

# Improvement of the Quality of Duck's and Chicken's Meat Using African Leaf (*Vernonia amygdalina*)

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## ABSTRACT

Animal product with high body weight and low cholesterol will improve the quality of the product. This study aims to determine the response of male local duck and broiler chickens, which are given African leaf meal (ALM) in their rations, to body weight and blood lipid content. The treatment that will be given is the level of ALM usage as many as 5 levels (0%; 0.5%; 1.0%; 1.5% and 2.0%). The treatments were analyzed by completely randomized design (CRD) with 4 replications. The treatment given to 100 broilers which is reared from the age of 8 days to 35 days. As well as 80 local male ducks. The results showed that increasing of ALM usage, will increase body weight gain of male duck and broiler, about 4,23 % at ALM 1,5 % usage. Likewise, the Feed Conversion Ratio (FCR) was high significantly better ( $P < 0.01$ ). Blood lipid content was reduced about 20,37 % at the 1.5% ALM level ( $P < 0.01$ ). The use of ALM 1,5 % level can improve the quality of meat male duck and broiler, because it produces weight gain higher and lowering the lipid content, in order to create a source of healthy food.

**Keywords:** *Vernonia amygdalina*, duck, chicken, healthy food

## 1. INTRODUCTION

Food with high cholesterol and triglycerides content has recently received a lot of attention, because both cholesterol and triglycerides are factors that cause coronary heart disease. Duck meat and broiler chickens are poultry commodities that have high levels of fat and cholesterol.

On the other hand, the most important thing in livestock production costs is how to reduce the cost of ration, because ration is the most important component of livestock covering 70% of the total production cost [1] [2]. Generally, poultry commercial husbandry requires nutritional content by importation of feed supplement, for example with supplementary feeding in order to reduce costs through increased FCR.

Weight gain is one of the criteria used to measure growth. Weight gain is defined as the increase in shape and weight of tissues such as muscle, bone, heart, and all other tissues. The growth rate of chickens depends on the strain of the chickens, sex, and environmental factors. Cholesterol is an amphipathic lipid that is important in regulating membrane permeability and fluidity, and also as an outer layer of plasma lipoproteins [3]. Lipids consist of cholesterol, triglycerides (neutral fats), and phospholipids (lecithin) [4]. But high cholesterol duck meat and broiler

chickens are often the limiting factor for consuming them. Excess cholesterol in the body will accumulate on the blood vessels walls, causing atherosclerosis, which is the narrowing of the blood vessels. This condition, if left untreated, will lead to heart disease and stroke [5]. Cholesterol content can be affected by meat fiber type and muscle fat content [6], as well as genetics and the environment [7]. Many studies have shown that several types of plants can be supplemented in animal feed to reduce levels of fat and cholesterol [8][9][10][11], like African Leaf (*Vernonia amygdalina*).

There are many health benefits of African plants, especially their leaves, for health, namely as an analgesic, antimicrobial, antihypertensive and antidiabetic [12]. African leaves are proven to contain high levels of antioxidants and various bioactive substances that will improve health, because these African leaves have a lot of lack of antioxidants as well secondary metabolite compounds [13]. It is known that African leaf extracts contain components of sugars, polyphenols, terpenoids, saponins, alkaloids, glycosides, steroids or triterpenes, anthraquinones and coumarin without cyanogenic [14]. However, only tannins, glycosides and saponins without flavonoid which can be obtained from the roots and stems of leather leaf Africa [15]. In addition, the phenolic compounds that have been identified in African leaf class

are flavonoid [14]. Previous research with mice that use African leaf, proven to reduce lipid content, like cholesterol, cholesterol-HDL, cholesterol-LDL and triglycerides [16].

Based on available information, African plants prospectively to reduce the lipid content of local male Duck and broiler products, especially cholesterol and triglyceride content, thereby eliminating the limiting factor for adult people who want to consume chicken or duck meat. Repons of local male ducks and broilers were studied to examine the use of African leaves as feed additives. It will improve meat quality including live weight, body weight gain, ration conversion, and lipid content.

**2. MATERIALS AND METHODS**

*2.1. Material*

**Table 1.** The content of nutrition ration ingredients

Substances	Concentrate	Rice bran	Corn meal	(ALM)*
Dry material ( % )	89,63	90,70	91,29	90,00
Crude protein (%)	31,00	11,19	8,60	18,48
Crude fiber (%)	5,00	17,63	3,37	16,70
Crude Fat (%)	3,00	4,00	2,60	1,68
ME (kcal/kg)	2600	1630	3420	291,60

Source : Suhaemi, Abbas and Uddin (2016)

\* Analyzed by Payakumbuh Politani laboratory (2018)

*2.1.2. Experiments on broiler chickens*

This study uses broiler chickens as much as 100 chickens aged 8 days to 35 days, which is kept in a cage battery system. The use of African leaves is done in the form of flour. African leaves that are wide

*2.1.1. Experiments on local male duck*

This research is using local duck male as much as 80 heads that start from the age of 4 weeks, which is kept in a cage system battery, maintained until the age of 12 weeks. The use of African leaves is done in the form of flour or meal. Leaves Africa are already quite wide dried under room temperature to dry and easily crushed, then milled until smooth and sieved to the size of mash sieve 1 mm.

Rations were used is consists of a concentrate 124 (45%), corn miller (30%) and bran fine (25%), with content of Crude Protein 16.14% and Energy 2.717 Kcal/Kg, compiled based on the nutritional content of the ration material (Table 1). Rations are given as much as 150 g/e/d, with rationing in the morning and afternoon day.

enough are dried in the sun to dry and are easily crushed, then milled until smooth and sieved with a mash sieve size of 1 mm.

The material used in ration is listed in Table 2, with the composition of the research ration as listed in Table 3.

**Table 2.** The nutritional content of the ration ingredients

Food substances	Soybean meal	Fish flour	Milled Corn	Fine bran	TD A *
Crude protein (%)	31.00	55.00	8.60	11.19	18.48
Crude fiber (%)	5.00	1.00	3.37	17.63	16.70
Crude Fat (%)	4.00	9.00	2.60	11.22	1.68
ME (kcal / kg)	2600.00	2,970.00	3420.00	1630.00	291.60

Source: Suhaemi, Abbas and Uddin (2016)

\* Results of the analysis of the Payakumbuh Politani laboratory (2018)

Table 3. Rations Composition of research for broiler

Ration materials	Treatment (% ALM)				
	0.0%	0.5%	1.0%	1.5%	2.0%
Milled corn (%)	56.50	56.50	57.50	57.00	58.00
Fine bran (%)	12.50	12.00	10.50	11.00	9.00
Soybean meal (%)	21.00	20.50	21.00	19.00	20.50
Fish flour (%)	10.00	10.50	10.00	11.50	10.00
ALM (%)	0.00	0.50	1.00	1.50	2.00
Crude protein (%)	21.00	21.09	21.06	21.20	20.88
Crude fiber (%)	4.76	5.44	5.39	5.21	5.21
Crude Fat (%)	3.96	3.95	3.87	3.95	3.64
ME (kcal / kg)	2903.41	2900.41	2900.01	2892.32	2842.32

Calculated based on Table 2

**2.2. Research methods**

This study used CRD (Completely Randomized Design) with 5 treatments using ALM (0%; 0.5%; 1.0%; 1.5; and 2.0%), and 4 replications. If a significant result is obtained, Duncan Multiple Range Tests were used [17]. The implementation of treatment research described in figure 1.

The variables in this study were the growth performance of male local ducks and broilers as meat producers and the content of blood lipid components of ducks and broilers including total cholesterol, triglycerides and cholesterol-HDL. The weight gain of duck were observing every week and the sum was cumulatif on the end of rearing ducks.

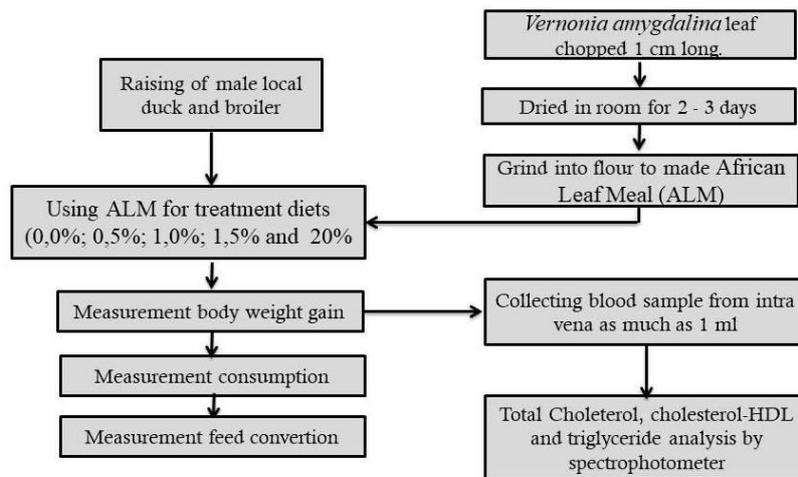


Figure 1. Research implementation diagram

**3. RESULTS AND DISCUSSION**

**3.1. Experiments on broiler chickens**

The results of the study on body weight gain , consumption and FCR are as shown in Table 4 . Table 4 illustrates that the average body weight gain increases following the increase in the use of ALM in the ration, but decreases at the use of ALM 2.0% (P <0.01). The use of

ALM has also been shown to significantly reduce the FCR of broiler chickens, although ration consumption has also increased. This is because the increase in Weight gain is higher than the increase in ration consumption.

Table 4 . Average weight gain, consumption, FCR, Total cholesterol (TC) and Triglyceride (Tgs) for broiler chickens

Variable	Treatment (% ALM)				
	0,0%	0,5%	1,0%	1,5%	2,0%
Consumption (g)	1903,55 <sup>ab</sup>	1921.37 <sup>bc</sup>	1925.39 <sup>bc</sup>	1941.15 <sup>c</sup>	1892,07 <sup>a</sup>
Weight gain (g)	1017,57 <sup>ab</sup>	1036.51 <sup>bc</sup>	1048.01 <sup>bc</sup>	1060,01 <sup>c</sup>	974,42 <sup>a</sup>
FCR	1,87 <sup>a</sup>	1,85 <sup>a</sup>	1,84 <sup>a</sup>	1,83 <sup>a</sup>	1,94 <sup>b</sup>
TC (mg / dl)	105,90 <sup>a</sup>	90,33 <sup>ab</sup>	84,87 <sup>b</sup>	84,33 <sup>b</sup>	97,33 <sup>ab</sup>
Tgs (mg / dl)	120,50 <sup>a</sup>	106,03 <sup>ab</sup>	101,40 <sup>b</sup>	98,40 <sup>b</sup>	113,83 <sup>ab</sup>

Different superscripts in the same row showed significantly differences (P <0.05)

Results of analysis of variance of consumption, weight gain and feed conversion of obtained results were highly significant (P <0.01). This is because the leaves Africa are known to contain bioactive substances and antioxidants [12], thereby improving livestock health and increasing growth and making more efficient use of feed. However, the use of the 2.0% level indicates an decrease in weight gain and increase in total cholesterol and triglycerides. These results are in line with previous studies, which showed that the use of TDA in local duck rations was shown to reduce total cholesterol and blood triglycerides [17].

The results in Table 4 show that the increasing use of ALM in the ration, decreased the mean of TC and TGS although it rose again at the level of 2.0%, but not significantly different (P>0.05). Cholesterol-HDL content also tended to increase, along with the increase in the use

of African leaf meal, however the analysis of variance showed not significantly different (P> 0.05). This shows that the use of African leaf meal has the opportunity to produce low cholesterol duck products. Because the active compounds of the flavonoid and tannin groups can increase the activity of the lipoprotein lipase enzyme so that it can reduce the levels of triglycerides in plasma [18].

### 3.2. Experiments on local male ducks

Results of research on the Weight of Life, Added weight of the body and the conversion ration such as that shown in Table 5. The mean body weight of local male Africa in the ration, it will increase the average body weight, as well as with the average weight gain. The use of ALM, also proved to be able to lower FCR of male ducks.

Table 5 . The mean of body weight (BW), weight gain (WG), and FCR of local duck male

Variabel	Treatment (% TDA)				
	0,0%	0,5%	1,0%	1,5%	2,0%
BW (g)	1393,5 <sup>a</sup> ±6,95	1395,0 <sup>a</sup> ±19,85	1428,0 <sup>b</sup> ±86,86	1503,6 <sup>b</sup> ±49,89	1511,8 <sup>b</sup> ±60,54
WG (g)	651,1 <sup>a</sup> ±19,82	661,7 <sup>a</sup> ±20,79	673,7 <sup>a</sup> ±22,73	687,2 <sup>a</sup> ±15,47	804,7 <sup>b</sup> ±23,95
FCR	7,8 <sup>a</sup> ± 0,22	7,6 <sup>a</sup> ±0,24	7,5 <sup>a</sup> ±0,25	7,3 <sup>a</sup> ±0,17	6,3 <sup>b</sup> ±0,19

Superscripts in the same row were significantly different (P <0.05) .

The results of the analysis of variance of the weight of body weight ducks, weight gain and FCR were highly significantly different (P <0,01). Based on the test continued, obtained results that the use of ALM 2,0 % level, high significantly different with the use of ALM were more slight. It is because the African leaves are known to contain bioactive and antioxidant substances [19], so it can improve the health of livestock and increase growth as well as be more efficient in utilizing ration.

The content of total cholesterol, triglycerides and cholesterol -HDL is depicted in Table 6. The results showed that an increase in ALM use in the ration will

decrease the average total cholesterol. Even though the result was not significant, treatment of 2.0%, ALM increased triglyceride level (P> 0.05). The content of cholesterol-HDL also tends to be more increased, along with the increase in the use of ALM, but not significant(P>0,05).

It is demonstrated that the use of ALM has the opportunity to produce duck products with low cholesterol, and increase cholesterol-HDL. As explained before, that total cholesterol is composed of cholesterol-LDL and cholesterol-HDL, where c-HDL is often called good cholesterol, not harmful for the body because it can

dispose of excess cholesterol is evil (K-LDL) in the artery

blood arteries back of biodiversity [4].

**Table 6.** Content of Total Cholesterol (TC), Triglycerides (Tgs) and Cholesterol-HDL (C-HDL) in duck blood (ml / dl)

Variable	Perlakuan (%TDA)				
	0,0%	0,5%	1,0%	1,5%	2,0%
TC	184,4 <sup>a</sup> ±3,61	175,5 <sup>b</sup> ±2,41	172,2 <sup>b<sup>c</sup></sup> ±0,92	170,7 <sup>c</sup> ±9,30	184,2 <sup>a</sup> ±3,68
C-HDL	81,6±1,30	82,0±4,08	83,5±4,54	83,1±2,44	83,6±0,93
Tgs	131,0 <sup>a</sup> ±19,41	119,2 <sup>b</sup> ±13,80	111,0 <sup>b<sup>±</sup></sup> 3,12	110,7 <sup>b<sup>±</sup></sup> 6,53	122,6 <sup>a<sup>±</sup></sup> 3,67

Superscripts are different at the same row were significantly different (P <0,05).

#### 4. CONCLUSION

The use of African leaf meal up to a level of 1.5% in the ration of local male ducks and broilers, can increase body weight gain and decrease FCR, as well as reduce the total blood cholesterol and triglycerides content, also the cholesterol-HDL content of local male ducks.

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