



The Effect of Moringa Leaf Extract (*Moringa oleifera*) in Drinking Water on Broiler Chicken Carcass Production

*Pengaruh Ekstrak Daun Kelor (*Moringa oleifera*) dalam Air Minum terhadap Produksi Karkas Ayam Broiler*

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ABSTRAK

Penelitian telah dilaksanakan di kandang ayam yang berlokasi di Fakultas Peternakan, Kelautan dan Perikanan Universitas Nusa Cendana, Kupang dari tanggal, 7 April 2023 sampai dengan 26 Mei 2023. Tujuan dari penelitian ini adalah untuk mengkaji pengaruh pemberian sari daun kelor (*Moringa oleifera*) dalam air minum terhadap produksi karkas ayam broiler. Penelitian ini menggunakan 96 ekor DOC ayam broiler strain CP 707. Rancangan percobaan yang digunakan adalah Rancangan Acak Lengkap (RAL) dengan 4 perlakuan dan 6 ulangan, setiap ulangan terdiri dari 4 ekor ayam broiler. Perlakuan yang diberikan adalah P0= air minum tanpa sari daun kelor (kontrol), P1= 40 ml sari daun kelor/l air minum, P2= 80 ml sari daun kelor/l air minum, P3 = 120 ml sari daun kelor/l air minum. Variabel yang diteliti adalah bobot badan akhir, persentase karkas, persentase non karkas dan lemak abdominal. Hasil analisis statistik menunjukkan bahwa pemberian sari daun kelor dalam air minum pada level 0, 40, 80 dan 120 ml/l air minum tidak memberikan pengaruh yang nyata ($P>0,05$) pada bobot badan akhir, persentase karkas dan persentase non karkas ayam broiler, namun nyata ($P<0,05$) meningkatkan persentase lemak abdominal. Berdasarkan hasil penelitian dapat disimpulkan bahwa penggunaan sari daun kelor (*Moringa oleifera*) dalam air minum hingga level 120ml/l air minum dapat meningkatkan persentase lemak abdominal tetapi belum memberikan perubahan pada bobot badan akhir, persentase karkas dan persentase non karkas ayam broiler.

ABSTRACT

The research was carried out in the chicken house of the Faculty of Animal Husbandry, Marine and Fisheries, Nusa Cendana University, Kupang from April 7th 2023 to May 26th 2023. The aim of this research was to examine the effect of administering *Moringa oleifera* leaf extract in drinking water on broiler chicken carcass production. This research used 96 DOC broiler chickens of the CP 707 strain. The experimental design used was a Completely Randomized Design (CRD) with 4 treatments and 6 replications, each replication consisting of 4 broiler chickens. The treatments given were P0= drinking water without moringa leaf extract (control), P1= 40 ml moringa leaf extract/l drinking water, P2= 80

KEYWORDS:

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ml moringa leaf extract/l drinking water, P3= 120 ml moringa leaf extract/l drinking water. The variables studied were final body weight, carcass percentage, non-carcass percentage and abdominal fat. The results of statistical analysis show that moringa leaf extract at levels of 0, 40, 80 and 120 ml/l of drinking water did not have a significant effect ($P>0.05$) on final body weight, percentage of carcass and non-carcass percentage of broiler chickens, but increased the percentage of abdominal fat significantly ($P<0.05$). Based on the research results, it can be concluded that the use of *Moringa oleifera* leaf in drinking water up to a level of 120ml/l drinking water can increase the percentage of abdominal fat but did not change the final body weight, carcass percentage and non-carcass percentage of broiler chickens.

1. Introduction

The need for animal protein for Indonesian people can be met from livestock products, including eggs and chicken meat. The quality of chicken meat is influenced by various potential internal and external factors, including nutrition and health management (Weimer *et al.*, 2022). Antibiotics have been widely used in the poultry industry to prevent and treat diseases and promote production (Engberg *et al.*, 2000). However, the excessive use of antibiotics has led to the emergence of antibiotic-resistant bacteria (Yuhu *et al.*, 2023). Antibiotics in animal feed were banned in Indonesia in 2017 (Indonesian Minister of Agriculture regulations no. 14/Permentan/PK 350/5/2017). Therefore, recently, some researchers and consumers have been striving to evaluate the effects of natural antibiotic alternatives on productivity of broiler chickens. Some of these natural antibiotic alternatives as feed supplements have been in the form of phytobiotics such as *Moringa oleifera* (Gopalakrishnan *et al.*, 2016)

Moringa plants are widely available in East Nusa Tenggara Province, especially in Kupang City, so they can be used as feed additives especially phytobiotic. Moringa leaves have been reported as a rich source of β -carotene, protein, vitamin C, calcium and are a source of antioxidants such as ascorbic acid, flavonoids, phenolics and carotenoids (Krisnadi, 2015).

Mohamed *et al.*, (2022) stated that flavonoids in moringa leaves have potential as antioxidants and have anti-bacterial, anti-inflammatory, anti-allergic and anti-thrombotic activities. Flavonoid active compounds have properties that can activate the lipase enzyme. The lipase enzyme will convert excess fat in the body into fatty acids and glycerol so that there is no accumulation of fat in the body of broiler chickens (Widyamanda *et al.*, 2013). The chemical compounds contained in moringa leaves are

expected to reduce abdominal fat and increase broiler chicken carcass production. Jefri et al., (2020) stated that administering extract Moringa in drinking water up to a level of 60ml/l drinking water did not have a significant effect on the carcass percentage and abdominal fat percentage of 5 weeks old broiler chickens. Munandar (2021) stated that giving extract moringa up to a level of 20% in drinking water had no effect on carcass percentage.

Based on the description above, research was carried to examine the effect of administering *Moringa oleifera* leaf extract in drinking water on broiler chicken carcass production.

2. Materials and Methods

2.1 Place and Time of Research

This research was carried out in a chicken cage located at the Faculty of Animal Husbandry, Marine and Fisheries, Nusa Cendana University, Kupang, NTT. The research treatment was given from 3 weeks to 6 weeks of age. Carcasses are cut at 6 weeks of age.

Research Materials

2.2.1 Types of Research Animals

The chickens used in this research were 96 DOC broiler chickens strain CP 707 produced by PT. Charoen Pokphand Indonesia, Tbk.

2.2.2 Feed

The feed used in this research was commercial CP511 given from 1-7 days of age. Then, CP11 feed was given from 1-2 weeks of age to chickens (starter phase). Next, CP12 feed was given to finisher phase chickens. Feed and drinking water were provided ad libitum. The nutritional composition of each feed can be shown in **Table 1**.

Table 1. Nutrient Content of Feed CP511, CP11 and CP12

Nutrient Levels	CP511	CP11	CP12
Water Content (% max)	14.00	14.00	14.00
Crude protein (% min)	20.00	20.00	19.00
Crude Fat (% min)	5.00	5.00	5.00
Crude Fiber (% max)	5.00	5.00	6.00
Ash(%max)	8.00	8.00	8.00
Calcium	0.80-1.10	0,80-1,10	0,80-1,10
Total phosphorus (% min)	0.50	0,50	0,45
Urea	ND	ND	ND
Total aflatoxin (%max)	50.00	50.00	50.00
Amino acids (% min) :			
Lysine (% min)	1,20	1,20	1,05
Methionine(% min)	0.40	0,45	0,40
Methionine + cystine (% min)	0,80	0,80	0,75
Tryptophan (% min)	0.19	0,19	0,18
Threonine (% min)	0,75	0,75	0,75

Source: PT. Charoen Pokphand Indonesia, Tbk

Research E Housing

The cage used in this research is a semi-permanent cage with a litter system. The number of pen was 24 with the size of each pen was 80cm x 80cm x 80cm and each pen contains 4 broiler chickens. Each cage is equipped with a plastic hanging feeder and drinker.

2.3 Research Methods

The experimental design used was a Completely Randomized Design (CRD), consisting of 4 treatments and 6 replications, in each replication there were 4 broiler chickens. The treatments were:

P0 = drinking water without extract moringa leaf

P1 = 40 ml moringa leaf extract/1 drinking water

P2 = 80 ml moringa leaf extract/1 drinking water

P3 = 120 ml moringa leaf extract/1 drinking water

2.4 Research Procedures

Making moringa leaf extract (Munandar, 2021)

1. Moringa leaves are separated from the stems, damaged leaves are discarded, then washed to remove dirt and dust.
2. Then, weigh it in a ratio of 1: 2 (500 g moringa leaves: 1000 ml water).

3. Boil moringa leaves for 5 - 10 minutes at a temperature range of 30 - 35°C.
4. The boiled product is cooled and filtered by sterile filter device
5. The filtered moringa leaves are ready to be mixed into drinking water according to the treatment.

2.5 Preparation of research cages

A few days before the DOC arrives, there are several things that must be done, namely:

- a. Cage sanitation
- b. Washing feed and drinking containers
- c. The cage is sprayed with disinfectant, namely formades.
- d. Sprinkle litter from dry and clean rice husks.
- e. A thermometer is hung in the cage to control the temperature of the cage.

2.6 Adjustment period

- a. After the DOC arrives, they weighed to determine the initial body weight. The average weight of DOC was around $40,18 \pm 2,36$ g.
- b. After the DOC is weighed, they given sugar water as an energy source.
- c. Broiler chickens given feed CP511 when they were 1-7 days old, then from 3-6 weeks they were fed CP12.

2.7 Providing Feed and Drinking Water

Feeding and drinking water was provided twice a day by filling $\frac{3}{4}$ of the feeder to avoid spilling the ration when the chickens eat. Feed and drinking water were provided ad libitum. The water used was sourced from the local regional drinking water company.

2.8 Parameters Researched

1. Final Body Weight

Final body weight is the weight obtained by weighing the body weight of live chickens at the end of rearing.

2. Carcass Percentage

Carcass percentage is the ratio between carcass weight and empty body weight after fasting. The carcass weight that is weighed is the empty weight without feathers, head, neck, legs and internal organs (El Sayed *et al.*, 2023).

$$\text{Carcass (\%)} = \frac{\text{Carcass Weight}}{\text{Final Body Weight}} \times 100\%$$

3. Non-Carcass Percentage

Obtained by weighing all non-carcass parts (head, innards, neck and both legs) (Subani, 2020).

$$\text{Non-carcass percentage} = \frac{\text{Non-Carcass Weight}}{\text{Final Body Weight}} \times 100\%$$

4. Abdominal Fat:

Abdominal fat weighting is done by weighing the fat that is attached to the chicken's abdominal cavity and is mostly located around the gizzard and in the cloaca (El Sayed *et al.*, 2023). The formula is:

$$\text{Abdominal fat (\%)} = \frac{\text{Abdominal Fat Weight}}{\text{Final Body Weight}} \times 100\%$$

2.9. Data analysis

The data obtained were tabulated and calculated then analyzed using analysis of variance (ANOVA) according to a Completely Randomized Design (CRD) to determine the effect of treatment and if there was a real effect then continued with Duncan's further test to determine the differences between treatments.

3. Results and Discussion

The average values for final body weight, carcass percentage, non-carcass percentage and abdominal fat for broiler chickens given the research treatment are presented in **Table 2**.

Table 2. Average values of carcass production for broiler chickens given different levels of moringa leaf extract in drinking water

Parameter	Treatment				P
	P0	P1	P2	P3	
Final BW (g)	1823,67±40,60	1920,16±45,72	1838,33±44,16	1916,17±38,41	0,260
Carcass(%)	65,12±3,31	66,09±2,04	64,23±3,41	67,05±2,97	0,415
Non Carcass (%)	23,97±3,46	22,45±2,15	23,96±3,33	21,39±1,91	0,334
Abdominal Fat(%)	0,43±0,17a	0,53±0,13 ^{ab}	0,63±0,08ab	0,73±0,25b	0,038

Note: Different superscripts on the same line indicate significant differences ($P < 0.05$)

3.1 Effect of treatment on final body weight of broiler chickens (g)

Based on **Table 2**, the average final body weight of broiler chickens from the highest to the lowest in treatment P1=1920,16 g; P3= 1916,17 g; P2= 1838,33 g; and the lowest was P0= 1823,67 g. The results of the analysis of variance showed that the treatment did not have a significant effect ($P > 0.05$) on the final body weight of broiler chickens. This indicates that the treatment did not have a positive effect in helping to increase final body weight. However, at the level of 40ml/l (P1), the final weight tended to increase, and at the level of 80ml/l drinking water there was a slight decrease in final weight, then at the level of 120ml/l drinking water there was another increase in final weight. The potential benefit of moringa inclusion on animal production have been previously reported, such as improving productive performance and carcass quality in broiler chicken (Melesse *et al.*, 2013). Jefri *et al.*, (2020) reported that supplementation of moringa up to 60ml/l drinking water did not have significant effect on performance and carcass production of broiler chickens. In current study, the positive effect of moringa on final body weight was observed at supplemental level up to 120ml/l drinking water. This could be due to low antinutritive factor in moringa (tannin, saponin, and phytates), as well as supplementation levels, diet type and animal traits during experiment.

3.2 Effect of Treatment on Carcass Percentage

Table 2 shows the highest carcass percentage on the treatment of 120 ml extract moringa/1 drinking water (P3), and the lowest carcass percentage in the P2 treatment (80 ml/1 drinking water). Based on the results of analysis of variance (ANOVA), it was shown that the treatment of giving moringa leaf did not have a significant effect ($P>0.05$) on carcass percentage. In agreement with our result, Jefri *et al.*, (2020) and Munandar (2021) did not observe differences in carcass yield at supplementation level of 20 and 60ml/l drinking water. According to Astuti and Heru (2020), the percentage of carcass is influenced by live weight and carcass weight. High carcass weight will result in a high percentage of carcass. Factors that influence the percentage of carcass are gender, live weight, feed quality and non-carcass weight. The carcass percentage value in the present study is still within the normal range (64.23% - 67.05%). This is in accordance with the opinion of Daud (2007) who stated that the percentage of broiler chicken carcasses ranges from 60% - 75% of body weight.

3.3 Effect of Treatment on Non-Carcass Percentage

The data in **Table 2** shows that the highest non-carcass percentage was obtained in 40 ml of Moringa leaf extract/1 liter of drinking water (P0) which was 23.97%, while the lowest non-carcass percentage was obtained in the treatment with a dose of 120 ml/1 liter of drinking water (P3) which was 21.39%.

The results of the analysis of variance showed that the addition of moringa leaf extract to drinking water had no significant effect ($P>0.05$) on the non-carcass percentage of broiler chickens. Subani (2020) stated that non-carcass weight is directly proportional to carcass weight and live weight. The final body weight and carcass weights in this study were not significant, so the non-carcass percentage was not significantly different.

3.4 Effect of Treatment on the Percentage of Abdominal Fat

Table 2 shows that the average abdominal fat for broiler chickens from highest to lowest is in treatment P3 = 0.73%; then followed by treatment P2 = 0.63%; P1 = 0.53%; and the lowest is P0 = 0.43%. The results of the analysis of variance showed that administering moringa leaf extract in drinking water had a significant effect ($P<0.05$) on

the abdominal fat of 35day old broiler chickens. This shows that a solution of moringa leaf extract in drinking water can increase the percentage of abdominal fat in broiler chickens.

Duncan's further test results showed that P0 was not significantly different ($P>0.05$) from P1, P2, but was significantly different from P3. The percentage of abdominal fat in the 120 ml/l drinking water treatment at (P3) was significantly ($P<0.05$) higher than the abdominal fat in treatments P1, P2 and P0. This indicates that the higher dose added to drinking water, up to a level of 120 ml/drinking water, can increase the percentage of abdominal fat. However, the percentage of abdominal fat from this study is lower than in the study by Jumiati *et al.* (2017), where the average percentage of abdominal fat for broilers aged 35 days was $1.43 \pm 0.13\%$ - $1.93 \pm 0.23\%$. In this current study, body weight increased in response to the increase of moringa supplementation in drinking water, with consistent increase observed in abdominal fat. The increased abdominal fat indicated a variation in lipid metabolism induced by moringa supplementation, which might be responsible for the increase in growth (Yao-ming *et al.*, 2018). The increase in the percentage of fat in this study shows that the component of bioactive substances in the moringa leaf solutions extract, such as essential oils, has not functioned optimally in increasing the metabolism and digestion process of fat. This is different from the result of Sangkitikomol *et al.*, (2014) and Yao-ming *et al.*, (2018) who observed that moringa supplementation can reduce lipid synthesis. These findings indicated that moringa leaves extract are an excellent addition to the chicken diet; however, dietary amounts should be carefully monitored.

4. Conclusion

Based on the research results, it can be concluded that the use of moringa oleifera leaf extract up to a level of 120ml/l drinking water did not have any negative effect on the final body weight, carcass percentage and non-carcass percentage of broiler chickens, but increase abdominal fat of broiler chicken.

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