INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print), 2222-5234 (Online)
http://www.innspub.net
Vol. 16, No. 5, p. 319-326, 2020

RESEARCH PAPER OPEN ACCESS

Pinto peanut Meal: Its Potential as Dietary Supplement for Philippine Mallard Ducks

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Key words: Itik Pinas, *Anas platyrhynchos, Arachis pintoi*, Economic analysis, Poultry nutrition.

http://dx.doi.org/10.12692/ijb/16.5.319-326 Article published on May 28, 2020

Abstract

The use of leguminous species as feed supplements is now recognized in poultry and farm animals. A study on the graded levels of pinto peanut meal enriched in duck ration was conducted to evaluate the potential of Pinto peanut meal on the production performance of Philippine Mallard Ducks. A total of 64 female Itik Pinas Kayumanggi were used as experimental animals. Birds were randomly distributed into four dietary treatments with T_1 (0%), T_2 (5%), T_3 (10%) and T_4 (15%) inclusion of Pinto peanut meal replicated four times with four birds every replication. The parameters considered in the study were average body weight gain, average daily gain, voluntary feed intake, feed conversion ratio, and return above feed and chick cost. Data gathered were subjected to One-way Analysis of Variance (ANOVA) in Completely Randomized Design using Statistical Package for Social Science (SPSS) version 17.0 software. Results showed no significant differences ($p>0.05$) in all parameters of the study. However, results revealed that the inclusion of 15% pinto peanut meal in the duck ration can improve growth and disclosed a bright prospect for mallard ducks.

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Introduction

Duck production is widespread in Asia and account for 82.5% of the total duck meat production in the world and rank next to chicken for meat and egg production (Jha *et al.* 2017). In the Philippines, ducks were mainly raised in backyard farms, and for the last five years, duck egg production increased at an average rate of 2.9% annually (PSA, 2018). Many entrepreneurs ventured into duck farming because of its advantages, specifically that it doesn't require expensive and elaborate housing facilities which needed little space for rearing purposes. It can thrive in a wide range of climatic and nutritional conditions (Chang and Dagaas, 2004), resistant to avian diseases, and feed on a variety of feeds.

The Philippine mallard duck (*Anas platyrhynchos* Lin.) is one of the most common avian species raised by the entrepreneurs as a source of income. The mallard duck eggs can be sold fresh or boiled and demand higher prices than commercial chicken eggs. The egg size is large, thick shells, and with a unique flavor that is suitable for processing into value-added products such as century, salted, boiled, pickled, and balut which is popular street food in the Philippines (Ampode and Espina, 2019).

In 2017, the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development of the Department of Science and Technology (DOST-PCAARRD) and the National Swine and Poultry Research and Development Center of the Bureau of Animal Industry (BAI-NSPRDC) developed a genetically superior breeder duck known as *Itik Pinas* (IP). It can produce more eggs up to 55 pieces per duck per year over that of the traditional mongrel ducks. IP eggs usually weigh 65 grams or more (Parungao, 2017).

The strains of Itik Pinas are products of systematic breeding and selection which focus on the homogeneity of physical characteristics and address the low and inconsistent egg production performance (Parungao, 2017). Itik Pinas has three developed strains – two of which are pure lines known as IP-Khaki and IP- Itim, and one commercial hybrid line the IP-Kayumanggi (Parungao, 2017). The Itik Pinas - Kayumanggi lays an egg for the first time at 20 weeks old and the age at peak of egg production is 29 weeks with laying production of 98% or 266 egg production per duck per year (Davao, 2016). However, the majority of the ducks are raised in the backyard where a traditional system of rearing using local feed sources, a simple cage, and under the free-range system is adopted. Rearing is practiced by moving around areas on empty paddy fields after the rice harvest. In cases where farmers cannot find any shepherding areas, farmers go for an intensive rearing system resulting in low duck egg productivity due to limited feed resources. Thus, ducks are fed with an incomplete diet due to expensive feed costs.

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 becomes a potential for agricultural research.

Pinto peanut (*Arachis pintoi,* Krapov and Greg) is a potential feed supplement for farm animals due to its high protein content. It is also fed in ruminant animals in combination with grasses such as *Pennisetum purpureum* (Crestani *et al.*, 2013), *Brachiaria sp.* (Cab Jiménez *et al.,* 2008), and *Cynodon dactylon* (Paris *et al.*, 2009). Hence, to utilize the abundant leguminous plants in the community, this study was conducted to ascertain the potential of feeding graded levels of pinto peanut meal on the production performance of Itik Pinas Kayumanggi.

Materials and methods

Experimental birds

The study was carried out in compliance with the standard rearing of farm animals as stipulated in the Good Animal Husbandry Practices of the Philippines

concerning animal farming, health, and welfare. A total of sixty-four (64) day-old itik pinas ducklings were used for 49 days feeding experiment. Experimental birds were purchased from a reliable hatchery farm in Agusan del Sur, Philippines. The experimental birds were selected based on their body conformation and good health status. Ducklings were weighed and randomly distributed to the different experimental pens and housed at the Poultry Experimental Station of the College of Agriculture, Sultan Kudarat State University, Lutayan Campus.

Preparation of experimental pens and housing

Housing with a total floor space area of 100 ft² was constructed with 5 ft² floor space allocated for each pen. A continuous flow of clean water was made available throughout the experiment. Each pen had a separate waterer and feeder to eliminate possible feeding stress. Shed type roofing with one and a half (1 ½) meter clearance was constructed to avoid direct exposure from sunlight and heavy rains. The entrance door in each pen was made to avoid disturbance stress to all birds during feeding. The whole experimental unit was covered with a polyester net with one (1) inch mesh to prevent the entrance of other birds and predators (Membrebe, 2016). Four (4) ducks were placed in each cage. Proper ventilation and sanitation were observed throughout the experiment period to ensure maximum comfort to the birds.

Brooding and rearing management

The day-old chicks were placed immediately in the brooding pen. During the whole duration of the brooding period, old newspapers were used as beddings or litter and regularly changed to maintain a dry and clean pen (Ampode, 2019). Two 50watt electric bulbs were provided as a source of artificial heat until the time when they were able to regulate their body temperature (Catolico and Ampode, 2019). The experimental birds were fed with commercial booster mash during the brooding period (14 days). On the 15th day of brooding, the experimental birds were transferred to the grower cages and the standard feeding program for ducks was followed. Proper sanitation, cleanliness, and daily removal of dung were done to get rid of flies and foul odor.

Sourcing and preparation of Pinto Peanut Meal

The mature pinto peanut is known to be rich in nutrients and amino acids (Table 1). These were collected from full-grown plants propagated within the household areas of Blingkong, Lutayan, Sultan Kudarat. The pinto peanut was chopped into 1 inch and sun-dried. The basis for monitoring dryness was brittleness, texture, and color. About 10-14% moisture content was attained and the dried pinto peanut was pulverized immediately using the hammer mill.

Feeding and water management

The composition of the experimental diet is presented in Table 2. All nutrients met or exceeded the Philippine Recommends for Poultry and Livestock Feed Formulation. The 4 dietary treatments were the basic diet supplemented with 0 (control), 5, 10, and 15% Pinto peanut meal/kg diet. The experimental diet was given every 6:00 in the morning, 12:00 and 3:00 p.m., as *ad libitum* basis. The feed given was weighed, recorded and a separate feed container was provided for every treatment. Feed refuse was collected and weighed. Further, clean drinking water was provided throughout the feeding experiment. The experimental birds were treated equally as to other environmental requirements throughout the experimental period.

Health management

A standard dose of electrolytes and multivitamins was administered via drinking water seven (7) days before the experiment started. This was done to strengthen the immune system of the ducks for management related stress. The disinfection of the experimental pens was done using commercial disinfectants. This was completed seven (7) days before the experiment started allowing seven (7) days downtime period. Cleanliness and proper sanitation were implemented throughout the experimental period. Proper biosecurity measures like setting-up fences were made to avoid entry of unauthorized persons and stray dogs. This likewise minimized disturbance and possible occurrence of diseases during the conduct of

the study.

Cost analysis and statistical analysis

Cost analysis was computed considering the market price of inputs and outputs. All data gathered were subjected to One-way Analysis of Variance (ANOVA) in Completely Randomized Design using SPSS version 17.0 software. Mean body weight was presented using Sigma plot version 12.0 software.

Results and discussion

Body weight gain

The mallard ducks supplemented with varying levels of pinto peanut meal in the duck starter ration revealed no significant differences in the average body weight gain (*p-value* = 0.233) among treatment means (Figure 1). Albeit not significant, numerical data showed a gradual increase in the weights of experimental birds complemented by 5-15% PPM compared to birds with no PPM supplementation.

This result is supported by the findings of Ata (2016) that body weight gain of broilers increased when supplemented with Pinto peanut meal. Moreover, it should be noted that the inclusion of pinto peanut meal can increase the body weight gain of mallard ducks compared to Treatment 1 control or without PPM.

Table 1. Nutrient analysis of Pinto peanut.

Parameters	Values
Dry Matter	21.2
Crude Protein	21.4
Crude Fibre	27.3
Lignin	8.1
Ether extract	1.3
Ash	6.6
Gross energy	19.0
Minerals	
Calcium	15.4
Phosphorus	1.4
Amino acids	
Arginine	4.0
Cysteine	0.8
Histidine	1.7
Isoleucine	3.3
Leucine	6.2
Lysine	4.8
Methionine	1.3
Phenylalanine	4.0
Threonine	3.4
Tryptophan	0.2
Valine	4.2

Source: https://www.feedipedia.org/node/702.

Average daily gain

The average daily gain weight of mallard duck supplemented with varying levels of pinto peanut meal is presented in Table 3. Results revealed no significant difference (*p-value* = 0.232) among treatment means. Although not significant, the daily gain weight of mallard ducks enriched with graded levels of pinto peanut meal showed better results as compared to the control or without pinto peanut meal in the ration.

The results conform to the findings of Yucailla *et. al* (2016) that Pinto peanut supplementation can improve the daily gain in weight of swine.

Table 2. Composition and calculated analysis of duck starter ration.

Feed ingredients	Parts by weight
Ground Yellow Corn	48.00
Rice Bran D_1	16.00
Soybean Meal	24.00
Palm Kernel Meal	5.00
Fish Meal	5.00
Limestones (Fine)	1.00
Dicalcium Phosphate	0.55
Methionine	0.10
Lysine	0.10
Vitamin Mineral Premix[1]	0.10
Salt	0.10
Coco oil	0.05
Total	100.00
Calculated analysis	
Crude Protein (%)	20.93
ME Kcal/kg	3034.30
Calcium	.55
Phosphorus	0.13
Lysine	.79
Methionine	.68
L-Tryptophan	.26

[1]Per 500 grams vitamin premix contains: Vitamin A (150,000 IU), Vitamin D3 (30,000 IU), Vitamin E (500 IU), Selenium (100mg), Potassium Iodide (100mg), Cobalt Sulfate (30mg), Manganese Sulfate (3,700mg), Ferrous Sulfate (1,600mg), Copper Sulfate (1,0500mg), Zinc Sulphate(220mg), DicalciumPhospate (97%), Carrier (q.s.ad).

Table 3. Effect of graded levels of Pinto peanut meal on the growth performance of Philippine mallard ducks.

Parameters	Treatments					
	T1 (0%)	T2 (5%)	T3 (10%)	T4 (15%)	% CV[3]	*P-value*
Feed Intake, g	5808.71 ± 36.13	5786.19 ± 283	5776.08 ± 315	5876.07 ± 100	3.76	0.915^{ns}
ADG[1], g	17.43 ± 0.33	18.07 ± 0.84	17.78 ± 0.67	18.44 ± 0.88	2.98	0.234^{ns}
FCR[2], %	6.85 ± 0.12	6.53 ± 0.12	6.53 ± 0.12	6.45 ± 0.12	8.42	0.364^{ns}

[ns]Means ± SD within the same row are not significantly different (P< 0.05)

[1]Average Daily Gain, [2]Feed Conversion ratio, [3]Coefficient of Variance.

Voluntary feed intake

The voluntary feed intake of mallard ducks supplemented with graded levels of pinto peanut meal in the diet is presented in Table 3. The result of this study showed no significant differences (*p-value* = 0.915) among treatment means. However, birds with 15 % pinto peanut meal in the homemade duck ration got the highest feed consumption among all treatments. The result implies that the increase in feed intake with a higher level of pinto peanut meal could be attributed to the lower digestibility of the nutrients due to its high fiber content. Thus, experimental mallard ducks in Treatment 4 with the inclusion of 15% pinto peanut meal in the duck starter ration tend to eat more to satisfy their nutrient requirements.

Table 4. Return Above Feed and Chick Cost of Philippine mallard ducks supplemented with graded levels of Pinto peanut meal.

Particulars	Treatments			
	T1 0 %	T2 5 %	T3 10 %	T4 15 %
Average Final live weight, kg	1.03	1.06	1.08	1.10
Price/kg live weight (₱)	270.00	270.00	270.00	270.00
Gross return/head (₱)	278.10	286.20	291.60	297.00
Cost of DOC/head (₱)	60.00	60.00	60.00	60.00
Feed Consumption (kg/head)				
a. CBM (kg)	0.35	0.35	0.35	0.35
b. Homemade duck ration (kg)	5808.71	5496.87	5198.46	4995.29
c. Pinto peanut meal (gms)	0	289.30	577.61	881.52
Price/kg of Feed (kg)				
a. CBM (kg)	34.00	34.00	34.00	34.00
b. Homemade duck ration (kg)	19.69	19.69	19.69	19.69
c. Arachispintoi	0	5.00	5.00	5.00
Total Feed Cost (Php)				
a. CBM (kg)	11.90	11.90	11.90	11.90
b. Homemade Ration (kg)	114.37	108.23	102.36	98.35
c. Pinto peanut meal	0	1.45	2.89	4.41
Total Cost (Php)	114.37	109.68	105.25	102.76
Return Above Feed and Chick Cost (PhP)	103.73	116.52	126.35	134.24

This observation conforms with the earlier trials of Chong *et al.* (2008) and Zulkifli *et al.* (2007) that birds fed with high fiber will result in higher feed consumption.

Feed conversion ratio

Feed conversion is the ratio between the total feed consumed over the total weight gain of birds. The lower the value, the more efficient are the birds in converting feed to live weight. Results showed no significant difference (*p-value* = 0.364) among treatment means (Table 3). Although not significant, data revealed that birds with 10 % pinto peanut meal had a higher average feed conversion ratio and lowest FCR was observed in treatment without pinto peanut meal (control).

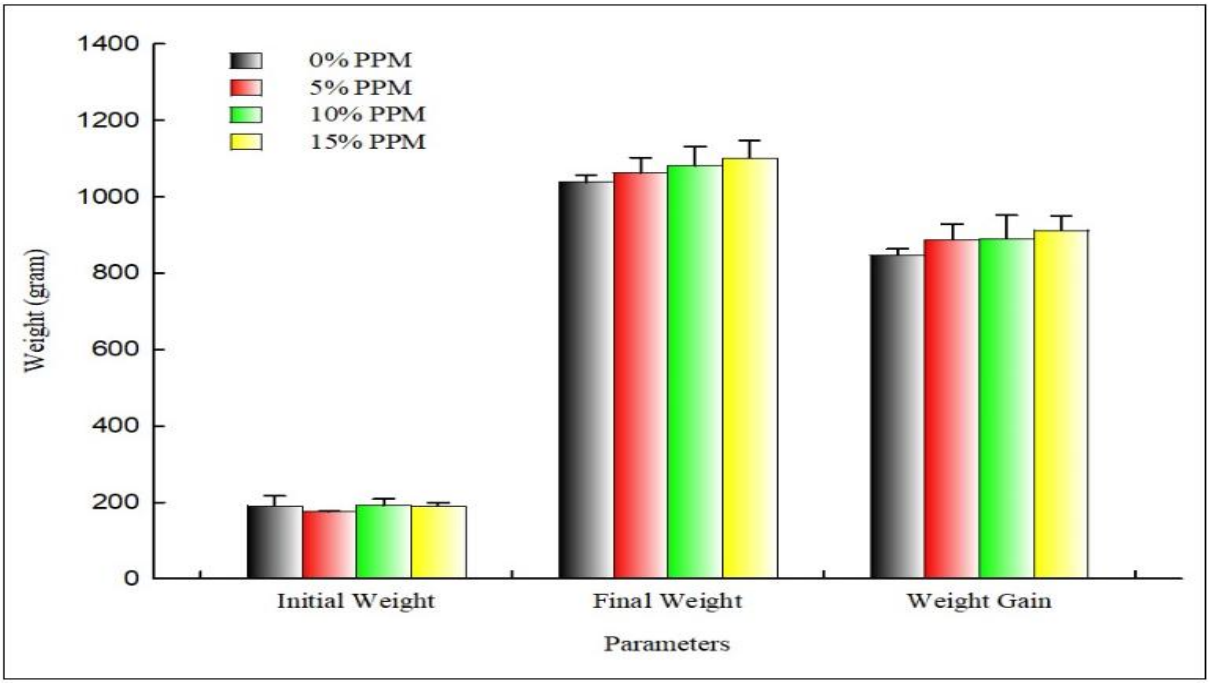

Fig. 1. Effects of Pinto peanut meal on body weight gain of Philippine mallard ducks.

Albeit not significant, birds with the inclusion of 10% pinto peanut meal in the ration had better feed conversion ratio compared to other treatments. This can be correlated with the voluntary feed intake (VFI) of experimental mallard ducks which can be linked to nutritional factors affecting efficiency.

Return above feed and chick cost

The return above feed and chick cost refers to the amount gained using the treatments of the study (Table 4). It shows that the given treatment had a positive or negative impact on profit gaining. Treatment 4 (15% PPM) gave the highest return above feed and chick cost with ₱134.24 followed by Treatment 3 (10% PPM) with ₱126.35; Treatment 2 (5% PPM) with ₱116.52, and the lowest return above feed and chick cost was observed in Treatment 1 (control) with ₱103.73.

This implies that the inclusion of 15% PPM in the homemade duck ration had a higher return of investment as compared to treatments without PPM.

Conclusion

The inclusion of graded levels of pinto peanut meal in homemade duck ration did not significantly influence the different parameters in raising ducks. Consequently, the addition of 15% pinto peanut meal is recommended to improve the profit of raising ducks and promote the efficiency of leguminous plant species as feed supplements. It is further recommended to study the potential of Pinto peanut meal on the laying performance and egg quality traits specifically to Itik Pinas Kayumanggi.

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