



The Effect of Azolla Flour (*Azolla microphylla*) in Commercial Ration on the Performance of 75 Days Old KUB Chicken

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ABSTRACT

Research on KUB chickens (Ayam Kampung Unggul Balitbangtan) needs to be conducted to support the progress of livestock farming in the field of poultry livestock production. This study determines the effect of giving Azolla flour in commercial rations on the performance of 75-day-old KUB chickens. The study was conducted at the Animal Biology Laboratory, Faculty of Animal Husbandry, HKBP Nommensen University, Medan in Simalingkar A Village. Pancur Batu District, Deli Serdang Regency. This study was conducted for 75 days. On days 1-7 days, commercial feed was given. At the age of 8-75 days, commercial feed was given and Azolla flour (*Azolla microphylla*) was added. The design used in the study was a Completely Randomized Design with four treatments and five replications, the research treatment was the comparison of azolla flour with commercial rations given for KUB chicken feed, namely Azolla flour levels of 0%, 2%, 4% and 6%. The research data were analyzed by analysis of variance. The results of the analysis showed that the provision of azolla flour with different treatments did not have a significant effect on ration consumption but had a very significant effect on body weight gain and feed conversion of 75-day-old KUB Chickens with the best treatment, namely P1 (Azolla 2%) with a Daily Body Weight Gain value of 15.81 grams/head/day and a conversion value of 3.01. In conclusion is that application of Azolla flour could improve KUB body weight gain and conversion.

Keyword: Azolla, Daily body weight gain, KUB chicken, Performance, Ration



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1. Introduction

One aspect of livestock management is feed management. Things that need to be considered in feed management are the quality of feed given to livestock must be in accordance with livestock needs. Feed for chickens must have optimal nutritional content and nutrients and be easily digested by chickens. In livestock farming, feed costs cover around 60-70% of the total production costs [1]. The amount of production costs must be reduced to benefit farmers, one of which is by using alternative feed. The alternative feed ingredients that are good and easy to breed for poultry feed are *Azolla microphylla*.

Azolla microphylla is a type of aquatic fern that is often found floating on the surface of the water. This plant has the ability to grow widely in calm waters and is often used as animal feed, especially for poultry feed mixtures because of its fairly good nutritional content and easy to digest. *Azolla microphylla* is a type of fern that floats in water. Its characteristic is its leaves that grow in a double arrangement that overlaps each other, forming a thick layer on the surface of the water [2].

Azolla microphylla has a very high nutritional content, including protein, essential amino acids, and vitamins (such as vitamin A, vitamin B12, and Beta-Carotene), as well as minerals such as calcium, phosphorus, potassium, iron, and magnesium. Based on its dry weight, *Azolla microphylla* contains around 25-35% protein, 10-15% minerals, and 7-10% amino acids, as well as bioactive compounds and biopolymers [3].

The use of azolla flour for animal feed mixtures must be limited because the crude fiber in azolla plants is quite high. One of the weaknesses of azolla flour as a raw material for feed is the presence of anti-nutritional substances such as Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF), and tannins. In addition, the crude fiber content in azolla flour is quite high, reaching 23.06%. The higher the crude fiber content in the ration, the more energy livestock need to digest so that the digestibility of other substances including protein will decrease. The addition of *Azolla microphylla* plants to chicken feed is usually limited to around 15%, this is done because if mixed with chicken feed in excess it can interfere with meat and egg productivity [2]. Based on this potential, research was conducted to obtain the effect of providing azolla microphylla flour in rations on the performance of KUB chickens.

2. Method

2.1. Place and Time

This research was conducted at the Experimental Garden of the Faculty of Animal Husbandry, HKBP Nommensen University, Medan in Simalingkar A Village, Pancur Batu District, Deli Serdang Regency. This research was conducted for 75 days. On days 1-7, commercial feed was given. At the age of 8-75 days, commercial feed was given and azolla flour (*azolla mcrophilla*) was added and was conducted on July 28, 2024 to October 03, 2024.

2.2. Materials and Equipment

The materials used were 100 1-day-old KUB DOC chickens obtained from the Poultry Shop. The rations used in this study were commercial rations, *Azolla microphylla* flour, drinking water, medicines and vitamins. Drinking water was provided continuously. The equipment used during the study was a cage made of 20 experimental plots, with a size of 1x1x1 meter, equipped with a feeder, a drinker, newspapers, rice husks as a base for the cage, books and pens as a means of recording data in the field every day, a digital scale brand SF-400 has an accuracy level of 1 gram to weigh feed consumption and chicken weight gain, a Miyako BI 102 PI blender and a 25 watt incandescent lamp.

2.3. Research Methods

This study was conducted using a Completely Randomized Design (CRD) with 4 treatments and repeated 5 times and each combination consisted of 5 KUB chickens aged 8-75 days so that the total KUB chicken livestock used was 100. The treatment used was the provision of *Azolla microphylla* flour mixed in commercial rations and given to livestock as needed. The level of addition of *Azolla microphylla* flour is as follows:

P0 = 100% commercial ration + 0% *Azolla microphylla* flour

P1 = 98% commercial ration + 2% *Azolla microphylla* flour

P2 = 96% commercial ration + 4% *Azolla microphylla* flour

P3 = 92% commercial ration + 6% *Azolla microphylla* flour

2.4. Research Parameters

a. Ration Consumption

Ration Consumption (KR) is calculated using the formula:

$KR (g) = \text{Amount of Ration Given} - \text{Amount of Remaining Ration}.$

b. Body Weight Gain

Measurement of Body Weight Gain (PPB) is calculated using the formula:

$PBB (g) = \text{Final Body Weight} - \text{Initial Body Weight}$

c. Ration Conversion

Ration conversion can be calculated using the formula:

$$\text{Ration Conversion} = (\text{Ration Consumption (g)})/(\text{Body Weight Gain (g)})$$

2.5. Data Analysis

Data were analyzed using a Completely Randomized Design (CRD) to determine the effect of treatment on the parameters measured. If there is a significant difference in ANOVA, a further significant test is carried out. Data were analyzed using the SPSS program.

3. Results and Discussion

3.1. Feed Consumption

The results of the average feed consumption in the study of the effect of adding Azolla flour (*Azolla microphylla*) in the ration on the consumption of rations of 75-day-old KUB chickens during the study can be presented in Table 1 below:

Table 1. Average Consumption of KUB Chicken Rations Aged 8–75 Days (grams/head/day)

Treatment	Replication					Average
	U1	U2	U3	U4	U5	
P0	48,08	47,53	47,78	48,14	48,07	46,91
P1	47,47	47,43	47,15	48,36	47,30	47,03
P2	46,70	45,52	47,67	47,87	47,80	46,80
P3	47,45	47,36	47,01	47,09	47,50	46,68
Average						47,46

Note: The same superscript in the same column indicates no significant effect ($P>0.05$)

From Table 1, it can be seen that the average consumption of rations during the study was 47.46 grams/head/day with a range of 45.52 - 48.36 grams/head/day. The highest average was obtained in treatment P1 which was 47.03 grams/head/day and the lowest average was in treatment P3 which was 46.68 grams/head/day. The results of this study are smaller than the study [4] which obtained the highest consumption of 88.12 grams/head/day with the provision of 12% azole fermented flour and higher than the results of the study [5] which obtained the highest average consumption of rations of 71.28 gr/head/day for broiler chickens with the provision of 5% azole flour in the study ration. And the results of this study are higher than the study [6] which obtained the highest ration consumption of 2585.34 gr/head/week by providing 15% fermented azolla flour to the offspring of Bangkok crossbred chickens and Lohman code 202 laying hens.

The results of the analysis of variance (ANOVA) showed that the provision of azolla flour on the consumption of KUB chicken rations had no significant effect ($P>0.05$). The consumption value in the P0 or control treatment was not much different from the other treatments.

This may be influenced by feed palatability, local temperature and climate, and genetics. Feed factors are also influenced by taste, aroma, color, and crude fat and crude fiber [7]. High crude fiber also affects chicken ration consumption. In this study, the crude fiber of each treatment was higher than the standard requirements of KUB chickens in Table 1. The crude fiber of azolla is quite high, which is 15%. This is supported by [8] that azolla is included in green plants that contain quite high crude fiber causing a barrier when digested. Chickens have limitations in digesting crude fiber, therefore, high crude fiber is around 23.06% [9].

Research [10] on the provision of Azola microphylla flour to super village chickens up to a level of 10%, the results of the study concluded that the level of provision of 4% Azola flour to KUB chickens provided the highest carcass weight value and good palatability.

In addition to crude fiber, temperature and environmental temperature also affect ration consumption, this is supported by [11] which states that high environmental temperatures in tropical areas during the day can cause heat accumulation in the body, so that livestock experience heat stress. Chickens

are homoethermic animals, they will maintain their body temperature in a relatively constant state, among others through the amount of water consumption and a decrease in ration consumption.

2. Body Weight Gain

The average body weight gain of KUB chickens during the 75 days of research can be seen in Table 2.

Table 2. Average Daily Body Weight Gain of KUB Chickens during Day 75 of Research (grams/head/day).

Treatment	Replication					Average
	U1	U2	U3	U4	U5	
P0	15,87	14,84	14,53	16,18	14,79	15,24 ^a
P1	16,41	16,26	14,94	15,78	15,64	15,81 ^b
P2	14,64	13,94	14,13	14,79	14,51	14,40 ^a
P3	13,96	15,33	13,81	14,19	14,51	14,36 ^a
Average						14,95

Note: Different superscripts in the same column indicate a very significant effect ($P < 0.05$).

From Table 2, it can be seen that the average weight gain during the study was 14.95 grams/head/day with a range of 13.81 - 16.41 grams/head/day. The highest average obtained in treatment P1 was 15.81 grams/head/day and the lowest average was in treatment P3, which was 14.36 grams/head/day. The results of this study are higher than the results of the study by Asmawati et al. (2022) who obtained the highest weight gain of 14.73 grams/head/day by giving 12% azolla fermented flour. However, the results of this study are lower than the results of the study [12] which showed the highest weight gain of 48.61 (grams/head/day) for broiler chickens, with the provision of 7% azolla flour and 3% cassava flour.

Based on the analysis (ANOVA) the weight gain of KUB chickens given azolla flour had a very significant effect ($P < 0.05$). Because the weight gain results had a very significant effect, it was continued with the Honestly Significant Difference (HSD) test to show the best treatment.

Weight gain is influenced by ration consumption, palatability, environmental temperature, and maintenance management, this opinion is supported by the opinion [13] that increasing weight gain is usually directly proportional to ration consumption. The higher the body weight, the higher the ration consumption. Visually, the treatment given azolla flour can affect body weight because azolla contains around 23-30% protein, as well as good essential amino acid, vitamin, and mineral content, and has a low lignin content [14].

Temperature and environment also affect weight gain, high environmental temperatures cause the heat load in the body to be greater because the environmental temperature is far from the comfortable temperature of livestock. A comfortable environmental temperature for livestock is around 18-21°C [15].

3. Ration Conversion

The average results of KUB chicken ration conversion during the study can be seen in Table 3 below.

Table 3. Average Conversion of KUB Chicken Rations during 75 Days of Research.

Treatment	Replication					Average
	U1	U2	U3	U4	U5	
P0	3,03	3,20	3,29	2,98	3,25	3,15 ^b
P1	2,89	2,92	3,16	3,07	3,02	3,01 ^a
P2	3,19	3,26	3,37	3,24	3,29	3,27 ^b
P3	3,40	3,09	3,40	3,32	3,27	3,30 ^b
Average						3,18

Note: Different superscripts in the same column indicate a very significant effect ($P < 0.05$).

From Table 3 above, it can be seen that the average ration conversion in this study was 3.0 with a range of 2.89-3.40. The lowest average ration conversion was P1, which was 3.01, which was the best conversion, while the highest was P3, which was 3.30. The results of this study are better than Raras et al.

(2017) with a feed conversion of 5.19 - 5.50 with the provision of fermented azolla flour (10%, 20%, 30%). And the results of this study are better than the results of the study [4] with a feed conversion of 6.05 - 7.94 for KUB Chickens in the grower phase, with the provision of fermented azolla flour (4%, 8%, 12%). However, the results of this study are lower than the results of the study [16] with a ration conversion of 1.36 - 1.43 for broiler chickens with the provision of azolla flour of (2.5%, 5%, 7.5%).

Based on the analysis of variance (ANOVA), the conversion of KUB chicken rations given azolla flour had a very significant effect ($P < 0.05$). Because the results of the ration conversion had a very significant effect, it was continued with the Honestly Significant Difference (HSD) test to show the best treatment.

This may be due to feed quality, strain, maintenance management, this opinion is supported by [17] that feed conversion is influenced by environmental temperature, feed consumption, physical form. The use of high crude fiber in feed will reduce growth as a result of reduced intestinal emptying time and feed digestibility. The use of azolla flour up to 6% does not reduce the FCR value, this is due to the presence of anti-nutritional substances, namely tannins, which are inhibiting factors in feed utilization. This is in accordance with the opinion of [18] that the presence of anti-nutritional substances, tannins in aquatic plants, can result in decreased utilization of ration nutrition from azolla flour. The ration conversion rate is closely related to feed consumption and weight gain, the smaller the ration conversion rate indicates the level of efficiency of poultry feed into meat.

4. Conclusion

Provision of azolla flour with treatments P0 (0%), P1 (2%), P2 (4%), P3 (6%) gave the same effect on ration consumption but gave different effects on weight gain and feed conversion of 75-day-old KUB Chickens.

References

1. Katayane, A. (2014). *Produksi dan Kandungan Protein Maggot (Hermetia illucens) dengan menggunakan Media Tumbuh Berbeda*. Jurnal zoetek vol. 34 (edisi khusus) : 27 – 36.
2. Tarigan, D. M. S., & Manalu, D. S. T. (2019). *Azolla Pinnata Segar Sebagai Pakan Alternatif Untuk Mengurangi Biaya Produksi Ayam Broiler*. Jurnal AGRISEP: Kajian Masalah Sosial Ekonomi Pertanian dan Agribisnis, 177-186.
3. Ghofier. (2013). *Pemanfaatan Azolla Terhadap Pakan Unggas*. Diklat Kuliah. Universitas Brawijaya Press.
4. Asmawati, A., Idrus, M., Mudarsep, M. J., & Winata, A. A. (2022). *Pemberian Tepung Azolla Azolla Microphylla Fermentasi ke Dalam Pakan Dengan Konsentrasi yang Berbeda Terhadap Performa Ayam Kampung Unggul Balitnak (KUB) Fase Grower*. Jurnal Ilmiah Ecosystem, 22(3), 635-647.
5. Irawati, D. A. (2021). *Pengaruh Substitusi Tepung Azolla (azolla microphylla) dan Tepung Gaplek Terhadap Permormans dan Kualitas Karkas Ayam Broiler*. Jurnal Peternakan Nusantara, 7(2).
6. Raras, A., Muryani, R., & Sarengat, W. (2017). *Pengaruh pemberian tepung azolla fermentasi (Azolla microphylla) terhadap performa ayam kampung persilangan*. Jurnal Peternakan Indonesia, 19(1), 30-36.
7. Koni, T. N. I. (2013). *Pengaruh pemanfaatan kulit pisang yang difermentasi terhadap karkas broiler*. JITV, 18(2), 153-157. Jurusan Peternakan Politeknik Pertanian Negeri Kupang. Kupang.
8. Winata, A. A. (2022). *Pengaruh Pemberian Tepung Azolla (Azolla Microphylla) Fermentasi Ke Dalam Pakan Dengan Konsentrasi Yang Berbeda Terhadap Performa Ayam Kampung Unggul Balitnak (Kub) Fase Grower*. Skripsi Fakultas Pertanian Universitas Bosowa Makassar.
9. Handajani, H. (2006). *Pemanfaatan Tepung Azolla sebagai Penyusun Pakan Ikan terhadap Pertumbuhan dan Daya Cerna Ikan Nila Gift (Oreochromis SP)*. Jurnal Gamma, 1(2).

10. Herlina, B., & Novita, R. (2021). *Penggunaan Tepung Azolla (Azolla microphylla) dalam Ransum terhadap Organ Pencernaan Ayam Kampung Super*. Skripsi. Fakultas Peternakan. Universitas Jambi. Jambi.
11. Kusnadi, E. (2006). *Suplementasi vitamin C sebagai penangkal cekaman panas pada ayam broiler*. Jitv, 11(4), 249-253. Fakultas Peternakan. Universitas Andalas. Padang.
12. Winaya, A., Maftuchah, M., & Zainudin, A. 2010. *Tanaman Air Azolla sp. Sebagai Imbuhan Pakan dan Pengaruhnya Terhadap Tampilan Produksi Ayam Broiler Strain Hubbard*. Jurnal Sain Peternakan Indonesia, 5(1), 1-12.
13. Kartadisastra, H. R. (1997). *Penyediaan dan pengelolaan pakan ternak ruminansia*. Kanisius. Yogyakarta.
14. Noferdiman, N., Zubaidah, Z., & Sestilawarti, S. (2017). *Retensi Zat Makanan Pada Ayam Kampung yang Mengonsumsi Ransum Mengandung Tepung Azolla (Azolla microphylla) Difermentasi dengan Jamur Pleurotus ostreatus*. Jurnal Ilmiah Ilmu-Ilmu Peternakan, 20(1), 39-50.
15. Suprijatno, E. Atmomarsono, U dan Kartosudjono, R. (2005). *Ilmu Dasar Ternak Unggas*. Penebar Swadaya. Jakarta.
16. Safira, A., Erwanto, E., Septinova, D., Liman, L., & Ermawati, R. (2024). *Pengaruh Penambahan Azolla Microphylla Pada Ransum BR-1 Terhadap Konsumsi Ransum, Pertambahan Bobot Tubuh, Dan Konversi Ransum Ayam Broiler*. Jurnal Riset dan Inovasi Peternakan, 8(2), 266-271.
17. Anggoridi, R. (1995). *Nutrisi Aneka Ternak Unggas*. PT. Gramedia Pustaka. Jakarta.
18. Hidayat, C., Faninidi, A., & Sopiyan, S. Komarudin. (2011). *Peluang pemanfaatan tepung azolla sebagai bahan pakan sumber protein untuk ternak ayam*. Balai Penelitian Ternak, Bogor. In Seminar Nasional Teknologi Peternakan dan Veteriner (pp. 678-683).