2] L. S. Banu, "Pemanfaatan Limbah Kulit Bawang Merah dan Ampas Kelapa sebagai Pupuk Organik terhadap Pertumbuhan Beberapa Tanaman Sayuran,"*Jurnal Ilmiah Respati Vol 11, No. 2, Desember 2020*.

[3] F. Damiano, *et al*, " Quercetin inhibition of SREBPs and ChREBP expression results in reduced cholesterol and fatty acid synthesis in C6 glioma cells, *The International Journal of Biochemistry & Cell Biology, Volume 117, December 2019, 105618*

[4] Satya and Rika, "*Sehat dan Sembuh dengan Terapi Bawang,* Aksara Sukses Yogyakarta, 2013.

[5] Agic, *et al*, *"Polyphenolic Flavonoids and Metalloprotease Inhibition: Applications to Health and Disease*, Academic Press, Pages 33-40, 2018.

[6] N. Mardiah, *et al*, " Penentuan Aktivitas Antioksidan dari Ekstrak Kulit Bawang Merah (Allium Ascalonium L.) dengan Metode DPPH, *Jurnal Pharmascience, 2017.*

[7] M. Janeczko, *et a*l. "Inhiboitory effect of a combination of baicalein and quercetin favonoids againts Candida albicans strains isolated from the female reproductive system, *Fungal Biology 126 407-420, 2022*

[8] S.N. Utami, S. K. Sita. "The Role of Livestock Extension Communications for the Development of Ducks Agribusiness in Brebes Regency, Jurnal Peternakan Indonesia, Oktober Vol. 20 (3): 160-165, 2018.

[9] D. Septinova, et al, "Profil Lemak Darah Itik Lokal Jantan yang diberi Campuran Bahan Pakan Lokal yang Difermentasi Dengan Effective Microorganisme-4, "Jurnal Ilmiah Peternakan Terpadu Vol. 8(3), November 2020.

[10] Shabela and Rifdah, "*pahami, Waspadai, Cegah, dan Musnahkan Kolesterol*. Cable, Klaten, 2012.

[11] V. G. Wijaya, *et al*, "Kajian Kadar Kolesterol dan Trigliserida Darah Berbagai Jenis Itik Lokal Yang Pakannya Disuplementasi Dengan Probiotik, *Jurnal Ilmiah Peternakan 1 (2): 661-668, July 2013*.

[12] R. D. Pramesti, *"Pemanfatan Flavonoid Kulit Bawang Merah (Allium ascalonium L.) dan Bunga Kana Merah (Canna coccinea Mill) Sebagai Pewarna Alami Kaya Antioksidan Terhadap Karakteristik Mie Basah*. Fakultas Pertania-Peternakan, Universitas Negeri Malang, 2021.

[13] A. Pawar, *et al*. " Molecular basis of quercetin as a plausible common denominator of macrophage-cholesterol-fenofibrate dependent potential COVID-19 treatment axis, *Result in Chemistry 3, 100148, 2021*

[14] J. G, Gormaz, " Cardiovascular Disease: A Target for the Pharmacological Effect of Quercetin. National Center for Biotechnology Information, University of Chile. 2015.

[15] A. Sahebkar, Effects of quercetin supplementation on lipid profile: a systematic review and meta-analysis of randomized controlled trials, Crit. Rev. Food Sci. Nutr. 57 (4) (2017) 666–676
[16] R. Tabrizi, O.R. Tamtaji, N. Mirhosseini, et al., The effects of quercetin supplementation on lipid profiles andinflammatory markers among patients with metabolic syndrome and related disorders: a systematic review and meta-analysisof randomized controlled trials, Crit. Rev. Food Sci. Nutr. 60 (11) (2020) 1855–1868
[17] H. Huang, D. Liao, Y. Dong, R. Pu, Effect of quercetin supplementation on plasma lipid profiles, blood pressure, and glucose levels: a systematic review and meta-analysis, Nutr. Rev. 78 (8) (2020) 615–62