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The Use of Moringa Leaf Meal [Moringa Oleifera, Lam] and "Katuk" Leaf Meal [Saurapus Androgynus] to Reduce The Volume of Fish Meal in Broiler Feed Formula

Sutan Y.F.G,Dillak, N. P. F. Suryatni, Luh Sri Enawati, and Franky M.S.Telupere*

Departement of Animal Science. Faculty of Animal Husbandry, Marine and Fisheries
Nusa Cendana University og Kupang, Indonesia

Corresponding author details: Franky M.S. Telupere; papyt2018@gmail.com

ABSTRACT

The purpose of this study was to examine the effect of giving Moringa leaf flour and "katuk" leafs and their combination on the performance of broiler chickens. The study used 96 DOC broiler chickens and Completely Randomized Design [CRD] with 4 treatments and 6 replications; each unit consists of 4 chickens. The treatments consisted of: R0: Basal ration [control], R1: Basal ration + 10% Moringa leaf meal, R2: Basal ration + 10% katuk leaf meal and R3: Basal ration + a combination of 5% Moringa and katuk leaf meal. The variables measured included feed intake, body weight gain and feed conversion ratio. The results of the analysis of variance showed that the treatment had a very significant effect [P<0.01] on all measured variables. It was concluded that the administration of 10% Moringa leaf meal, 10% katuk leaf meal and a combination of 5% of these two herbal meal decreased the performance of broiler chickens and tend to increase income offer feed cost [IOFC].

Keywords: broiler; performance; moringa leafs; katuk leafs

INTRODUCTION

Protein sources for feed formulas generally rely on animal and vegetable proteins such as soybean meal, fish meal, blood meal or legume plants. Fish meal is the main source of protein in poultry rations, but this feed ingredient is still imported. The fact that is often faced by farmers is that the price of fish meal continues to increase, the quality is uncertain and its availability is sometimes limited, thus affecting the price and quality of the ration. According to NRC [1994], fish meal has a high protein content of about 60.05% and energy of 2820 kcal/kg.

To reduce the use of fish meal in the ration formula, other alternative feed ingredients are needed, which are cheap and available throughout the year.

Moringa leaves [Moringa oleifera, lam] and katuk leaves [Saurapus androgynus] have not been widely used in animal feed, especially for poultry feed. These medicinal plants have low side effects and are able to maintain product quality and livestock performance [Simitzis et al., 2008]. Antioxidant compounds in medicinal plants include -tocopherol [vitamin E], -carotene, ascorbic acid, flavonoids, carotenoids, anthocyanins, phenolic compounds, zinc and selenium [Moyo et al., 2012; Atowadi et al. 2010].

The availability of moringa leaves and katuk leaves which are quite abundant and available throughout the year is one of the considerations to be used as a mixture of ingredients in relatively inexpensive feed.

Moringa leaves contain simple sugars, rhamnose, and unique compounds namely glucosinolates and isothiocyanates and are known to have hypotensive, anti-cancer and antibacterial activities including 4-[α-Lrhamnopyranosyloxy] benzyl isothiocyanate, pterygospermin, and 4-[α-L-rhamnopyranosyl oxy] benzyl glucosinolate [Soetanto, 2005]. Research conducted by Sjofjan [2008] showed that the provision of Moringa leaves in feed provided an increase in feed consumption, live weight gain, feed conversion, carcass weight, production efficiency factors and income over feed cost [IOFC]. Ariyansah [2018] reported that the use of up to 10% Moringa leaf flour in feed did not have a negative effect on the appearance of broiler production and reduced abdominal fat content and meat fat content. The results of another study showed that administration of 5% Moringa leaf extract [Moringa oleifera] and garlic extract [Allium sativum] via drinking water could increase ration consumption, drinking water consumption, final body weight, weight gain, and produce efficient FCR values. in broilers aged 2-6 weeks.

While it is suspected that katuk supplementation improves the balance of microflora in the digestive tract by reducing the pathogenic microflora of Escherichia coli and Salmonella sp. [Santoso et al., 2001; Santoso et al., 2002], Salmonella typhosa and Staphylococcus aureus [Darise and Sulaeman, 1997] and increased effective microorganisms such as Lactobacillus sp. and Bacillus subtilis [Santoso et al., 2001]. It is known that the increase in Bacillus subtilis [Santoso et al., 2002] and/or Lactobacillus sp. improve feed conversion. The use of katuk leaf flour has the same effect on consumption and ration conversion but reduces body weight gain in broiler chickens aged 1 day to 6 weeks [Saleh and Dwi, 2005]. Meanwhile, Marsetyo, et al, [2015] reported that the use of katuk leaf flour up to a level of 10% in rations could increase livestock growth.

The advantages of these two herbs contain bioactives that function as antibiotics and antioxidants, besides being able to improve the quality and improve the taste of broiler chicken meat. The addition of Moringa leaf flour and katuk, and their combination in the ration is expected to improve the performance of broiler chickens.

RESEARCH METHOD

This study used 96 DOC broiler CP 707 produced by Charoen Pokphan Indonesia. Placed in 12.50 m x 5.00 m housing which consisting of 24 plots measuring 100 x 80 cm. The feed provided was in the form of a basal ration consisting of local ingredients such as corn, soybeans, rice bran, fish meal. Furthermore, Moringa leaf flour and katuk leaves were added according to the treatment. Provision of feed and drinking water is done ad-libitum. The composition and nutritional content of the treatment rations are presented in Tables 1 and 2.

TABLE 1: Composition of feed ingredient rations for each treatment [kg].

Ingredients	R0	R1	R2	R3
Corn	63,81	49,94	51,94	50,94
Soy flour	10,45	28,62	23,3	25,96
Fish flour	18,24	3,94	7,26	5,6
Bran	5	5	5	5
Moringa leaf flour	0	10	0	5
Katuk leaf flour	0	0	10	5
Premixes	0,5	0,5	0,5	0,5
Oil	1,5	1,5	1,5	1,5
Chalk	0,5	0,5	0,5	0,5
Total	**100**	**100**	**100**	**100**

TABLE 2: Nutritional content of each treatment.

Nutrients	R0	R1	R2	R3
Gross Energi [kcal/kg]	4536	4730	4697	4648
Crude protein [%]	20,75	22,08	22,36	21,63
Crude Fiber [%]	6,51	4,63	5,38	5,60
Crude Fat [%]	10,11	12,33	12,72	11,69
Gross Energi [kcal/kg]	4536	4730	4697	4648

Source: Undana Animal Science Feed Chemistry Lab [2018]

The rations tested in this study consisted of:
R0 : Basal feed without Moringa leaf meal and katuk [control]
R1 : 90% basal feed + 10% katuk leaf meal
R2: 90% basal feed + 10% Moringa leaf meal.
R3 : 90% basal feed + 5% Moringa leaf meal and 5% katuk leaf meal

The variables measured were feed consumption, body weight gain, and feed conversion. The method used was an experimental method using Completely Randomized Design. The collected data is processed by Analysis of Variety. Duncan's multiple distance test was used to determine the effect of differences between treatments [Steel and Torrie, 1993].

RESULTS AND DISCUSSION

Effect of Treatment on Feed Intake

Feed intake is the entry of a number of nutritional elements in the ration which has been composed of various food ingredients to meet the nutritional needs of broiler chickens [Rasyaf, 1995]. Feed intake is the most important aspect in evaluating the nutrition of feed ingredients, because the diversity of the appearance of an animal is greatly influenced by ration consumption.

TABLE 3: Average appearance of broilers for each treatment.

Parameter	Perlakuan				P value
	RO	RI	R2	R3	
Feed intake [g/h/week]	577.74[a]	477.19[b]	532.43[c]	508.97[c]	0.00
Body weight gain [g/h/week]	283.16[a]	183.93[b]	231.35[c]	207.93[d]	0.00
Feed conversion ratio	2.04[a]	2.60[b]	2.31[c]	2.46[c]	0.00
IOFC [Rp/h]	12..199[a]	12.459[a]	12.589[a]	12.585[a]	0.06

Note: different superscripts on the same line show a very significant difference [P<0.01].

Table 3. shows data on broiler feed intake for each treatment. The results of the analysis of variance [ANOVA] showed that the treatment had a very significant effect [P<0.01] on the intake of broiler rations. Duncan's further test showed that the feed intake of the addition of katuk leafs , Moringa leafs meal and their combination in the ration was lower than the intake of the control ration. This is presumably because the administration of the two herbal flours above reduces the palatability or appetite of chickens.

According to Amrullah [2003] one of the factors that affect the amount of feed consumed by livestock is palatability. The anti-nutritional tannins contained in these two herbs are thought to reduce palatability. Tannins reduce appetite in chickens because of the astringent taste and can bind to proteins in the digestive tract, besides that, tannins can cover the mucosal walls of the digestive tract, thereby inhibiting the absorption of feed nutrients [Mahfudz, 2009 in Mide, 2013].

The palatability of livestock to feed is influenced by the physical and chemical properties of the feed. The physical properties of the feed, including the smell, texture of the feed, and the form of the feed in the form of flour or granules. According to Sedyaadi [2018] the smell of Moringa leaf flour at a concentration of 3% has been felt and has a more distinctive taste of Moringa leaf flour along with the addition of Moringa leaf flour concentration. That is, the physical properties of the rations that were added with Moringa leaf flour resulted in a decrease in the level of preference for the ration, so that the consumption of poultry feed also decreased.

In addition to the active compounds, the flour preparations of these two herbs also have relatively intact crude fiber, giving rise to bulky properties that can suppress hunger in broilers and consequently reduce ration consumption. The use of high crude fiber causes a decrease in body weight of broilers [Randa et al. ., 2002] because broilers do not have cellulase enzymes so that crude fiber cannot be digested [Cao et al., 2003].

Effect of Treatment on Body Weight Gain

Body weight gain is one of the criteria used to measure livestock growth. This factor is used to see the extent to which livestock convert nutrients into meat.

Average data in Table.3. showed that the increase in body weight of chickens that received the addition of Moringa leaf flour, katuk leaves and their combination in the rasnum was lower than the control treatment. The results of the analysis of variance [ANOVA] showed that the treatment had a very significant effect [P<0.01] on broiler body weight gain. This proves that the treatment significantly reduces body weight gain. Duncan's further test showed that all treatments were significantly different from one another.

The lowest body weight gain was obtained by treatment R1 which received an addition of 10% katuk leaves and was followed by R3 which received an addition of 5% combination of moringa flour and katuk, it is suspected that the presence of anti-nutritional substances such as tannins and saponins were the cause. Mide [2013] stated that giving katuk leaf flour tends to reduce broiler growth.

In general, tannins can cause disturbances in the digestive process in the digestive tract. In addition, saponins increase the permeability of small intestinal mucosal cells, which results in inhibition of active nutrient transport, and causes the absorption of nutrients in the digestive tract to be disrupted. The results of the study by Rukmana [2004] using turmeric flour in broiler feed resulted in increased body weight gain compared to control, but after turmeric flour was mixed with katuk leaves of 0.5% each, it turned out that broiler body weight gain decreased, this is thought to be due to the effect of tannins and saponins. in katuk leaves. According to Andryanto et al., [2010] giving 10-15% katuk leaf flour in feed can reduce body weight of broilers.

Another factor suspected of causing low body weight gain was the reduced portion of fish meal in each treatment [Table 1] compared to the control ration where it was known that fish meal was a source of protein containing complete and balanced essential amino acids. According to Ethics [2021] the amino acid content and structure of animal protein is different from that of vegetable protein. The amino acids present in animal proteins are complete essential amino acids, and their structure is almost similar to the amino acids found in the body. Therefore, animal protein sources are a good source of amino acids for the body. Vegetable protein, on the other hand, lacks the amino acids methionine, tryptophan, isoleucine, and lysine. So that the better absorption of amino acids is animal protein. According to Utami [2020] the absorption of animal protein by the body is 90% while the absorption of vegetable protein is only 60-70%. while Tilman., et al [1991] stated that the efficiency of protein use depends on the availability of essential and non-essential amino acids in the feed.

Effect of Treatment on Feed Conversion Ratio

Feed conversion as a benchmark to assess the effectiveness of chickens in using feed. The average ration conversion in this study ranged from 2.04 - 2.60. The ration conversion value obtained in this study was still higher than the normal standard, a good ration conversion according to Amrullah [2003]. The biological data obtained in this study showed that all treatments gave a ration conversion above 2. This means that the addition of 10% flour Katuk leaves and 10% Moringa leaves and 5% combination of these two leaf powders in the basal ration are not efficient and economical.

It is suspected that the presence of anti-nutritional substances such as tannins and saponins are the cause. Rahayu [1999] reported that the tannin content in katuk leaves makes the feed difficult to digest and reduces the nutrient absorption of the feed. In addition to the active compounds, crude fiber also affects absorption in the digestive tract. High crude fiber causes reduced absorption in the intestine [Yang et al., 2013] so that not enough nutrients are available for the formation of meat.

Effect of Treatment on IOFC

Based on IOFC data in table 3, it is known that with the addition of 10% moringa and katuk leaf meal and 5% of their combinations in basal feed, the IOFC value is higher Rp. 12,585/h, Rp. 12,589/h and Rp 12,459/h compared to control [R0] which reached IOFC of Rp 12,199/h.

The results of statistical analysis showed that the addition of moringa leaf flour, katuk leaves and their combinations in the basal feed mixture with different compositions had no significant effect [P>0.05] on the Income Over Feed Cost [IOFC] of chickens in this study. This is presumably because even though the price of the control ration [Rp. 11,875] was the highest, it was followed by a high body weight gain. In contrast, the treatment ration [R1, R2, R3] even though it has a low ration price is also accompanied by low body weight gain so that it has the same effect on IOFC.

CONCLUSION

A 10% reduction in fish meal due to the addition of moringa and katuk leafs meals and the combination of the two leafs meal for this in the basal ration reduces broiler performance and tend to incrase IOFC

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