

The Effect of Dietary Violet Roselle Flower and Moringa Leaves Meal Supplementation on Blood Profile of Broiler Chickens

Akyas Manjaniq¹, Wihandoyo¹, Nanung Danar Dono¹

¹Faculty Animal Science, Universitas Gadjah Mada, Jl. Fauna No.3, Bulaksumur, Yogyakarta
Corresponding email: nanungdd@ugm.ac.id

ABSTRACT

The study was conducted to observe the effect of dietary violet roselle (*Hibiscus sabdariffa*) flower and moringa (*Moringa oleifera*) leaves meal supplementation on blood profile of broiler chickens. A hundred and twenty-day old male broiler chickens were fed commercial CP 511 feed with violet roselle (VRM) and moringa leaves meal (KLM) in different levels. Four treatment diets were: commercial feed without VRM or KLM supplementation (basal diet; control; T₁), basal diet with 3.0% VRM supplementation (T₂), basal diet with 3.0% KLM supplementation (T₃), and basal diet with 1.5% VRM and 1.5% KLM supplementation (T₄). Each feeding treatment was replicated 6 times, with 5 birds in each pen. The collected data were statistically analyzed using Complete Randomized Design in the One-way arrangement. Result showed that 3.0% dietary VRM supplementation or 3.0% dietary KLM supplementation had no effect on blood profile (leukocytes, erythrocytes, hematocrits, hemoglobin, and cholesterol) with average of (26.4x10³ cell/μl, 2.6x10⁶ cell/μl, 32,5%, 10,8 g/dl, and 79 mg/dl). It indicates that the blood profile was normal and the used of violet roselle flower and moringa leaves meal were still safe for broilers chickens. It can be concluded that the dietary supplementation of violet roselle flower meal or moringa leaves the meal in the diets, separately or in combination in 3.0% level had no adverse effect on blood profile of broiler chickens.

Keywords: Blood profile, Broiler chickens, Moringa leaves, Phytobiotics, Violet roselle flower

INTRODUCTION

The utilization of feed additive in broiler chickens diet is widely used by farmers to maximize and accelerate growth. The most commonly used feed additive is antibiotics as growth promoters or antibiotic growth promoters (AGP). The use of excessive antibiotics in the diet could be followed by an accumulation of residual and bacterial resistance to an antibiotic that threatens consumers. There should be a solution to replace the use of antibiotics with feed additives. Phytobiotics is claimed to be the safest feed additives that from plants and have similar activity as antibiotics. One alternative of fitobiotics that can be used are violet roselle flower and moringa leaves.

Violet roselle flower and moringa leaves have the main active compounds that can be utilized to maximize growth. Violet roselle flower has an antioxidant active compound and moringa leaves have active compounds that act as antimicrobial. The combination is thought to maximize the growth of broiler chickens and producing healthy products. The use of fitobiotic in the diet can be observed from the physiological status of blood. Blood profile is a parameter that can indicate the physiological status of the body. Blood profiles can be used as an indicator for broiler chickens acceptance of a feed additive, so the parameters of blood are very important to observe in a study. It expected that the use of violet roselle flower and

moringa leaves in the diet does not affect the blood profile so that the blood profile is still at normal intervals and indicates that broiler chickens in a good health. Because an abnormality of blood profile indicates that physiological process in the body is abnormal as the body response to something that obtains.

MATERIALS AND METHODS

Birds, Housing, and Experimental Methods

Birds, Housing, and Experimental Methods. The materials used in this research were 120 days old male Cobb 500 (CP 707 Super, Charoen Pokphand Indonesia, Sukabumi, Indonesia) broiler chickens, commercial feed (CP 511, Charoen Pokphand Indonesia, Cirebon, Indonesia), drinking water, fumigation material, violet roselle flower meal, moringa leaves meal, and fine sand. The instruments used in this research were 24 raised floor pens, digital scale (EK 3650, Camry Electronic, Guangdong, China), round-feeders, bell-drinkers, thermo-hygrometer, syringe, and blood tube. A hundred and twenty broiler chickens were divided randomly into 4 treatment groups, with 6 replications and 5 birds in each replicate pen. The four treatments were: commercial feed + 3.0% filler (control; T₁), commercial feed + 3.0% violet roselle flower meal (T₂), commercial feed + 3.0% moringa leaves meal (T₃), and commercial feed + 1.5% violet roselle flower + 1.5% moringa leaves meal (T₄). The birds were kept for 28 days in opened poultry house and treated from day 3 with the commercial diet with nutritional contents in Table 1.

Table 1. Ingredients and nutritional contents of the experimental diet

Ingredients	Dietary treatment			
	T ₁	T ₂	T ₃	T ₄
Commercial feed (%)	97.0	97.0	97.0	97.0
Violet roselle flower (%)	0	3.0	0	1.5
Moringa leaves (%)	0	0	3.0	1.5
Filler (%)	3.0	0	0	0
Total	100	100	100	100
Nutritional contents of the experimental diet				
Metabolizable energy (kcal/kg) ¹	2964.7	3142.5	3019.0	3154.0
Dry matter (%) ²	90.8	90.5	90.6	90.3
Ash (%) ²	7.1	6.2	6.4	6.4
Crude protein (%) ²	22.7	22.8	22.3	22.5
Crude fat (%) ²	5.7	5.9	5.9	5.3
Crude fiber (%) ²	3.0	2.5	3.8	2.7
Nitrogen free extract (%) ²	52.7	54.3	51.8	54.4
Calcium (%) ³	0.9	0.9	0.9	0.9
Phosphorus (%) ³	0.6	0.6	0.6	0.6
Cocciostat ⁴	+	+	+	+

T₁ = Commercial feed (CF) + 3.0% filler; T₂ = CF + 3.0% violet roselle flower meal; T₃ = CF + 3.0% moringaleaves meal; and T₄ = CF + 1.5% violet roselle flower meal + 1.5% moringaleaves meal.

¹) Analyzed by integrated research and testing laboratory (LPPT), UGM (2016)

²) Analyzed by animal feed science laboratory, Animal Science Faculty, UGM (2016)

³) Calculation of nutrient content based on NRC (1994)

⁴) Antibiotic growth promoter which contained in commercial feed

Data Collection and Statistical Calculation. Parameters observed were blood profile (leukocytes, erythrocytes, hematocrits, hemoglobin, and cholesterol) The slaughter weight

was obtained by weighing the chickens before being slaughtered. On days 28, one chicken with body weight close to the median body weight of each group was chosen for collecting blood samples. Blood samples were taken from the brachial veins and inserted to blood tube which already contains anti blood-coagulant. Blood profile were analyzed by Research and Integrated Testing Laboratories (LPPT) Universitas Gadjah Mada to determine levels of leukocytes, erythrocytes, hematocrits, hemoglobin, and cholesterol. Data were statistically analyzed using Completely Randomized Design in the One-way arrangement.

RESULTS AND DISCUSSION

The effects of violet roselle flower and moringa leaf meal supplementation at the level of 3.0% of both phytobiotics on broiler chickens in broiler chickens were presented in Table 2. Result showed that dietary supplementation with VRM or MLM in the diets, individually or in combination in 3.0% level had no effect on leukocytes, erythrocytes, hematocrits, hemoglobin, and cholesterol. There was no difference between VRM or MLM and control diet supplementations in growth performance.

Table 2. Blood profile of male broiler chickens that given feeding treatment by violet roselle flower and moringa leaves meal supplementation

Parameter	Treatment				Statistics	
	T ₁	T ₂	T ₃	T ₄	SEM	P-value
Leukocytes, 10 ³ cell/ μ l	25.9	26.6	26.3	26.7	15.231	0.339 ^{ns}
Erythrocytes, 10 ⁶ cell/ μ l	2.4	2.6	2.5	2.7	4.745	0.228 ^{ns}
Hematocrits, %	30.9	32.5	32.1	34.3	0.574	0.249 ^{ns}
Hemoglobin, g/dl	10.1	10.8	10.8	11.4	0.196	0.190 ^{ns}
Cholesterol, mg/dl	87.5	76.5	71.1	80.6	2.245	0.099 ^{ns}

Note: T₁ = Commercial feed (CF) + 3.0% filler; T₂ = CF + 3.0% violet roselle flower meal; T₃ = CF + 3.0% moringa leaves meal; and T₄ = CF + 1.5% violet roselle flower meal + 1.5% moringa leaves meal; SEM = standard error mean; ^{ns}: non significant

The main active compounds in VRM and MLM had no negative effect on leukocyte levels because an increase or decrease in leukocyte levels are too high in the blood then a negative reaction occurs due to the addition of VRM and MLM in the diets. Olugbemi *et al.* (2010) stated the addition of moringa leaves meal in the diet at the level of 10% can increase the leukocyte level of broiler chickens. Violet roselle flowers and moringa leaves contain saponins and polyphenols (Ayerdi *et al.*, 2007; Dhayanti *et al.*, 2012; Pacome *et al.*, 2014). Talebi *et al.* (2005) stated normal leukocyte level in broiler straw Cobb 500 raised 28 days 21.5-27.8 x10³/ μ l. It shows that results of leukocytes blood levels were within normal and no provide a negative effect in reducing or increasing blood leukocytes levels of chicken. The addition of purple rosella flower and moringa flour in the feed is within the safe limits of administration.

Nijveldt *et al.* (2001) added that a number of erythrocytes may be affected by active compounds, such as saponins, flavonoids, and tannins in the diet in high concentrations. Khalil and El-Adawy (1994) stated saponins have hemolytic activity against the activity of erythrocyte destruction or lysis of erythrocytes. It could increase the production of erythrocytes. Francis *et al.* (2002) stated saponins could stimulate the production of erythrocytes by lysis of erythrocytes because saponin has the ability to increase cell membrane permeability facilitating large molecules such as proteins can be absorbed easily by the body. Francis *et al.* (2002) stated other active compounds such as flavonoids have the ability as an antioxidant that serves as a container of hydroxyl and superoxide radicals could protect lipid erythrocytes membranes that can prevent damage and lysis of erythrocytes.

Aderinola *et al.* (2013) stated moringa leaves meal might decrease hematocrit level, it could indicate that a limit factor or toxic effect decreased erythrocytes formation compared with overall blood volume. Sanchez *et al.* (2006) stated hematocrit levels tend to increase with the addition of the provision of moringa leaves meal in the diet at the level of 4%. It shows the use of moringa leaves meal had no toxic effects or inhibit an absorption of nutrients feeds. Kusnadi (2008) stated the percentage of hematocrit represents an erythrocyte volume in 100 ml of total blood plasma expressed in percent.

Francis *et al.* (2002) stated saponins have the ability to decrease hemoglobin levels because saponins can bind to a divalent 2-ion atom such as Fe²⁺ forming a complex compound. The compounds formed by saponins can reduce the availability of Fe²⁺ then that could decreasing hemoglobin levels. Tannin could reduce hemoglobin levels because tannins can bind proteins that can interfere with the formation of hemoglobin. Sriwati *et al.* (2014) added that the major components of hemoglobin-forming are proteins and Fe²⁺. The hemoglobin level might decrease as a result of oxidative reactions that can damage the hemoglobin, enzymes (particularly the sulfhydryl groups) and lipid membranes, which can lead to intravascular hemolysis or erythrophagocytosis could shorten the life of the erythrocytes (Meyer and Harvey, 2004). Ismawati (2009) stated the oxidative damage by hemoglobin can lead to changes in the structure and function of erythrocytes and the age of erythrocytes to be short. This can be overcome either by the presence of compounds that can function as antioxidants such as in the violet roselle flower was anthocyanins which can prevent the oxidation of hemoglobin (Chattopadhyay *et al.*, 2004).

Anthocyanins have small effect on the decrease in blood cholesterol levels and produce a different effect. Dibyantini and Simorangkir (2011) stated supplementation of roselle flower extract in diet at the rate of 60 mg/kg BW/day had an effect on the decrease of cholesterol level of broiler chicken blood. Restiayanti *et al.* (2014) stated that 50 mg/l of moringa leaves extract given in drinking water could decrease cholesterol level of broiler chicken 6 weeks. Agustina (2006) stated that increase in production and secretion of bile salt into the duodenum can reduce cholesterol of blood. Bile salts as raw materials cholesterol was excreted. Cholesterol levels has affected by the active compound of saponins. Restiayanti *et al.* (2014) stated the saponin content in moringa leaves meal could decrease cholesterol levels by inhibiting the absorption of endogenous cholesterol.

CONCLUSIONS

It could be concluded that violet roselle flower and moringa leaves meal can be supplemented in the diets, separately or combination, in 3.0% level with no effect on blood profile of broiler chickens. It indicates that the blood profile was normal and the used of violet roselle flower and moringa leaves meal was still safe for broilers chickens.

REFERENCES

- Aderinola, O. A., T. A. Rafiu, A. O. Akinwumi, T. A. Alabi, and O. A. Adeagbo. 2013. Utilization of *Moringa oleifera* leaf as feed supplement in broiler diet. International Journal of Food, Agriculture and Veterinary Science. 3: 94–102.
- Agustina, L. 2006. Penggunaan ramuan herbal sebagai *feed additive* untuk meningkatkan performans broiler. Lokakarya Nasional Inovasi Teknologi dalam Mendukung Usaha Ternak Unggas Berdaya saing. Bogor.
- Ayerdi, S. G. S., S. Arranz, J. Serrano, and I. Goni. 2007. Dietary fiber content and associated antioxidant compounds in roselle flower (*Hibiscus sabdariffa* L.) beverage. Journal of Agriculture and Food Chemistry. 55: 7886–7890.

- Chattopadhyay, I., K. Biswaws., U. Bandyopadhyay, dan R. K. Banarjee. 2004. Turmeric and curcumin: Biological actions and medicinal applications. *Journal of Current Science*. 87: 44–53.
- Dhayanti, A. P. Y., P. Trisunuwati, dan S. Murwani. 2012. Efek antimikroba ekstrak neheksana daun kelor (*Moringa oleifera* Lamk) terhadap *Escherichia coli* secara *in vitro*. Kedokteran Hewan, Universitas Brawijaya. Malang.
- Dibyantini, R. E dan I. Simorangkir. 2011. Uji efektifitas ekstrak kelopak rosela (*Hibiscus sabdariffa* L.) terhadap penurunan kadar kolesterol serum darah ayam broiler. Laporan Penelitian. Fakultas MIPA, Universitas Negeri Medan. Medan.
- Francis, G. Z., H. P. S. Kerem, Makkar, dan K. Beker. 2002. The biological action of saponin in animal sistem: a review. *British Journal of Nutrition*. 88: 587–605.
- Ismawati. 2009. Kelebihan rantai A pada talasemia β . *Jurnal Ilmu Kedokteran*. 3: 1–5.
- Khalil, A. H. and T. A. El-Adawy. 1994. Isolation, identification and toxicity of saponin from different legumes. *Food Chemistry*. 50: 197–201.
- Kusnadi, E. 2008. Pengaruh temperatur kandang terhadap konsumsi ransum dan komponen darah ayam broiler. *Journal of the Indonesian Tropical Animal Agriculture*. 33: 197–202.
- Nijveldt, R. J., E. V. Nood, D. V. Hoorn, P. G. Boelens, K. V. Norren, and P. V. Leeuwen. 2001. Flavonoids: a review of probable mechanisms of action and potential application 1-3. *The American Journal of Clinical Nutrition*. 23: 418–425.
- Olugbemi, T. S., S. K. Mutayoba, and F. P. Lekule. 2010. Effect of moringa (*Moringa oleifera*) inclusion in cassava based diets fed to broiler chickens. *International Journal of Poultry Science*. 9: 363–367.
- Pacome, O. A., D. N. Bernard, D. Sekou, D. A. Joseph, N. J. David, K. Mongokame, and K. T. Hilaire. 2014. Phytochemical and antioxidant activity of roselle (*Hibiscus sabdariffa* Linn) petal extracts. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*. 5: 1453–1465.
- Restiayanti, L., I. G. N. G. Bidura, dan N. L. G. Sumardani. 2014. Pengaruh pemberian ekstrak daun kelor (*Moringa oleifera* L) dan daun bawang putih (*Allium sativum*) melalui air minum terhadap distribusi lemak tubuh dan kadar kolesterol broiler umur 2-6 minggu. *Journal of Tropical Animal Science*. 2: 402–414.
- Sanchez, N. R., E. Spordnly, and I. Ledin. 2006. Effect of feeding different levels of foliage of *Moringa oleifera* to creole dairy cows on intake, digestibility, milk production, and composition. *Livestock Science*. 101: 24–31.
- Sriwati, D., E. Widodo, dan M. H. Natsir. 2014. Pengaruh penggunaan tepung jintan putih (*Cuminum cyminum* L) dalam pakan terhadap profil darah ayam pedaging. Laporan Penelitian. Universitas Brawijaya. Malang.
- Talebi, A., S. A. Rezaei, R. R. Chai, and R. Sahraei. 2005. Comparative studies on haematological values of broiler strains (Ross, Cobb, Arbor-acres, and Arian). *International Journal of Poultry Science*. 4: 573–579.