talenta PUBLISHER
Jurnal Peternakan Integratif

The Use of Marine Mushroom Extract (Nodulisporium sp.) as Feed Additive in the Ration of Native Chickens on Protein Utilisation Ratio

MO. Br Surbakti, Nurhayati[1], Nelwida[2]
Faculty of Animal Science, Jambi University, Kabupaten Muaro Jambi, Jambi

Abstract. Feed plays an important role in the growth process of native chickens. This research aims to determine the effect of using marine fungi extract (Nodulispolium sp.) as a feed additive in native chicken rations on the protein utilization ratio. This research was a collaboration between the IPB University and Jambi University which used 180 unsexing DOC native chickens and marine fungi extract. The design used was a Completely Randomized Design (CRD) consisting of 5 treatments and 4 replications. The treatments were P0 = Basal Ration (control), P1 = P0 + 1 ml marine fungi extract/kg, P2 = P0 + 2 ml marine fungi extract/kg, P3 = P0 + 3 ml marine fungi extract/kg and P4 = P0 + 4 ml marine fungi extract/kg. The variables observed included dry matter consumption, crude protein consumption, body weight gain and protein utilization ratio. Data were analyzed using analysis of variance (ANOVA) and the differences between treatments, adding were tested using Duncan's Multiple Range Test. The results of analysis of variance showed that the use of marine fungi extract as a feed additive in rations up to 4 ml/kg ration had no significant effect (P>0.05) on dry matter consumption, crude protein consumption, body weight gain and protein utilization ratio. It can be concluded that the use of marine fungi extract as a feed additive in rations up to 4 ml/kg has not been able to increase the protein ratio chickens.

Keywords: feed additives, marine fungi extract, native chicken, performance, protein utilization of native chicken ratio

Received 09 September 2023| Revised 16 February 2024 | Accepted 16 February 2024

1. Introduction

The native chicken is known as a non-race chicken (free-range) which is one of the poultry livestock that is widely maintained and in demand in the community. This is because the process of raising native chickens is relatively easy to maintain, does not require large capital and native chickens have a high survival rate compared to other poultry livestock. Feed has an important role in the process of maintenance and growth of native chickens, this is because feed is one of the factors that can determine the success of cultivation and development of native chicken farmers. In addition to feed, the growth of native chickens can be influenced by the presence of feed additives or often called feed additives. Feed additives are additional feed given to livestock

*Corresponding author at: **Faculty of Animal Science, Jambi University, Kabupaten Muaro Jambi, Jambi**
E-mail address: oktaviam325@gmail.com

 ISSN: 2303-3207 e-ISSN: 2808-2753
DOI: 10.32734/jpi.v11i3.13596
Journal Homepage : https://talenta.usu.ac.id/jpi

consisting of vitamins, minerals, probiotics, antibiotics and growth hormones that function to improve nutrition in poultry and improve livestock performance [1].

Feed additives that are often added to commercial feed for poultry are antibiotics that have a function as a growth trigger and can increase immunity in poultry [2]. However, antibiotics given to poultry continuously over a long period of time have negative effects. This is because poultry can be increasingly resistant to antibiotics and the products produced by poultry in the form of meat have antibiotic residues that can endanger the health of consumers if they consume them [3]. Therefore, the government issued a ban on the use of antibiotics as Agent Growth Prometer or AGP to boost the growth of poultry livestock which has been regulated in Law No.18/2009 in conjunction with Law No.41/2014 on Animal Husbandry and Animal Health which states the prohibition of the use of feed mixed with certain hormones and feed additive antibiotics. Therefore, it is necessary to find feed additives or feed additives that have active compounds in naturally promoting growth and improving performance in native chickens. One of the feeds that has active compounds in it is the marine fungus Nodulisporium sp.

The marine fungus Nodulisporium sp. is a species of fungi that is commonly found in marine or estuarine environments. Marine fungi are also marine components that grow and spore on substrates in the marine environment [4]. According to [5] which states that marine fungi can be used as natural antibiotics and are an important source of secondary metabolites that function in drug discovery. The active compounds possessed by marine fungi Nodulisporium sp. can be utilised as feed additives that have been studied in vaname shrimp. According to [6] explained that marine fungi Nodulisporium sp. KT29 is an endophytic fungus that has active compounds in the form of β-glucan, phytosterols, saponins and polyphenols where active compounds in the form of phytostrerol and saponins in marine fungi Nodulisporium sp. KT29 can increase vaname shrimp production and feed use efficiency.

In addition, the saponin content contained in the marine fungus Nodulisporium sp. KT29 can be beneficial in the growth of vaname shrimp, this is because the saponin content contained in the fungus can increase immunity in vaname shrimp against pathogens [7]. Then, the content of β-glucan contained in the marine fungus Nodulisporium sp. KT29 can improve the intestinal surface in vaname shrimp this is because the bioactive compounds in β-glucan can make the intestinal microvilli in vaname shrimp wider as a result of better nutrient absorption [7]. While the results of research by [8] showed that β-glucan can be used as an immunostimulant in vaname shrimp in increasing endurance or as immunity in the face of stress that occurs due to changes in environmental conditions during maintenance at sea. The purpose of this study was to determine the effect of using sea mushroom extract (*Nodulisporium sp*.) as an additive feed in the ration of native chickens on the ratio of protein use. And the benefits obtained in this study are to provide new insights for writers, readers, and poultry farmers, especially native chickens, about the benefits of sea mushrooms as a natural substitute for antibiotics, as well as the effect of using sea

mushroom extract (*Nodulisporium sp*.) as an additive feed in native chicken rations on protein utilization ratio.

2. Materials and Methods

2.1. Place and Time

This research was conducted in the research house of Livestock and Forage Cultivation Laboratory, Faculty of Animal Husbandry, Jambi University for 10 weeks from 19 November 2022 to 28 January 2023.

2.2. Materials and Equipment

There is also material used in this study, which is using as many as 180 day-old chickens (DOC) unsexing. The feed ingredients used in the ration were yellow corn, fine bran, fish meal, soybean meal, vegetable oil, coconut meal, lysine, methionine and mineral mix and sea mushroom extract. This study used 20 colony cages, with a cage size of 50 x 100 x 90 cm, each cage unit was filled with 9 native chickens. The equipment used in this study included feed bins, drinking water bins, 25 watt lights and scales.

2.3. Research Methods

The research design used in this study is a complete randomised design (CRD) with 5 treatments and 4 replications. Each treatment repeated 4 times and each experimental unit contains 9 native chickens.

The treatment rations given containing sea mushroom extract according to the treatment can be seen as follows:

P0 = Basic ration without addition of marine mushroom extract, as control
P1 = Basic ration + 1ml sea mushroom extract/kg ration
P2 = Basic ration + 2 ml sea mushroom extract/kg ration
P3 = Basic ration + 3 ml sea mushroom extract/kg ration
P4 = Basic ration + 4 ml sea mushroom extract/kg ration

2.4. Observed Variables

The variables observed in this study were ration dry matter consumption, body weight gain, crude protein consumption, and protein utilisation ratio.

2.4.1. Ration dry matter consumption (gram/head/week)

Ration dry matter consumption was obtained from the difference between the amount of ration given and the amount of remaining ration multiplied by the % BK Ration.

Ration Dry Material Consumption = (Total ration given - Total remaining ration) in the same week × % BK Ration.

2.4.2. Crude Protein Consumption (gram/head/week)

Crude protein consumption is obtained by multiplying the dry matter consumption of the ration by the crude protein content of the ration. Here's how to calculate crude protein consumption every week according to [9].

Crude Protein Consumption = Ration dry matter consumption (gr/head/week) × Ration protein content (%).

2.4.3. Body Weight Gain (grams/head/week) Body weight gain (PBB) is calculated by reducing the body weight at the end of the week by the beginning of the week (grams/head/week).

2.5. Data Analysis

Data were analysed by analysis of variance (ANOVA) in accordance with the design used, namely Completely Randomised Design (CRD) and if there is a significant effect between treatments, it will be tested using Duncan's Multiple Range Test [10].

The composition of the basic ration ingredients that will be given to native chickens, the food substance content of the basic ration ingredients, and the food substance composition of the basic ration can be seen in "Tables 1, 2, and 3" as follows:

Table 1. Composition of Basic Ration Ingredients

Feed Ingredients	**(%)**
Corn	40
Coconut Meal	10
Fish Meal	15
Soybean Meal	10
Fine Bran	21
Vegetable Oil	2
Lisin	0,5
Methionine	0,5
Mineral Mix	1
Total	100

Table 2. Feed substance content of basic ration ingredients

Feed Ingredients	**EM (kkal/kg)***	**DM (%)**	**Ash (%)**	**CP (%)**	**CF (%)**	**CFat (%)**	**BETN (%)**
Corn	2916,54*	87,6[a]	11,32[a]	22,35[a]	3,98[a]	13,46[a]	36,49[a]
Coconut Meal	3061,25*	88,74[a]	4,52[a]	21,03[a]	14,13a	21,84[a]	27,22[a]
Fish Meal	2758,07*	88,32[a]	6,48[a]	60,24[a]	4,16[a]	1,26[a]	16,18[a]
Soybean Meal	2256,77*	93,2[a]	35,1[a]	42,62[a]	2,69[a]	11,79[a]	1[a]
Fine Bran	1699,39*	90,31[a]	14,8[a]	9,44[a]	28[a]	0,53[a]	37,54[a]
Vegetable Oil	6216[b]	-	-	-	-	100[b]	-
Lisin	4181,67[b]	-	-	119,75[b]	-	-	-
Metionin	2049,45	-	-	58,69[b]	-	-	-
Mineral Mix	0	-	-	-	-	-	-

Note:- (a) Analyses of Feed Science and Technology Laboratory, Faculty of Animal Science, IPB (2022)
- (b) NRC (1994)
- * EM = 34.92 PK + 62.16 LK + 35.61 BETN [11]

- 1 kg of lysine contains 99% lysine
- 1 kg of methionine contains 99% methionine
- Mineral Mix each kg contains 32.5% Calcium (Ca); 1% Phosphor (P); 6 grams Iron (Fe); 4 grams Manganese (Mn); 0.075 grams Iodine (I); 0.3 grams Copper (Cu); 3.75 grams Zinc (Zn); 0.5 mg Vitamin B12 and 50,000 IU Vitamin D3. (Medion Feed).

Table 3. Feed Substance Composition of Basic Ration

Feed Substances	**(%)**
DM	85,45
Ash	12,57
CP	27,22
CF	9,78
CFat	11,05
BETN	27,73
EM (kkal/kg)	2624,48

Note: Calculation Results Table 1 and Table 2

3. Results and Discussion

3.1. Ration Dry Matter Consumption

The average dry matter consumption of rations in native chickens reared from 0 - 10 weeks of age that added sea mushroom extract as a feed additive in the ration for 10 weeks can be seen in "Table 4", as follows:

Table 4. Average Ration Dry Material Consumption (grams/head/week) in chickens that added sea mushroom extract as feed additive in the ration.

Treatments	**Ration Dry matter Consumption (gram/head/week)**
P0	339,13 ± 17,52
P1	303,88 ± 8,75
P2	301,60 ± 20,55
P3	335,32 ± 43,98
P4	303,13 ± 16,11

Description:
P0 = Control Ration (Basic Ration);
P1 = P0 + 1ml sea mushroom/kg Ration;
P2 = P0 + 2 ml sea mushroom/kg Ration;
P3 = P0 + 3 ml sea mushroom/kg Ration;
P4 = P0 + 4 ml sea mushroom/kg Ration

Based on the analysis of variance showed that the addition of sea mushroom extract as a feed additive in the ration had no significant effect (P>0.05) on the dry matter consumption of rations in native chickens. This is thought to be because the active compounds contained in sea mushroom extracts as feed additives added in the ration do not affect the dry matter consumption of rations in native chickens. From the results of this study, the average value of dry matter consumption of rations obtained ranged from 301.60 - 339.13 (grams/head/week) lower than the results of research from [12], namely the average value of dry matter consumption of rations obtained ranged from 392.77 - 406.994 (grams/head/week) in 12-week-old native chickens. The results of this study were higher than the results of research by [13], namely the value of the average ration consumption of native chickens reared for 10 weeks from the age of 0 - 10 weeks ranged from 297.41 - 310.16 (grams/head/week). The results of research by [14], the value of ration

consumption of native chickens reared for 10 weeks from the age of 10 - 20 weeks is in the range of 352.38 - 430.01 (grams/head/week). According to [15] ration consumption will increase if the energy content contained in the ration is low and vice versa ration consumption decreases if the energy contained in the ration increases. In this study, the energy content between treatment rations was the same so that the composition of the ration was not different.

3.2. Crude Protein Consumption

The results of the study of crude protein consumption values in native chickens reared for 10 weeks from the age of 0 - 10 weeks which added sea mushroom extract as a feed additive in the ration can be seen in "Table 5", as follows:

Table 5. Average Crude Protein Consumption (grams/head/week) in local chickens that added sea mushroom extract as feed additive in the ration.

Treatments	Crude Protein Consumption (grams/head/week)
P0	92,31 ± 4,77
P1	82,72 ± 2,38
P2	82,10 ± 5,59
P3	91,27 ± 11,97
P4	82,51 ± 4,38

Description:
P0 = Control Ration (Basic Ration);
P1 = P0 + 1ml sea mushroom/kg Ration;
P2 = P0 + 2 ml sea mushroom/kg Ration;
P3 = P0 + 3 ml sea mushroom/kg Ration;
P4 = P0 + 4 ml sea mushroom/kg Ration

The results of the analysis of variance showed that the addition of sea mushroom extract up to 4 ml as a feed additive in the ration showed no significant effect (P>0.05) on crude protein consumption. From the results of this study, the value of crude protein consumption obtained ranged from 82.10 - 92.31 (grams/head/week), higher than the research of [16] which showed the value of crude protein consumption in 12-week-old native chickens ranged from 43.44 - 45.02 (grams/head/week). Then the results of this study were higher than the results of research from [17] which showed the value of protein consumption in native chickens reared for 10 weeks from the age of 0 - 10 weeks ranged from 23.17 - 35.77 (grams/head/week), and the results of research by [14] which where the value of protein consumption of native chickens reared for 10 weeks (age 10 - 20 weeks) ranged from 56.28 - 79.38 (grams/head/week). High protein consumption is also followed by high protein intake, which results in higher protein to be used in the formation of meat for livestock [18].

3.3. Body Weight Gain (PBB)

The results of the study of body weight gain (PBB) in native chickens from 0 - 10 weeks of age maintained for 10 weeks given sea mushroom extract as a feed additive in the ration can be seen in "Table 6", as follows:

Table 6. Average Body Weight Gain (PBB) (gram/head/week) in native chickens added with sea mushroom extract as feed additive in the ration

Treatments	Weight Gain (PBB) (gram/head/week)
P0	72,11 ± 5,74
P1	71,80 ± 4,66
P2	69,61± 4,97
P3	65,28 ± 4,22
P4	68,74 ± 3,41

Description: P0 = Control Ration (Basic Ration);
P1 = P0 + 1ml sea mushroom/kg Ration;
P2 = P0 + 2 ml sea mushroom/kg Ration;
P3 = P0 + 3 ml sea mushroom/kg Ration;
P4 = P0 + 4 ml sea mushroom/kg Ration

3.4. Protein Utilisation Ratio

The results of the study of the ratio of protein use in native chickens from 0 - 10 weeks of age reared for 10 weeks given sea mushroom extract as a feed additive in the ration can be seen in "Table 7", as follows:

Table 7. Average ratio of protein utilisation in native chickens that added sea mushroom extract as feed additive in the ration

Treatments	Protein Utilisation Ratio
P0	1,29 ± 0,16
P1	1,16 ± 0,10
P2	1,18 ± 0,12
P3	1,40 ± 0,19
P4	1,20 ± 0,07

Description: P0 = Control Ration (Basic Ration);
P1 = P0 + 1ml sea mushroom/kg Ration;
P2 = P0 + 2 ml sea mushroom/kg Ration;
P3 = P0 + 3 ml sea mushroom/kg Ration;
P4 = P0 + 4 ml sea mushroom/kg Ration

The results of the analysis of variance showed the addition of sea mushroom extract as a feed additive in the ration gave no significant effect ($P>0.05$) on the ratio of protein use. Protein utilisation ratio (RPP) is a determination of an animal in converting every gram of protein consumed into body weight gain [9]. According to [19] to find the value of protein utilization ratio obtained by comparing protein consumption and body weight gain so that the smaller the value of protein utilization ratio, the less livestock consume protein in the formation of body weight. The protein utilisation ratio obtained in this study ranged from 1.16 - 1.40. The results of the study of the ratio of protein use is higher than the results of research [19] that the average number of protein use ratio obtained in native chickens aged 2 - 12 weeks ranged from 0.57 - 0.65. According to [20], the protein efficiency ratio is obtained by comparing body weight gain with protein consumption so that the higher the protein efficiency ratio, the more efficient the livestock in consuming protein.

4. Conclusion

Based on the results of this study, it can be concluded that the use of sea mushroom extract as a feed additive in the ration added up to 4 ml of sea mushroom/kg has not been able to increase the value of protein utilization ratio in native chickens.

REFERENCES

[1] Akhadiarto, S. 2014. "Pengaruh penambahan probiotik dalam ransum lokal terhadap performans ayam broiler". *Jurnal Sains Dan Teknologi Indonesia*.16(1):16–22.

[2] Ulupi, N., Soesanto, I. R. H., dan Inayah, S. K. 2015. "Performa ayam broiler dengan pemberian serbuk pinang sebagai feed aditive". *Jurnal Ilmu Produksi Dan Teknologi Hasil Peternakan*. 3(1):8–11.

[3] Mahendra, D. A., Tugiyanti, E., dan Susanti, E. 2022. "Pengaruh pemberian feed additive dalam pakan sebagai pengganti antibiotik terhadap persentase karkas bagian dada dan paha ayam broiler". *Journal of Animal Science and Technology*. 4(1):61–71.

[4] Amend, A., Burgaud, G., Cunliffe, M., Edgcomb, V. P., Ettinger, C. L., Gutiérrez, M. H., Heitman, J., Hom, E. F. Y., Ianiri, G., Jones, A. C., Kagami, M., Picard, K. T., Quandt, C. A., Raghukumar, S., Riquelme, M., Stajich, J., Vargas-Muñiz, J., Walker, A. K., Yarden, O., and Gladfelter, A. S. 2019. "Fungi in the marine environment: open questions and unsolved problems". *MBio*. 10(2):1–15.

[5] Shin, H. J. 2020. "Natural products from marine fungi". *Marine Drugs*.18(5):230.

[6] Saputra, F., Wahjuningrum, D., Tarman, K., dan Effendi, I. 2016. "Pemanfaatan metabolit jamur laut Nodulisporium sp. KT29 untuk meningkatkan kinerja produksi budidaya udang vaname di laut". *Jurnal Ilmu Dan Teknologi Kelautan Tropis*. 8(2):747–756.

[7] Wahjuningrum, D., Hariati, S., Yuhana, M., Effendi, I., Citarasu, T., Utami, D. A. S., and Tarman, K. 2022. "Low dose of Nodulisporium sp. KT29 metabolite promotes production performance and innate immunity of Pacific white leg shrimp (Litopenaeus vannamei) against co-infection of white spot syndrome virus and vibrio harveyi". *Aquaculture International*. 30(5):2611–2628.

[8] Meena, D. K., Das, P., Kumar, S., Mandal, S. C., Prusty, A. K., Singh, S. K., Akhtar, M. S., Behera, B. K., Kumar, K., Pal, A. K., and Mukherjee, S. C. 2013. "Beta-glucan: an ideal immunostimulant in aquaculture (a review)". *Fish Physiology and Biochemistry*. 39(3):431–457.

[9] Varianti, N. I., Atmomarsono, U., dan Mahfudz, L. D. 2017. "Pengaruh pemberian pakan dengan sumber protein berbeda terhadap efisiensi penggunaan protein ayam lokal persilangan". *Agripet*. 17(1): 53–59.

[10] Steel, G. D dan Torrie, T. H. 1993. "Prinsip dan Prosedur Statistik: Suatu Pendekatan Biometric". Ed. 2, Cet. 3. P.T Gramedia Pustaka Utama Jakarta.

[11] Janssen, W. M. M. A. 1989. "European table of energy values for poultry feedstuffs. 3rd ed". Spelderholt center for poultry research and information services, Beekbergen, the Netherlands.

[12] Sejati, G. C. S., Arifin, H. D., dan Mudawaroch, R. E. 2019. "Produktivitas ayam kampung super (joper) pengaruh rasio lisin dan metionin". *Jurnal RISET Agribisnis dan Peternakan*. 4(1):43–51.

[13] Munira, S., Nafiu, L. O., dan Tasse, A. M. 2016. "Performans ayam kampung super pada pakan yang disubttusi dedak padi fermentasi dengan fermentor berbeda". *JITRO*. 3(2):21–29.

[14] Mahardika, I. G., Kristina Dewi, G. A. M., Sumadi, I. K., dan Suasta, I. M. 2013. "Kebutuhan energi dan protein untuk hidup pokok dan pertumbuhan pada ayam kampung umur 10-20 minggu". *Majalah Ilmiah Peternakan*. 16(1):6–11.

[15] Nurhayati. 2010. "Pengaruh penggunaan tepung buah mengkudu terhadap bobot organ pencernaan ayam pedaging". *Jurnal Agripet*. 10(2):40–44. https://doi.org/10.17969/agripet.v10i2.643

[16] Sejati, G. C. S., Arifin, H. D., dan Mudawaroch, R. E. 2019. "Produktivitas ayam kampung super (joper) pengaruh rasio lisin dan metionin". *Jurnal RISET Agribisnis dan Peternakan*. 4(1):43–51.

[17] Ariesta, A. H., Mahardika, I. G., dan Dewi, G. A. M. K. 2015. "Pengaruh level energi dan protein ransum terhadap penampilan ayam kampung umur 0-10 minggu". *Majalah Ilmiah Peternakan*. 18(3):89–94.

[18] Pratiwi, H., Atmomarsono, U., dan Sunarti, D. 2017. "Pengaruh pemberian pakan dengan sumber protein berbeda terhadap persentase potongan karkas dan massa protein daging ayam lokal persilangan". *Jurnal Peternakan Indonesia*. 19(1):23–29.

[19] Kompiang, I. P., Supriyati, Togatorop, M. H., dan Jarmani, S. N. 2001. "Kinerja ayam kampung dengan sistem pemberian pakan secara memilih dengan bebas". *Jurnal Ilmu Ternak Dan Veteriner*. 6(2):94–101.

[20] Sari, K. A., Sukamto, B., dan Dwiloka, B. 2014. "Efisiensi penggunaan protein pada ayam broiler dengan pemberian pakan mengandung tepung daun kayambang (Salvinia molesta)". *Jurnal Agripet*. 14(2): 76–83.