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Effect of Various Levels of Bitter Melon (Momordica Charanta, L) Leaf Juice on the Growth of Broiler Chicks

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Abstract

Bitter melon (*Momordica charantia*) leaves, which are rich in nutrients and bioactives (flavonoids, folacin), have potential as a natural feed additive to improve broiler growth, but research on their use in drinking water is limited. This study aimed to determine the effect of various levels of bitter melon leaf juice in drinking water on broiler growth performance. This study used a completely randomized design with 4 treatments (0 ml, 10 ml, 12.5 ml, 15 ml/day) and 20 replicates. Variables measured included feed consumption, body weight, FCR, and drinking water consumption for 6 weeks. Data were analyzed by ANOVA and Duncan's test. The 12.5 ml/day treatment resulted in the highest body weight gain (1746.55 g) and the best feed consumption (3140.05 g), significantly different ($P<0.05$) from the control and the 15 ml dose. However, FCR was not significantly different (1.81 vs. 1.79 control), indicating increased growth without improved feed efficiency. Bitter melon leaf juice 12.5 ml/day is effective as a natural growth stimulant, but needs to be combined with other ingredients for FCR optimization. Further research is recommended to explore the bioactive mechanism, economic test, and commercial scale application.

Keywords: Broiler chicken, bitter melon leaf juice, growth, feed consumption, FCR.

INTRODUCTION

Broilers are one of the poultry commodities that make a major contribution in fulfilling the need for protein of animal origin for the people of Indonesia (Azizah & Wati, 2018; Prayogi, 2014a; Wibowo, 2020). Broilers are a type of poultry that has a very fast growth rate, because it can be harvested at the age of 5 weeks. The superiority of broilers is supported by genetic traits and environmental conditions which include food, environmental temperature, and maintenance (Saryanti, 2019; Tjokropranoto & Nathania, 2011; Yusuf et al., 2022).

Broiler chickens whose life span is quite short, their growth is highly dependent on food, in addition to management factors and disease prevention (Banamtuan, 2019; Gultom et al., 2023; Prayogi, 2014b). For their growth and life needs, broiler chickens require elements in the feed they consume, such as protein, energy, vitamins, minerals, and water. All these nutrients are interrelated with one another and affect each other (Umam et al., 2014).

Bitter melon leaves are part of the bitter melon plant that is not utilized by humans, but can be used to spur the growth of chicken livestock (Herlina et al., 2015; Leelaprakash et al., 2011). The bitter taste of bitter melon (Momordica charantia) is due to the content of cucurbitasin substances from the titerpenoid group that function to spur the secretion of bile, pancreatic fluid, and gastric juice secretion, so the use of bitter melon in the ration

can increase appetite, help the absorption of nutrients in the intestine and can function as an antioxidant (Yudiarti et al., 2015).

According to Leelaprakash et al. (2011), bitter melon leaves contain alkaloids, flavonoids, saponins, and tannins. According to Mutiara and Wildan (2014), bitter melon leaves also contain phenolics, polyphenols. The chemical composition of each 100 grams of bitter melon leaves contains 80 grams of water, 44 grams of calories, 5.6 grams of protein, 0.4 grams of fat, 12 grams of carbohydrates, 264 mg of calcium, 5 grams of iron, 666 mg of phosphorus, 5.1 mg of vitamin A, 0.05 mg of vitamin B, 170 mg of vitamin C, and 88 mg of folacin (Anonimous, 1993).

The chemical composition of bitter melon leaves, which has a fairly complete nutritional content, especially as a source of vitamins and minerals that have an important role in the metabolism of the body so that it can be used to improve the ration formula for broiler chickens (Nuryati & Nur, 2012). The use of bitter melon in the ration can also increase appetite, help the absorption of nutrients in the intestine (Isroli et al., 2015; Press, 2024; Rahardjo, 2023). Based on the description above, research was conducted on the effect of various levels of bitter melon (Momordica charanta, L) leaf juice on the growth of broiler chicks (Komariyah et al., 2018; Mutiara et al., 2014; Nastiti & R, 2010; Umam et al., 2014; Yudiarti et al., 2015).

This study makes a new contribution by evaluating the effect of bitter melon leaf juice level (12.5 ml/day) in drinking water on broiler growth, which has not been explored in previous studies, in contrast to the research of Yudiarti et al. (2015) which focused on the combination of bitter melon flour and seaweed in the ration or Mutiara and Wildan (2014) which tested bitter melon leaf extract for antidiabetic activity, with unique findings in the form of an optimal dose of 12.5 ml/day which significantly increased body weight and feed consumption (significantly different from the control and 15 ml dose) through the mechanism of folacin content (88 mg/100g) and B vitamins (Anonimous, 1993) which spur metabolism, in contrast to the study of Leelaprakash et al. (2011) which only tested antimicrobial activity, although there was no improvement in FCR, indicating the need for combination with other ingredients such as probiotics/herbals for nutritional efficiency (new implications vs. Ibrahim, 2024).

RESEARCH METHODS

This research was conducted in Rumah Tiga Village, Teluk Ambon Sub-district, which lasted for 6 weeks. The materials used in this research are:

a. CP 707 broiler chicks, 1 day old, 80 birds
b. Broiler chicken feed
c. Bitter melon leaf juice
d. Cage with size 4 m x 2 m x 2 m
e. Eating and drinking places
f. Digital scales
g. Thermometer
h. Measuring cup
i. Juicer extractor

The research method used in this study is the experimental method, using a completely randomized design, consisting of 4 treatments and 20 replicates. The mathematical model is as follows:

$$Yij=\mu + \alpha i + €ij$$

Description:

Yij = The response given due to the effect of treatment i and level j
μ = Generalized mean
αi = effect of treatment i at level j
€ij = experimental error due to the effect of i-th treatment at level j

The treatments tried were as follows:
R0 = Drinking water without bitter melon leaf juice (control)
R1 = Bitter melon leaf juice 10 ml per day for 4 weeks
R2 = Bitter melon leaf juice 12.5 ml per day for 4 weeks
R3 = Bitter melon leaf juice 15 ml per day for 4 weeks

The data obtained were analyzed using analysis of variance (ANOVA). If there is a significant difference between treatments, it is continued with Duncan's test (Steel and Torrie, 1995).

The variables observed in this study are as follows:

a. Feed consumption
b. Drinking water consumption
c. Body weight
d. Body weight gain
e. Feed conversion

The research procedure is:

a. Chicks were randomly divided into 16 groups of 5 chicks each.
b. Chicks are entered by simultaneously weighing the initial body weight of 1-day-old chicks, then given an initial vaccine. Subsequent weighing will be done every week.
c. Food and drinking water are provided ad libitum.
d. Ration and drinking water consumption calculated per day
e. Bitter melon leaf juice is obtained by pureeing bitter melon leaves using a juicer extractor.
f. Bitter melon leaf juice in each treatment (except control) was mixed with 100 ml of water and then given to the chickens. The amount of water is added (3 x a day) where the amount of administration is adjusted to the drinking water needs per head per day on.

RESULTS AND DISCUSSION

Feed Consumption

The average feed consumption per head over 6 weeks is shown in Table 1 below:

Table 1. Average Feed Consumption Per Tail for Each Treatment for 6 Weeks

Repeat	Treatment			
	R0	R1	R2	R3
	gram			
1	2794,80	2822,00	3194,00	2799,40
2	2671,40	3061,00	3071,60	2731,60
3	3031,80	2899,80	3208,80	2857,20
4	2771,60	3289,80	3085,80	2806,00
Total	11269,60	12072,60	12560,20	2806,00
Average	2817,40	3018,15	3140,05	2798,55

From the results of the study, it can be seen that the highest feed consumption in the R2 treatment was 3140.05 grams, followed by R1 treatment of 3018.15 grams, R0 treatment of 2817.40 grams and R3 treatment of 2798.55 grams.

The results of the analysis of variance of the average ration consumption per head for 6 weeks are as follows:

Table 2. Analysis of Variance of the Effect of Treatment on Feed Consumption for 6 Weeks

Source of Diversity	db	JK	KT	Fhit	F Table	
					0,05	0,01
Treatment	3	324465,00	108155,00	5,86*	3,49	5,95
Random	12	221247,08	18437,25			
Total	15	545712,08				

Description: * Significantly different

The results of the analysis of variance showed that the level of bitter melon juice had a significant effect on feed consumption ($P < 0.05$). Based on the results of the honest real difference test, it showed that the R2 treatment was not significantly different ($P>0.05$) from the R1 treatment, but was significantly different ($P<0.05$) from the R0 treatment and the R3 treatment, while the R1 treatment was also significantly different from the R0 treatment and the R3 treatment while the R0 treatment was not significantly different ($P>0.05$) from the R3 treatment. The high ration consumption in treatment R1 with bitter melon juice level of 10 ml and treatment R2 with bitter melon juice level of 12.5 ml proves that the folacin content contained in bitter melon juice can stimulate the appetite of broiler chickens. The combination formula of vitamin B complex and protein, L casein factor and pteroglmonoglutamic acid that stimulates appetite in chicks (Hommer, 1980). Yamin (2002) added that to get the maximum body weight gain, it is very necessary to pay attention to the quantity of feed. The feed must contain adequate and balanced nutrients to support maximum growth. Nastiti (2010) also suggests that the ration given must also meet the quantity requirements or in sufficient quantities so that later it can also meet the amount of nutrients needed for growth.

Drinking Water Consumption

The average drinking water consumption per head for 6 weeks can be seen in Table 3 below:

Table 3. Average drinking water consumption per head for each treatment for 6 weeks

Repeat	Treatment			
	R0	R1	R2	R3
	Repeatml			
1	7670,10	7761,76	8421,17	6786,24
2	5964,32	8401,28	7985,35	6764,80
3	7859,12	7991,40	8675,57	7470,13
4	6922,42	8172,62	8317,47	6909,14
Total	28415,96	32327,06	33399,56	27930,31
Average	7103,99	8081,76	8349,89	6978,07

The data showed that the highest drinking water consumption in R2 treatment was 8349.89 ml, followed by R1 treatment of 8081.76 ml, R0 of 7103.99 ml and R3 of 6978.07 ml.

The results of the analysis of variance of the average drinking water consumption can be seen in Table 4 below:

Table 4. analysis of variance of treatment effect on drinking water consumption for 6 weeks.

Source of Diversity	db	JK	KT	Fhit	F Table	
					0,05	0,01
Treatment	3	5672699,40	1890899,80	7,52**	3,49	5,95
Random	12	3017595,40	251466,28			
Total	15	86,8090294				

Description: **=Very significantly different

The results of the analysis of variance showed that the level of bitter melon leaf juice had a very significant effect on drinking water consumption ($P < 0.01$). Based on the results of the honest real difference test (BNJ), it shows that the R2 treatment is not significantly different ($P>0.05$) from the R1 treatment, but is significantly different ($P<0.01$) from the R0 treatment and the R3 treatment, while the R1 treatment is also significantly different from the R0 treatment and the R3 treatment. Furthermore, the R0 treatment was not significantly different ($P>0.05$) from the R3 treatment. The low consumption of drinking water in treatment R3 with bitter melon juice content of 15 ml, indicates that broiler chicks are not able to consume bitter melon juice more than 12.5 ml because of the high levels of kukurbitasin which causes a bitter taste in bitter melon juice. According to Yudiarti et al., 2015, the bitter taste in bitter melon (Momordica charantia) is due to the content of cucurbitasin substances from the titerpenoid group. Herlina et al., 2015, that palatability is also a factor that determines the level of ration consumption in broiler chickens. Palatability is influenced by the shape, odor, taste, texture, and temperature of the food provided.

Body Weight

Data on the results of research on broiler body weight are shown in Table 5 below:

Table 5. Average body weight of broiler chicks per bird from 1 day to 6 weeks of age

Age (weeks)	Treatment			
	R0	R1	R2	R3
	gram			
DOC	38,45	40,00	39,45	38,25
I	155,50	168,85	175,35	155,30
II	370,35	402,05	405,95	349,10
III	686,00	711,55	759,00	677,50
IV	1000,40	1034,20	1068,75	978,70
V	1341,50	1365,25	1423,50	1299,00
VI	1628,00	1692,00	1786,00	1594,50

The results showed that differences in body weight began to occur at week I, where the average body weight per head per week for treatment R2 was always higher,

followed by treatment R1, then treatment R0 and treatment R3. This difference lasted until the chicks reached 6 weeks of age.

The results of the analysis of variance showed that the body weight of chickens at the age of 6 weeks between treatments were significantly different (P <0.05). Based on the results of the Honest Real Differences (BNJ) test, it shows that the R2 treatment is significantly different (P < 0.01) from the R1 treatment, R0 treatment and R3 treatment, while the R1 treatment is also significantly different from the R0 treatment and R3 treatment, while the R0 treatment is not significantly different (P>0.05) from the R3 treatment. The difference in body weight between treatments showed that the optimum growth response achieved by broiler chicks due to the use of bitter melon leaf juice levels in the R2 treatment was 12.5 ml. This proves that the nutritional composition of bitter melon juice can improve the ration formula of broiler chickens with increased body weight. The use of bitter melon in the ration can increase appetite, help the absorption of nutrients in the intestine and can function as an antioxidant (Yudiarti et al., 2015).

Weight gain

Weight gain of broiler chicks over 6 weeks is shown in Table 6 below:

Table 6. Weight gain of broiler chicks for each treatment at 6 weeks of age

Repeat	Treatment			
	R0	R1	R2	R3
	gram			
1	1650	1475	1445	1620
2	1621	1208	1860	1480
3	1600	1290	1772	1380
4	1480	1682	1550	1262
5	1385	1670	1645	1480
6	1462	1510	1600	1465
7	1201	1070	1520	1080
8	1500	2098	1540	1462
9	1420	1740	1638	1665
10	1500	1390	1935	1740
11	1682	1640	2040	1860
12	1910	1610	1850	1262
13	1598	1658	1762	1480
14	1740	1740	1905	1702
15	1782	1895	1962	1780
16	1802	2062	2050	1892
17	1560	2025	1625	1680
18	1322	1980	1650	1715
19	1480	1705	1742	1340
20	2096	1592	1840	1780
Total	31791	33040	34931	31125
Average	1589,55	1625,00	1746,55	1556,25

From the results of the study, the highest average weight gain of broiler chicks was achieved in the R2 treatment of 1746.55 grams, followed by the R1 treatment of 1652.00 grams, then the R0 treatment of 1589.55 grams and the R3 treatment of 1556.25 grams.

The results of the analysis of variance of body weight gain per head are shown in Table 7 below:

Table 7. Analysis of variance of the effect of treatment on body weight gain of chickens at 6 weeks of age

Source of Diversity	db	JK	KT	Fhit	F Table	
					0,05	0,01
Treatment	3	419898,80	139966,26	2,77*	2,76	4,13
Random	76	38512227,60	50674,05			
Total	79					

Description :*=real

The results of the analysis of variance showed that the level of bitter melon leaf juice had a significant effect (P <0.05) on body weight gain. Based on the results of the Honest Real Differences (BNJ) test, it shows that the R2 treatment is significantly different (P <0.01) from the R1 treatment, R0 treatment and R3 treatment, while the R1 treatment is also significantly different from the R0 treatment and R3 treatment, then the R0 treatment is not significantly different (P>0.05) from the R3 treatment. (P>0.05) against treatment R3. This proves that the provision of bitter melon leaf juice up to 12.5 ml is able to provide a response to weight gain. In addition to stimulating appetite in chickens, bitter melon leaves also contain a number of nutrients. The chemical composition of each 100 grams of bitter melon leaves contains 80 grams of water, 44 grams of calories, 5.6 grams of protein, 0.4 grams of fat, 12 grams of carbohydrates, 264 mg of calcium, 5 grams of iron, 666 mg of phosphorus, 5.1 mg of vitamin A, 0.05 mg of vitamin B, 170 mg of vitamin C, and 88 mg of folacin (Anonimous, 1993). Furthermore, added by Rasyaf (1994), that the growth of broiler chicks is determined by the consumption of rations, if the consumption of rations is high, growth is also fast and chickens will reach a specific weight at a young age, especially in the age of growth it is used stimulating material.

Feed Conversion (FCR)

The average feed conversion per head for 6 weeks can be seen in Table 8 below:

Table 8. Average feed conversion per head for each treatment at 6 weeks of age

Repeat	Treatment			
	R0	R1	R2	R3
	ml			
1	1,81	1,95	1,95	1,95
2	1,89	2,05	1,87	1,89
3	1,74	1,70	1,68	1,80
4	1,72	1,77	1,74	1,69
Total	7,16	7,49	7,24	7,33
Average	1,79	1,86	1,81	1,83

The data showed the highest feed conversion value in the R1 treatment of 1.86 followed by the R3 treatment of 1.83, R2 of 1.81 and the R0 treatment of 1.79.

The results of the analysis of variability on feed conversion are shown in Table 9 below:

Table 9. Analysis of variance of treatment effect on feed conversion

Source of Diversity	db	JK	KT	Fhit	F Table	
					0,05	0,01
Treatment	3	0,01	0,003	0.3^{tn}	3,49	5,95
Random	12	0,18	0,01			
Total	15	0,19				

Note: tn = not significantly different

Based on the results of the analysis of variance showed that the effect of treatment on feed conversion was not significantly different (P>0.05). FCR is an important indicator to measure the production efficiency of broiler and layer chickens. By understanding how to calculate and the factors that influence it, farmers can take action to improve FCR and increase business profitability. The ideal FCR value may vary depending on various factors such as chicken age, genetics, feed quality, environmental conditions and rearing management. However, in general, a good FCR for broilers ranges from 1.5 to 1.8, while for layer chickens it can vary depending on the production phase (Ibrahim, 2024).

CONCLUSIONS

Based on the conclusion that bitter melon leaf juice (12.5 ml/day in drinking water) improves broiler growth, future studies can test the optimal dose (e.g. 10-20 ml/day) to avoid toxic effects, analyze the bioactive content (such as momordycin or flavonoids) and its mechanism on nutrient absorption and immunity, and combine it with other probiotics/herbs or compare it with antibiotic growth promoters. There is also a need to evaluate the full range of performance parameters (FCR, mortality, meat quality), different growth phases (starter, grower, finisher), and economic feasibility, including testing extraction methods, storage stability, effects under stress/infection conditions, and long-term testing of internal organs and meat residues. Validation on a commercial farm scale is also required to ensure practical application in reducing reliance on synthetic antibiotics.

REFERENCES

Azizah, Z., & Wati, S. W. (2018). Skrining fitokimia dan penetapan kadar flavonoid total ekstrak etanol daun Pare (Momordica charantia L.). *Jurnal Farmasi Higea*, *10*(2), 163–172.

Banamtuan, A. N. (2019). Strain dan karakteristik ayam broiler di Indonesia. *Universitas Nusa Cendana. Kupang*.

Gultom, R., Ilmania, L. A., Rinca, K. F., Bollyn, Y. M. F., Luju, M. T., & Achmadi, P. C. (2023). Evaluation Of The Supplementation Of Bitter Melon Flour (Momordica charantia) As A Feed Additive To Physical And Chemical Content Of Broiler Meat. *Jurnal Ilmiah Peternakan Terpadu*, *11*(2), 82–93.

Herlina, B, Novita, R., & Karyono, T. (2015). Pengaruh Jenis dan Waktu Pemberian Ransum terhadap Performans Pertumbuhan dan Produksi Ayam Broiler. *Jurnal Sain Peternakan Indonesia*, *10*(2), 107–113.

Isroli, I., Yudiarti, T., Sugiharto, S., Widiastuti, E., Wahyuni, H. I., & Sartono, T. A. (2015). Pengaruh Penggunaan Tepung Rumput Laut (Gracilaria verrucosa) dan Pare (Momordica charantia) dalam Ransum terhadap Konsumsi dan Kadar Metabolit Protein Darah Ayam Broiler. *Prosiding Seminar Nasional Peternakan*

Berkelanjutan 7:" Pengembangan Sumber Daya Lokal Dalam Agribisnis Peternakan", 264–268.

Komariyah, S., Rahmahani, J., & Agustono, B. (2018). Pengaruh ekstrak buah pare (momordica charantia) terhadap titer antibodi ayam broiler yang divaksin Newcastle disease. *Jurnal Medik Veteriner*, *1*(3), 128–133.

Leelaprakash, G, Caroline, J., Gowtham, B. M., Pradeep, K., & Shivram, P. (2011). In Vitro Antimicrobial and Antioxidant Activity of Momordica charantia Leaves. *Pharmacophore*, *2*(4), 242–252.

Mutiara, V, E., Wildan, & A. (2014). Ekstraksi Flavonoid dari Daun Pare (Momordica charantia L.) Berbantu Gelombang Mikro sebagai Penurun Kadar Glukosa secara In Vitro. *Metana*, *10*(01), 1–11.

Nastiti, & R. (2010). *Menjadi Milyarder Budidaya Ayam Broiler*. Pustaka Baru Press.

Nuryati, Y., & Nur, Y. H. (2012). Variabilitas harga telur ayam ras di indonesia. *Buletin Ilmiah Litbang Perdagangan*, *6*(2), 235–252.

Prayogi, H. S. (2014a). The performance of broiler rearing in system stage floor and double floor. *Jurnal Ilmu-Ilmu Peternakan*, *24*(3).

Prayogi, H. S. (2014b). The performance of broiler rearing in system stage floor and double floor. *Jurnal Ilmu-Ilmu Peternakan*, *24*(3).

Press, U. G. M. (2024). *Dasar-Dasar Nutrigenomik dan Aplikasinya*. UGM PRESS.

Rahardjo, D. Y. (2023). *Beternak ayam petelur*. Nuansa Cendekia.

Saryanti, D. (2019). Formulasi dan Uji Stabilitas Fisik Sediaan Tablet Ekstrak Buah Pare (Momordica charantia L.) secara Granulasi Basah. *Smart Medical Journal*, *2*(1), 25–31.

Tjokropranoto, R., & Nathania, M. Y. (2011). Anthelmintic effect of ethanol extract of pare leaf (Momordica charantia L.) against female Ascaris suum worm in vitro. *Jurnal Medika Planta*, *1*(4), 245875.

Umam, K, M., Prayogi, H. S., & Nurgiartiningsih, V. M. A. (2014). Penampilan Produksi Ayam Pedaging Yang Dipelihara Pada Sistem Lantai Kandang Panggung Dan Kandang Bertingkat. *Jurnal Ilmu-Ilmu Peternakan*, *24*(3), 79–87.

Wibowo, K. C. (2020). Analisis Peramalan Produksi dan Konsumsi Daging Ayam Ras Pedaging di Indonesia dalam Rangka Mewujudkan Ketahanan Pangan. *Indonesian Journal of Industrial Research*, *12*(2), 58–65.

Yudiarti, T, I., Widiastuti, S. E., Wahyuni, H. I., & Sartono, T. A. (2015). Pengaruh penggunaan tepung rumput laut (Gracilaria verrucosa) dan pare (Momordica charantia) dalam ransum terhadap konsumsi dan kadar metabolit protein darah ayam broiler. *Prosiding Seminar Nasional Peternakan Berkelanjutan*, *7*(11), 264–268.

Yusuf, A. L., Nugraha, D., Wahlanto, P., Indriastuti, M., Ismail, R., & Himah, F. A. (2022). Formulasi Dan Evaluasi Sediaan Gel Ekstrak Buah Pare (Momordica Charantia L.) Dengan Variasi Konsentrasi Carbopol 940. *Pharmacy Genius*, *1*(1), 50–61.