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COMPARISON OF CHERRY LEAVES (*MUTINGIA CALABURA*) AS FEED COMPONENT AGAINST THE LOW DENSITY OF LIPOPROTEIN BLOOD, HIGH BLOOD LIPOPROTEIN DENSITY, PROTEIN AND FAT CONTENTS OF MOJOSARI DUCK MEAT

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ABSTRACT

This study compares the addition of cherry leaf meal (*Mutingia calabura*) in the feed to the levels of low-density lipoprotein and high-density lipoprotein, fat, and protein content of Mojosari male duck meat. The samples used were 27 male Mojosari ducks divided into three treatment groups and nine replications—the first treatment group (P1), including nine ducks given bran feed for 15 days. The second treatment group (P2) is nine ducks given 6% cherry leaf flour for 15 days. The third treatment group (P3) is nine ducks given 8% cherry leaf flour for 15 days. The variables measured were serum LDL and HDL as well as levels of fat and protein in meat. The results of the study were P1 LDL values showed 60.20 ± 0.89 ; P2: 58.67 ± 0.83 ; P3: 58.24 ± 0.79 ($P > 0.05$), while the HDL value P1 showed 59.10 ± 0.74 ; P2: 55.82 ± 0.69 ; P3 showed 55.12 ± 0.67 ($P > 0.05$). The results of the study, the protein value of meat P1 showed $8.38 + 0.32$; P2 showed $11.04 + 0.11$; and P3 showed $12.00 + 0.14$ ($P < 0.01$) while the value of meat fat was P1 showed $18.72 + 0.47$; P2 showed $16.89 + 0.42$; and P3 showed $16.54 + 0.26$ ($P < 0.01$). This research concludes that the addition of cherry leaf flour in the feed does not affect the blood LDL and HDL levels but does affect the protein and fat levels of Mojosari male duck meat.

KEY WORDS

Veterinary, animal nutrition, poultry, health.

Duck production can play a major role in the agricultural economy (Adzitey & Adzitey, 2015). Asian countries alone contribute 84.2% of total duck meat produced globally (Biswas *et al.*, 2019). Driven by consumer demand for duck meat consumption is the increasing number of duck stalls on the side of the road, catering, restaurants, and restaurants often providing processed portions of duck meat (Lembong *et al.*, 2015; Sulistyoningsih, 2018). Duck meat has a higher muscle fiber content in breast meat than chicken and is considered red meat (Onbaşilar & Yalcin, 2018). Moreover, due to a higher fat content than chicken, duck meat can be less appreciated by the consumer (Amaral *et al.*, 2015). Also, consumption of duck meat has considerable risk, namely an increase in cholesterol levels in consumers. It is feared that it will cause obesity and atherosclerosis diseases such as coronary heart disease, hypertension, and stroke. Hence, it is fundamental to explore germplasm as an alternative to developing novel value-added feed for ducks.

Mojosari duck is a type of duck relatively common in the community for meat or eggs because it tastes pretty delicious. This duck is small compared to other cultivated ducks but has a medium egg size. Mojosari ducks that are usually in rural areas are often cared for properly and given food from the leftovers of the farmer's family, sometimes also given rice snail feed (Putra *et al.*, 2016). On the other hand, the cherry plant (*Mutianga calabura*) is a plant that is often found in rural areas. This plant is easy to grow so that it can be appropriately cultivated. The leaves of *M. calabura* can be a solution in the management of high cholesterol in duck meat. *M. calabura* have various contents such as vitamin C 11.21 mg/g, flavonoids 42.61 mg/g, vitamin E 0.41 mg/g, 61, polyphenols 23.06 mg/g, protein 6.21 mg/g and carbohydrates 194.0 mg/g and rich in anti-oxidants (Nagara, 2015; Putri *et al.*, 2018). *M. calabura* is expected to be a source of additional feed in the ration because *M.*

calabura contains flavonoids, alkaloids, and saponins, reducing cholesterol levels (Zakaria *et al.*, 2011).

Furthermore, there is almost no data available on using *M. calabura* in the duck feed. The purpose of this study was to evaluate and compare low-density lipoprotein (LDL), blood high-density lipoprotein (HDL), protein content, and fat Mojosari male duck meat. The present study may give information to consumers, healthcare professionals, and feed manufacturers. These findings could be as an alternative to develop novel value-added feed for ducks.

MATERIALS AND METHODS OF RESEARCH

This type of research is a type of experimental research with a completely randomized design (CRD) (Zhang *et al.*, 2011). In this study, ducks were divided into three treatment groups and nine replications with individual cages. In this study, the samples used were male ducks aged three days with a weight of 100-200 grams. As many as 27 ducks were obtained from the village of Mojosari Mojokerto, East Java. The sampling technique used was simple random sampling, a sampling technique in which each duck was grouped randomly and not because of subjective considerations. In the research conducted, there were three observed variables. The independent variable is the concentration of cherry leaf flour. On the other hand, The dependent variables include blood serum LDL and HDL, meat fat, and protein levels. Control variables include age, weight, sex, and environment.

A total of five kilograms of cherry leaves obtained from the Lamongan area are dried and aerated for $\pm$ two days so that the active compounds contained in the cherry leaves are not lost due to sunlight. The leaves are then crushed using a blender until a powder-like formation is obtained with a smooth texture. The fine powder is weighed according to the predetermined feed concentration.

This study used 27 male Mojosari ducks aged three days with a weight of 100-200 grams. The adaptation process was carried out for two weeks so that the animal conditions were stable and given standard feed and ad libitum drinking water. After going through the adaptation process, the treatment process is carried out, namely feeding cherry leaf flour. The three groups of treatment ducks used in this study can be described as follows: 1) the control group (P1) consisted of 9 ducks only given standard feed (bran) once a day for 30 days; 2) the second group (P2) consisted of 9 ducks which were given 94% standard feed and 8% cherry leaf meal once a day for 30 days, and 3) the third group (P3) consisted of 9 ducks which were given 92% standard feed and 10% cherry leaf meal once a day for 30 days. On the 30th day, a sample collection was carried out by collecting duck blood through the veins aseptically using an alcohol swab and a 3 ml syringe, after which the blood that flowed out was collected to obtain serum. The obtained serum was then examined using a spectrophotometer in the Clinical Pathology laboratory, The Faculty of Veterinary Medicine, Universitas Wijaya Kusuma Surabaya. At the same time, the analysis of fat and protein content of duck meat was carried out in the Veterinary Public Health Laboratory, The Faculty of Veterinary Medicine, Universitas Wijaya Kusuma Surabaya. Animal experimental procedures were performed with the approval of the Animal Ethics Research Committee of The Faculty of Veterinary Medicine, Universitas Wijaya Kusuma Surabaya (19-KKE).

The data obtained from the research results were then analyzed using analysis of variance (ANOVA).

RESULTS OF STUDY

A total of 27 male Mojosari ducks were used in this study as experimental animals (Figure 1). This research also succeeded in developing the potential of *M. calabura* (Figure 2) into cherry leaf flour (Figure 3) as a feed additive. Table 1 shows the mean levels of LDL and HDL in Mojosari duck blood after treatments in the present study. Based on the ANOVA test, there was no significant difference in reducing LDL levels in each treatment group ($P >$

0.05). It indicates that the addition of *M. calabura* in duck feed did not affect reducing LDL and HDL in the blood of Mojosari ducks after 30 days.

Figure 1 – Mojosari ducks

Figure 2 – *M. calabura*

Figure 3 – Cherry leaf flour

Table 1 – Average levels of LDL and HDL in Mojosari duck blood after 30 days of feeding

Treatment	Mean $\pm$ Standard Deviation	
	LDL	HDL
P1 (0%)	60.20 $\pm$ 0.89	55.12 $\pm$ 0.67
P2 (6%)	58.67 $\pm$ 0.83	55.82 $\pm$ 0.69
P3 (8%)	58.24 $\pm$ 0.79	59.10 $\pm$ 0.74

Table 2 summarises the mean of protein and fat from Mojosari Duck's meat after treatments for 30 days. The mean P3 contained a higher level ($p < 0.01$) of protein than P1

and P2. In addition, the mean of Mojosari Duck meat fat content indicates significant differences between P2 and P1, but P2 did not differ ($p > 0.05$) with P3.

Table 2: Average levels of protein and fat content in Mojosari duck meat after 30 days of feeding

Treatment	Mean $\pm$ Standard Deviation	
	Protein	Fat
P1 (0%)	8.38 $\pm$ 0.32 ^a	18.72 $\pm$ 0.47 ^a
P2 (6%)	11.04 $\pm$ 0.11 ^b	16.89 $\pm$ 0.42 ^b
P3 (8%)	12.00 $\pm$ 0.14 ^c	16.54 $\pm$ 0.26 ^b

^{a-c} Across treatments, means superscripts differ significantly ($p < 0.01$).

DISCUSSION OF RESULTS

Hyperlipidemia is a risk factor for coronary heart disease and stroke (Alloubani *et al.*, 2020). It can be seen from the results of the lipid profile. Currently, prevention of hyperlipidemia can be done by natural means called phytopharmaceuticals (Nooreen *et al.*, 2018). One of them is cherry leaf extract which contains flavonoids, saponins, and tannins (Nurhuda *et al.*, 2020) to improve lipid profiles in the blood. Flavonoids inhibit cholesterol synthesis by inhibiting HMG-CoA reductase (Baskaran *et al.*, 2015). Saponins and Tannins work by inhibiting cholesterol and triglycerides in the intestines (Adriani 2013). This study succeeded in developing a feed additive in cherry leaves flour to improve the quality of duck meat. Cherry leaves (*M. calabura*) well-known contain flavonoid compounds, saponins, and tannins, which are productive as antihyperlipidemic (Listiantini, 2017). Various doses of cherry leaf flour were added to the commercial feed of Mojosari Duck in this study. The result showed cherry leaves (*M. calabura*) could decrease LDL levels but no significant difference ($p > 0.05$) between treatments. These results show that the *M. calabura* concentration in the feed mixture could not significantly reduce LDL in duck blood within 30 days. Though *M. calabura* contains potential substances as an antihyperlipidemic, cherry leaves were not effective in lowering LDL in normal Mojosari ducks. Listianti (2017) found that cherry leaves can reduce dyslipidemia but are not significant. The LDL level in the present study agreed with the previous study (Sopandi *et al.*, 2019) that using *M. calabura* in rats with hyperlipidemia was not effective. However, they showed that the combination of *M. calabura* and *Cayratia trifolia* effectively prevented and avoided other effects of high cholesterol.

It is known that different types of flavonoids can lower LDL cholesterol levels with different abilities (Hirano *et al.*, 2001). The flavonoids, naringenin, and hesperitin can inhibit the activity of ACAT (cholesterol acyltransferase) and MTP (microsomal transfer protein), where ACAT and MTP are responsible for the synthesis and esterification of cholesterol in the liver (Wilcox *et al.*, 2001). The flavanones in orange juice were also able to lower human LDL cholesterol levels (Franke *et al.*, 2005), while the flavonoids in black tea did not lower LDL cholesterol levels (McAnlis *et al.*, 1998). The type of flavonoid in cherry leaves flour is not known not to explain LDL cholesterol levels. One of the weaknesses of this study is that the type of flavonoid contained in cherry leaves flour was not examined. This study concluded that cherry leaves flour can not reduce LDL cholesterol levels.

Similarly, the results of testing on HDL in this study, the increase in HDL that occurred in the blood of Mojosari ducks was not significant. Layli *et al.*, (2017) also found the same results where cherry leaf extract could not increase HDL cholesterol levels. Other studies have shown that various types of flavonoid compounds given the same dose have different effects on increasing HDL cholesterol levels (Zou *et al.*, 2005; van Dam *et al.*, 2013). In addition, antioxidants in phytochemical compounds may affect the Apolipoprotein (Apo) AI gene (Mooradian *et al.*, 2006). Apo AI is the main structural protein of HDL cholesterol (Mangaraj *et al.*, 2016). Several antioxidants in high concentrations can reduce the activity of

the Apo A-I promoter (Mooradian *et al.*, 2006). Giving antioxidants at high doses is possible to reduce HDL cholesterol levels (Bohm, 2012). Further research is needed to determine the ability of flavonoids in EDK to increase HDL cholesterol levels.

Puspasari *et al.*, (2016) found that cherry leaf extract affected improving the lipid profile levels of hyperlipidemic white mice with the best dose at a dose of 6 (mg/200gBW/day) with a percentage of total cholesterol improvement of 65%, TG 79%, LDL 79%, and HDL 75%. In contrast, Marinda (2016) showed that cherry fruit could reduce hyperlipidemia. It indicates that fruit has a high concentration of compounds for reducing hyperlipidemia. Moreover, Wiyati *et al.*, (2020) showed that cherry leaves extract (*M. calabura*) with the dose of 600 mg/KgBB had the best activity in reducing total cholesterol, LDL, and triglyceride levels. It indicates that the use of *M. calabura* to reduce hyperlipidemia depends on the extraction method, doses, host, and combination with other compounds. The use of cherry leaves standalone in duck feed for the prevention of hyperlipidemia was not recommended.

Although the administration of cherry leaf flour did not show a significant decrease in LDL and an increase in HDL in this study, cherry leaf flour was able to increase the total protein in Mojosari duck meat significantly. Even more interesting, the administration of cherry leaf flour significantly reduced the total fat content in P2 with a concentration of 6% (Table 2). However, increasing the concentration of *M. calabura* did not decrease the total fat content in the meat (Table-3). This study concludes that the administration of *M. calabura* with a concentration of 6% is the optimum concentration to obtain low-fat meat.

CONCLUSION

Cherry leaf flour is less effective in changing the levels of low-density lipoprotein significantly. Also, the provision of cherry leaf flour is not effective in increasing the high-density lipoprotein significantly. However, cherry leaf flour is effective in reducing the total fat content of Mojosari duck significantly and increasing the protein content of Mojosari duck meat significantly.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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