EFFECT OF SUNDRIED DANDELION (*Taraxacum officinale*) LEAF MEAL (DLM) ON GROWTH PERFORMANCE, CARCASS TRAITS AND HAEMATOLOGICAL INDICES OF WEANED RABBITS

***Grace I. Christopher, Iko-obong E. Ekette, Loveday S. Okon and Emediong J. Udombon**

Department of Animal Science, Akwa Ibom State University, Obio Akpa Campus, Akwa Ibom State, Nigeria
**Corresponding author: graceidiong@aksu.edu.ng*

Abstract

This study evaluated the effect of sun-dried dandelion (*Taraxacum officinale*) leaf meal (DLM) on the growth performance, carcass traits and haematological indices of weaned rabbits. Using a completely randomized design (CRD), a total of 27 weaned rabbits with a mean initial body weight of 588.75 g, were randomly allocated to three dietary treatments: T_1 (0 g/kg DLM), T_2 (10 g/kg DLM), and T_3 (20 g/kg DLM), with each treatment having three replicates. Growth was monitored; carcass and blood indices were also determined. The feeding trial lasted for sixty-three days and the data were analyzed using one -way analysis of variance (ANOVA). The significant means were compared using the Duncan's multiple range test (DMRT). Result showed that rabbits fed 10 g/kg DLM (T_2) diet exhibited significantly ($p<0.05$) higher final body weight (1657.00 g/rabbit), average daily weight gain (16.96 g/rabbit), and best feed conversion ratio (8.29), relative to other groups. Furthermore, rabbits on T_2 showed the highest ($p<0.05$) live and eviscerated weights, 1540.87 and 892.00 g/rabbit, respectively. The relative cut-up parts: hind limbs, forelimbs, loin, back cut, and rack were statistically similar across the treatments. Haematological assay revealed that rabbits fed 10 g/kg DLM diet had higher ($p<0.05$) packed cell volume (42 42.00 %) and white blood cell counts (9.40×10^9/L). All haematological values remained within normal physiological limits, indicating no negative health effects from DLM inclusion. Incorporating 10 g/kg DLM in weaned rabbit diets enhanced growth, carcass traits, and blood profile. This level is recommended for practical feeding, while further research should assess long-term and reproductive effects on rabbits.

Keywords: Blood, carcass, dandelion, growth, rabbits, leaf meal

Introduction

The rising cost of conventional feed ingredients poses a critical constraint to livestock production, particularly in smallholder rabbit farming systems. Feed expenditure accounts for approximately 60–70% of total production costs, underscoring the need for alternative feed resources that are both economically viable and nutritionally adequate (Usoro *et al.*, 2025; Udombon *et al*., 2025). In response, there has been increasing interest in the utilization of non-conventional feedstuffs, such as leaf meals, to reduce feed costs and enhance animal productivity (Udombon *et al*., 2025).

Dandelion *(Taraxacum officinale)*, locally referred to as "lion's teeth" in Ibibio, Akwa Ibom State, is a wild leafy plant commonly recognized for its ethnomedicinal properties. The foliage is rich in essential nutrients, including vitamins A, C, and K, as well as minerals such as calcium, potassium, and iron (Napoli and Zucchetti, 2021). Additionally, it contains dietary fibre and antioxidants which have been associated with improved digestive efficiency, immune modulation, and reduced oxidative stress (Napoli and Zucchetti, 2021). Studies by Kassem *et al*. (2018) also highlighted its prebiotic properties, which promote the proliferation of beneficial gut microbiota.

Beyond its nutritional profile, dandelion exhibits anti-inflammatory and detoxifying effects, further supporting its use as a functional feed additive (Napoli and Zucchetti, 2021). However, the presence of anti-nutritional factors, such as oxalates and tannins, may interfere with nutrient bioavailability when consumed in excessive quantities (Fan *et al*., 2023; Christopher *et al*., 2024a). Notably, these anti-nutritional compounds are significantly reduced through sun-drying (Christopher *et al*., 2022), making the dried leaf meal a safer and more effective feed component.

Despite the promising attributes of Dandelion, limited studies have evaluated its use in the diets of livestock, particularly rabbits. Given their efficient utilization of forages and high feed-to-meat conversion efficiency, rabbits present a suitable model for assessing the potential of unconventional plant-based feed supplements. Evaluating both performance and physiological responses, including haematological and carcass parameters, provides critical insights into the suitability and safety of new dietary feed inclusions.

This study, therefore, investigated the effects of dietary inclusion of sun-dried dandelion leaf meal (DLM) on the growth performance, carcass traits and haematological indices of weaned rabbits.

Materials and methods

Study location

The study was conducted at the Rabbitry Unit of the Teaching and Research Farm, Akwa Ibom State University, Obio Akpa Campus, Nigeria. The site lies between latitudes 4°35'N and 5°5'N and longitudes 7°25'E and 8°25'E (AKSG, 2012). The region is characterized by an annual rainfall range of 3,500–5,000 mm, an average ambient temperature of approximately 25°C, and relative humidity levels ranging from 60 - 90% (AKSG, 2024).

Collection of test ingredient (Dandelion leaves) and experimental diets

Fresh dandelion leaves were harvested from a designated pasture in Akwa Ibom State University, Obio Akpa Campus, washed thoroughly with clean tap water, and sun-dried on aluminum roofing sheets for five (5) days. The sun-dried leaves were roughly broken by hand, then milled into coarse particles using a Binatone® Electric Blender (Model BLG-450, Binatone, China) and stored in airtight plastic containers until needed for diet formulation (AOAC,2005). Three experimental diets were formulated and designated as T_1, T_2, and T_3. These diets contained 0 g/kg (T_1), 10 g/kg (T_2), and 20 g/kg (T_3) levels of DLM, respectively. The basal diet (isonitrogenous and isocaloric) was formulated to meet the nutritional requirements of weaned rabbits, based on the guidelines provided by the National Research Council (NRC, 2007). All diets contained similar proportions of maize, soybean meal, groundnut cake, palm kernel cake, wheat offal, oyster shell, bone meal, vitamin–mineral premix, methionine, lysine, salt, and palm oil; which was included to reduce feed dustiness and minimize the risk of respiratory tract infections.

Metabolizable Energy (ME) Determination: The metabolizable energy (ME) content of the diet (Table 1) was estimated using data from the feed composition Table provided by Aduku (1993). The calculation followed the Pauzenga equation (Pauzenga, 1985), which multiplies the percentage of each feed component by its corresponding energy conversion factor: ME (kcal/kg) = (37×%CP) +(81.8×%EE) +(35.5×%NFE). The resulting values were then summed to obtain the ME in Kilocalories per kilogram (Kcal/kg). Table 5 presents the proximate analyzed values of the experimental diets. The metabolizable energy (ME) of the proximately analyzed (T_1, T_2, T_3) feed was calculated using the formula: ME (kcal/kg) = (37 × %CP) + (81.8 × %EE) + (35.5 × %NFE). The percentage values of crude protein (CP), ether extract (EE), and nitrogen-free extract (NFE) obtained from the proximate analysis of the diets were substituted into the equation, and the resulting values were summed to derive the ME of the feed (NRC, 1994; Pauzenga, 1985).

Experimental animals, management and experimental design

A total of 27 crossbred weaned rabbits (Chinchilla × New Zealand White), aged between 6 and 7 weeks, with a mean initial body weight of 588.75±0.01 g, were procured from a reputable breeder at Ikot Ekpene, Akwa Ibom State. Upon arrival, the animals were subjected to a seven-day acclimatization period during which prophylactic antibiotics and anti-stress vitalytes were administered through drinking water. The two-month-old rabbits were not dewormed, as they were considered at low risk of parasitic exposure. Additionally, young rabbits have sensitive digestive systems, and deworming at this age may pose potential risks (Harcourt-Brown, 2002). Following acclimatization, rabbits were randomly allotted to three dietary treatments (T_1, T_2, and T_3), each comprising nine animals. Each group was further sub-divided into three replicates of three rabbits and housed in individual cages under a completely randomized design (CRD). Feed and clean water were provided *ad libitum* throughout the sixty-three days feeding trial. The *ad libitum* feeding approach allowed for feed leftovers, which facilitated the calculation of the actual feed intake by the experimental rabbits.

Experimental Diets fed to weaned rabbits

The gross composition of the experimental diets fed to the weaned rabbits is presented in Table 1. The basal diet was formulated from maize, soybean meal, groundnut cake, palm kernel cake, wheat offal, oyster shell, bone meal, palm oil, methionine, lysine, common salt, and vitamin premix in fixed proportions. Dandelion Leaf Meal (DLM) was sun-dried, milled, and incorporated into the diets at three levels: 0 g/kg (T1), 10 g/kg (T2), and 20 g/kg (T3).

Both the test ingredient (DLM) and the experimental diets were analyzed for proximate composition, including crude protein, crude fibre, ether extract, ash, and nitrogen-free extract, following the procedures of AOAC (2019).

Data collection

The parameters measured during the study included:

The average daily feed intake, which was determined under *ad libitum* feeding conditions. Feed was supplied in pre-weighed amounts each morning and afternoon to maintain unrestricted access. The following morning, the leftover feed was weighed, and actual intake was calculated as the difference between the total feed offered and the refusals (Martí *et al*., 2019). The total weight gain was obtained by subtracting the initial body weight from the final body weight at the end of the sixty-three-day feeding trial. Daily weight gain was calculated by dividing the total weight gain during the experimental period by the number of days the experiment lasted. The feed conversion ratio (FCR) was determined as the ratio of daily feed intake to daily weight gain (FCR = feed intake/weight gain). Weights were taken using an electronic scale (Shimadzu TX4202L model, 4,200g capacity and 0.01g precision).

At the end of the feeding trial, three rabbits with body weights closest to the mean values of their respective treatment group, were randomly selected for carcass and organ evaluation. Prior to slaughter, the selected rabbits were fasted overnight from 6:00 p.m. to 6:00 a.m. to empty the gastro-intestinal tract and reduce the risk of carcass contamination, as recommended by Driessen *et al*. (2020). Blood sampling was collected in accordance with established guidelines for laboratory rabbit handling and venipuncture. Initially, samples were obtained from the central auricular vein. Each rabbit was gently restrained to minimize stress, and the pinna was cleaned with 70% ethanol to improve vein visibility and reduce contamination risk. Using a sterile 23-gauge needle attached to a 2 mL syringe, blood was drawn with steady, minimal negative pressure to prevent hemolysis. For this, selected rabbits were first rendered unconscious using an approved inhalant anesthetic (isoflurane), humanely euthanized via cervical dislocation followed immediately by severing of the jugular vein using a sharp knife to ensure complete exsanguination over 3–5 minutes (Lebas *et al*., 1997) Blood was collected into sterile, anticoagulant-coated bottles (EDTA) to preserve sample integrity for haematological analysis.

All procedures followed ethical principles for the care and use of animals in research, as outlined by the European Commission Directive 2010/63/EU and the recommendations of Harkness *et al*. (2010), while the procedures of Parasuraman *et al*. (2017; Marinou & Donatus, (2023) were also adopted to guide blood collection and handling.

Haematological analysis

Blood was collected into bottles containing ethylenediaminetetraacetic acid (EDTA), an anticoagulant for haematological parameters (Table 4). All the samples collected were taken to the laboratory for haematological assay.

Carcass evaluation

Live weight was recorded prior to slaughter. Following slaughter, the carcasses were weighed, skinned, and eviscerated. Carcass weight and cut-up parts were determined by weighing to assess the effect of dietary treatment. Organ weights (liver, kidney, heart, and lungs) were also taken. All the carcass parts and organ weights were expressed as percentage of live weight (Table 3).

Statistical analysis

All data obtained in this study were subjected to one-way analysis of variance (ANOVA) (Steel and Torrie, 1980) using the SPSS (2004) statistical software package. Significant means were separated using Duncan's Multiple Range Test (DMRT) (Duncan, 1955).

Results and Discussion

Results

Proximate composition of experimental diets with DLM fed to weaned rabbits

There were no variations in all the calculated nutrient composition of the formulated diets as crude protein (CP), ether extract (EE), crude fibre (CF), ash, nitrogen-free extract (NFE) and metabolizable energy (ME) were fixed across all the treatment diets. The inclusion of DLM at 10 g/kg and 20 g/kg levels led to notable variations in the proximate composition (Table 2). Crude protein (CP), crude fibre(CF), ether extract (EE), and ash contents increased from 17.50-21.00, 7.00 - 9.00, 3.00 - 4.00 and 5.00 - 9.00% in the control (T_1) and T_3, respectively. In contrast, nitrogen-free extract (NFE) declined from 57.16% in T1 to 47.68% in T3, accompanied by a reduction in metabolizable energy (ME) from 2922.08 Kcal/kg to 2797.84 Kcal/kg. Dry matter (DM) content showed a slight increase from 89.66% to 90.68% with DLM inclusion. The proximate composition of DLM, as determined from laboratory analysis, revealed a crude protein content of 17.50%. The ether extract and crude fibre contents were 4.50% and 13.00%, respectively, while the ash content was 6.00%. Nitrogen-free extract accounted for 46.50%, and the dry matter content was 87.50%. The metabolizable energy value was determined to be 2666.35 Kcal/kg.

Growth performance of weaned rabbits fed diets with DLM

The results of the effect of sun-dried Dandelion leaf meal (DLM) on the growth performance of weaner rabbits are presented in Table 3. Significant differences ($p<0.05$) were observed in the average final body weight, daily weight gain, feed intake, and feed conversion ratio. Rabbits fed the 10 g/kg DLM (T2) diet performed best across all measured parameters. Final Body Weight (g)**:** T_2 (1657.00 g) T_3 (1360.00 g) T_1 (Control) (1323.00 g). Average Daily Weight Gain (g/day)**:** T_2 (16.96 g) T_3 (12.24 g); T_1 (11.65 g). Feed conversion ratio: T_2 (8.29), T_3 (11.63) and T_1 (11.89)

In terms of feed intake, rabbits in T_3 consumed significantly ($p<0.05$) more forage (78.83 g/day) compared to those in T1 (76.23 g/day) and T2 (75.01 g/day). Conversely, T_2 had the highest average daily concentrate intake (65.62 ± 0.01 g/day), while T_1 consumed the least (62.38 g/day). Consequently, the total daily feed intake was highest in T_3 (142.40 g) and lowest in T_1 (138.61 g).

The FCR was significantly ($p<0.05$) better in T_2 (8.29), indicating more efficient feed utilization compared to T_1 (11.89) and T3 (11.63). This suggests that the moderate supplementation of DLM enhanced growth performance and feed efficiency.

Carcass traits of weaned rabbits fed diets with DLM

Table 4 shows the carcass characteristics of weaned rabbits across the dietary treatments. The live weight and eviscerated weight were significantly ($p < 0.05$) influenced by DLM inclusion levels. Live Weight (g): T_2: 1540.87, T3: 1238.27, T_1 (Control): 1187.87. Eviscerated Weight (g): T_2: 892.00, T_3: 665.00 and T_1 (Control): 639.50. These rankings indicate that rabbits fed the 10 g/kg DLM (T2) diet exhibited superior carcass traits compared to the control and 20 g/kg DLM (T3) groups. No significant differences ($p>0.05$) were observed in the relative weights of the cut-up parts (foreleg, hind limbs, rack, loins and back cut) as well as the organ weights.

Haematological parameters of weaned rabbits fed diets with DLM

The effect of DLM on the haematological profile of weaned rabbits is presented in Table 5. The packed cell volume (PCV) and white blood cell (WBC) counts were significantly influenced by dietary treatments ($p< 0.05$). T_2(10 g/kg DLM) rabbits recorded the highest PCV (42.00 %) and WBC count (9.40×10^9/L), compared to T_1 (37.00 % and 5.70×10^9/L) and T_3 (38.00 % and 7.20×10^9/L). No significant differences ($p>0.05$) were observed in haemoglobin concentration, red blood cell counts, mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) across treatments. Differential leukocyte counts revealed significant variations in neutrophil and lymphocyte counts. Neutrophil counts were highest in T_3 (23.00%), while lymphocyte counts were highest in T_1 (74.00%), with significant decreases noted in T_2 (65.00%) and T3 (69.00 %). Monocyte, eosinophils and basophils percentages were not significantly affected ($p>0.05$).

Discussion

Proximate composition of experimental diets containing DLM

Sun-dried Dandelion Leaf Meal (DLM) contained moderate protein (17.50%) and appreciable fibre (13.00%), indicating its potential as a supplementary feedstuff that can support growth and gut health in rabbits. This observation aligns with the findings of Christopher *et al*. (2024b), who reported that leaf meals are rich in fibre and beneficial for digestive health in rabbits. With a metabolizable energy value of 2666.35 kcal/kg and balanced levels of ether extract, ash, and nitrogen-free extract, DLM can contribute both nutrients and functional properties when strategically supplemented in rabbit diets.

All diets (T_1, T_2, T_3) were formulated to be nutritionally similar in crude protein (CP), ether extract (EE), crude fibre (CF), ash and Nitrogen-Free Extract (NFE). However, DLM inclusion at 10 g/kg and 20 g/kg led to notable compositional changes. Crude protein increased from 17.50% in T_1 to 21.00% in T_3, indicating DLM's protein-enhancing potential. This supports the findings of Hien *et al.* (2017), who observed similar effects from protein-rich leaf meals. Ether extract rose with DLM inclusion, suggesting enhanced dietary energy levels. This aligns with Kania-Dobrowolska and Baraniak (2022), who noted that dandelion leaves contain appreciable fat content as well as other nutrients. Ash content rose from 5.00% (T_1) to 9.00% (T_3), implying improved mineral content. This agrees with Napoli and Zucchetti (2021), who reported high mineral levels in dandelion. The dry matter (DM) content of the diets showed a progressive increase with the inclusion of Dandelion Leaf Meal (DLM). The control diet (T1) recorded 89.66% DM, which rose slightly to 89.75% in T2 (10 g/kg DLM) and reached 90.68% in T3 (20 g/kg DLM), compared to 87.50% in the test ingredient itself. This upward trend indicates that total dry matter, and by extension nutrient density increased with higher DLM inclusion levels. Such an increase suggests reduced moisture content and a greater concentration of nutrients per unit weight of feed, which can enhance feed quantity, stability and storage quality). This aligns with Zambrano *et al.* (2019) who reported that incorporating dry feed ingredients lowers overall feed moisture and increase dry matter content.

Crude fibre values rose from 7.00% in the control (T_1) to 9.00% in T_3. While higher fibre content in feed can aid digestion and gut health in rabbits, this trend coincided with the progressive reduction in nitrogen-free extract (NFE) and metabolizable energy (ME). As DLM inclusion increased, NFE decreased from 57.16% in T_1 to 47.68% in T_3, and ME dropped from 2922.08 kcal/kg to 2797.84 kcal/kg. This decline is likely due to the addition of fibre-rich ingredient, DLM. Similar observations were reported by Christopher *et al.* (2024b) and Hien *et al.* (2017) when Moringa oleifera, Leucaena, and Stylosanthes leaf meals were incorporated into rabbit diets, and fibre enrichment led to a reduction in NFE and ME values.)

Growth performance characteristics of weaned rabbits fed diets with DLM

The present study demonstrated that dietary inclusion of sun-dried Dandelion leaf meal (DLM) at 10 g/kg significantly ($p<0.05$) improved growth performance characteristics in weaned rabbits. Rabbits fed 10 g/kg DLM (T_2) exhibited superior final body weight and daily weight gain compared to both the control (T_1) and the higher inclusion group (T_3). This finding suggests that moderate inclusion of DLM optimizes nutrient utilization and growth, likely due to the bioactive compounds in Dandelion that enhance digestive efficiency and metabolic function. According to Napoli and Zucchetti (2021), Dandelion leaf meal (DLM) contains several notable bioactive constituents that contribute to its physiological benefits. These include sesquiterpene lactones, such as taraxinic acid and tetrahydroridentin B, which act as choleretic agents by stimulating bile secretion and aiding digestion. It also contains inulin, a fructan-type prebiotic fostering a balanced gut microbiome and enhances nutrient uptake. Furthermore, phenolic acids, including chlorogenic and caffeic acids, contribute to metabolic health by providing antioxidant effects and assisting in glucose regulation. Lastly, flavonoids, like luteolin and quercetin glycosides, modulate digestive enzyme activity and possess anti-inflammatory properties. These results are consistent with previous findings by Christopher *et al*. (2019) and Abdulkarim and Jurgen (2020), who reported that bioactive constituents in seed and leaf meals can positively influence animal performance through improved gut health and feed digestibility.

The average daily feed intake revealed that rabbits in T_3 consumed more total feed, especially forage, likely in response to higher dietary fibre content. However, the increased intake did not translate into better weight gain or feed efficiency. This supports the concept of dietary fibre acting as an energy diluent, wherein animals consume more feed to meet their energy requirements when feed energy density is low (Evans *et al*., 2023; Christopher *et al*., 2024b).

A superior FCR value in T_2 indicated more efficient conversion of feed into body mass. Conversely, the less favourable FCR in T_3, despite higher feed intake, may be attributed to reduced nutrient assimilation or mild interference from residual anti-nutritional factors at higher DLM inclusion. Also, Napoli and Zucchetti (2021) acknowledged the presence of high polyphenolic content in Dandelion, which includes tannins. These observations highlight the importance of balancing dietary fibre and bioactive compound levels to avoid diminishing returns.

Overall, the improved growth performance at 10 g/kg DLM suggests that this inclusion level achieves a balance between palatability, nutrient availability, and physiological tolerance, supporting findings by Ekpo *et al*. (2022), that moderate inclusion of plant-based supplements enhances animal productivity without compromising health.

Carcass characteristics of weaned rabbits fed diets with DLM

Carcass evaluation revealed that rabbits in the 10 g/kg DLM group (T_2) had significantly ($p<0.05$) greater live weight and eviscerated weight, respectively. The major carcass cuts (forelimbs, hind limbs, and rack) were not numerically higher in T_2, although not statistically significant. This suggests improved meat yield. These enhancements were in line with the superior growth performance observed in this group and may reflect better nutrient partitioning toward muscle development.

Although, dressing percentage and organ weights were statistically ($p>0.05$) similar across treatments, numerical increases in the T_2 group suggest potential benefits of moderate DLM inclusion on overall carcass composition. The observed improvements are consistent with the findings of Igila *et al*. (2020) and Mmadu *et al*. (2020), who also reported enhanced carcass traits in rabbits fed leaf meal-based diets.

The organ weights were not significantly ($p>0.05$) different across the treatments, possibly indicating that dietary treatments were not deleterious, but rather improved organ function and development due to better nutrient assimilation. Absence of organ compromise supports the safety of DLM as a dietary supplement (Siri-Tarinoet *et al*., 2010).

In contrast, the 20 g/kg DLM group (T_3) did not maintain the improvements observed in T_2, reinforcing the hypothesis that higher levels may impair performance due to increased fibre load or residual anti-nutrients. This highlights the need for precise dosage optimization when incorporating phytogenic feed additives.

Haematological parameters of weaned rabbits fed diets with DLM

Haematological indices serve as critical indicators of physiological status, immune competence, and animal welfare. In this study, significant improvements in the packed cell volume (PCV) and white blood cell (WBC) counts were observed in rabbits fed diets containing DLM. The elevated PCV indicates enhanced erythropoiesis and oxygen-carrying capacity, while the increased WBC count suggests a stimulated immune response, possibly due to antioxidant or immunomodulatory effects of Dandelion constituents, as observed in male rabbits (Fayrouz *et al*., 2019). These results are also consistent with the findings of Abdulrazak *et al*. (2024) and Ayo-Ajasa*et al*. (2020), who reported improved haematological profiles in rabbits fed leaf meal-based diets.

Although, other parameters such as haemoglobin, red blood cell count, and erythrocyte indices (MCV, MCH, MCHC) were not significantly ($p>0.05$) different, all values remained within normal physiological ranges for healthy rabbits (Table 4) as stated byJain (1993) andColes (1986), indicating no adverse effects on blood composition or oxygen transport capacity of rabbits in this study.

The differential leukocyte counts further revealed an immunological shift in T_1 and at the higher DLM level, T_3. The increased neutrophil and lymphocyte count in T_3 may suggest a mild inflammatory response, while the reduced lymphocyte percentage in

DLM-fed group T_2 may indicate immune modulation influenced by dietary bioactive compounds. The neutrophils are often the first responders to inflammation (specifically bacterial invasion) (Novia *et al*., 2024). Importantly, monocyte counts remained stable across all treatments, suggesting that DLM did not induce systemic infection or haematological stress.

Collectively, the haematological profile confirms that DLM at 10 g/kg supports physiological health and immune function without inducing toxicity or stress, reinforcing its suitability as a functional feed additive.

Conclusion

This study on growth performance, carcass traits and haematological indices of weaned rabbits fed sun-dried dandelion leaf meal (DLM) has demonstrated that dietary inclusion of the meal at a moderate level of 10g/kg will significantly enhance growth performance, carcass characteristics, and haematological parameters. Rabbits fed this inclusion level showed marked improvements in final body weight, average daily gain, and feed conversion ratio. Additionally, carcass yield, eviscerated weight, and major meat cuts were superior in this group. Haematological evaluations further indicated that inclusion of DLM at 10 g/kg supported optimal physiological function, as evidenced by elevated packed cell volume and white blood cell counts, without compromising erythrocyte integrity or organ development. All assessed blood parameters remained within normal physiological reference ranges at a moderate level of 10 g/kg, suggesting that this tested level is both safe and physiologically beneficial. In contrast, increasing the inclusion rate to 20 g/kg did not offer additional benefits and, in some instances, resulted in reduced feed efficiency and growth performance. This decline may be attributed to excessive dietary fibre or the presence of residual anti-nutritional factors, indicating a potential threshold beyond which the efficacy of DLM diminishes.

Recommendation

Based on the findings of this study, sun-dried Dandelion leaf meal can be recommended as a nutritionally valuable feed supplement for weaned rabbits at an optimal inclusion rate of 10 g/kg, without fear of compromising growth, carcass traits and haematological indices of rabbits. Further research is suggested to investigate the long-term effects of DLM inclusion, its interactions with other phytogenic compounds, and its economic feasibility in commercial rabbit production.

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Table 1: Gross composition of experimental diets supplemented with DLM

Ingredient	**T1**	**T2**	**T3**
Maize	50.88	50.88	50.88
Soybean	10.56	10.56	10.56
Groundnut cake	10.56	10.56	10.56
Palm kernel cake	5.00	5.00	5.00
Wheat offal	15.00	15.00	15.00
Oyster shell	3.00	3.00	3.00
Bone meal	2.00	2.00	2.00
Palm oil	2.00	2.00	2.00
Methionine	0.25	0.25	0.25
Lysine	0.25	0.25	0.25
Common salt	0.25	0.25	0.25
Vitamin premix	0.25	0.25	0.25
Total	**100**	**100**	**100**
Calculated analysis			
Crude protein (%)	18.00	18.00	18.00
Ether extract (%)	5.92	5.92	5.92
Crude fibre (%)	4.43	4.43	4.43
Ash (%)	8.31	8.31	8.31
Nitrogen-free extract (%)	63.97	63.97	63.97
Metabolizable energy (kcal/kg)	3421.20	3421.20	3421.20

Note: Diets were supplemented with DLM at **0 g/kg (T1), 10 g/kg (T2), and 20 g/kg (T3).**

Table 2: Proximate composition of experimental test ingredient (DLM) and diets supplemented with DLM

Parameter	DLM	T1 (0 g/kg)	T2 (10 g/kg)	T3 (20 g/kg)
Dry matter (%)	87.50	89.66	89.75	90.68
Crude protein (%)	17.50	17.50	18.00	21.00
Ether extract (%)	4.50	3.00	3.50	4.00
Crude fibre (%)	13.00	7.00	7.75	9.00
Ash (%)	6.00	5.00	5.50	9.00
Nitrogen-free extract (%)	46.50	57.16	55.00	47.68
Metabolizable energy (Kcal/kg)	2666.35	2922.08	2904.80	2797.84

Table 3: Growth performance of weaned rabbits fed diets supplemented with DLM

Parameter	T1 (0 g/kg)	T2 (10 g/kg)	T3 (20 g/kg)	SEM
Initial body weight (g)	588.75	588.75	588.75	0.01
Final body weight (g)	1323.00^{c}	1657.00^{a}	1360.00^{b}	52.32
Average daily weight gain (g)	11.65^{c}	16.96^{a}	12.24^{b}	0.01
Average daily forage intake (g)	76.23^{b}	75.01^{c}	78.83^{a}	0.01
Daily concentrate intake (g)	62.38^{c}	65.62^{a}	64.08^{b}	0.01
Total daily feed intake (g)	138.61^{c}	140.63^{b}	142.40^{a}	0.01
Feed conversion ratio	11.89^{a}	8.29^{c}	11.63^{b}	0.01

Note: ^{abc}Means along the same rows with different superscript are significantly different ($p<0.05$)

Table 4: Carcass traits of weaned rabbits fed diets supplemented with DLM

Parameter	T1 (0 g/kg)	T2 (10 g/kg)	T3 (20 g/kg)	SEM
Live weight (g)	1187.87^{b}	1540.87^{a}	1238.27^{ab}	0.01
Carcass weight (g)	913.71^{b}	1216.48^{a}	946.63^{ab}	0.01
Eviscerated weight (g)	639.50^{b}	892.00^{a}	665.00^{ab}	17.67
Dressing percentage (%)	51.87	53.83	48.92	2.97
Forelimbs (% LW)	7.62	7.52	7.87	0.46
Hind limbs (%)	16.00	16.74	16.60	0.29
Rack (%)	7.79	8.73	7.27	0.68
Loin (%)	9.68	15.51	12.48	1.80
Neck (%)	2.32	2.21	2.07	0.28
Back cut (%)	4.76	6.13	5.98	0.34
Liver (%)	2.90	2.60	2.79	0.17
Kidney (%)	0.63	0.58	0.69	0.06
Heart (%)	0.29	0.32	0.24	0.06
Lungs (%)	0.59	0.58	0.69	0.29

Note:^{ab} means along the rows with different superscript are significantly different ($p<0.05$)

Table 5: Haematological profile of weaned rabbits fed diets supplemented with DLM

Parameter	T1 (0 g/kg)	T2 (10 g/kg)	T3 (20 g/kg)	SEM	Ref. Range
Packed cell volume (%)	37.00^{b}	42.00^{a}	38.00^{b}	1.00	30–45
Hemoglobin (g/dl)	11.40	13.20	11.80	1.00	10–15
Red blood cell ($\times 10^{12}$/l)	5.50	6.60	5.70	1.00	5–10
White blood cell ($\times 10^{9}$/l)	5.70^{c}	9.40^{a}	7.20^{b}	1.00	5–12
Mean corpuscular volume (fl)	69.00	64.00	65.00	1.00	50–70
Mean corpuscular hemoglobin concentration (pg)	32.00	30.00	31.00	1.00	30–36
Mean corpuscular hemoglobin (g/dl)	20.00	21.00	21.00	1.00	15–22
Neutrophils (%)	20.00^{b}	20.00^{b}	23.00^{a}	1.00	20–75
Lymphocytes (%)	74.00^{a}	65.00^{c}	69.00^{b}	1.00	40–75
Eosinophils (%)	2.00	2.00	2.00	1.00	1–4
Basophils (%)	1.00	1.00	1.00	1.01	1–7
Monocytes (%)	1.00	2.00	1.00	1.00	1–4

^{abc*} means along with different superscripts are significantly different ($p<0.05$)