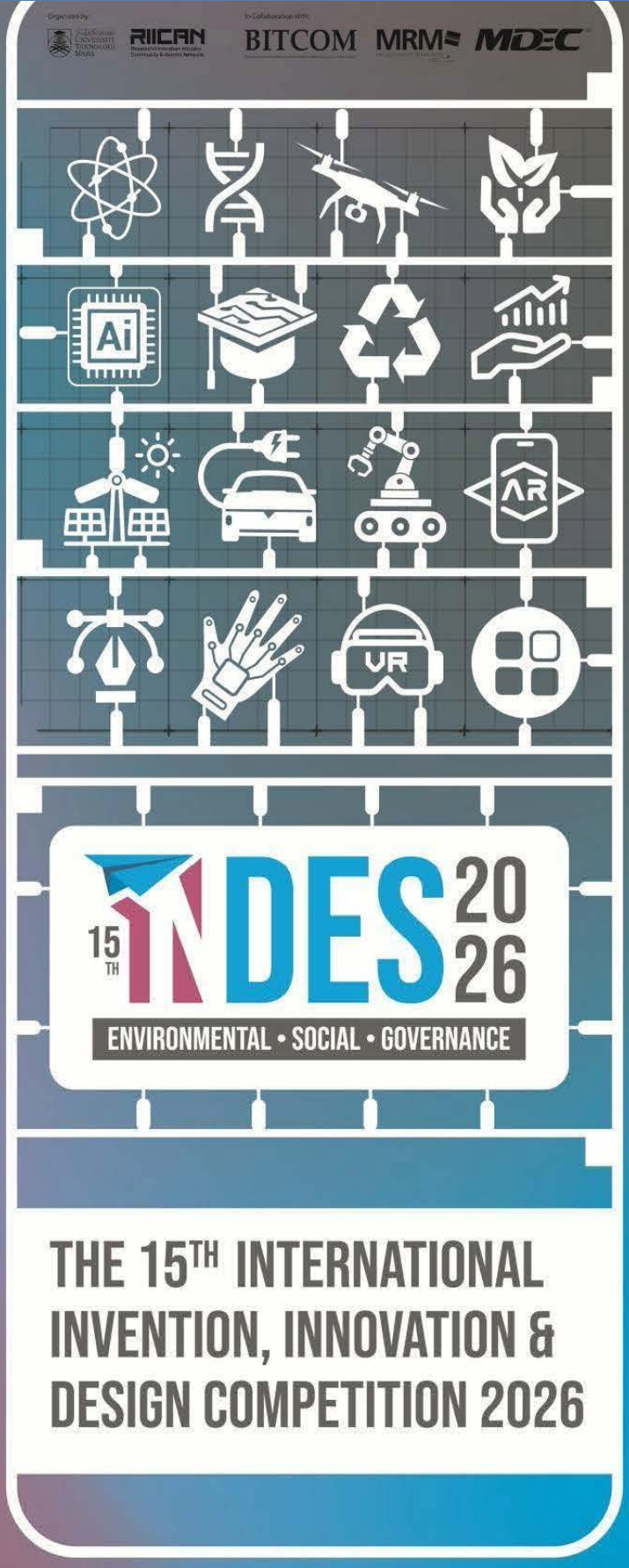


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THE 15th INTERNATIONAL
INVENTION, INNOVATION &
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SUSTAINABLE HIGH-PROTEIN RABBIT FEED PELLETS FROM PETAI BELALANG (Leucaena leucocephala) VARIETIES WONDERGRAZE AND TARAMBA

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ABSTRACT

Malaysia faces a significant shortage of animal feed ingredients such as yellow corn and soybean meal, leading to heavy reliance on imports to sustain the livestock industry. In rabbit production, imported alfalfa hay (RM8.40–RM12/kg) is the main fiber source, but it significantly increases feed costs. Petai belalang (Leucaena leucocephala), commonly used as ruminant fodder, presents a promising local and cost-effective alternative due to its high nutritional value, including crude protein (>28%), fat (6%), fiber (20%), neutral detergent fiber (NDF, 40%), acid detergent fiber (ADF, 35%), and high dry matter degradability (>80%). This study evaluated the use of L. leucocephala varieties Wondergraze and Taramba as substitutes for imported ingredients in rabbit feed pellets. An optimized formulation containing 15% Petai belalang reduced alfalfa hay to 28%, eliminated soybean meal, and lowered yellow corn to 2.5%, resulting in approximately 25% reduction in feed production costs. The pellets met essential nutritional requirements for rabbit growth, including crude protein (20%), ADF (36%), NDF (38%), and gross energy (13.8 MJ/kg), values comparable to those of premium commercial feeds. Digestibility evaluation using in vitro gas production indicated that 10–15% inclusion of Petai belalang is suitable for rabbit diets. Feeding trials with Haycole rabbits showed positive weight gain, with rabbits reaching the recommended market weight after 2 months. These findings demonstrate that Petai belalang-based pellets are a sustainable and economical alternative to imported feed ingredients.

Keyword: Alfalfa, Petai belalang, Leucaena leucocephala, Wondergraze, Taramba, Rabbits, and Rabbit feed pellets.

1. INTRODUCTION

Feed costs are the largest expense in rabbit production, primarily because of imported ingredients such as alfalfa hay. In tropical regions, limited alfalfa cultivation results in high prices and unreliable supply. Therefore, exploring locally available forage resources is crucial for enhancing the sustainability and economic efficiency of rabbit farming. Leucaena leucocephala, a tropical legume, is recognized for its high crude protein content, favorable amino acid profile, and adaptability to tropical climates, making it a promising alternative feed resource (Raju et al., 2025). This plant can contain over 20% crude protein in dry matter, along with essential minerals that benefit animal diets. Recent studies demonstrate that incorporating Leucaena leucocephala in rabbit diets can improve growth performance when used in appropriate pellet formulations (Istifanus et al., 2025; Oloruntola et al., 2023).

However, the presence of anti-nutritional compounds like mimosine may hinder its use in animal feed, potentially affecting animal health (Honda & Borthakur, 2024; Irawan et al., 2025). Innovative strategies are required to minimize these negative effects while maintaining nutritional value. This roject presents a new rabbit feed pellet formulation using improved varieties of Leucaena leucocephala (Wondergraze and Taramba) and processing methods to reduce anti-nutritional factors and enhance nutrient availability. The research aims to evaluate the nutritional suitability of these leaves and assess their effectiveness in supporting rabbit growth.

2. METHODOLOGY

2.1 Sample Preparation

Leaves of L. leucocephala from the Wondergraze and Taramba varieties were collected and processed prior to analysis. Two processing conditions were prepared: ensiled and unensiled leaves. The prepared samples were stored in airtight containers prior to further nutritional and anti-nutritional analyses.

2.2 Nutritional and Anti-Nutritional Analysis

The nutritional composition of the leaf samples was analyzed using standard procedures. Proximate analysis assessed moisture, crude protein, crude fiber, ash, and carbohydrate content following AOAC methods (2019). The mimosine concentration was measured by high-performance liquid chromatography (HPLC) using an established method, while tannin content was determined by a standard spectrophotometric method. All analyses were performed in triplicate for accuracy and reproducibility.

2.3 Feed Formulation and Pellet Production

Rabbit feed pellets were formulated using a central composite mixture design to optimize L. leucocephala leaf meal and other ingredients. This formulation was designed to meet the nutritional requirements for growing rabbits (Lebas et al., 1997). The ingredients were mixed and processed into uniform pellets, which were then analyzed to confirm their nutritional composition using standard methods.

2.4 Feeding Trial

A feeding trial with growing rabbits was conducted to assess the performance of formulated feed pellets over two months. During this period, body weight gain and feed intake were recorded according to standard procedures in rabbit nutrition studies (Lebas et al., 1997).

3. FINDINGS

The results indicated that both Wondergraze and Taramba varieties of L. leucocephala leaves possessed favorable nutritional characteristics for rabbit diets. The leaves had relatively high crude protein content and adequate fiber levels, both required for proper digestive function in rabbits.

Ensiling improved the nutritional quality of the leaves and reduced the levels of anti-nutritional compounds. The concentration of mimosine decreased to levels considered safe for rabbit consumption, while tannin levels remained within acceptable ranges for animal feeding.

The optimized feed pellet formulations achieved crude protein levels of 20% to 21% on a dry-matter basis, meeting the recommended nutritional requirements for growing rabbits. The pellets also exhibited suitable physical characteristics for handling and feeding.

During the feeding trial, rabbits fed with the formulated pellets showed satisfactory growth performance. The animals reached approximately 2 kg in body weight within 2 months, indicating that the formulated feed adequately supported normal growth and development.

Overall, the findings demonstrate that L. leucocephala leaves can effectively replace a portion of conventional forage ingredients such as alfalfa hay in rabbit feed pellets without compromising nutritional quality or animal performance (Table 1).

Table 1. Nutritional composition of rabbit feed pellet formulation incorporating the leaves of L. leucocephala var. Wondergraze and Taramba.

Compositions	Wondergraze	Taramba
Moisture (%DM)	9.09±0.020b	7.91±0.028e
Protein (%DM)	20.23±0.152a	20.89±0.030a
Ash (% DM)	11.73±0.030b	11.82±0.015b
Fat (%DM)	1.5±0.035b	1.02±0.035d
Fiber (%DM)	10.96±0.020e	17.94±0.020a
Carbohydrate (% DM)	57.45±0.021c	58.36±0.014b
Energy (MJ/kg)	11.21±0.028b	13.81±0.152a
NDF (%DM)	38.19±0.001a	38.1±0.021a
ADF (%DM)	36.33±0.015a	16.33±0.035f

4. CONCLUSION

This project presents an innovative approach to develop rabbit feed by integrating improved varieties of L. leucocephala, using ensiling technology to inhibit anti-nutritional compounds, and optimizing pellet formulation through mixture design. The results indicate that the newly developed feed pellets can serve as a sustainable, cost-effective alternative to traditional forage ingredients such as alfalfa hay. These findings improve feed resource utilization and support sustainable rabbit production systems in tropical regions.

REFERENCES

Association of Official Analytical Chemists (AOAC). (2019). Official methods of analysis (21st ed.). AOAC International.

Lebas, F., Coudert, P., Rouvier, R., & de Rochambeau, H. (1997). The rabbit: Husbandry, health and production. Food and Agriculture Organization (FAO).

Honda, M., & Borthakur, D. (2024). Mimosine concentration in giant leucaena (Leucaena leucocephala subsp. glabrata) fluctuates with age and plant part. Tropical Grasslands-Forrajes Tropicales, 12(1), 11–23.

Irawan, F., Halliday, M. J., Hegarty, R. S., & Cowley, F. C. (2025). The effects and toxicological mechanisms of leucaena toxicity on ruminant reproduction: A review. Toxicon, 260, 108367.

Istifanus, G., Bitrus, M. S., Okpara, J. O., Goholshak, P. M., Gyang, P. J., Philip, J. C., Otitoju, A. P., Denkok, Y., Kopdorah, S. W., Agi, J. P., Ochube, E. O., Vongdip, N. G., Yunusa, U., & Luka, W. (2025). Growth performance of weaner rabbits fed graded levels of Leucaena leucocephala seeds supplemented diet. Asian Journal of Food Research and Nutrition, 4(2), 620–628.

Raju, S., Nagalakshmi, D., Kumari, N. N., & Sravanthi, B. (2025). Nutritional characterisation of Leucaena leucocephala leaves: Insights for sustainable ruminant production. Journal of Experimental Agriculture International, 47(6), 274–280.

Ojo, V. O. A., Adelusi, O. O., Idowu, O. J., Shittu, O. O., Okeniyi, F. A., Ogundapo, B. M., Dada, F. I., & Oso, A. O. (2023). Effect of increasing levels of Leucaena leucocephala inclusion in grass pellets on performance and blood indices of grower rabbits. Tropical Animal Health and Production.

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