2026 SCIENCELINE

Online Journal of Animal and Feed Research

Volume 16, Issue 3: 140-144; May 30, 2026

ISSN 2228-7701

DOI: https://dx.doi.org/10.51227/ojafr.2026.17

GROWTH PERFORMANCE OF NATIVE CHICKENS FED DIETS CONTAINING FERMENTED PUTAK (*Corypha gebanga*)

Theresia Nur Indah KONI[1], Tri Anggarini Yuniwati FOENAY[1], Eni ROHYATI[1], and Asri Apriana WIDU[2]

[1]*Department of Animal Science, Politeknik Pertanian Negeri Kupang, Kupang 85011, East Nusa Tenggara, Indonesia*

[2]*Department of Animal Science, Faculty of Animal Science, Marine, and Fisheries Sciences Universitas Nusa Cendana, Kupang 85011, East Nusa Tenggara, Indonesia*

Email: Indahkoni@gmail.com

Supporting Information

RESEARCH ARTICLE
PII: S222877012600017-16
Received: October 31, 2025
Revised: May 19, 2026
Accepted: May 21, 2026

ABSTRACT: Putak, a potential feed ingredient obtained from the inner pith of the gebang palm (*Corypha gebanga*), is traditionally used on Timor Island, Indonesia. However, its low crude protein content and high fibre level restrict its inclusion in poultry diets. Previous studies have indicated that fermentation with 10% palmyra sap for six days enhances the crude protein content of putak. This study evaluated the effects of graded dietary inclusion levels of fermented putak on the growth performance of native chickens during the starter phase. A completely randomized design was applied with four dietary treatments and five replications (7 birds per replicate): 0% (P0), 10% (P1), 20% (P2), and 30% (P3) fermented putak inclusion in the diet. Increasing levels of fermented putak significantly affected feed conversion ratio (FCR; $P < 0.05$) but did not significantly influence feed intake or body weight gain ($P > 0.05$). The FCR of birds fed the control diet did not differ significantly from that of birds fed diets containing 10% fermented putak, whereas poorer FCR values were significantly observed at inclusion levels of 20%. In conclusion, fermented putak can be included at levels of up to 10% in the diets of native chickens during the starter phase without adverse effects on feed efficiency. Future studies should aim to optimize the inclusion level of fermented putak beyond 10% by improving its nutritional quality, particularly through enhanced fermentation techniques or the use of feed additives such as enzymes. Research should also investigate its long-term effects across different growth phases of native chickens, as well as its impact on carcass characteristics and overall health.

Keywords: Feed efficiency, Gebang palm, Growth performance, Native chickens, Palmyra sap.

INTRODUCTION

In rural livestock systems, the utilization of locally available feed resources plays a crucial role in reducing production costs and enhancing sustainability. One such traditional feedstuff in East Nusa Tenggara, Indonesia, is putak. Putak is derived from the pith (central portion) of the trunk of the gebang palm (*Corypha gebanga*) and has been traditionally used as an energy source in livestock diets, particularly for pigs and ruminants (Ginting-Moenthe et al., 2004). The nutritional composition of putak varies among studies but consistently indicates a high carbohydrate content accompanied by low protein levels. For example, per 100 g of putak flour, it provides approximately 351.55 kcal of energy and 85.40 g of carbohydrates, but only 0.36–2.3% crude protein and 0.09 g crude fat (Lalel and Rubak, 2024; Lalel et al., 2024)

Furthermore, its relatively high crude fibre content, which may reach up to 16% (Fuah and Pattie, 2013), constitutes a major limitation to its utilization in monogastric animal diets. Due to these nutritional constraints, the inclusion level of putak in poultry diets is generally restricted. Nevertheless, previous studies have reported that putak can be used as a partial substitute for maize at inclusion levels of up to 20% (Nalle et al., 2017). Fermentation has been proposed as an effective processing strategy to improve the nutritional quality of low-protein, high-fibre feed resources. Previous studies have demonstrated that fermentation can increase crude protein content, reduce crude fibre, and improve feed digestibility (Lateef et al., 2008; Samadi et al., 2015). The effectiveness of fermentation is strongly influenced by the use of additives that serve as both nutrient sources and microbial inoculants. Palmyra sap (*Borassus flabellifer*), a sugar-rich liquid tapped from the male inflorescence of the palmyra palm, represents a potential additive for this purpose (Das and Tamang, 2021).

Palmyra sap contains approximately 77.81 g total sugars per 100 g, mainly sucrose (65.26 g), fructose (6.64 g), and glucose (5.91 g) (Le et al., 2021). Following tapping, the sap undergoes spontaneous fermentation mediated by naturally occurring microorganisms, including *Saccharomyces cerevisiae*, *Leuconostoc mesenteroides*, *Acetobacter*, and *Gluconobacter* species (Sornsenee et al., 2021; Lalel et al., 2024). These microorganisms have been associated with improvements in the nutritional quality of fermented feed materials. In line with this, Koni et al. (2023) reported that the inclusion of 2% urea and 10% palmyra sap during rice bran fermentation increased crude protein content from 8.69% to 10.58% and reduced crude fibre content from 29.43% to 24.59%.

Citation: Koni TNI, Foenay TAY, Rohyati E, and Widu AA (2026). Growth performance of native chickens fed diets containing fermented putak (*Corypha gebanga*). *Online J. Anim. Feed Res.*, 16(3): 140-144. DOI: https://dx.doi.org/10.51227/ojafr.2026.17

Recent studies have shown that fermenting putak with 10% palmyra sap for six days significantly increases crude protein content, mineral availability, and lactic acid concentration, while reducing pH and ammonia levels (Koni et al., 2025). These improvements indicate that fermentation may enhance the suitability of putak for poultry diets. Therefore, the objective of this study was to evaluate the effects of graded dietary inclusion levels of putak fermented with palmyra sap on the growth performance of KUB chickens (Kampung Unggul Balitbangtan) during the starter phase.

MATERIALS AND METHODS

Ethical approval

This research was conducted following the poultry rearing regulations outlined in the Regulation of the Minister of Agriculture of the Republic of Indonesia, Number 31/Permentan/OT.140/2/2014. Nutritional requirements for the diets were based on the Indonesian National Standard for Native Chickens (SNI 7783.2:2022) (National Standardization Agency of Indonesia, 2022)

Experimental site and animals

This research was conducted using 140 day-old KUB chickens, obtained from PT. Mekar Jaya Unggas, Indonesia. The experiment lasted for 35 days during the starter phase. The birds were reared in individual pens (80 × 70 × 70 cm) in a semi-open housing system with controlled lighting and ventilation. Each pen was equipped with a 25-watt bulb, feeder, and drinker.

Materials

The main feed ingredient tested was fermented putak (the inner pith of *Corypha gebanga* palm). Other materials used included yellow maize, commercial layer concentrate (K204 Premium), pollard, palm oil, topmix (vitamin-mineral premix), salt, and water. Additives included palmyra sap (*Borassus flabellifer*), and rice husks for bedding.

Fermentation procedure

The fermentation procedure followed the methods described by Koni et al. (2025). Fresh putak was sun-dried for two days, ground into flour, and analyzed for dry matter (DM) content, which was 91.69% DM (8.31% moisture). Fermentation was carried out by mixing putak flour with 10% palmyra sap on a DM basis, and the moisture content of the final mixture was adjusted to 35%. For a 71-kg batch of material (65% DM; 46.15 kg DM), the mixture consisted of 50.33 kg putak, 4615 mL palmyra sap, and 16.05 L of water. The mixture was thoroughly homogenized, compacted into plastic bags, sealed airtight using adhesive tape, and stored away from direct sunlight for six days under anaerobic conditions. After fermentation, the material was air-dried and subsequently used for diet formulation.

Feed formulation

Four diets were formulated with varying inclusion levels of fermented putak (0%, 10%, 20%, and 30%) as shown in Table 1.

Table 1 - Formulation and composition of treatment feed nutrients

Ingredient \ Dietary treatment (%)	PF0	PF10	PF20	PF30
Fermented putak	0.00	10.0	20.0	30.0
Yellow maize	41.0	33.5	26.0	18.5
Layer concentrate (K204)	37.0	37.0	37.0	37.0
Vegetable oil	2.00	2.00	2.00	2.00
Vitamin-mineral premix	0.50	0.50	0.50	0.50
Pollard	19.3	16.8	14.3	11.8
Salt	0.30	0.30	0.30	0.30
Total	100	100	100	100
Nutrient component (calculate value)				
Dry matter (%)	88.2	87.7	87.3	86.8
Crude protein (%)	18.2	17.7	17.1	16.6
Crude fat (%)	6.86	6.20	5.54	4.88
Crude fiber (%)	8.38	8.09	7.80	7.51
Calcium (%)	3.34	3.37	3.41	3.44
Phosphorus (%)	0.31	0.29	0.27	0.24
Metabolizable energy (kcal/kg)	3166.6	3189.4	3212.2	3234.9
Feed cost (IDR/kg)	8000.5	7663	7325.5	6988

PF0: Control feed without fermented putak; PF10: Feed with 10% fermented putak; PF20: Feed with 20% fermented putak; PF30: Feed with 30% fermented putak

Experimental design

The study employed a completely randomized design (CRD) with a single factor consisting of four treatments and five replicates per treatment. Each replicate contained seven chickens, totaling 140 birds. The four treatments were: PF0: Control feed without fermented putak, PF10: Feed with 10% fermented putak, PF20: Feed with 20% fermented putak, PF30: Feed with 30% fermented putak.

Data analysis

Data on feed consumption, body weight gain, and feed conversion ratio were subjected to analysis of variance (ANOVA). If significant differences were detected (P < 0.05), means were further compared using Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Feed consumption

The effects of graded inclusion levels of fermented putak on feed intake are presented in Table 2. The results showed that increasing levels of fermented putak (0–30%) did not significantly affect (P > 0.05) weekly feed intake of chickens. The similar feed intake observed across treatments indicates that diet palatability remained acceptable at all inclusion levels. This comparable feed intake may be attributed to the relatively similar nutrient composition of the experimental diets, particularly their metabolizable energy contents, which ranged from 3166.64 to 3234.91 kcal/kg (Table 1). These findings are consistent with those of Ferket and Gernat (2006), who reported that dietary energy level plays a major role in regulating feed intake in poultry. Similarly, Gao et al. (2025) stated that dietary energy content is one of the key factors influencing feed consumption in chickens. The present results are also in agreement with Nalle et al. (2017), who observed no significant differences (P > 0.05) in feed intake of broiler chickens fed putak meal at inclusion levels ranging from 50 to 200 g/kg. In addition, Ginting-Moenthe et al. (2004) reported no differences in feed intake of pigs fed diets containing up to 20% fermented putak.

The average feed intake of native chickens reared for six weeks in this study was 202.13 g/bird/week. This value was within the range of feed consumption reported for KUB chickens fed diets containing 16 to 20% crude protein, which ranged from 202.75 to 222.50 g/bird/week (Sinurat et al., 2022). However, the feed intake observed in the present study was lower than that reported in native chickens fed fermented banana peel supplemented with palmyra sap, where feed intake ranged from 215.82 to 250.98 g/bird/week (Koni et al., 2026). Differences in feed intake among studies may be influenced by variations in feed composition, nutrient content, palatability, and the physiological response of chickens to the dietary treatments provided

Table 2 - Effect of fermented putak (%) on feed intake, weight gain, FCR and final weight of KUB chicken

Parameters \ Dietary treatment (%)	PF0	PF10	PF20	PF30	SEM	P-value
Initial weight (g)	40.5	40.9	40.4	40.6	0.15	0.519
Feed intake (g/bird/week)	196	202	200	211	3.84	0.554
Weight gain (g/bird/week)	66.7	67.7	59.9	61.6	1.34	0.094
Feed conversion ratio	2.99[b]	3.12[b]	3.57[a]	3.89[a]	0.09	0.001
Final weight (g)	320	328	299	306	6.54	0.329

PF0: Control feed without fermented putak; PF10: Feed with 10% fermented putak; PF20: Feed with 20% fermented putak; PF30: Feed with 30% fermented putak. [a,b,] means in the same row without a common letter are different at p<0.05; SEM: Standard error of the mean; p: probability

Body weight gain

Although there were no significant differences (P > 0.05) in body weight gain among treatments, numerically higher gains were observed in birds fed 0% and 10% fermented putak (66.70 and 67.71 g/bird/week, respectively) compared to those fed 20% and 30% inclusion levels (59.89 and 61.58 g/bird/week). The average body weight gain in this study was 63.97 g/bird/week., The body weight gain observed in this study was lower than that reported by Saragih et al. (2024), who found that KUB chickens fed commercial diets achieved body weight gains ranging from 88.00 to 101.33 g/bird/week. However, the present result was higher than the findings of Sinurat et al. (2022), who reported average body weight gains of 49.38 to 56.50 g/bird/week in KUB chickens fed diets containing 16 to 20% crude protein. These differences may be related to variations in feed quality, nutrient composition, digestibility, and the efficiency of nutrient utilization by the chickens

Feed conversion ratio

The inclusion of fermented putak in the diet increased the feed conversion ratio (FCR). This was because feed intake did not correspond proportionally to body weight gain. Duncan's test showed that the 10% fermented putak treatment had a similar FCR to the control (PF0), while the 20% and 30% putak treatments had significantly higher FCR values (P < 0.05) compared to the 0-10% treatments. These results differ from Nalle et al. (2017), who reported no significant differences in FCR of broilers fed putak at levels of 0, 5, 10, 15, and 20%, with FCR values of 2.15, 2.18, 2.097, and 2.094, respectively.

Final body weight

The inclusion of fermented putak at different levels had no significant effect (P > 0.05) on the final body weight of six-week-old KUB chickens. The results of this study indicate that the use of fermented putak up to a level of 30% can maintain the final body weight of KUB chickens. The absence of significant differences in final body weight observed in this study is presumed to be due to the similar feed intake and weekly body weight gain among treatments during the experimental period. This is likely because the similar feed intake resulted in comparable nutrient absorption.

These findings are supported by Sugiharto et al. (2020), who stated that the amount of feed consumed influences the final body weight of KUB chickens. Prasetyo et al. (2021) also reported that feed quantity, feed quality, nutrient content, and feed intake level play important roles in determining the final body weight of KUB chickens. In the present study, the average final body weight at six weeks of age was 313.17 ± 26.78 g, which was lower than the final body weight reported in KUB chickens fed fermented sago waste diets, ranging from 401.6 to 455.5 g (Erwan et al., 2023). Differences in final body weight may be associated with variations in feed ingredients, nutrient digestibility, dietary energy and protein levels, as well as the growth response of chickens to different feeding treatments.

CONCLUSION

The inclusion of fermented putak up to 30% in the diets of indigenous chickens (KUB) during the starter phase did not significantly affect feed intake or body weight gain. However, higher inclusion levels (20–30%) significantly worsened feed conversion ratio, indicating reduced feed efficiency. The optimal inclusion level was found at 10%, which provided similar growth performance and feed efficiency to the control diet without fermented putak. Therefore, fermented putak can be used as an alternative energy source in poultry feed up to 10% without compromising performance. Further research should focus on increasing the allowable inclusion level of fermented putak beyond 10% by enhancing its nutritional value, particularly through improved fermentation methods or the incorporation of feed additives such as enzymes. Additionally, studies are needed to evaluate its long-term effects across various growth stages of native chickens, including its influence on carcass traits and overall health status.

DECLARATIONS

Corresponding author

Correspondence and requests for materials should be addressed to Theresia Nur Indah Koni; E-mail: indahkoni@gmail.com; ORCID: https://orcid.org/0000-0003-4668-7832

Authors' contribution

Theresia Nur Indah Koni contributed to creating the research idea, designing experiments, analyzing data, and writing this article; Tri Anggarini Yuniwati Foenay, and Eni Rohyati contributed data collection and corrected the article; Asri Apriana Widu helped with data analysis, and corrected the article.

Acknowledgements

The author expresses sincere gratitude to the Politeknik Pertanian Negeri Kupang for providing financial support and facilities for the completion of this study.

Data availability

The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request.

Funding

Politeknik Pertanian Negeri Kupang provided financial support through a research contract under the Applied Research Scheme and supported by PNBP of Politani Kupang for the 2025 fiscal year, under contract number: 03/P3M/SP DIPA-39.03.2.693484/2025.

Competing interests

The authors declare no competing interests in this research and publication.

REFERENCES

Das S and Tamang JP. (2021). Changes in microbial communities and their predictive functionalities during fermentation of toddy , an alcoholic beverage of India. Microbiological Research. 248: 1–13. https://doi.org/10.1016/j.micres.2021.126769.

Erwan E, Juliantoni J, Rizky A and Fati N. (2023). Performance of KUB chicken feed sapuring as substitution of commercial feed (Performa ayam kampung unggul balitbangtan (KUB) yang diberi sapuring sebagai substitusi ransum komersial). Journal of Livestock and Animal Health. 6(1): 51–56. https://doi.org/10.32530/jlah.v6i1.24.

Ferket P. and Gernat AG. (2006). Factors that affect feed intake of meat birds: a review. International Journal of Poultry Science. 5(10): 905–911. https://doi.org/10.3923/ijps.2006.905.911.

Fuah AM and Pattie WA. (2013). Productivity of local goats supplemented with Acacia villosa and Coripha gebanga. Media Peternakan. 36(1): 40–44. https://doi.org/10.5398/medpet.2013.36.1.40.

Gao Z, Zheng J and Xu G. (2025). Molecular mechanisms and regulatory factors governing feed utilization efficiency in laying hens: insights for sustainable poultry production and breeding optimization. International Journal of Molecular Science. 26(6389): 1–25. https://doi.org/10.3390/ijms26136389.

Ginting-Moenthe U, Chakeredza S and Meulen U. (2004). The influence of fermented putak on diet digestibility and growth performance of weanling pigs. Animal Feed Science and Technology. 102(2002): 217–224. https://doi.org/10.1016/S0377-8401(02)00248-1.

Koni TNI, Foenay TAY and Vertigo S. (2023). The use of urea and palmyra sap (Borassus flabellifer) on the characteristics and nutrient composition of fermented rice bran. Advances in Animal and Veterinary Sciences. 11(4): 624–629. https://doi.org/10.17582/journal.aavs/2023/11.4.624.629.

Koni TNI, Paga A, Jehemat A, Asrul, Batafor GG and Foenay TAY. (2025). Growth performance of java super chickens fed fermented rice bran during the starter phase. Journal of Animal Health and Production Growth. 13(1): 149–153. https://doi.org/10.17582/journal.jahp/2025/13.1.149.153.

Koni TNI, Wea YTL, Mari YD, Wea PE, Sabuna C, Anthonia D, Ndolu DAJ and Lisnahan C V. (2026). Growth performance and carcass characteristics of jawa super native chickens fed fermented banana peel. International Journal of Veterinary Science. 15(2): 514–519. https://doi.org/10.47278/journal.ijvs/2025.162.

Lalel HJD and Rubak YT. (2024). Gebang (Corypha utan Lamk) tree as a food resource for timorese people. EAS Journal of Nutrition and Food Sciences. 6(01): 1–5. https://doi.org/10.36349/easjnfs.2024.v06i01.001.

Lalel HJD, Simamora A V., Gandut YRY, Roefaida E, Kapa MJ and Pitay NF. (2024). Study on physicochemical and organoleptic properties of Gebang starch-based artificial rice with Mung Bean flour supplementation. EAS Journal of Nutrition and Food Sciences. 6(01): 25–28. https://doi.org/10.36349/easjnfs.2024.v06i01.005.

Lateef A, Oloke JK, Gueguim Kana EB, Oyeniyi SO, Onifade OR, Oyeleye AO, Oladosu OC and Oyelami AO. (2008). Improving the quality of agro-wastes by solid-state fermentation: Enhanced antioxidant activities and nutritional qualities. World Journal of Microbiology and Biotechnology. 24(10): 2369–2374. https://doi.org/10.1007/s11274-008-9749-8.

Le DHT, Chiu CS, Chan YJ, Wang CCR, Liang ZC, Hsieh CW, Lu WC, Mulio AT, Wang YJ and Li PH. (2021). Bioactive and physicochemical characteristics of natural food: Palmyra palm (borassus flabellifer linn.) syrup. Biology. 10(10): 1–15. https://doi.org/10.3390/biology10101028.

Nalle CL, Yowi MRK and Tulle DR. (2017). Nutritional value of putak: apparent metabolisable energy, and growth performance. International Journal of Agriculture System. 5(1): 53–59. https://doi.org/10.20956/ijas.v5i1.1170.

National Standardization Agency of Indonesia. (2022). Native Chicken Feed- SNI 7783.2.2013. Jakarta. BSN. https://akses-sni.bsn.go.id/sni.

Prasetyo A, Prabowo A, Sudrajad P and Hayati RN. (2021). Effectiveness of using local ingredients ration to increase KUB chicken productivity in the grower period. in The 3rd International Conference of Animal Science and Technology. IOP Conference Series: Earth and Environmental Science 1–5. https://doi.org/10.1088/1755-1315/788/1/012037.

Sabuna C, Ndolu DAJ, Asrul and Koni TNI. (2024). PH, lactic acid, and ammonia changes anaerobic fermentation putak with different levels of palmyra sap (Perubahan pH, kadar asam laktat, dan ammonia putak yang difermentasi anaerob dengan level nira lontar yang berbeda). Journal of Tropical Animal and Veterinary Science. 14(2): 63–69. https://doi.org/10.46549/jipvet.v14i2.412.

Samadi, Wajizah S and Usman Y. (2015). In vitro study of fermented complete feed by using sago residues as main source diet. Animal Production. 17(3): 129–137. https://doi.org/10.20884/1.anprod.2015.17.3.542.

Saragih HTSSG, Salsabila N, Deliaputri R, Firdaus ABI and Kurnianto H. (2024). Growth morphology of the gastrointestinal tract, pectoralis thoracicus muscle, lymphoid organ and visceral index of kampong chicken. Journal of the Saudi Society of Agricultural Sciences. 23(1): 34–41. https://doi.org/10.1016/j.jssas.2023.08.005.

Sinurat AP, Haryati T, Herliatika A and Pratiwi N. (2022). Performances of KUB chickens fed diets with different nutrient densities and BS4 enzyme supplementation. Tropical Animal Science. 45(1): 73–83. https://doi.org/10.5398/tasj.2022.45.1.73.

Sornsenee P, Singkhamanan K, Sangkhathat S, Saengsuwan P and Romyasamit C. (2021). Probiotic properties of Lactobacillus species isolated from fermented palm sap in Thailand. Probiotics and Antimicrobial Proteins. 13(4): 957–969. https://doi.org/10.1007/s12602-021-09754-y.

Sugiharto S, Yudiarti T, Isroli I, Widiastuti E and Wahyuni HI. (2020). Effect of formic acid, Saccharomyces cerevisiae or their combination on the growth performance and serum indices of the Indonesian indigenous crossbred chickens. Annals of Agricultural Sciences. 64(2): 206–210. https://doi.org/10.1016/j.aoas.2019.12.004.