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Original Article

Potential of meniran extract (*Phyllanthus niruri* Linn) on the economic value of feed and income over feed cost in Texel sheep

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ABSTRACT

This research was conducted to determine the potency of meniran extract (*Phyllanthus niruri* Linn) on economic value of feed and income over feed cost of Texel sheep. This research type was an observational study and data used was secondary data which consisted of 4 treatments. The research was conducted using completely randomized design by divided 24 Texel sheeps into 4 treatments, each treatment consisted of 6 repetitions. The treatment groups consisted of: P0 (sheeps were given CMC-Na 0,5% solution), P1 (given meniran extracts at 5% concentration), P2 (given meniran extracts at 10% concentration) and P3 (given meniran extracts at 20% concentration). Administration of treatment between groups using a syringe (20 ml). The data were analyzed statistically using the Analysis of Variance (ANOVA) and continued with Duncan's test. The economic value of feed is obtained from the feed conversion value multiplied by the feed price, where the feed conversion is obtained from the ratio between the amount of feed consumption and body weight gain. The income over feed cost obtained through the difference between income and total feed costs, where the total feed price is obtained from the cost of Texel sheep feed plus the cost of meniran extract (*Phyllanthus niruri* Linn). P1 with meniran extract 5% gives the best result. It can be conclude that the addition of 5% meniran extract could reduce the economic value of feed and increase income over feed costs on Texel sheeps.

Keywords: Feed economic value, income over feed cost, meniran extract, Texel sheeps

Introduction

Texel sheep are livestock that produce meat as a source of animal protein. Texel sheep farming has the potential to be used as a source of income, considering that the products produced have quite high economic value. Not only meat but also other products such as skin, wool, offal, and sheep manure have economic value (Kuntjoro and Astirin, 2010). The highest component of livestock farming is feed costs, so efforts are needed to reduce feed costs (Martins *et al*., 2016).

Feed efficiency is an important parameter in Texel sheep farming. The level of feed efficiency can be seen from the feed conversion (Muharlien *et al*., 2020). The calculation of feed conversion is obtained from the comparison between the amount of feed consumption and body weight gain during the

maintenance period. Low feed conversion indicates good feed efficiency while high feed conversion indicates poor feed efficiency (Mulatu *et al*., 2019). Feed efficiency affects the economic value of feed. The more efficient the use of feed, the lower the economic value of feed because the amount of feed consumed by livestock is less (Anahamu *et al*., 2018). The economic value of feed can be obtained by the feed conversion formula multiplied by the price of feed per kg during the production period (Abdel-Hafeez *et al*., 2017).

Income over feed cost is an economic analysis used to determine the profit in a livestock business. The calculation of income over feed cost can be done using the formula of income minus feed costs during the production period (Zulfan *et al*., 2021). Income over feed cost is influenced by several factors, including weight gain, livestock selling price, feed consumption, and feed price (Setyaningrum *et al*., 2014). The selling price of Texel sheep is fluctuating; this is influenced by supply and demand. If supply is high while demand remains constant, the selling price of livestock tends to fall and if supply is low while demand remains constant, the selling price of livestock tends to rise (Purwaningsih *et al*., 2018). The income of livestock farmers is greatly influenced by livestock productivity. Income will affect the value of Income over feed cost (Hidayatullah *et al*., 2019). Efforts to increase livestock productivity can be done by using feed additives. Feed additives are additional feed ingredients given to livestock (Mulatu *et al*, 2019). The addition of feed additives aims to improve livestock health and stimulate livestock growth to be more optimal (Alagawany *et al*., 2019). The addition of feed additives can also reduce feed costs where feed costs can be minimized so as to increase the efficiency of feed use. One of the feed additives that comes from natural ingredients can come from plants called phytogenic. The use of phytogenic feed additives has begun to be widely developed, one of which is meniran (*Phyllanthus niruri* Linn) (Tayo *et al*., 2022). Meniran (*Phyllanthus niruri* Linn) contains bioactive compounds including flavonoids, saponins, terpenoids, alkaloids, and tannins (Hidanah *et al*., 2022). Flavonoids in meniran act as immunomodulators that can restore and repair a disturbed immune system and suppress excessive function, so that the body's resistance is maintained (Sabdoningrum *et al*., 2020). Saponins in meniran can accelerate growth and increase feed efficiency. Saponins work by increasing the diameter of the villi and the permeability of the intestinal cell walls, thus affecting the absorption of nutrients from feed (Chaudhary *et al*., 2018). Phytochemical compounds in the meniran plant (*Phyllanthus niruri* Linn) can act as a supporter of livestock productivity and health. Healthy livestock and optimal absorption of feed nutrients can reduce the conversion of livestock feed which will later affect the income of farmers. Based on the description above, a study was conducted on the potential of meniran extract (*Phyllanthus niruri* Linn) on the economic value of feed and income over feed cost in Texel sheep.

Materials and methods

Research design

This research was conducted from October to December 2022. Treatment of Texel sheep to see feed consumption and weight gain of Texel sheep was conducted at Panji Farm, Jalan Siwalanpanji no 38, Buduran District, Sidoarjo Regency. The manufacture of meniran extract (*Phyllanthus niruri* Linn) was carried out at the Pharmacology Laboratory of the Division of Basic Veterinary Medicine, Faculty of Veterinary Medicine, Airlangga University, Surabaya.

This study is in the form of secondary data obtained from previous research by Karimah, (2023). The secondary data used include feed consumption, body weight gain, and feed conversion of Texel sheep using 24 male Texel sheep aged 9 months with an initial body weight of 15-17 kg as experimental animals using 4 treatments with 6 replications.

The research was conducted using completely randomized design by divided 24 Texel sheeps into 4 treatments, each treatment consisted of 6 repetitions. The treatment groups

consisted of: P0 (sheeps were given CMC-Na 0,5% solution), P1 (given meniran extracts at 5% concentration), P2 (given meniran extracts at 10% concentration) and P3 (given meniran extracts at 20% concentration).

Preparation and treatment of meniran extract (Phyllanthus niruri Linn) in Texel sheep

The preparation and treatment of meniran extract (*Phyllanthus niruri* Linn) on Texel sheep has been carried out in previous research by Karimah (2023).

Economic value of feed

The economic value of feed according to Abdel-Hafeez *et al.* (2017) can be calculated using the formula:

Economic value of feed = Feed conversion x Feed price per kg.

$$Feed\ conversion = \frac{\Sigma\ Feed\ consumption}{Weight\ gain}$$

Feed consumption = Σ Total feed during maintenance – Σ Remaining feed

Body weight gain = Final body weight – Initial body weight

Feed consumption data were calculated for each experimental unit for 14 days. Feed in one experimental unit was calculated from the amount of feed in one experimental unit divided by the number of Texel sheep in one experimental unit. Body weight gain data during treatment was calculated from the difference between the final body weight and the initial body weight in each experimental unit for 14 days. Body weight gain in one experimental unit was calculated from the body weight in one experimental unit divided by the number of Texel sheep in one experimental unit.

Income over feed cost

Income over feed cost according to Zulfan *et al.* (2021) can be calculated using the formula:

Income over feed cost = Income (Rp) - Total feed cost (Rp)

Income = Weight gain (kg) x Selling price of livestock per kg (Rp)

Total feed cost = Feed consumption (kg) x Feed price per kg (Rp)

Feed consumption = Σ Total feed during maintenance – Σ Remaining feed

Income is calculated from body weight multiplied by the selling price of Texel sheep per kg, while the total feed cost is obtained from the sum of the feed cost of Texel sheep with the cost of meniran extract. The calculation of the cost of sheep feed is calculated from the result of multiplying the amount of feed consumption by the price of sheep feed per kg, while meniran extract is calculated from the result of multiplying the amount of meniran extract consumption by the price of meniran extract per gram.

Data analysis

The research data results are arranged in a table presented in the form of averages and standard deviations using the SPSS version 25 computer program. The data analysis for this research used Analysis of Variance (ANOVA) followed by the Duncan test to determine whether there were any significant differences in each treatment.

Result

Economic value of feed

The economic value of feed given meniran extract (*Phyllanthus niruri* Linn) showed a significant difference in all treatments ($p<0.05$). The average and standard deviation of the economic value of feed in Texel sheep given meniran extract (*Phyllanthus niruri* Linn) are shown in table 1.

Table 1. Average and standard deviation of economic value of texel sheep feed in each treatment

Treatment	Economic Value of Feed (Rp) ± Standard Deviation
P0	$6,031.17^{a}$ ± 628.899
P1	$10,418.67^{b}$ ± 310.894
P2	$15,756.57^{c}$ ± 1,024.561
P3	$28,218.33^{d}$ ± 8,530.395

Note: Different superscripts in the same column indicate a significant difference ($p<0.05$).

Income over feed cost

The calculation results of income over feed cost given meniran extract (*Phyllanthus niruri* Linn) showed that P0 was significantly different from P1 and P3 ($p<0.05$) but not significantly different from P2 ($p>0.05$). P1 was significantly different from P0 and P3 ($p<0.05$) but not significantly different from P2 ($p>0.05$). P2 was significantly different from P3 ($p<0.05$) but not significantly different from P0 and P1 ($p>0.05$). P3 was significantly different from P0, P1, and P2 ($p<0.05$). The average and standard deviation of income over feed cost in Texel sheep given meniran extract (*Phyllanthus niruri* Linn) are shown in table 2.

Table 2. Average and standard deviation of income over feed cost of texel sheep in each treatment

Treatment	Income Over Feed Cost (Rp) ± Standard Deviation
P0	$634,716.50^{b} \pm 96,739.690$
P1	$715,256.67^{c} \pm 38,091.745$
P2	$668,152.33^{bc} \pm 60,099.911$
P3	$532,097.50^{a} \pm 33,229.840$

Note: Different superscripts in the same column indicate a significant difference ($p<0.05$).

Discussion

Economic value of feed

Based on the research results in table 1, the average economic value of feed at P0 = IDR 6,031.17/head; P1 = IDR 10,418.67/head; P2 = IDR 15,756.67/head; and P3 = 28,218.33/head. The economic value of feed is obtained from the feed conversion value multiplied by the feed price per kg, where the feed conversion is obtained from the comparison between the amount of feed consumption and body weight gain (Yulianti *et al*., 2014; Shah *et al*., 2019). The calculation of the economic value of feed in this study was obtained from the total feed consumption multiplied by the feed price per kg added to the consumption of meniran extract multiplied by the price of meniran extract per gram then divided by the body weight of Texel sheep.

The results of the study in table 1 show that the results of administering 5% meniran extract (*Phyllanthus niruri* Linn) resulted in a lower economic value of feed than the treatments with concentrations of 10% and 20%. At P0, namely without administering meniran extract (*Phyllanthus niruri* Linn), it had the lowest economic value of feed, but had a lower body weight gain rate than P1, P2, and P3 and had a lower income over feed cost value than P1 with the administration of 5% meniran extract (*Phyllanthus niruri* Linn). Good economic value of feed is a low economic value of feed, in accordance with the statement of Zampiga *et al*. (2021) that the economic value of feed is considered good if the figure obtained is as low as possible, which means that in terms of economy the use of feed is more efficient and profitable because the amount of feed consumed by livestock is less and the increase in body weight is higher.

Feed efficiency is a key factor in achieving economic profitability. The lower the economic value of feed, the more efficient the use of feed (Omasaki *et al*., 2017). The better the feed efficiency, the lower the feed conversion. Feed conversion is a measure of how well livestock convert feed consumption into body weight. According to Seabury *et al*. (2017) the smaller the feed conversion value is proportional to the low economic value of feed, thus indicating good feed efficiency. In conditions of constant feed prices, the smaller the feed conversion, the better the economic value of feed (Abdel-Hafeez *et al*., 2017).

The provision of herbal plants as feed additives can increase the efficiency of feed use (Alagawany *et al*., 2019). The addition of feed additives aims to improve livestock health and stimulate livestock growth to be more optimal (Alagawany *et al*., 2019). Meniran (*Phyllanthus niruri* Linn) is used as a feed additive containing phytochemical compounds. The content of phytochemical compounds in meniran (*Phyllanthus niruri* Linn) includes flavonoids, saponins, terpenoids, alkaloids, and tannins (Hidanah *et al*., 2022). Flavonoid content can increase the permeability of the intestinal mucosa so that the absorption of

nutrients from feed is maximized (Hidanah *et al*., 2022). Flavonoids in meniran can also act as a neutralizer of free radicals formed in the body by stimulating genes so that antioxidant enzyme synthesis occurs (Sabdoningrum *et al*., 2020). Saponin compounds play a role in nutrient absorption for livestock weight gain. This is because saponins play a role in the digestive process by increasing the permeability of cell walls in the intestine and absorption of nutrients (Cao *et al*., 2024).

Phyllanthus niruri Linn extract given during treatment affects palatability so that it can increase feed consumption of Texel sheep. The high and low value of feed consumption in livestock is influenced by palatability (Wulandari *et al*., 2014). Therefore, increasing feed consumption can increase feed costs so that it affects the economic value of feed.

Income over feed cost

Based on the research results in table 2, the average income over feed cost was obtained at P0 = IDR 634,716.50/head; P1 = IDR 715,256.67/head; P2 = IDR 668,152.33/head; and P3 = IDR 532,097.50/head. Income over feed cost is obtained through the difference between income and total feed costs (Zulfan *et al*., 2021).

The results of the study in table 2 show that in the P1 treatment with the administration of meniran extract (*Phyllanthus niruri* Linn) at a concentration of 5% produced the highest income over feed cost among other feed treatments. Income over feed cost is considered good if high income is obtained but is balanced with low feed costs so that a large difference is obtained (Zulfan *et al*., 2021).

The high and low income is influenced by the increase in body weight and the selling price of Texel sheep. High livestock body weight is achieved when livestock production results are optimal (Al-Sagan *et al*., 2020). The flavonoid content in meniran is efficacious as an immunomodulator. Immunomodulatory activity plays a role in increasing the immune system and suppressing excessive immune system reactions. According to research by Hidanah *et al*. (2018), administration of meniran extract can affect non-specific immune responses through increased phagocytosis, macrophage chemotaxis, neutrophil chemotaxis, and complement activation and affect specific immune responses through increased T lymphocyte proliferation, secretion of TNFα, IFNγ, and IL-4, and decreased IL-2 and IL-10. Immunomodulators cause increased immune cell performance so that immunity will increase and livestock can produce optimally, so that with high production, the income obtained by farmers increases.

Flavonoid content also shows inhibitory activity against a number of α-amylase enzymes produced from saliva and pancreas which play an important role in breaking down complex carbohydrates into simpler molecules. Inhibition of the α-amylase enzyme can delay and prolong the digestion time of carbohydrates (De Sales *et al*., 2012). This causes livestock to become full quickly and not easily hungry for a relatively longer time so that it can reduce feed costs and increase income over feed costs obtained by farmers.

Conclusion

The results of this study can be concluded that the administration of meniran extract (*Phyllanthus niruri* Linn) reduces the economic value of feed in Texel sheep at a concentration of 5% and increases income over feed cost in Texel sheep at a concentration of 5%.

References

Abdel-Hafeez HM, Saleh ESE, Tawfeek SS, Youssef IMI, Abdel-Daim ASA. Effects of Probiotic, Prebiotic, and Synbiotic with and without Feed Restriction on Performance, Hematological Indices and Carcass Characteristics of Broiler Chickens. Asian-Australas. J. Anim. Sci. 2017; 30(5): 672–682.

Al-Sagan AA, Khalil S, Hussein EOS, A Attia Y. Effects of Fennel Seed Powder Supplementation on Growth Performance, Carcass Characteristics,

Meat Quality, and Economic Efficiency of Broilers under Thermoneutral and Chronic Heat Stress Conditions. Animals (Basel). 2020; 10(2): 206.

Alagawany M, Elnesr SS, Farag MR, Abd El-Hack ME, Khafaga AF, Taha AE, Tiwari R, Yatoo MI, Bhatt P, Marappan G, Dhama K. Use of Licorice (*Glycyrrhiza glabra*) Herb as a Feed Additive in Poultry: Current Knowledge and Prospects. Animals (Basel). 2019; 9(8): 536.

Anahamu YM, Yulianti DL, Hadiyani DPPA. Pengaruh Level Feed Additive Tepung Daun Sambiloto (*Andrographis paniculeta*) terhadap Nilai Ekonomis Pakan dan Income Over Feed Cost Itik Mojosari. J. Sains Peternakan. 2018; 6(2): 42–49.

Cao S, Liu M, Han Y, Li S, Zhu X, Li D, Shi Y, Liu B. Effects of Saponins on Lipid Metabolism: The Gut–Liver Axis Plays a Key Role. Nutrients. 2024; 16(10): 1514.

Chaudhary SK, Rokade JJ, Aderao GN, Singh A, Gopi M, Mishra A, Raje K. Saponin in Poultry and Monogastric Animals: A Review. Int. J. Curr. Microbiol. Appl. Sci. 2018; 7(7), 3218–3225.

De Sales PM, De Souza PM, Simeoni LA, Magalhaes PO, Silveira D. A-Amylase Inhibitors: A Review of Raw Material and Isolated Compounds from Plant Source. J. Pharm. Pharm. Sci. 2012; 15(1): 141–183.

Hidanah S, Sabdoningrum EK, Rachmawati K, Soeharsono S, Trika GGA, Huda MA, Widiati TP. The activity of Meniran (*Phyllanthus niruri* Linn.) extract on *Salmonella pullorum* infected broilers. Vet. World. 2022; 15(5): 1373–1382.

Hidanah S, Sabdoningrum EK, Wahjuni RS, Chusniati S. Effects of meniran (*Phyllanthus niruri* L.) administration on leukocyte profile of broiler chickens infected with *Mycoplasma gallisepticum*. Vet. World. 2018; 11(6): 834–839.

Hidayatullah D, Fenita Y, Sulistiyowati E. Efek Penggunaan Tepung Limbah Biji Durian Fermentasi dalam Ransum Ayam Broiler terhadap Performans dan Income Over Feed Cost (IOFC) Ayam Broiler. J. Penelitian Pengelolaan Sumber Daya Alam Lingkungan. 2019; 8(1): 113–121.

Karimah RIF. Potensi Ekstrak Meniran (*Phyllanthus niruri* Linn) Terhadap Konsumsi Pakan, Pertambahan Bobot Badan, dan Konversi Pakan Domba Texel. Fakultas Kedokteran Hewan. Universitas Airlangga Surabaya. 2023.

Kuntjoro A, Astirin OP. Bobot Badan dan Statistik Vital Domba Texel di Kabupaten Wonosobo dengan Pemberian Limbah Rami sebagai Pakan Tambahan. Bioteknologi. 2010; 6(1): 29–39.

Martins JMS, Carvalho CMC, Litz FH, Silveira MM, Moraes CA, Silva MCA, Fagundes NS, Fernandes EA. 2016. Productive and Economic Performance of Broiler Chickens Subjected to Different Nutritional Plans. Braz. J. Poult. Sci. 2016; 18(2): 209–216.

Muharlien, Sudjarwo E, Yulianti DL, Hamiyanti AA, Prayogi HS. Comparative Production Performance of Broiler Under Opened House and Close House System. J. Ilmu-Ilmu Peternakan. 2020; 30 (1): 86–91.

Mulatu K, Ameha N, Girma M. Effects of Feeding Different Levels of Baker's Yeast on Performance and Hematological Parameters in Broiler Chickens. J. World Poult. Res. 2019; 9(2): 38–49.

Omasaki SK, Janssen K, Besson M, Komen H. Economic Values of Growth Rate, Feed Intake, Feed Conversion Ratio, Mortality and Uniformity for Nile Tilapia. Aquaculture. 2017; 481(1): 124–132.

Purwaningsih R, Arief M, Handayani NU, Rahmawati D, Mustikasari A. Market Risk Assessment on Poultry Industry Using Monte Carlo Simulation. Mater.

Sci. Eng. 2018; 403: 012044.

Sabdoningrum EK, Hidanah S, Ansori ANM, Fadholly A. Immunomodulatory and antioxidant activities of *Phyllanthus niruri* l. Extract against the laying hens infected by *Escherichia coli*. Res. J. Pharm. Technol. 2020; 13(5): 2246–2250.

Seabury CM, Oldeschulte DL, Saatchi M, Beever JE, Decker JE, Halley YA, Bhattarai EK, Molaei M, Freetly HC, Hansen SL, Yampara-Iquise H, Johnson KA, Kerley MS, Kim J, Loy DD, Marques E, Neibergs HL, Schnabel RD, Shike DW, Spangler ML, Weaber RL, Garrick DJ, Taylor JF. Genome-wide association study for feed efficiency and growth traits in U.S. beef cattle. BMC Genomics. 2017; 18(1): 386.

Setyaningrum F, Handayani M, Setiadi A. Income Over Feed Cost Pemeliharaan Ayam Broiler Betina dengan Ransum Mengandung Tepung S. molesta. Anim. Agric. J. 2014; 3(2): 172–178.

Shah TM, Patel JG, Gohil TP, Blake DP, Joshi CG. Host transcriptome and microbiome interaction modulates physiology of full-sibs broilers with divergent feed conversion ratio. NPJ Biofilms Microbiomes. 2019; 5(1): 24.

Tayo GO, Olufayo OO, Olumide MD, Akintunde AO. Growth and haematological parameters of Isa-brown pullets fed *Phyllanthus niruri* leaf meal as additive at the chick phase. Nig. J. Anim. Prod. 2022; 49(2): 130–139.

Wulandari S, Agus A, Soejono M, Cahyanto MN, Utomo R. Performa Produksi Domba yang Diberi Complete Feed Fermentasi Berbasis Pod Kakao Serta Nilai Nutrien Tercernanya Secara in Vivo. Buletin Peternakan. 2014; 38(1), 42.

Yulianti DL, Leondro H, Mole YP. Penggunaan Fermentasi Ekstrak Ramuan Herbal terhadap Income Over Feed Cost (IOFC) dan Nilai Ekonomis Pakan pada Pemeliharaan Ayam Broiler. Agrisains. 2014; 15(2): 8794.

Zampiga M, Calini F, Sirri F. Importance of Feed Efficiency for Sustainable Intensification of Chicken Meat Production: Implications and Role for Amino Acids, Feed Enzymes and Organic Trace Minerals. World's Poult. Sci. J. 2021; 77(3): 639–659.

Zulfan, Zulfikar, Latif H, Allaily, Nazarullah T, Shaleha R. Effects of Using Fermented Moringa (*Moringa oleifera*) Leaf Meal and Yellow Corn in the Diets on the Performances and Income Over Feed Cost of Broiler Chickens. J. Agripet. 2021; 21(1): 84–91.