E-ISSN:2685-452X *Journal of Tropical Animal Science and Technology, Januari 2025:7 (1): 37-45*
DOI: *10.32938/jtast.v7i1.8846*
https://jurnal.unimor.ac.id/JTAST

THE EFFECT OF PROVIDING MORINGA LEAF FLOUR (*MORINGA OLEIFERA*) IN FEED AS A FEED ADDITIVE ON INCREASING THE PERFORMANCE OF SUPER VILLAGE CHICKENS (*GALLUS GALLUS DOMESTICUS L. VARIATION JOPER*)

Carlos M Manalu[1], Sayed Umar[1], Nevy Diana Hanafi[1], Winda F Saragih*

[1]Animal Science Study Program, Faculty of Agriculture, Universitas Sumatera Utara

**Corresponding Author. E-mail: windafransisca@usu.ac.id*

ABSTRACT

Joper chickens are breeds of kampung chickens, Bangkok chickens, or other local breeds of chickens separated from purebred chickens. In addition to genetic factors and feed management, the use of natural constituents as feed additives can affect the meat quality of super hens. Feed additives are ingredients that do not include food substances that are added to the stove in small amounts and are aimed at spurring growth and increasing feed efficiency. The existence of various studies in the selection of feed raw materials that produce quality feed additives that are easy to use and cheap to meet the needs of super rural chickens are moringa leaves. The design used in this research was a Completely Randomized Design (CRD) with 4 treatments and 5 replications. The treatment consisted of T0 (Ration does not contain Moringa leaf flour), T1 (Ration contains 6% Moringa leaf flour), T2 (Ration contains 9% Moringa leaf flour), T3 (Ration contains 12% Moringa leaf flour). The parameters observed were feed consumption, body weight gain and feed conversion. The results showed that Moringa leaf flour had a significant effect on feed consumption, body weight gain and feed conversion. The best results were obtained in treatment T1, namely the ratio containing 6% Moringa leaf flour, which was able to increase feed consumption by 367.46 grams, body weight gain by 88.62 grams and feed conversion ratio by 4.16.

Keywords: Joper chicken, moringa leaf flour, feed additive, performance.

INTRODUCTION

The need for poultry meat, especially free-range chicken meat, is increasing every year. Free-range chicken meat production in Indonesia in 2021 was 269,799.30 tons, and free-range chicken meat production in 2022 was 275,415.61 tons (Central Statistics Agency of Indonesia). The high contribution of free-range chicken meat has caused the supply of chicken meat to have a very large influence on the stability of the provision of animal protein needs. One of the livestock commodities that is considered potential by the Indonesian people for meat production is super free-range chicken (Abadi et al., 2022).

Super kampung chicken is a descendant of kampung chicken, Bangkok chicken, or other types of local chicken that are crossed with broiler chicken. This crossing is known as grading up which is used to improve the genetics of kampung chicken offspring. It should be noted that the quality of super kampung chicken feed is an important factor in determining the selling value and consumption of chicken meat. In addition to genetic factors and feed management, the use of natural ingredients

as feed additives can affect the quality of super kampung chicken meat.

Feed is the most costly factor in broiler farming, which is 60-70% of the total production cost (Budiansyah, 2010). The high demand for feed has resulted in many studies aimed at increasing feed efficiency by implementing good feed management. One step that can be taken to improve livestock production performance is to maintain the quality and quantity of feed and add feed additives to the feed. Feed additives are materials that are not included in food substances that are added to feed in small amounts and aim to stimulate growth and increase feed efficiency. Moringa leaves (*Moringa oleifera*) are chosen as raw materials for feed that can be used as feed additives because of their quality, easy availability and economical price.

Moringa plants (*Moringa oleifera*) are shrubs that can grow anywhere. Besides that, Moringa is a plant that has many benefits. In addition to being beneficial for humans, Moringa leaves are also useful as animal feed, especially for super native chickens. The content of protein, vitamins, minerals, and other components in Moringa leaves is beneficial for the development of native chickens. According to Inggriani et al. (2020), the use of Moringa in native chickens has not been widely used, even though native chickens have a very large role in people's lives, especially in rural areas to meet the need for meat, eggs and as additional income and contribute around 17% of meat production from the national meat supply. Moringa leaves can be used as a feed additive up to 5%. Based on the description above, it is important to study the effect of providing Moringa leaf flour (*Moringa oleifera*) in feed as a feed additive to improve the performance of super native chickens (*Gallusgallus domesticus L. joper variation*).

MATERIALS AND METHODS

Place and Time of Research

The research was conducted in the Greenhouse and Field Laboratory cage of the University of North Sumatra. This research lasted for 84 days.

Research Materials

Equipment. The equipment used is a battery cage made of wire mesh measuring 50 cm long, 100 cm wide, and 100 cm high. There are 20 cages, each containing five chickens. A feeder, drinking water container, and one lamp are included in each cage unit. An oven for drying moringa leaves, a blender, an analytical scale, a cage cleaner, a scale, a calculator, and a camera.

Material. The research material used was 100 1-day-old Day Old Chicken (DOC) joper chickens. The ingredients of the basal feed ration consisted of moringa flour, rice bran, corn, soybean meal, fish meal, coconut oil, and premix. For drinking water, use additional vitamins and supplements such as Vitachick.

Table 1. Nutritional Content of Feed Ingredients in Rations Formulation of Starter Phase Joper Chicken (%)

Feed ingredients	Treatment			
	T0	T1	T2	T3
Corn	53	52	51	50
Bran	18	15	14	13
Fish meal	4	2	2	2
Moringa leaf flour	0	6	9	12
Soybean meal	21.5	21.5	20.5	19.5
Rock flour	1	1	1	1
Premix	2.5	2.5	2.5	2.5
Amount (%)	100	100	100	100
Nutritional composition				
Metabolic energy (kcal/kg)	2976.16	2979.16	2981.9	2984.63
Crude protein (%)	17,204	17,359	17,514	17,669
Crude fat (%)	6,076	5,726	5,571	5,417
Crude fiber (%)	5,764	5,819	5.87	5,931
Calcium (%)	0.921	0.971	1,038	1,105
Phosphorus (%)	0.685	0.659	0.669	0.679

Formulation of Ration for Finisher Phase Joper Chickens (%)

Feed ingredients	Treatment			
	T0	T1	T2	T3
Corn	53.5	51.5	50.5	49.5
Bran	19	16	15	14
Fish meal	1	1	1	1
Moringa leaf flour	0	6	9	12
Soybean meal	21	21	20	19
Rock flour	2	2	2	2
Premix	2.5	2.5	2.5	2.5
Amount (%)	100	100	100	100
Nutritional composition				
Metabolic energy (kcal/kg)	2941.01	2945.83	2948.57	2951.3
Crude protein (%)	16,169	16,733	16,888	17,043
Crude fat (%)	6,091	5,740	5,585	5,431
Crude fiber (%)	5,767	5,851	5,907	5,964
Calcium (%)	1,198	1,297	1,364	1,431
Phosphorus (%)	0.654	0.649	0.66	0.671

Research methods

This study used an experimental design based on a completely randomized design (CRD) with 4 treatments and 5 replications. The treatments given were T0 (ration without the addition of moringa leaf flour as a control); T1 (ration containing 6% moringa leaf flour); T2 (ration containing 9% moringa leaf flour and T3 (ration containing 12% moringa leaf flour). The nutritional content of the feed ingredients in the ration can be seen in Table 1. Feeding of Joper chickens raised for 60 days consists of starter feed, namely for ages 0-30 days and finisher feed, namely for ages 31-60 days, as can be seen in Table 2.

Table 2. Feeding of Joper chickens raised for 60 days

Age of Joper Chicken (Days)	Feeding (grams/head)
1-7	10
8-14	15
15-21	20
22-28	30
29-35	40
36-42	50
43-49	60
50-60	70

Making Moringa Leaf Flour

The making of moringa leaf flour is carried out based on the method of Budiani, et al. (2020), namely, picking and removing the moringa leaf stalks from the shoots, then washing them thoroughly, drying the moringa leaves using an oven at a temperature of 45° for 24 hours, smoothing the dried moringa leaves using a blender for 5 minutes, sieving to separate the moringa leaf flour using a 100 mesh sieve.

Joper Chicken Rearing

Cage and Equipment Preparation. The cage used is a stage cage and consists of 20 plots. Each plot contains 5 DOC joper. Before the DOC is put in, the cage is cleaned with water and then disinfected. The cage is equipped with a place to feed and drink and lighting equipment. The cage is a place for livestock to carry out production activities, so the comfort and shape of the cage need to be considered so that the livestock feel comfortable and do not interfere with the production process (Setiawati et al., 2016). Rest is done for 1 week. Sugar water is given to the DOC upon arrival to reduce stress during the trip. The cage is equipped with a 25-watt incandescent lamp. Water and rations are distributed ad libitum according to the calculation of feed requirements based on body weight.

Day Old Chicken (DOC) Randomization. Random selection of DOC aims to avoid bias (experimental error) and then placed in each available plot as many as 5 tails.

Data Retrieval

Data collection was done by weighing the feed and joper chickens. Feed weighing is done every morning where the initial feed and remaining feed are weighed, the difference between the initial feed and remaining feed will be referred to as consumed feed. Weighing the body weight of joper chickens is done once a week, namely at the beginning of DOC entering as a study, then carried out on the seventh day

before the feed is given. The weight of the chickens is weighed / head/week using a digital scale. Calculation of feed conversion is done by comparing the amount of feed that has been consumed and the body weight of joper chickens in a week.

Research Variables

The observed variables are:

1. Feed Consumption

   Consumption of chicken feed is calculated as a comparison of the number of chickens (g/head/day) and the amount of feed consumed (Nuningtyas, 2014).

$$Feed\ consumption\ (g) = \frac{Total\ feed\ supplied(g) - Total\ residual\ feed(g)}{The\ number\ chickens}$$

2. Body Weight Gain (BWG)
   The difference between final body weight (FBW) and initial body weight (IBW)(g/head/week) is known as weight gain (Nuningtyas, 2014).

$$BWG\ (g) = FBW\ (g) - IBW\ (g)$$

3. Conversion Ration (FCR)
   Ration conversion compares feed consumption with body weight gain. The lower the FCR value, the less ration is needed to produce one kilogram of body weight. The FCR value is a comparative number that represents the total ratio required to obtain one kilogram of body weight (Nuningtyas, 2014).

$$Feed\ Conversion\ Ratio = \frac{Feed\ consumption\ (g)}{body\ weight\ gain\ (g)}$$

Data Analysis

The data that has been obtained is then analyzed using ANOVA, if there are significant differences between treatments, it will be further tested using the Duncan Test with a test level of 5%.

RESULTS AND DISCUSSION

RESULTS

Based on the research results, it is known that the addition of moringa leaf flour to the ration formulation gives very significantly different results (P <0.01) on the performance of super kampung chickens. The parameters studied were feed consumption, body weight gain and feed conversion. The effect of the addition of moringa flour on the performance of super kampung chickens can be seen in Table 3.

Table 3. Average feed consumption, body weight gain and feed conversion

Parameter	Treatment			
	T0	T1	T2	T3
Feed consumption (g/head/week)	353,94[a]	367,46[b]	391, 26[c]	424,61[d]
BWG (g/head/week)	76,78[a]	88,62[b]	84,54[b]	73,30[a]
Feed conversion	4,62[b]	4,16[a]	4,63[b]	5,80[c]

Note: Different codes in the same column indicate significant differences (P<0.05); T0 (Ration does not contain Moringa leaf flour), T1 (Ration contains 6% Moringa leaf flour), T2 (Ration contains 9% Moringa leaf flour), T3 (Ration contains 12% Moringa leaf flour).

The table above shows that the three treatments, T1 (Ration containing 6% moringa leaf flour), T2 (Ration containing 9% moringa leaf flour) and T3 (Ration containing 12% moringa leaf flour), produced body consumption, body weight gain and feed conversion that were significantly different from the control treatment (without the addition of moringa flour). Treatment T0 produced feed consumption of 353.94 g/head/week, body weight gain of 76.78 g/head/week and feed conversion of 4.62. Treatment T1 produced an average feed consumption of 367.46 g/head/week, body weight gain of 88.62 g/head/week and feed conversion of 4.16. Treatment T2 produced an average feed consumption of 391.26 g/head/week, body weight gain of 84.54 g/head/week and feed conversion of 4.63. The T3 treatment resulted in an average feed consumption of 424.61 g/head/week, body weight gain of 73.30 g/head/week and feed conversion of 5.80.

DISCUSSION

Feed Consumption

The results of the analysis showed that the consumption of super kampung chicken feed with the addition of various percentages of moringa leaves into the ration gave very significantly different results (P <0.01) on ration consumption. Based on the results of the Duncan's Multiple Range Test (DMRT) further tests, the provision of moringa leaf flour with a concentration of 12% (T3) had a higher average feed consumption. It was significantly different compared to the T0 (0%), T1 (6%), and T2 (9%) treatments. Ustundag and Ozdogan (2016), explained that moringa leaf flour can be used safely at a level of 5% -20% in chicken feed without damaging effects on chicken performance and is able to increase ration consumption. Conn (2002) stated that several factors affect ration consumption, namely the type of poultry, environmental temperature, body weight, sex, age, livestock activity, cage type, feed palatability, feed nutritional quality and water consumption.

The average feed consumption of super kampung chicken with the addition of various percentages of moringa leaves into the ration ranged from 353.94 g-424.61 g. This result is higher than the research of Munira et al. (2016), who conducted a study of super kampung chicken using fermented rice bran as a feed substitute with an average consumption ranging from 297.41-310.16 g/head/week. The increase in feed consumption in this study was due to the addition of moringa flour. Feed rations with additional formulations of Moringa flour contain the nutrients needed by kampung super chickens, are relatively cheap and easy to obtain and palatable (with a high level of liking for poultry). The use of Moringa flour in the ration provides good performance in increasing feed consumption in kampung super chickens. Still, it affects reducing body weight and feed conversion ratio. Moringa plants contain anti-nutritional substances such as tannins, saponins, and alkaloids, which can affect digestibility by disrupting metabolic processes and reducing livestock body weight. A high conversion value indicates low digestibility and nutrient absorption of the ration so that the digestive tract is empty and the chicken consumes more feed. Research conducted by Sjofjan (2008) showed that the provision of moringa leaves in feed increased feed consumption, live weight gain, feed conversion, carcass weight, production efficiency factors and income over feed cost (IOFC).

Body Weight Gain (BWG)

The results of the analysis showed that the increase in body weight of super kampung chickens with the addition of various percentages of moringa leaves to the ration produced a very significant difference (P <0.01). Based on the results of the further Duncan's Multiple Range Test (DMRT) test, the best body weight

gain was in the T1 treatment, namely 88.62 grams (ration containing 6% moringa flour), which was able to optimize metabolism in the chicken's body and did not affect the effects of anti-nutrients, namely tannins and saponins. The data is in accordance with the results of the study by Tirajoh et al. (2020), which revealed that moringa leaves contain good nutritional value to help in the metabolic process in the chicken's body in the form of protein content, especially amino acids and other active substances in increasing digestibility so that it has an impact on better weight gain in chickens. The higher the concentration of Moringa flour, the more anti-nutritional substances will increase. Providing Moringa flour in treatments, T1-T3, resulted in a significant reduction in chicken body weight due to metabolic disorders, which caused the chicken's body metabolism not to be able to digest feed nutrients properly. If tannins are in the digestive tract, they can cover the lumen of the digestive tract, causing reduced absorption of feed nutrients. Apart from tannins, the anti-nutritional substance saponin also reduces the permeability of small intestinal mucosal cells, which can result in the inhibition of nutrient metabolism and cause the absorption of nutrients in the digestive tract to be disrupted (Haril et al., 2017).

The BWG results in this study were higher compared to the study by Munira et al. (2016), who conducted a study on super kampung chickens treated with fermented rice bran with an average of 70.94-79.31 g/head/week. A previous study reported that the use of moringa leaves at a level of 10% had no adverse effect on the BWG of super kampung chickens (Dima et al., 2022).

Feed Conversion Ratio (FCR)

The results of the analysis showed that the feed conversion ratio of super kampung chicken with the addition of various percentages of moringa leaves into the ration had a very significant effect ($P < 0.01$). Based on the results of the Duncan's Multiple Range Test (DMRT) test, treatment T1 had the best FCR compared to other treatments. This shows that feed using moringa leaves is better at increasing the production of super kampung chicken than not using moringa leaves. The optimal level of moringa leaf use is 6%. If used above 6% tends to increase the FCR value. This level of moringa leaf use is close to the level of use of Sebola et al. (2015), who conducted an in vivo study using 5% moringa leaves to improve health status, growth performance and feed conversion efficiency. The positive response of chickens to the use of moringa leaves in broiler finisher feed did not have a negative effect on chicken growth performance. Falowo et al. (2018) added that Moringa leaves can be used as a source of important nutrients rich in protein, essential amino acids, minerals and vitamins with relatively low amounts of anti-nutrients and rich in other bioactive substances, including flavonoids and phenolic compounds.

The FCR results in this study were higher compared to the study by Munira et al. (2016), who conducted a study on super kampung chickens using fermented rice bran as a feed substitute, which had an average feed conversion ranging from 4.09-4.99. In this study, the feed conversion ratio given 12% moringa flour (T3) had the highest feed ratio because the feed consumption rate was quite high. However, the body weight gain was still low due to anti-nutrients from tannins and saponins contained in moringa flour. Kampung super chickens that given moringa leaf flour have less efficient feed conversion if the ratio of moringa leaves is added too high (>5%), so it is more efficient if the correct addition of Moringa leaves is able to improve body weight gain and feed consumption which will improve the conversion value feed.

According to Tirajoh et al. (2020), the feed conversion of chickens given additional moringa leaves had a high conversion value above 5. The low body weight and feed consumption produced so

that the chickens were not efficient in producing meat production.

CONCLUSION

The addition of moringa leaf flour as a feed additive can increase feed consumption and body weight gain and can reduce the feed conversion ratio. The optimal level of moringa leaf use is 6%, which can produce feed consumption of 367.46 g/head/week, body weight gain of 88.62 g/head/week and a feed conversion ratio of 4.16.

REFERENCES

Abadi, S., Candra, A. A. dan Zairiful, Z. 2022. Aplikasi Kulit Nanas (*Ananas comosus L. Merr*) Fermentasi dalam Ransum untuk Menunjang Produktivitas Ayam Joper (jawa Super) *Fase Finisher*. Peterpan (Jurnal Peternakan Terapan) 4(2): 58-63

Budiani, R. D., Mutmainah., J. Subandono., Sarsono., dan Martini. 2020. Pemanfaatan Tepung Daun Kelor Sebagai Komponen Makanan Pendamping Asi (MPASI) Padat Nilai Gizi. Jurnal Abdidas 1(6): 789–796

Budiansyah, A. 2010. Performan ayam broiler yang diberi ransum yang mengandung bungkil kelapa yang difermentasi ragi tape sebagai pengganti sebagian ransum komersial. Jurnal Ilmiah Ilmu Peternakan 13(1): 260- 268

Conn, C.N. 2002. Digestion and Metabilosm. In: Bell, D.D. dan Wiliam D. Weaver, Jr. (Editors). Commersial Chicken Meet and Egg Production. 5 th Edition. Kluwer Academic Publishers., Norwell

Dima, Y. B., Malik, A. K. dan Telupere, F. 2022. Pengaruh Kombinasi Tepung Krokot (*Portulaca Oleracea*) Dan Tepung Kelor (*Moringa Oleifera*) dalam Ransum Komersial terhadap Konsumsi Ransum dan Performa Ayam Kampung Super Fase Starter. Seminar Nasional Fakultas Peternakan, Kelautan, dan Perikanan 1(1): 95-104

Falowo A. B., Mukumbo F. E., Idamokoro E. M., Lorenzo J. M., Afolayan A. J. and Muchenje V. 2018. Multi-functional application of *Moringa oleifera* Lam. in nutrition and animal food products: A review. Food Research International 106(1): 317–334

Haril, J. D., Yan, T. dan I Nyoman, K. 2017. Efek Penambahan Tepung Daun Kelor (*Moringa Oleifera*) pada Ransum Komersial terhadap Berat Karkas, Persentase Karkas dan Persentase Non Karkas Ayam Broiler. Gema Agro 23(1): 53-58

Inggriani, K., Tethool A. N. dan Lumatauw S. 2020. Pengaruh Ekstrak Sarang Semut (*Myrmecodia Sp*) dalam Pengencer Ringer Laktat Terhadap Abnormalitas dan Viabilitas Spermatozoa Ayam Kampung. Jurnal Ilmu Peternakan dan Veteriner Tropis (*Journal of Tropical Animal and Veterinary Science*) 10(1): 1

Munira, M. dan Tasse, A. M. 2016. Performans ayam kampung super pada pakan yang disubttusi dedak padi fermentasi dengan fermentor berbeda. Jurnal Ilmu dan Teknologi Peternakan Tropis 3(2): 21-29

Munira, M. dan Tasse, A. M. 2016. Performans ayam kampung super pada pakan yang disubttusi dedak padi fermentasi dengan fermentor

berbeda. Jurnal Ilmu dan Teknologi Peternakan Tropis 3(2): 21-29

Nuningtyas, Y. F. 2014. Pengaruh Penambahan Tepung Bawang putih (*Allium Sativum*) sebagai aditif terhadap penampilan produksi ayam pedaging. Jurnal Ternak Tropika 15(1): 21-30

Sebola N. A., Mlambo V., Mokoboki H. K. and Muchenje V. 2015. Growth performance and carcass characteristics of three chicken strains in response to incremental levels of dietary *Moringa oleifera* leaf meal. Livestock Science 178(1): 202–208

Setiawati, T., Afnan, R. dan Ulupi, N. 2016. Performa produksi dan kualitas telur ayam petelur pada sistem litter dan cage dengan suhu kandang berbeda. Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan 4(1): 197- 203

Sjofjan, O. 2008. Efek Penggunaan Tepung Daun Kelor (*Moringa oleifera*) dalam Pakan terhadap Penampilan Produksi Ayam Pedaging. Fakultas Peternakan Universitas Brawijaya: Malang

Tirajoh, S., Batseba A.W.T., Palobo, F. dan Rohimah H.S.L. 2020. Pemanfaatan Daun Kelor (*Moringa oliefera)* Terhadap Kualitas Pertumbuhan Ayam Kampung Unggul Balibangtan di Jayapura, Papua. Jurnal Ilmu Peternakan dan Veteriner Tropis 10(20): 119-127

Ustundag A. and Ozdogan M. 2016. Using *Moringa oleifera* in poultry nutrition. Journal of Agricultural Faculty of Uludag University 30(1): 195–201