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Influence of lubeg *(Sygyzium linatium* L.*)* leaf meal on the growth performance of mallard ducks

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Abstract

The study was conducted to evaluate the growth performance of mallard ducks fed with lubeg *(Sygyzium linatium* L.*)* leaf meal. A total of 200–three day old mallard ducks were divided to 5 groups and assigned to one of the 5 dietary treatments with 0, 3, 6, 9 and 12% lubeg leaf meal (LLM) following the Completely Randomized Design (CRD). Based on the study's findings, the nutritional content of lubeg leaf meal was 11.33% crude protein, 21.56% crude fiber, 3.15% crude fat, 16.53% moisture, 8.16% ash, and mineral analysis revealed 1.13% calcium and 0.94% phosphorus. The varying levels of lubeg leaf meal in the mallard duck ration had a significant impact on optimum body weight, gain in weight, feed intake, feed conversion ratio, and efficiency. In terms of income above feed and duck expenses, the addition of 6% lubeg leaf meal (Treatment 3) yielded a higher return of 136.83 Php, hence, recommended.

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Introduction

Poultry farming is becoming more and more important on a worldwide scale as many nations expand their agricultural industries to satisfy growing food demands. In Asia, where they are widely produced for both meat and eggs, ducks play a vital role in world agriculture. Between 1961 and 2022, the number of ducks worldwide increased steadily from 193 million to over 1.1 billion, mirroring broader trends in the poultry business driven by consumer demand for a variety of protein sources (Wordstat, 2024). Poultry production placed second among the most important subsectors in the agriculture industry in the Philippines. This is mainly for their meat and egg.

Duck is one of the most popular species which contribute to our meat and egg industry. As of 30 September 2023, the total duck inventory was recorded at 14.49 million birds. This was 6.1 percent higher than the previous year's same period level of 13.66 million birds. About 64.8 percent of the country's duck population came from small holds farms, while the remaining 32.7 percent and 2.6 percent were from semi-commercial and commercial farms, respectively (PSA, 2023). Central Luzon recorded the highest duck population of 5.15 million birds as of 30 September 2023. This (Wordstat, 2024)was followed by SOCCSKSARGEN and Cagayan Valley with corresponding duck population of 1.49 million birds and 1.48 million birds. These three regions accounted for 56.0 percent of the country's total duck population during the period.

Egg from ducks is mostly used to produce salted and cooked embryonated eggs. Production of duck eggs was measured as 14.26 thousand metric tons from April to June of 2023 which indicates a decline of -8.6% from the previous year 15.60 thousand metric tons output in the same period 2022. Among regions, Central Luzon was the top producer with 7.69 metric tons or 53.9% share of total duck eggs. Duck laying flock inventory as of June 30, 2023, was expected to be at eighty-two million birds. In comparison to the prior year, this was 1.4% higher seventy-million birds throughout the same period (PSA, 2023). The average farmgate price of duck egg for the second quarter of 2023 was quoted at PhP 8.71 per piece. This was 9.7 percent higher than the previous year's same quarter average farmgate price of Php 7.94 per piece.

There are many breeds of duck here in the Philippines, contributing to a high meat and egg supply. Among this breed is the Improved Philippine Mallard Duck. This is locally the most popular raised. They start laying at 20 weeks old. Although this is smaller than other imported breeds, they are good layers and non-sitters in which they lay large eggs (Davao, 2016) (Opey, 2018). They have qualities that make them not only one of the most well-liked but also among the best layers for rearing in the Philippines. Smallholders in the Philippines rear mallard ducks, which provide affordable animal protein and a source of revenue for the impoverished populace in rural regions. Fresh or cooked duck eggs are more in demand than chicken table eggs. Some researchers concluded that duck eggs are large, have thick shells, and suitable for processing into value added product such as salted, boiled and balut (embryonated egg).

However, these faces a significant challenge due to the high cost of feed ingredients (Curibot, 2019), which directly affects the overall cost of poultry production. The rising prices of essential feed components, such as grains, proteins, and minerals, impact the profitability of egg production and raise concerns about the sustainability and competitiveness of the industry.

Addressing the issue of high-cost feeds is crucial for supporting the growth and efficiency of the duck production sector. Strategies such as exploring alternative feed sources, optimizing feed formulations, and enhancing feed efficiency can alleviate financial strain on poultry farmers and promote sustainable production (DA, 2022) (Thirumalaisamy, 2019). By addressing these challenges, the Philippines can foster a more resilient and thriving duck production industry, ensuring a stable supply of quality meat and eggs and enhancing the economic viability of poultry farming. Lubeg (*Syzygium linatium*), an Indigenous plant commonly found in the northern part of the Philippines (Ruma, 2016) can be alternative feed ingredients added to the diet of ducks. Some related studies about *Syzygium* species leaves used this as poultry feeds and promote growth in their respective experiment (Adu, 2020) (Freitas, 2017).

Lubeg, the Philippine Cherry belongs to family *Myrtacaea* under species *Syzygium* (Gaertn). It was identified as *S. lineatum* (Roxb.) (DC.) Merr & Perry *'Syzygium'* was derived from the Greek term *'syzygos,'* meaning the paired leaves are opposite in arrangement and *'lineatum'* means stripes, netted veins on the leaves (Columna, 2019). This vigorously, naturally and endemically found in Region II and in the municipality of Lal-lo. A study identified and collected it in six towns of Southern Isabela (Echague, San Isidro, Jones, San Agustin, Santiago and Cordon) and conducted phytochemical screening (Ruma, 2016). They concluded the presence of secondary metabolites like anthraquinones, flavonoids, tannins, saponins, triterpenes and glycosides. The same result also was revealed by some studies and recommends the utilization not only for its fruit but also to the leaves (Manicad, 2016). These secondary metabolites found in Lubeg *(S. lineatum)* leaves and fruits extracts believe to have a health promoting properties such as antioxidants, reduces blood sugars, anti-toxic, anti-inflammatory, anti-cancer, heart health, skin protection, bone health and stimulation of the immune system.

Some studies about lubeg leaves founded that this contains flavonoids, anthraquinones, saponins, and glycoside (Manicad, 2016; Ruma, 2016). Flavonoids provide the ability to support bird health while improving the nutritional quality of poultry meat and eggs by changing the profile of fatty acids and reducing cholesterol content (Tan, 2022). These compounds offer health benefits by protecting against oxidative stress and reducing inflammation and help to protect from cardiovascular disease, cancer, neurodegenerative diseases, and more through their antioxidant and anti-inflammatory activities (Robbins, 2021). This can also enhance the immune response and improved overall blood health in poultry and can also help in reducing the risk of infections and diseases (Sun, 2023). One close-related family of lubeg is the *S. cumini*, in which a study found that the inclusion of *S. cumuni* leaf meal has no significant effect on feed intake, laying percentage, weight and egg mass, feed conversion ratio, Haugh units, specific gravity, percentage of yolk, albumen and egg shells and shell thickness on laying hens. They also concluded that the inclusion of *S. cumini* leaves in laying hen diet at levels of up to 10 g/kg improves the color and lipid stability of egg yolk, without harming the performance and quality of albumen and egg shell (Freitas, 2017). A study was also conducted to broilers using *S. aromaticum*, one of the close-related families of *S. lineatum*, together with *M. fragrams* seed meal revealed their potential to enhance growth performance, health, and meat quality of broiler chickens when used as phytogenic feed supplement. They concluded that the inclusion up to 0.25% of the said mixture can improved body weight gain and endogenous enzymes, maintain carcass traits, organ weight, and gut microflora and reduce meat cholesterol and lipid oxidation of broiler chickens (Adu, 2020). The packed also of cell volume, red blood cells, hemoglobin concentration, mean cell hemoglobin concentration, and white blood cells of broiler chickens were not significantly affected. There is also positive effect of *S. aromaticum* leaf extract when kept at high stocking density and could higher body weight gain ($P < 0.05$), higher feed consumption, decrease the ph of ileum and cecum, increased lactic acid bacteria and decreased coliform bacteria in the ileum and cecum (Sjafani, 2022).

Incorporating lubeg leaf meal into poultry feed formulations could help mitigate the impact of high-cost conventional feed ingredients, thereby reducing the overall production costs for duck farmers. Strategies such as exploring alternative feed sources like lubeg, optimizing feed formulations, and enhancing feed efficiency can alleviate financial strain on poultry farmers and promote sustainable production. By addressing these challenges and leveraging the nutritional benefits of lubeg, a number of Sustainable Development Goals (SDGs) by giving rural communities especially smallholder farmers and women-income, in which it reduces poverty.

This can also provide protein-rich meat and eggs that support regional diets and nutrition, the industry improves food security. Sustainable techniques like incorporating leaf meal like lubeg can lessen dependency on chemicals and support biodiversity in which we can promote sustainable consumption and production, while the financial gains from duck farming allow households to invest in health and well-being. Additionally, by providing people with tools and expertise, duck farming boosts economic growth and generates job possibilities.

Materials and methods

Two hundred 3 day old ducks were randomly distributed to five (5) treatments replicated four times with 10 ducks per replication. The ducks were fed with 5 dietary treatments of lubeg leaf meal (LLM) which described as follows: Treatment 1- 0% LLM, Treatment 2- 3% LLM, Treatment 3- 6% LLM, Treatment 4- 9% LLM, and Treatment 5- 12% LLM.

The experimental poultry house was designed wherein the experimental animals was reared under a confinement production system with a total area of 7 x15 meters square. The housing facility is constructed with locally available materials such as bamboo, lumber, sacks, nets, and chicken wire etc., was used in the experimental poultry house. The experimental cage measuring 7×15 meters was subdivided into 20 pens measuring 1.5×3 meter each.

Proper hygiene and sanitation were observed throughout the study. All facilities and other materials such as feeders and drinkers were cleaned and disinfected with disinfectant diluted in water following the manufacturer's guidelines before the start of the study, this was done to eliminate the disease-causing microorganisms and prevent the birds from the diseases.

Fresh lubeg leaves was collected and gathered manually at the vicinity of Jones and, Echague, Isabela. After harvest, the leaves were detached in the branches immediately and were air dried in a plastic net, turning the leaves occasionally for uniform dryness. The basis for monitoring dryness was the brittleness, texture, and color. The dried leaves were hammered milled through 2-mm sieve. This was mixed to other feed ingredients to make a formulated ration appropriate for the mallard ducks.

The experimental diet was formulated to meet the recommended nutrients for duck following the standard set by PCCARD Philippine Recommends for Poultry and Livestock Feed Formulation.

The diets were made isonitrogenous and isocaloric. The experimental animals were fed with lubeg leaf meal-based diets starting at 14-day old until the end of growing period (8 weeks old).

The lubeg leaf meal diet was weighed at 5:30 A.M. 11:30 A.M and 3:30 P.M. and was offered at 6:00 A.M and 4:00 P.M., in a round feeder, respectively. Feed refusals will be collected and weighed from the feeder and buckets every week. Moreover, fresh, and clean water were provided in restricted feeding throughout the study.

Data gathered and statistical analysis

The growth performance of mallard ducks in 5 dietary treatments were evaluated in terms of body weight, gain in weight, feed consumption, feed conversion ratio and feed conversion efficiency.

The income over feed and duck cost was computed to determine the economic profitability of the birds per treatment. All data gathered was analyzed using the Analysis of Variance following Complete Randomized Design. The statistical software for Agricultural Research (STAR 2.0) was used to analyzed the data gathered. The Least Significant Differences (LSD) was also used to compare treatment means.

Results and discussion

The proximate and mineral analysis was done at the Cagayan Valley Integrated Agricultural Laboratory, Tuguegarao City. Proximate analysis revealed nutritional content of lubeg leaf meal with 11.33% crude protein, 21.56% crude fiber, 3.15% crude fat, 16.53% moisture, 8.16% ash and mineral analysis with 1.13% calcium and 0.94% phosphorus. The nutritional and mineral analysis test method and reference method and nutritional contents is shown in the Table 1.

The initial body weight, final body weight, total gain in weight, FCR, and FCE of the mallard ducks fed with different levels of lubeg leaf meal is presented in Table 2.

Significant differences were observed among the treatments on the final weight of the birds with a mean value ranging from 734.50 to 814.75 grams. Treatments 1 (0% LLM), Treatments 3 (6%) and Treatment 5 (12%) are comparable with each other with a mean value of 814.75, 797.25 and 786.00 but not significantly different to Treatment 1 (0% LLM), Treatment 2 (3% LLM) and Treatment 4 (9% LLM). Treatment 2 (3% LLM) is not significantly different to Treatment 4 but significantly different to Treatment 1, Treatment 3 and treatment 5. The total gain in weight of the birds of Treatment 1 (0% LLM) and Treatment 3 (6% LLM) with mean value of 745.80 and 728.75 are comparable with each other but not significantly different to Treatment 2, Treatment 4 and Treatment 5. Treatment 4 (9% LLM) and Treatment 5 (12%) are comparable with each other with a mean value of 701.55 and 717.05 but not significantly different to Treatment 1, Treatment 2, and Treatment 3. Treatment 2 (3%) is not significantly different to Treatment 4 and Treatment 5 but significantly different to Treatment 1 and Treatment 3.

Treatment 1 (0% LLM) and Treatment 2 (3% LLM) with a mean value of 2657.68 and 2641.68 are comparable with each other but not significantly different to Treatment 3 but significantly different to Treatment 4 and Treatment 5. Treatment 4 is not significantly different to Treatment 3 and Treatment 5 but significantly different to Treatment 1 and Treatment 2.

Significant difference was observed in FCR. Treatment 2 (3% LLM) and Treatment 4 are comparable with each other with a mean value of 3.94 and 3.86 but not significantly difference with treatment 5. Treatment 1 is not significantly difference with treatment 3 but significantly difference with treatment 2, treatment 4 and treatment 5.

Treatment 1 (0%LLM) are not significantly different with Treatment 3 (6% LLM) but significantly different to Treatment 2, Treatment 4, and Treatment 5. Treatment 2 (3% LLM) and Treatment 4 are comparable with each other with a mean value of 39.42 and 38.57 and not significantly different from Treatment 5 but significantly different to Treatment 1 and Treatment 3.

The significant difference in growth parameters of the ducks in terms of final weight, gain in weight, FCR, and FCE indicates a potential of lubeg leaf meal inclusion on feed formulation in mallard ducks. The same results were also observed in the study of *Sygizium aromaticum*, a related family of lubeg (Adu, 2020). The inclusion of 6% and 12% are not significantly difference with the treatment 1 which is control in terms of Final weight and gain in weight. This proves that lubeg leaf meal can be added to the diet of mallard ducks .Since this study was the first to investigate the potential of lubeg in animal feed, further investigation is advised for a better conclusive result. Furthermore, lubeg leaves are high in crude protein up to 11.33% and flavonoids which are the major constituents of all *Sygizium* species, which provides provide the ability to support bird health while improving the nutritional quality of poultry meat and eggs by changing the profile of fatty acids and reducing cholesterol content (Tan, 2022). Compounds in poultry offer health benefits by protecting against oxidative stress, reducing inflammation, and preventing cardiovascular, cancer, and neurodegenerative diseases. They enhance immune response, improve blood health, and reduce infection risk (Robbins, 2021) (Sun, 2023) (Tan, 2022). Lubeg also have anthraquinones and triterpenes have numerous biological activities, including anticancer, anti-inflammatory, diuretic, anti-arthritic, antifungal, antibacterial, and antimalarial properties. They also have antioxidant properties, reducing oxidative stress in poultry (Diaz, 2018; Mishra, 2021).

Table 1. Proximate and mineral analysis method of lubeg leaf meal

Proximate and mineral analysis	Test method	Reference method	Nutritional contents %
Crude protein	Semi-automatic Kjeldahl method	AOAC official method 984.13	11.33
Crude fiber	ANKOM filter bag technique	In-house method	21.56
Crude fat	ANKOM filter bag technique	In-house method	3.15
Moisture	Gravimetric method	AOAC official method 934.0	16.53
Ash	Gravimetric method	AOAC official method 942.05	8.16
Calcium	Atomic absorption	AOAC official method 368.08	1.13
Phosphorus	Spectrophotometry method	AOAC official method 965.17	0.94

The temperature recorded was 25°C±3 and a relative humidity of 40- 60%.

Table 2. Growth performance of mallard ducks fed with lubeg leaf meal (LLM) (g/bird)

Parameters	Treatments of LLM levels							
	1	2	3	4	5	CV (%)	P > F	LSD value
Initial BW (g)	68.95	68.75	68.50	68.70	68.95	1.36	0.9542	--
Final BW (g)	814.75^{a}	734.50^{b}	797.25^{a}	770.25^{ab}	786.00^{a}	3.06	0.0031	49.80
Total GW (g)	745.80^{a}	670.50^{b}	728.75^{a}	701.55^{ab}	717.05^{ab}	3.18	0.0033	47.26
Feed consumed	2657.68^{bc}	2641.68^{c}	2652.75^{bc}	2705.39^{ab}	2718.82^{a}	1.03	0.0035	57.25
FCR	3.56^{c}	3.94^{a}	3.64^{bc}	3.86^{a}	3.79^{ab}	2.54	0.0003	0.19
FCE	35.66^{c}	39.42^{a}	36.43^{bc}	38.57^{a}	37.94^{ab}	2.51	0.0003	1.96

Note: Means with the same letter/s are not significantly different using LSD. BW- Body weight, GW- Gain in Weight, FCR- Feed Conversion Ratio, FCE- Feed Conversion Efficiency, LSD- Least Significant Difference

Table 3. Return above feed and duck cost (per duck)

Parameters	T1	T2	T3	T4	T5
Final weight, g	814.75	734.50	797.25	770.25	786.00
Return for duck	244.5	220.5	239.1	231	235.8
Cost of chicks	40.00	40.00	40.00	40.00	40.00
Price of duck per kilo, Php	300.00	300.00	300.00	300.00	300.00
Cost of starter	23.74	23.62	23.50	23.21	23.17
Total amount of lubeg, kg	---	0.079	0.159	0.243	0.330
Cost of lubeg, Php	---	0.237	0.477	0.729	0.99
Total feed consumed, g	2.66	2.64	2.65	2.70	2.72
Total cost of feed	63.14	62.36	62.27	62.66	63.02
Income over feed and duck cost	141.36	118.14	136.83	128.34	132.78

The income over feed and duck cost is presented in Table 3. The income was computed based on the final weight of the birds which multiplied by the prevailing price of the birds at 300 Php/kg less the expenses of feeds and duck cost. The income over feed and duck cost obtains the highest return in Treatment 1 (0%LLM) with 141.36 Php, followed by Treatment 3 (6% LLM) with 136.83 Php, Treatment 5 (12% LLM) with 132.78 Php, Treatment 4 (9% LLM) with 128.34 and the lowest is Treatment 2 with 118.14 Php.

Conclusion

Based on the study's findings, the nutritional content of lubeg leaf meal was 11.33% crude protein, 21.56% crude fiber, 3.15% crude fat, 16.53% moisture, 8.16% ash, and mineral analysis revealed 1.13% calcium and 0.94% phosphorus.

The varying levels of lubeg leaf meal in the mallard duck ration had a significant impact on optimum body weight, gain in weight, feed intake, feed conversion ratio, and efficiency. In terms of income above feed and duck expenses, the addition of 6% lubeg leaf meal (Treatment 3) yielded a higher return of 136.83 Php, hence, recommended.

References

Adu OG. 2020. The effects of *Myristica fragrans* seed meal and *Syzygium aromaticum* leaf meal dietary supplementation on growth performance and oxidative status of broiler chicken. Bulletin of the National Research Centre.

Columna N. 2019. "LUBEG" (Philippine Cherry), *Syzygium lineatum* (Roxb.) (DC.) Merr & Perry: Its taxonomic and molecular identification. Indian Journal of Science and Technology **12**(35), 1–7. https://doi.org/10.17485/ijst/2019/v12i35/146280

Curibot JP. 2019. Market composition and performance of firms in broiler, chicken egg, and swine production: Implications to the Philippine Competition Act. AG ECON. https://ageconsearch.umn.edu/record/309432/?v=pdf

DA CG. 2022. DA sets strategic interventions to address rising prices of chicken meat, and eggs. Retrieved June 2024, from https://www.da.gov.ph/da-sets-strategic-interventions-to-address-rising-prices-of-chicken-meat-eggs/

Davao E. 2016. Promising prospects in agriculture: Duck raising. Retrieved 2024, from https://edgedavao.net/agri-trends/2017/07/promising-prospects-agriculture-duck-raising/

Diaz GM. 2018. Anthraquinones: An overview. Studies in Natural Products Chemistry **58**, 313–338. https://doi.org/10.1016/B978-0-444-64056-7.00011-8

Freitas EF. 2017. Effect of *Syzygium cumini* leaves on laying hens performance and egg quality. Agrarian Science. https://doi.org/10.1590/0001-3765201720150317

Manicad M. 2016. Phytochemical analysis of Lubeg (*Syzygium lineatum* (DC) L.M. Perry) species in Apayao. International Journal of Novel Research in Life Sciences, 1–5. https://www.noveltyjournals.com/upload/paper/

Mishra PS. 2021. A review on the phytochemical and pharmacological properties of *Hyptis suaveolens* (L.) Poit. Future Journal of Pharmaceutical Sciences. https://doi.org/10.1186/s43094-021-00219-1

Opey. 2018. Duck raising. https://cagayanvalley.da.gov.ph/wp-content/uploads/2018/02/duck.pdf

PSA. 2023. Duck egg situation report. PSA. Retrieved September 2024.

Ruma O. 2016. Phytochemical screening of selected indigenous edible plants from the towns of Isabela, Philippines. Agricultural and Food Science. https://www.semanticscholar.org/paper/Ruma/6abdbe76acd41e36d8e9784d9e7351622e608bea

Sjafani NH. 2022. The influence of clove leaf extract (*Syzygium aromaticum*) on growth performance and bacterial population of broiler chickens raised in stressful conditions of high stocking density. Journal of Animal Behaviour and Biometeorology. https://doi.org/10.31893/jabb.22015

Sun W. 2023. Therapeutic potential of phenolic compounds in medicinal plants—Natural health products for human health. Molecules **28**, 1845. https://doi.org/10.3390/molecules28041845

Tan ZH. 2022. Dietary flavonoids as modulators of lipid metabolism in poultry. Frontiers in Physiology **13**, 863860. https://doi.org/10.3389/fphys.2022.863860

Thirumalaisamy G. 2019. Cost-effective feeding of poultry. Research Gate **5**(6), 3997–4005. https://www.researchgate.net/publication/335054995_Cost-Effective_Feeding_of_Poultry

Wordstat. 2024. Duck population by country 2024. https://worldostats.com/duck-population-by-country-2024/