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# Performance of improved Philippine Mallard duck (*Anas platyrhynchos* L.) fed diet with *Trichanthera* leaf meal

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## Abstract

A study was conducted to evaluate the performance of Improved Philippine Mallard Duck *(Anas platyrhynchos* L.*)* fed diet with *Trichanthera* leaf meal. A total of 225 Improved Philippine Mallard Duck (IPMD) were divided to 5 groups and were fed with 5 formulated diets with 0, 3, 6, 9 and 12% *Trichanthera* leaf meal (TLM) for 14 weeks. The study was laid out in a Completely Randomized Design (CRD). Results of the study revealed that the different levels of *Trichanthera* leaf meal (3, 6, 9 and 12%) fed diet have no positive effect on the growth performance of Improved Philippine Mallard Duck in terms of the body weight, feed consumption, gain in weight, FCR, FCE, and percentage of livability. However, it showed that *Trichanthera* leaf meal up to 12% is very safe to use as fed diets for ducks and it can contribute to the nutritional needs of ducks and improve economic returns. The addition of 6% *Trichanthera* leaf meal on the ration of IPMD generated a higher return of Php 388.64; hence, it is recommended.

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## Introduction

Raising duck in the Philippines is predominantly for production of egg that is processed into cooked embryonated egg and salted egg. In 2019, about 11.83 million heads were the estimated population of mallard ducks for both backyard and commercial farms in the country (PSA, 2019). Local farmers and entrepreneurs ventured into duck farming because of some economic value and significant role in Filipino culture. Duck farming does not require costly and elaborate housing facilities which needed slight space for rearing purposes. It can succeed in a wide range of climatic and nutritional conditions (Chang and Dagaas, 2004); resilient to avian diseases, and can subsist on various feedstuff.

Improved Philippine Mallard Duck or Itik Pinas (IP) is one of the superior breeder ducks, developed through selection and breeding, using parents from the Philippine Mallard Duck or *Pateros* Duck. It is a true to type breed with production performance potential that exceeds the current level of performance of Pateros duck mongrels. Parungao (2017) reported the three developed strains – two of which are pure lines the Itik Pinas (IP) Itim and Khaki, and one terminal hybrid line the IP-Kayumanggi. The Itik Pinas-Kayumanggi starts to lay an egg at the age of 20 weeks old and reaches the peak of egg production when they are about 29 weeks old. Additionally, the laying production performance has about 98% or 266 egg production per duck per year (Davao, 2016).

Plant proteins are abundantly available somewhere in the environment. One of the potential sources is the *Trichanthera gigantea* which contains proteins, fibers, calcium and saponins in their leaves (Rosales, 1997). A multi-purpose tree, *Trichanthera gigantea* (Madre de agua) contains high crude protein content of the foliage particularly the leaves and the thin stems, which are also consumed by the animals and apparently most of it is true protein and has a good amino acid balance as reported by Lacayanga (2015). A potential source of protein, its leaves contain 18-22% crude protein in dry matter form (Dela Cruz, 2001). *Trichanthera* is useful forage to be used as animal feed. It can be harvested every 3 months and produced a yield of 17t/ha/year of fresh matter. This forage can be grown in various soils and produces highly nutritious feed. This is because this forage has the ability to fix nitrogen and increase the fertility of the soil.

Majority of duck farming in the Philippines are raised in the backyard where a traditional system of rearing using local feed sources and a free-range system is practiced. Local farmers used to move their ducks on the areas with empty paddy field after the rice harvest. In some instances where farmers cannot find areas for the rearing of ducks, they go for an intensive rearing system resulting in low duck egg productivity due to limited resources. Thus, mallard ducks are fed with an incomplete diet due to expensive feed cost. Since the majority of the duck farming expenses is on feed cost, it is but safe to conclude that high feed cost results in high production cost. Consequently, researchers are looking into the improvement of feeding efficiency that lowers the production cost of raising ducks. With the growing interest in reducing feed cost in poultry and livestock production, feedstuff substitution and supplementation become a potential for agricultural research.

In this regard, there is a need to explore for potential locally available plants as protein source to lessen feed cost and increase the profit of local duck raisers.

## Materials and methods

Two hundred twenty-five 22-day old Improved Philippine Mallard Ducks (IPMD) were randomly distributed to five treatments with 15 IPMD ducks per replicate. The IPMD were fed with 5 dietary treatments of *Trichanthera* Leaf Meal (TLM) levels described as follows: Treatment 1- 0% TLM, Treatment 2- 3% TLM, Treatment 3- 6% TLM, Treatment 4- 9% TLM, and Treatment 5- 12% TLM.

An experimental duckery house was constructed and provided with fenced yard at the ITIK project site was used in this study. The growing pen had a dimension of 280 cm length × 300 cm width. It was established

with the use of locally available materials such as lumber, bamboo, and other usable materials. Plastic net was used as divisional fence for the open yard. The building and its surroundings were thoroughly cleaned and disinfected before stocking.

Green *Trichanthera* leaves were collected and gathered using pruning shear. The age of *Trichanthera* leaves used was at 90 days of regrowth. After harvest, the leaves were detached in the branches immediately and air dried in a plastic net, turning the leaves occasionally for uniform dryness. The basis for monitoring dryness was brittleness, texture, and color. The dried leaves were then hammer-milled through 2-mm sieve. This was mixed to other feed ingredients to make a formulated ration appropriate for the mallard ducks.

The experimental diets were formulated to meet the recommended nutrients for duck following the standard set by PCAARRD Philippine Recommends for Poultry and Livestock Feed Formulation. The diets were made isonitrogenous and isocaloric with an average calculated analysis of 2,977.29 to 2,995.13 ME/Kcal during the starting period and 3,098.50 to 3, 125.64 ME/Kcal during the growing period. On the 22$^{nd}$ day, the experimental ducklings were transferred to the grower cages and the standard feeding program for ducks was followed up to 14 weeks old. The diet was given every 7:00 in the morning, 12:00 noon and 4:00 in the afternoon, following the recommended feeding guide for mallard duck (BAI-NSPRDC).

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The feed given was weighed, recorded and a separate feed container was provided for every treatment. Feed refuse was collected and weighed. Furthermore, clean drinking water was provided throughout the feeding experiment. The experimental ducks were treated equally as to other environmental requirements throughout the experimental period.

*Data gathered and statistical analysis*

The performance of IPMD in the different treatment groups were evaluated based on the body weight, gain in weight, feed consumption, feed conversion ratio and efficiency and percentage of livability.

The income over feed and duck costs was estimated to determine the economic profitability. All the data gathered were subjected to Analysis of Variance using the Statistical Tool for Agricultural Research (STAR) following a Completely Randomized Design (CRD).

**Results and discussion**

*Initial and 14$^{th}$ week body weight*

Presented in Table 1 is the performance of IPMD fed diet with *Trichanthera* Leaf Meal. The initial body weight of the experimental ducks ranged from 216.35 to 217.60 grams. The result indicates the uniformity or homogeneity of the experimental ducks which is essential in attaining reliable results.

However, on the 14-week body weight of the IPMD, significant differences were observed among treatments with a mean value ranging from 1287.39 to 1309.02 grams. Treatments 4 (9% TLM) and 3 (6% TLM) were comparable with each other with a mean value of 1302.70 and 1309.02 grams but not significantly different to Treatments 2 (3% TLM) and 1 (control) with a mean value of 1287.39 and 1288.89 grams. Treatment 5 (12% TLM) with a mean value of 1266.36 were not significantly different to Treatments 2 and 1. The significant result at the end of the study is in agreement with the findings of Sarria and Preston (1995).

*Feed consumption*

In terms of the cumulative feed consumption of the mallard ducks, no significant differences were observed among treatment with a mean value ranging from 8363.66 grams to 8716.48 grams. The IPMD with 3% TLM in the formulated duck ration got the highest feed consumption among all the treatments while the lowest was observed on Treatment 1 (control).

This result showed that *Trichanthera* leaf meal is palatable, and increasing levels did cause reduction in the feed intake of the IPMD. This is supported by

Rosales (1997) and Morbos *et al.* (2016), saying that *Trichanthera gigantea* forage is highly palatable to animals. It could also be due to its bulky character with rather lower nutrient concentration per unit weight. Thus, birds eat more to satisfy their needs (Adeyemi *et al.*, 2012). Sarria and Preston (1995) also supports the comparable results of the study in terms of feed consumption.

*Gain in weight (g), feed conversion ratio and efficiency*

The results revealed no significant differences among treatment means on the gain in weight of the mallard ducks with a mean value ranging from 1049.90 grams to 1091.83 grams. However, the pattern of differences showed a generally decreasing trend in the gain in weight with increasing level of *Trichanthera* leaf meal supplementation. According to Samadi (2006) and Morbos *et al.* (2016), growing birds have a definite limit for protein accretion and this ability is mainly governed by genotype. The crude protein contents in leaf meals are much higher than farm by-products (Tesfaye *et al.*, 2013; Sugiharto *et al.*, 2018; Libatique, 2021). It has been acknowledged that specific foliage contains several bioactive compounds that are advantageous to the health of chickens. These compounds include vitamins, phenolic acids, flavonoids, isothiocyanates, tannins as well as saponins (Vergara-Jimenez *et al.*, 2017).

**Table 1.** Performance of improved Philippine mallard duck fed diet with *Trichanthera* leaf meal (TLM)

| Performance parameter | Treatment TLM levels | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | CV (%) |
| Initial body weight (g) | 216.35 | 217.29 | 217.19 | 217.60 | 216.46 | 3.73 |
| 14th week body weight (g) | 1288.89$^{ab}$ | 1287.56$^{ab}$ | 1309.02$^{a}$ | 1302.70$^{a}$ | 1266.36$^{b}$ | 1.14 |
| Gain in weight (g) | 1072.54 | 1070.10 | 1091.83 | 1085.09 | 1049.90 | 1.72 |
| Feed consumption (g) | 8363.66 | 8717.48 | 8522.75 | 8599.86 | 8603.81 | 3.40 |
| Feed conversion ratio | 7.81 | 8.15 | 7.80 | 7.93 | 8.19 | 3.96 |
| Feed conversion efficiency | 12.84 | 12.29 | 12.82 | 12.63 | 12.21 | 4.02 |
| Percentage of livability | 97.78 | 93.33 | 97.78 | 97.78 | 97.78 | 0.94 |

Note: Means with the same letter are not significantly different with each other.

Feed conversion ratio is the ratio between the total feed consumed over the total weight gain of mallard ducks. The lower the value, the more efficient are the mallard ducks in converting feed to live weight. Based on the result of the study, numerically, the data showed that all the different treatments have statistically the same amount of feeds consumed to produce a kilogram of weight with an average ratio of 7.80 to 8.19. Although not significant, data revealed that mallard ducks in Treatment 3 with 6% TLM had higher average feed conversion ratio and lowest FCR was observed in treatment with 12% TLM. The mallard ducks with the inclusion of 6% TLM in the ration had better feed conversion ratio compared to other treatments. This can be correlated with the feed consumption of the experimental mallard ducks which can be linked to nutritional factors affecting efficiency (Ampode *et al.,* 2020). This study also corroborates the results obtained in the study of Bejar (2017).

The same trend was observed in terms of feed conversion efficiency of mallard duck supplemented with and without *Trichanthera* leaf meal. Based on the result of the study, the mallard ducks have an average efficiency means of 12.21% to 12.84%. It should be noted that as birds grow older, they become more efficient in utilizing feed containing *Trichanthera* leaf meal (Morbos *et al.*, 2016).

*Percentage of livability*

Statistical analyses revealed no significant variations were observed among treatment means. The percentage livability of the IPMD ranged from 93.33% to 97.78%. The present data are similar to the findings (Diego *et al.*, 2021) who obtained a little higher livability rate of 98.89% during rearing period in a full confinement management system.

The mallard ducks were reared in a full confinement for 14 weeks however there was 3.11% or an

equivalent of seven mortalities all throughout the study. This value implies the resilience of ducks under full confinement conditions. The data are in agreement with the recorded low mortality rate of Itik Pinas (IP) during the growing period in previous studies (Martin *et al.*, 2020). This means that the feeds given and the system of rearing have no adverse effect on their livability. There were no cases of any sickness during the conduct of the study. This implies that the mallard ducks were easily acclimatized to the environment after they were transferred from the brooder to the respective experimental units.

**Table 2.** Return above feed and mallard duck costs

| Items | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ |
|---|---|---|---|---|---|
| Average final weight (kg) | 1.29 | 1.29 | 1.31 | 1.30 | 1.27 |
| Return per mallard ducks (Php)[1/] | 516.00 | 516.00 | 524.00 | 520.00 | 508.00 |
| Cost of IP ducklings (Php) | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 |
| Total amount of TLM (g) | --- | 549.26 | 546.24 | 553.10 | 544.14 |
| Cost of TTLM[2/] (Php) | --- | 16.48 | 16.39 | 16.59 | 16.32 |
| Amount of starter feed consumed (g) | 2124.61 | 2090.62 | 2103.94 | 2183.84 | 2133.24 |
| Cost of starter feed consumed (Php) | 23.88 | 22.04 | 21.76 | 23.88 | 19.90 |
| Amount of grower feed consumed (g) | 5683.02 | 6076.60 | 5872.37 | 5862.92 | 5924.43 |
| Cost of grower feed consumed (Php) | 23.35 | 23.47 | 23.60 | 21.13 | 21.79 |
| Total amount of feed consumed (g) | 8.34 | 8.72 | 8.52 | 8.59 | 8.60 |
| Total cost of feed consumed (Php) | 47.23 | 45.51 | 45.36 | 42.01 | 46.69 |
| Return above feed and mallard duck cost | 378.77 | 372.01 | 388.64 | 387.99 | 371.31 |

[1/]400/kg live weight of IP ready to lay

[2/]Php 3.00/kg price of *Trichantera* leaf meal

*Income over feed and duck costs*

The income over feed and mallard duck costs is presented in Table 2. The income was computed based on the final weight of the duck multiplied by their prevailing price of ready to lay ducks at PhP 400.00 per live weight less the expenses on the feeds and the IP ducklings. In descending order, the return above feed cost from the different treatments is as follows: $T_3$ = PhP 388.64, $T_4$ = PhP 387.99, $T_1$ = 378.77, $T_2$= 372.01 and $T_5$ = PhP 371.31. The computed income derived from ducks fed diet with the inclusion of varying levels of *Trichanthera* leaf meals can reduce feed cost.

## Conclusion

Results of the study revealed that the different levels of *Trichanthera* leaf meal (3, 6, 9 and 12%) have no positive effect on the production performance of Improved Philippine Mallard Duck. However, results showed that ducks fed diet with *Trichanthera* are comparable to without *Trichanthera* in terms of the body weight, feed consumption, gain in weight, FCR, FCE, and percentage of livability. The addition of 6-9% *Trichanthera* leaf meal (TLM) on the ration of IPMD generated higher return ranging from Php 387.99 to 388.64.

With all these information, it is safe that *Trichanthera* leaf meal can nutritionally and economically be used as poultry diet up to 12% level without detrimental effect on the performance of IPMD.

## Recommendation(s)

The addition of 6-9% *Trichanthera* leaf meal on the ration of Improved Philippine Mallard Duck generated higher return ranging from Php 387.99 to 388.64. Hence, it is recommended. However, further research is needed to include other parameters on the meat analysis, sensory evaluation of oven baked breast, histopathological effects of *Trichanthera* leaf meal on the small intestinal mucosa and the use of commercial duck feeds to compare and to obtain a more conclusive result.

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**References**

**Adeyemi OA, Adekoya JA, Sobayo RA.** 2012. Performance of broiler chicken fed diets containing cassava leaf-blood meal mix as replacement for soybean meal. Revista Cientifica UDO Agricola **12**(1), 212-219.

**Ampode KMB, Galgo SJC, Lapurga IGC.** 2020. Pinto peanut meal: Its potential as dietary supplement for Philippine mallard ducks. International Journal of Biosciences **16**(5), 319-326.

**Bejar FR.** 2017. Madre de agua (*Trichanthera gigantea*) leaf meal as feed to quails with *Aloe vera* extract and acid cheese whey supplementation. **5**(207).

**Chang HS, Dagaas CT.** 2004. The Philippine duck industry: Issues and research needs. University of New England, Graduate School of Agricultural and Resource Economics.

**Davao E.** 2016. Promising prospects in agriculture: Duck raising. Retrieved from www.edgedavao.net on January 5, 2019.

**Dela Cruz RT.** 2001. *Trichanthera*: Cheaper feed substitute to soybean oil meal. PCAARRD Message Board, 2009.

**Diego JML, Martin EA, Barroga AJ, Velasco VV.** 2021. Feeding program for *Itik Pinas* (*Anas platyrhynchos*) during the growing phase and their influence on the subsequent egg production performance. Philippine Journal of Veterinary and Animal Science **47**(1), 29-38.

**Lacayanga C.** 2015. Effects of different levels of madre de agua, lead tree and horseradish fresh leaf as partial replacement of feeds on egg production performance of mallard duck. International Journal of Science and Basic Applied Research **24**(3), 71-85.

**Libatique FO.** 2021. Growth performance, blood dynamics and sensory characteristics of broilers fed with madre de agua (*Trichantera gigantea*) leaf meal. LINKER: The Journal of Emerging Research in Agriculture, Fisheries and Forestry **2**(1), 1-12.

**Martin EA, Rafael EJ, Juan JJ, Velasco VV, Valdez MAT.** 2020. Feeding system and floor space on the growth, egg production and reproductive performances of Itik Pinas Kayumanggi (*Anas platyrhynchos* L.) under semi-confinement system. Philippine Journal of Veterinary and Animal Science **46**(1), 20-30.

**Morbos CE, Espina DM, Bestil LC.** 2016. Growth performance of Philippine native chicken fed diet supplemented with varying levels of madre de agua (*Trichanthera gigantea* Nees) leaf meal. Annals of Tropical Research **38**(1), 174-182.

**Parungao ART.** 2017. ITIK PINAS: Development, promotion and utilization in building rural enterprises. Retrieved on July 2019 from http://www.pcaarrd.dost.gov.ph/home/portal/index.php/quick-information-dispatch/2970-itik-pinas-development-promotion-and-utilization-in-building-rural-enterprises.

**Philippine Statistics Authority.** 2019. Duck Situation Report July to September, (2019). Date of Release, November 21, 2019, Reference No. 2019-328. https:/psa.gov.ph/content/livestock-and-poultry-statistics-philippines.

**Rosales M.** 1997. *Trichanthera gigantea* (Humboldt & Bonpland.) Nees: A review. Livestock Research and Rural Development **9**(4).

**Samadi LF.** 2006. Estimation of nitrogen maintenance requirements and potential for nitrogen deposition in fast-growing chickens depending on age and sex. Poultry Science **85**, 1421-1429.

**Sarria P, Preston T.** 1995. A chick assay method for the evaluation of non-conventional protein sources derived from nacedero (*Trichanthera gigantea*) and azolla (*Azolla filiculoides*). Livestock Research and Rural Development **7**(3), 6.

**Suárez JC, Ramirez B, Velásquez JE.** 2006. Biomass production and nutritive value of protein banks established with fodder species for cut-and-carry in the Amazonian foothills of Colombia. Past Tropical **28**(1), 57-61.

**Sugiharto S, Yudiarti T, Isroli I, Widiastuti E.** 2018. The prospective of tropical agro-industrial by-products as an indigenous feedstuffs for poultry animals. Iranian Journal of Applied Animal Science **8**, 375-385.

**Tesfaye E, Animut G, Urge M, Dessie T.** 2013. *Moringa oleifera* leaf meal as a substitute for protein-rich feed ingredient in broiler ration. International Journal of Poultry Science **12**, 289-297. https://doi.org/10.3923/ijps.2013.289.297.

**Vergara-Jimenez M, Almatrafi MM, Fernandez ML.** 2017. The effect of bioactive components of *Moringa oleifera* leaf in protecting poultry against chronic disease. Antioxidants **6**(4), 91. https://doi.org/10.3390/antiox6040091.