

## THE EFFECT OF *Azolla microphyla* USING IN RATION ON Hyla RABBIT PERFORMANCE

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### ABSTRACT

The purpose of this study was to determine the effect of the use of *Azolla microphyla* flour in rations on the performance of Hyla rabbits. This study was conducted from March 11, 2024 to June 22, 2024, in Jagalan Hamlet, Sukoharjo Village, Ngaglik District, Sleman Regency, Special Region of Yogyakarta. This study used 24 male Hyla rabbits aged 2.5 months - 3 months, with an initial body weight of 1.3 kg on average. Rabbits were obtained from rabbit breeders in Sleman Yogyakarta. This study used an experimental method with a Completely Randomized Design (CRD) with a one-way pattern. This study used 4 treatments and 3 replications P0: 0% *Azolla microphyla*; P1: 5% *Azolla microphyla*; P2: 10% *Azolla microphyla*; P3: 15% *Azolla microphyla*, each experimental unit used 2 rabbits. Data collected in the study included feed consumption, body weight gain, feed conversion, and Income Over Feed Cost. The results showed that the average feed consumption of treatments P0, P1, P2 and P3 were 83.35; 69.66; 68.56 and 68.52 grams/head/day, respectively. The results showed that rabbit feed consumption was significantly different ( $P > 0.05$ ). The average daily weight gain of treatments P0, P1, P2 and P3 were 10.71; 10.99; 9.56 and 8.53 grams/head/day, respectively. The results showed that the daily weight gain of rabbit feed was significantly different ( $P < 0.05$ ). The average feed conversion of treatments P0, P1, P2 and P3 were 7.77; 6.42; 7.17; 8.03, respectively. The average income over feed cost of treatments P0, P1, P2 and P3 respectively in Rp/head were Rp 21,408.00; Rp 18,721.00; Rp 22,988.00 and Rp 19,317.00. Based on the results of the study, it can be concluded that the addition of *Azolla microphyla* flour at a level of 5% in the ration showed the best performance of Hyla rabbits.

**Keywords:** *Azolla microphyla*, rabbit, performance, and replacement for coconut meal.

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### PENDAHULUAN

As a single-hulled animal, the rabbit's feeding needs must contain forage. It becomes very important for the rabbit breeding industry to be able to provide about 60% to 70% of quality feed (Tistiana et al., 2023). The need for crude protein in rabbits

in the growth phase is 15%, the need for fat is 3% and the need for crude fiber is 10-12%, and Ca 0.45% and TDN is 65% (Saraswati et al., 2018)

Rabbit farming industry has a good potential in order to overcome the shortage of meat as a source of protein and can ensure the availability of a variety of food. Rabbit meat has a smoother texture than other red meats

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such as beef, lamb and mutton. The fat content of rabbit meat is also more dense, which is only 6.2%, compared to the fat content of beef which reaches 18.3% and goat fat which is also high, reaching 17.5% (Mubarak et al., 2023). Even more advantageous is the protein content of rabbit meat is higher at 20.7% compared to the protein content of beef which is 19.3%, and lamb which has a protein content of 18.7% (Rinanto et al., 2018). Based on these data, it can be concluded that the development of broiler rabbits as an alternative food can overcome the problem of meat needs for the community. In addition, the development of broiler rabbit livestock does not take too long, because one of the advantages of rabbit livestock is high production power with rapid growth.

*Azolla microphylla* is a type of small-leaved aquatic plants, stacked, has a green color, and grows into a disturbing plant in calm aquatic environment conditions; ponds, rivers, lakes,

and rice fields (Syamsiyah et al., 2021). *Azolla microphylla* Contains crude protein 19.75%, moisture content 14.97%, ash content 14.93%, crude fiber 17.03%, crude fat 4.20% and BETN 29.12%. The value was obtained from the analysis of the fpik IPB Bogor Laboratory in 2021, as well as the metabolic energy of the flour (Nurhita, 2023). Seeing the good nutrient content, the use of *Azolla microphylla* can be used as an alternative feed that is expected to reduce the dependence of farmers on feed manufacturers. *Azolla microphylla* is also expected to be used as a single feed or a mixture of rabbit ration feed ingredients, but still meet the nutritional needs of rabbits. Based on the above background, research has been conducted related to the effect of the use of *Azolla microphylla* flour in rations on the performance of *Hyla* rabbits.

## METHODS

### Time and place of research

The research was conducted on March 11, 2024 to June 22, 2024 in Jagalan Hamlet, Sukoharjo Village, Ngaglik District, Sleman regency, Yogyakarta Special Region.

### Research Materials

#### Material

The material in this research is a male rabbit species *Hyla* a number of 24 tail aged 2.5 months – 3 months, with an average initial

weight of 1.3 kg. Rabbits obtained from rabbit breeders in Sleman. The type of cage used is the individual type of parallel model, made of galvanized ram, wood, and bamboo. With a cage size of 70 x 50 x 40 cm sudah complete with feed and drinking water

#### Tools

The tool used to determine body weight and feed consumption using electronic brand digital scales with a sensitivity of 0.1 grams. Materials used are Rabbit and *Azolla microphylla*.

### Research Methods

The method used in this study uses a complete randomized design (RAL) unidirectional pattern. This study used 4 feeding treatments with 3 replications, each experimental unit with a capacity of 2 *Hyla* rabbits.

- P0 : 0% *Azolla microphylla*
- P1 : 5% *Azolla microphylla*
- P2 : 10% *Azolla microphylla*
- P3 : 15% *Azolla microphylla*

**Table 1. Nutritional Needs Of Rabbits**

Nutrition	Needs
Protein (%)	12 – 16
Coarse Fiber (%)	12 – 20
Gross Fat (%)	2 – 4
Phosphor (%)	0,22
Calcium (%)	0,4

Source: Anonimus (2009)

**Table 2. Nutritional content of feed ingredients preparation of rations**

Feed Material	PK	LK	SK	Abu	BETN	BK	P	Ca
	-----%-----							
Azolla microphylla	19,93	4	26,73	10,89	38,44	48,2	0,96	1,52
Rice bran	11,9	12,1	10	10,1	41,9	86	1,3	0,1
Coconut Cake	18,6	8,8	10,4	5,5	42,7	86	0,56	0,18
Corn	8,9	4	2,2	1,7	68,6	86	0,02	0,23
Molasses	4,2	2	7,7	8	57,1	77	0,09	0,84

Source : Hartadi (2017)

**Table 3. Composition and nutrient content of the treatment ration**

Bahan Pakan ( % )	Perlakuan			
	P0	P1	P2	P3
Jagung	45	45	45	45
Dedak Padi	15	14	10	16
Bungkil Kelapa	38	34	33	22
<i>Azolla microphylla</i>	0	5	10	15
Tetes tebu	2	2	2	2
<b>Jumlah</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
PK	12,94	13,07	13,41	13,07
LK	5,17	5,09	4,77	5,25
Abu	4,53	4,75	4,84	5,38
SK	6,59	7,42	8,25	9,04
BETN	54,52	54,32	54,13	53,87
BK	85,82	77,81	82,04	80,15
P	0,42	0,43	0,42	0,48
CA	0,17	0,27	0,34	0,40

Source: processed primary calculations (2024).

### Pengambilan Data

The Data taken in the study include feed consumption, weight gain, feed conversion, and Income Over Feed Cost.

#### 1. Feed Consumption

How to calculate the consumption of feed by weight of feed given reduced by the rest of the feed every day (grams/head/Day) (Marhamah et al., 2019).

Consumption = weight of feed given at the beginning of the week (grams) - weight of the remaining feed at the end of the week (grams).

#### 2. Daily body weight gain (grams / head/Day)

The way to calculate weight gain per day is to subtract the final weight from the initial weight and then divide by the length of maintenance.

(Al Kindi et al., 2020)

$$PBBH = \frac{\text{Late body weight} - \text{early body weight}}{\text{Long time maintenance}}$$

#### 3. Konversi pakan

Feed conversion is calculated by comparing the weight of feed consumption (grams/day) with daily weight gain (grams/day) in the same period and time of observation. Calculated by the formula (Nurmeidiansyah et al., 2024,)

### Feed material consumption

$$PBBH = \frac{\text{Feed material consumption}}{\text{Weight gain}}$$

#### 4. Income Over Feed Cost (IOFC)

A business in the field of animal husbandry can be said to be profit or loss seen from the indicator of Income Over Feed Cost (Sritiasni et al., 2022). The IOFC indicator can be calculated by subtracting the amount of income by the amount of feed costs.

$$IOFC = \text{Amount of income} - \text{the amount of feed costs}$$

### Data Analysis

The analysis used in this study used a complete randomized design (RAL) with a one-way Pattern, 4 treatments and 3 repetitions. Then the results of data acquisition were analyzed using an analysis of variance (ANOVA). The results of the analysis if there is a real difference, the test is carried out immediately with Duncan's New Multiple Range Test (DMRT) (Nugroho, 2008 dalam Sulaiman et al., 2018)

## RESULTS AND DISCUSSION

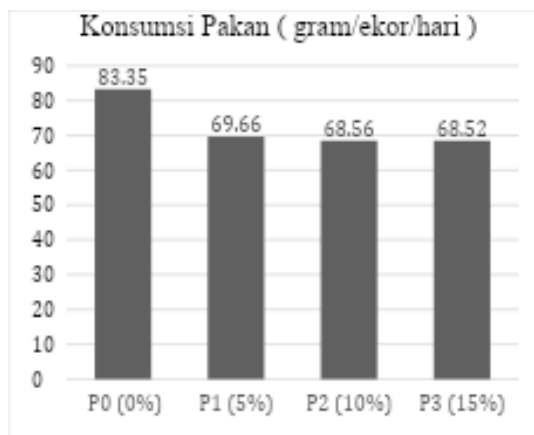
### Feed Consumption

The effect of Azolla microphylla flour on Hyla rabbit feed consumption during the study is presented in Table 4.

**Table 4. Feed consumption at various treatments in BK (gram / head/Day)**

Repetition	Use of Azolla microphylla			
	P0 (0%)	P1 (5%)	P2 (10%)	P3 (15%)
	84,57	71,14	71,71	65,28
	83,35	66,71	65,42	70,71
	82,14	71,14	68,57	69,57
Average	83,35 <sup>a</sup>	69,66 <sup>b</sup>	68,56 <sup>b</sup>	68,52 <sup>b</sup>

Description: the average with different notation on the same line shows different real ( P < 0.05 )



**Figure 1. Hyla Rabbit Feed Consumption in Various Treatments**

Figure 1. The average consumption of feed treatment P0, P1, P2 and P3 respectively in grams/head/Day is 83.35; 69.66; 68.56 and 68.52 grams/head/Day. The results of variance analysis showed that the treatment of rabbit feed consumption was significantly different ( $P < 0.05$ ). P0 = 83.35 is significantly different from P1 = 69.66 ; P2 = 68.56 and P3 = 68.52. The lowest dry matter consumption at P3 treatment (68.52) and the highest at P0 treatment (83.35).

Consumption of feed that has a real difference can be caused because the treatment ration has a low palatability and feed containing azolla microphylla is more bulky or larger in volume but contains low nutrients. Diningrat et al., (2023,) states that the factors affecting consumption are palatability and taste. Palatability is determined by physical and chemical states such as appearance,

smell, taste, texture and temperature. Azolla microphylla plant is a water Nail plant that can be found from lowlands to an altitude of 2200 meters above sea level has a rough texture, tasteless, relatively small in shape. Azolla microphylla flour comes from Azolla microphylla that has been dried and ground into a fine powder. In the study, Azolla microphylla flour used has a slight fishy aroma that is not liked by rabbits, has a relatively bland taste with a slightly rough dry texture. Pellet feed that tends to be bulky is caused because there is Azolla microphylla flour which has a relatively high fiber content which causes the feed flow velocity in the digestive slauran to be more moist so that feed consumption tends to decrease. According to Wahyu (1978) in Kastalani, (2012) that rations containing high crude fiber cannot be

digested by livestock and are generally bulky, besides that it will directly affect the digestive apparatus to process harder in digesting the feed. Consumption of dry matter in this study is lower than recommended by Arrington and Kelley (1976) in (Sukarini et al., 2014). Lebas dkk (1986) in (Sukarini et al., 2014) states that the need for rabbit feed is determined based on the size or magnitude of the rabbit and the stage or level of production.

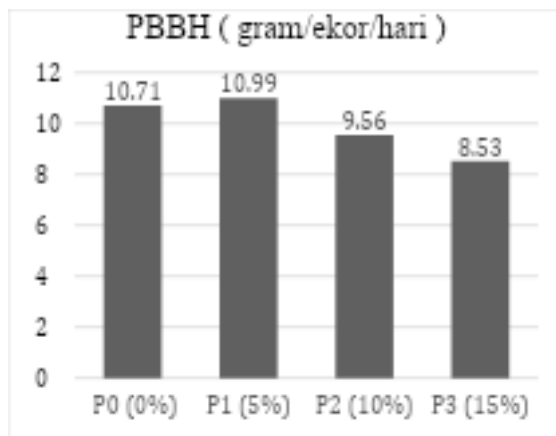
### Daily Weight Gain

The effect of Azolla microphylla flour on The Daily weight gain of Hyla rabbits in this study is presented in Table 5.

**Table 5. Average daily weight gain of Hyla rabbits during the study (grams / head/Day)**

Repetition	Use of <i>Azolla microphylla</i> (%)			
	P0 (0%)	P1 (5%)	P2 (10%)	P3 (15%)
1	10,85	8,85	10,28	8,48
2	10,71	12,28	8,85	8,85
3	10,57	11,85	9,57	8,28
Average	10,71 <sup>a</sup>	10,99 <sup>a</sup>	9,56 <sup>ab</sup>	8,53 <sup>b</sup>

Description: the average with different notation on the same line shows different real ( $P < 0.05$ )



**Figure 2. Average daily weight gain of Hyla rabbits**

Figure 2. showed the average daily weight gain treatment P0, P1, P2 and P3 respectively 10.71; 10.99; 9.56 and 8.53 grams/head/Day. Variance analysis showed the effect of treatment on the daily weight gain of rabbit feed significantly different effect ( $P < 0.05$ ). These results are lower when compared to those presented by Cheeke (1987) in (Sampul et al., 2018), revealed that the growth of rabbits in tropical areas can reach 1 - to 20 grams/head per day. The addition of Azolla microphylla flour reduces weight gain in accordance with the amount of feed consumption. Treatment of coconut cake with Azolla microphylla in rations up to P3 level 15% significantly reduced the weight gain of Hyla rabbits. The low weight gain in this study is thought to be caused by the nutritional content of feed rations that fall resulting in fewer nutrients for growth available so that growth becomes worse.

According to Tahuk et al., (2021) the composition of clams, types, as well as feed consumption exert a considerable influence on growth. Differences in feed consumption in each treatment can cause energy and protein content to be different, thus affecting the growth of Hyla rabbits. Sarwono (2008) also gives a similar statement that the nutrient that influences growth is protein because protein is one of the largest constituents in the tendons, cartilage, connective tissue outside and inside and

forming organs. Livestock body weight is strongly influenced by feed consumption, in addition, genetic factors, environment and maintenance management at the farmer level breeders are also thought to have a great influence on the growth of Hyla rabbits, so this study has not been able to provide a good growth value.

Based on the results of previous studies local rabbit weight gain also showed relatively low results, the results of research Sukarini et al. (2014) in local rabbits ranged from 5.58 to 8.20 grams/head/day the difference was due to differences in Race, feed, air temperature.

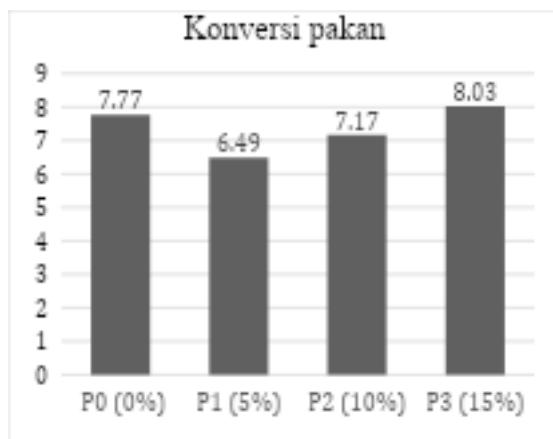
### Feed Conversion

Based on the results showed that the effect of Azolla microphylla flour on feed conversion can be seen in Table 6.

**Table 6. Average feed conversion of Hyla rabbits fed with Azolla microphylla flour**

Repeti tion	Use of <i>Azolla microphylla</i>			
	P0 (0%)	P1 (5%)	P2 (10% )	P3 (15% )
1	7,78	8,03	6,97	7,74
2	7,78	5,45	7,38	7,98
3	7,77	6	7,16	8,39
Avera ge	7,77 <sup>a</sup> b	6,49 <sup>b</sup>	7,17 <sup>a</sup> b	8,03 <sup>a</sup>

Description: the average with different notation on the same line shows different real ( $P < 0.05$ )



**Figure 3. Hyla rabbit feed conversion**

Figure 3. shows the average conversion of feed treatment P0,P1, P2and P3 respectively 7,77; 6,42; 7,17; 8,03. From the results of the study showed Azolla microphylla treatment up to the level of P1 6.49 tend to improve feed conversion it is suspected that in the treatment of P1 occurs complementary effect of nutrients because Azolla microphylla contains high enough protein so that the complementary effect occurs so that it can improve feed conversion, but once Azolla microphylla was raised to. Based on the results of research Sukarini (2007) conversion paka local rabbits showed results ranging from 3.80 to 16.92. Feed conversion into a picture of the efficiency of the use of feed types in an effort to increase livestock weight gain (suhardiani, 1997 in Harwanti 2011). Efficiency in the use of feed can be considered high if the conversion rate is lower (Doho and Bustami 1986 in Anggraeni *et al.*, 2013).

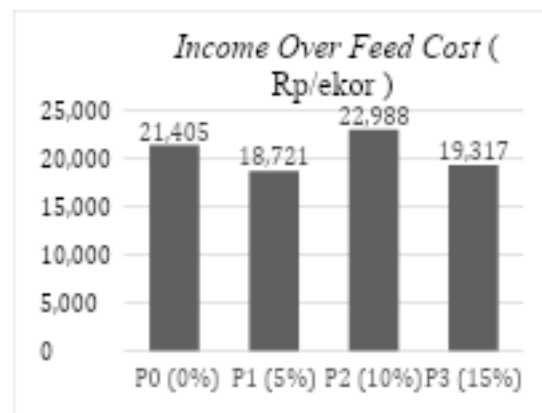
#### ***Income Over Feed Cost (IOFC)***

Multiplication of livestock production is referred to as acceptance is PBBH with selling price, while the amount of costs used in producing livestock weight gain is referred to as feed costs (Prasetyo, 2013). To be able to determine the economic value of feed to income in the livestock sector, especially rabbits, then the calculation can be done with IOFC. The average results of each treatment are presented in Table 7.

**Table 7. Average Income Over Feed Cost of Hyla Rabbits (Rp/head)**

Repeti tion	Use of <i>Azolla microphylla</i>			
	P0 (0%)	P1 (5%)	P2 (10%)	P3 (15%)
1	26.5 87	17.0 73	21.1 33	18.0 38
2	21.3 22	16.2 68	24.8 61	21.9 40
3	16.3 08	22.8 23	22.9 72	17.9 74
Avera ge	21.4 05	18.7 21	22.9 88	19.3 17

Description: the average with different notation on the same line shows different real (  $P < 0.05$  )



**Figure 4. Average Income Over Feed Cost of Hyla Rabbits**

Figure 8 shows the average IOFC of treatments P0, P1, P2 and P3 sequentially in the form of Rp/head, namely Rp 21,408.00; Rp 18,721.00; Rp 22,988.00 and Rp 19,317.00. In Table 9. The P2 10% treatment ration has an IOFC value of Rp 22,988.00/head. so it can be explained that the P2 treatment ration (10% Azolla microphylla) has a very large economic value. The cost of using Azolla micropylla flour can be said to be average because it is

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not too high so that it causes the use of Azolla microphylla flour to be said to have economic value. The IOFC of Hyla rabbits in this study showed significantly different results because it was caused by weight gain and feed consumption which marked the main parameters of the IOFC calculation, also relatively different. In accordance with the opinion of Wahyu (2004), which states that those that influence IOFC include rations, ration prices, livestock selling prices and final weight. Looking at the efficiency of feed, providing feed in the form of ground corn, rice bran, coconut meal, molasses and Azolla microphylla flour is very easy to do because it only mixes all the ingredients above into one and then grinds them into pellets.

## CONCLUSION

Based on the research results, it can be concluded that the addition of 5% Azolla microphylla flour to the ration showed the best performance of Hyla rabbits..

## REFERENCES

- Al Kindi, M., Wajizah, S., & Rachmadi, D. (2020). Performa Domba Lokal Jantan yang Diberikan Limbah Serai Wangi (Cymbopogon nardus) Fermentasi sebagai Pengganti Sebagian Pakan Basal. *Jurnal Ilmiah Mahasiswa Pertanian*, 5(1), 213-224.
- Amalia, F., Muryani, & Isroil. (2017). Pengaruh Penggunaan Tepung Azolla Microphylla Fermentasi Pada Pakan Terhadap Bobot Dan Panjang Saluran Pencernaan Ayam Kampung Persilangan (Effect Of The Use Of Azolla Microphylla Fermentation Powder Feed On Weight And Length Digestive Tract Of Crossbreed. *urnal Pengembangan Penyuluhan Pertanian*, 14(26), 53-59.
- Diningrat, S. C., Irfan, M., Ismail, M., Mustafa, Nirwana, Zainal, & Amam. (2023). Evaluation of Voluntary Feed Intake and Digestibility Organic Feed Ingredients for Adult Female Goats. *Jurnal Ilmiah Peternakan Terpadu*, 11(3).
- Kastalani. (2012). Pengaruh Pemberian Rumput Lapangan dan Daun Lamtoro Gung Terhadap Konversi Ransum Kelinci Lokal Jantan (Ericolagus cuniculus)/The Effect of Field Grass and Lamtoro Gung Leaf on The Feed Conversion of Local Male Hare (Ericolagus cuniculus). *Jurnal Ilmu Hewani Tropika (Journal of Tropical Animal Science)*, 1(1), 12-14.
- Marhamah, Akbarillah, S. U., & Hidayat. (2019). *Kualitas nutrisi pakan konsentrat fermentasi berbasis bahan limbah ampas tahu dan ampas kelapa dengan komposisi yang berbeda serta tingkat akseptabilitas pada ternak kambing*, 14(2), 145-153.
- Mubarak, A., Rokana, E., Safitri, A., & Winahyu, N. (2023). *Manajemen Usaha Ternak Kelinci*. Penerbit NEM.
- Nurhita. (2023). Pengaruh Penggunaan Tepung Azolla Microphylla dalam Ransum terhadap Performan Burung Puyuh. *Jurnal Embrio*, 1(15), 46-55.
- Nurmeidiansyah, A., Almatlubi, D., Alhuur., K. R., & Permana, R. (2024). Pengaruh Bobot Badan Awal Terhadap Pertambahan Bobot Badan Harian, Konsumsi Pakan dan Efisiensi Pakan Domba Lokal Penggemukan. *Bulletin of Applied Animal Research*, 6(1), 1-9.



- Rinanto, U. A., Kustanti, N. O., & Widigdyo, A. (2018). Pengaruh penggunaan tepung daun belimbing manis (*Averrhoa carambola* L.) sebagai substitusi pakan kelinci terhadap performa kelinci *Hyla Hycle*. *AVES: Jurnal Ilmu Peternakan*, 12(1), 9-20.
- Sampul, M., Tulung, B., Umboh, J., & S.A.E. (2018). Pengaruh pemanfaatan daun ubi jalar (*Ipomea batatas* L) terhadap performans ternak kelinci. *ZOOTECH*, 38(2), 314-319.
- Saraswati, Wijang, A., Al Arif, M. A., Wibawati, P. A., Damayanti, R., Agustono, B., & Purnama, M. T. (2018, Oktober). Pengaruh Substitusi Tepung Buah Hala (*Pandanus Tectorius*) dalam Pelet terhadap Konsumsi Bahan Kering dan Bobot Kelinci Pedaging. *Jurnal Medik Veteriner*, 1(3), 57-61.
- Sritiasni, Jihan, A., & Syaefullah., B. L. (2022). Analisis Kelayakan Usaha Ternak Kelinci menggunakan Fodder Jagung sebagai Pakan Substitusi. *Jurnal Agroekoteknologi dan Agribisnis*, 6(2), 59-68.
- Sulaiman, W. A., Dwatmadji, & Suteky, T. (2018). Pengaruh pemberian pupuk feses sapi dengan dosis yang berbeda terhadap pertumbuhan dan produksi rumput Odot (*Pennisetum purpureum* Cv. Mott) di kabupaten Kepahiang. *Jurnal Sain Peternakan Indonesia*, 13(4), 365-376.
- Syamsiyah, J., Herdiansyah, G., Hartati, S., & Suryono. (2021). Pengembangan Budidaya Azolla untuk Mendukung Pengembangan Pertanian Organik. *PRIMA : Journal of Community Empowering and Services*, 5(1), 38-46.
- Tahuk, P. K., Dethan, A. A., & Sio, S. (2021). Konsumsi dan pencernaan bahan kering, bahan organik dan protein kasar sapi bali jantan yang digemukkan di peternakan rakyat. *Konsumsi dan pencernaan bahan kering, bahan organik dan protein kasar sapi bali jantan yang digemukkan di peternakan rakyat*, 3(1), 21-35.
- Tistiana, H., Widodo, E., & Djunaidi, I. H. (2023). *Teknologi Pakan Pelet untuk Kelinci*. Universitas Brawijaya Press.