SMGroup

International Journal of Animal Science

Research Article

Growth Performance of Broilers Supplemented with Madre De Agua (*Trichanthera gigantea Nees*), Malunggay (*Moringaoleifera Lam*) and Pinto Peanut (*Arachispintoikrap & Greg*) Leaf Meals

Gofredo Jonna P*, Espina Dinah M and Poliquit Angie R

Department of Animal Science, Visayas State University, Philippines

Article Information

Received date: Feb 20, 2018

Accepted date: Apr 04, 2018

Published date: Apr 06, 2018

***Corresponding author**

Gofredo Jonna P, Department of Animal Science, College of Agriculture and Food Science, Visayas State University, Philippines, Visca, Baybay City,

Tel: +63 53 563 7067;

Email: jpgofredo@gmail.com

Distributed under Creative Commons CC-BY 4.0

Abstract

The study was made to assess the growth performance of broilers supplemented with Madre de Agua (*T. gigantea*), Malunggay (*M. oleifera*) and Pinto Peanut (*A. pintoi*) leaf meals. Seventy-two (72) male Cobb broilers randomly assigned to four treatments and replicated six times with three birds per replication laid out in a Completely Randomized Design set-up. Data gathered were subjected to one-way Analysis of Variance (ANOVA) using Statistical Tool for Agricultural Research (STAR) 2.0.1 and treatment means compared using Least Significant Difference (LSD) Test. The inclusion of 10% leaf meal into the starter and grower rations commenced on the 3rd week until five weeks old. From day 1 to day 14 of the brooding stage, broilers were given chick booster, which gradually shifted to treatment diets from day 15 to 21. The 10% Malunggay Leaf Meal (MLM) inclusion showed significantly ($p<0.01$) lower average feed intake. The control with commercial ration alone consistently displayed highest feed intake. Higher ($p<0.05$) ADG was noted on commercial ration, and lowest ADG on 10% Arachis Leaf Meal (ALM). Better ($p<0.05$) average FCE on commercial ration than rations with leaf meals. Heavier ($p<0.05$) fasted live weight and dressed weight on commercial ration but dressing percentage was not significant. Relatively lower ($p<0.01$) feed cost, but lower ($p<0.05$) ROI on rations with leaf meals.

Supplementation of leaf meals from different plant sources at 10% level of inclusion reduced feed cost; however, it could not offset the higher gain in weight on commercial ration that resulted to significantly Higher Return on Investment (ROI).

Introduction

Broilers have been heavily selected for high juvenile growth rate, breast-meat yield and efficiency of feed conversion. Specifically, these are raised for meat production under intensive production system using commercial feed ration. However, broiler production cost has gone up substantially in recent years due to the increase in price of feed ingredients [1]. The search for cheap, locally available and equally nutritive feed sources to partially substitute commercial poultry diet has never been more pressing [2,3]. Plant proteins are good sources of dietary fiber and essential amino acids in the diet. Several plant protein sources, like Madre de Agua *(Trichantheragigantea Nees.),* Malunggay (*Moringaoleifera Lam.)* and Pinto Peanut *(ArachispintoiKrap & Greg)* were reported to have good nutritional attributes. Some authors Rosales et al., Nguyen Xuan Ba et al., [4-6] revealed that madre de agua foliage is relatively rich in protein (13 to 22% DM) and has a good balance of amino acids. Yameogo et al., [7] noted that malunggay leaves contained 27.2% protein with its amino acid composition and protein digestibility as well as soybean [8]. Fresh pinto peanut forage has a protein content ranging from 18 to 25 % DM as studied by some authors Hess et al., Valentimet al., Ferreira et al., Silva et al., Khamseekhiewet al., Ladeiraet al., [9-14] Significant and positive effects on the exploitation of these plant protein sources as animal feed were observed particularly in ruminants. However, published studies regarding the utilization and inclusion of these plant protein sources in broiler diet were limited. Hence, this study to assess the performance of broilers supplemented with leaf meals from different plant sources was conducted.

Materials and Methods

The experiment was carried out at the Poultry Project of the Department of Animal Science-College of Agriculture, Visayas State University, Visca, Baybay City, and Leyte from April to May 2015.

Source and processing of different leaf meals

Fresh Madre de Agua (*T. gigantea*), Malunggay (*M. oleifera*) and Pinto Peanut (*A. pintoi*) leaves with stems were collected from established small-scale plantations in Visayas State University,

OPEN ACCESS

ISSN: 2575-7806

Visca, Baybay City, and Leyte. The leaves were carefully separated from the stems, dried under direct sunlight for about 4 hours and processed into leaf meal using hammer mill. The Trichanthera Leaf Meal (TLM), Moringa Leaf Meal (MLM) and Arachis Leaf Meal (ALM) were mixed with the commercial ration a day before the start of the feeding trial. Dietary ration containing leaf meal from different plant sources were prepared weekly and stored at room temperature.

Experimental diets

The inclusion of 10% leaf meal into the commercial ration was used as follows: T0 - Commercial ration, without supplement (Control)

T1 - Commercial ration with 10% Trichantera Leaf Meal (TLM)

T2- Commercial ration with 10% Moringa Leaf Meal (MLM)

T3 - Commercial feed ration with 10% Arachis Leaf Meal (ALM)

Experimental birds

A total of seventy-two (72) day-old Cobb Strain straight-run chicks were weighed and randomly transferred to the experimental cages to the feeding trial. The standard period for gradual shifting of diet from pure commercial ration to experimental diets was followed. The inclusion of 10% leaf meal into the starter and grower rations started on the third week until five weeks old (35 days). Birds were fed with the treatment diets twice a day, 6:00 AM and 3:00 PM, and fresh drinking water was provided at all times. After weighing the birds individually as their initial weights, they were also weighed individually in a weekly basis during experimental period. Feed intake was recorded daily. Weight gained and Feed Conversion Ratio (FCE) was calculated at the end of the experiment. Vaccination and other poultry management practices were carried out as well.

Dressing percentage

After the 35-day feeding trial, a total of 48 broilers with 12 broilers from each treatment were weighed and slaughtered. It is the carcass weight after evisceration and all blood, feathers and scales were removed as a proportion of the bird's live weight. Upon determining the fasted live weight and dressed weight of experimental birds, dressing percentages were determined as well. And this was computed as the quotient of fresh carcass weight and fasted final live weight multiplied by 100.

Statistical Analysis

Data gathered were subjected to one way Analysis Of Variance (ANOVA) and comparison of treatment means was done using Least Significant Difference (LSD) Test. Analysis was carried out using the Statistical Tool for Agricultural Research (STAR) 2.0.1.

Results and Discussion

The feed intake of broilers supplemented with leaf meals from different plant sources are presented in Figure 1. Results revealed that the inclusion of any of the leaf meals (*T. gigantea, M. oleifera, A. pintoi)* had no significant effect on voluntary feed intake of broilers at weeks 3 and 4. However, broilers fed with commercial ration alone (control) had the highest ($p < 0.01$) feed intake specifically at week 5. Sarria et al., [15] mentioned a decrease in feed intake was observed when *T. gigantea* leaf meal was supplemented in broilers' diet. The trend on the weekly feed intake was similar on all treatments showing increasing fed intake from week 3 to week 4, but decreasing feed intake going the week 5 probably because the birds were growing fast going to week 4, and tend to decrease and level off in the last week of the growing period thus the reason for giving finisher ration.

Rations with leaf meal supplements were did not differ significantly from each other (Figure 2). It should be noted that broilers fed commercial ration obtained the highest ($p>0.01$) final body weight (1066.67 g) at 35 days old, and lowest on broilers supplemented with 10% ALM (877.78 g). Morbos [16] mentioned lower cumulative weekly weight gains on native chickens supplemented with increasing level of *T. gigantean* leaf meal, while Abbas and Ahmed [17] reported insignificant effect on weight gain when *M. oleifera* leaf meal was supplemented on broilers' diet.

Average daily gain of broilers (Figure 3) supplemented with leaf

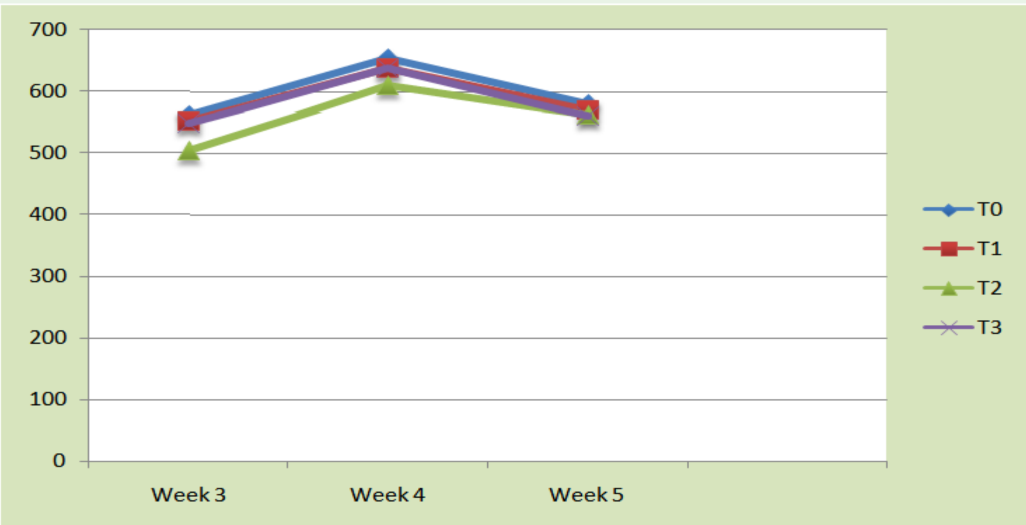

Figure 1: Feed intake (g) of broilers supplemented with leaf meals from different plant sources *(T. gigantea, M. oleifera, A. pintoi)* from weeks 3 to 5.

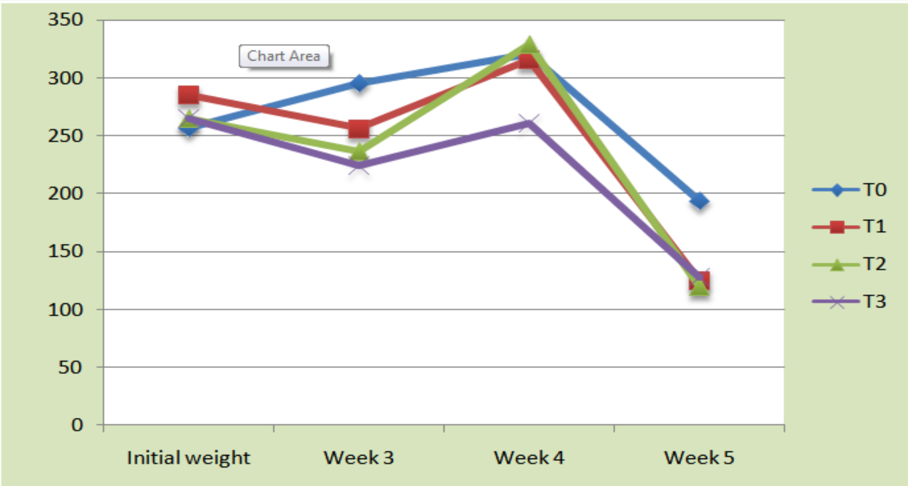

Figure 2: Weekly weight gain (g) of broilers supplemented with leaf meals from different plant sources (*T. gigantea, M. oleifera, A. pintoi*).

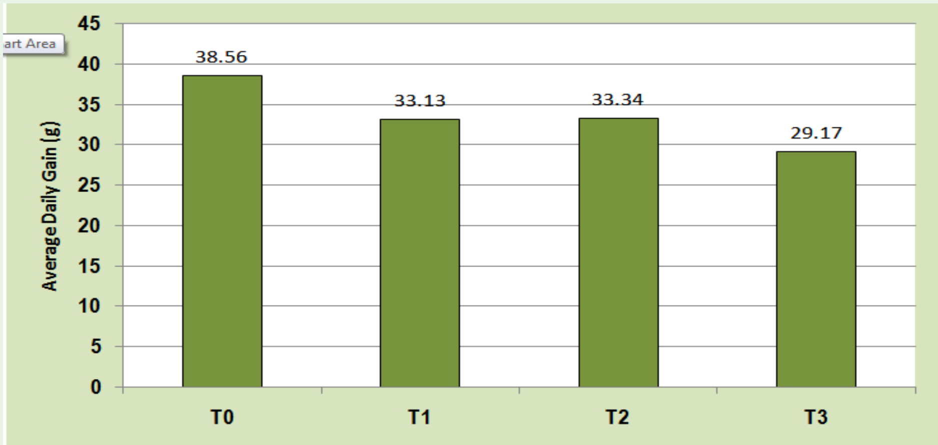

Figure 3: Average daily gain of broilers supplemented with leaf meals from different plant sources (*T. gigantea, M. oleifera, A. pintoi*).

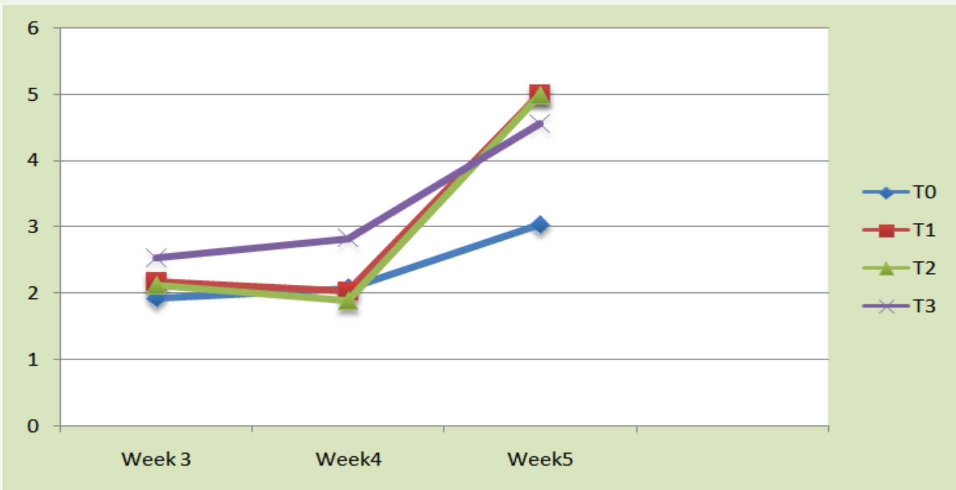

Figure 4: Feed conversion ratio of broilers supplemented with leaf meals from different plant sources (*T. gigantea, M. oleifera, A. pintoi*).

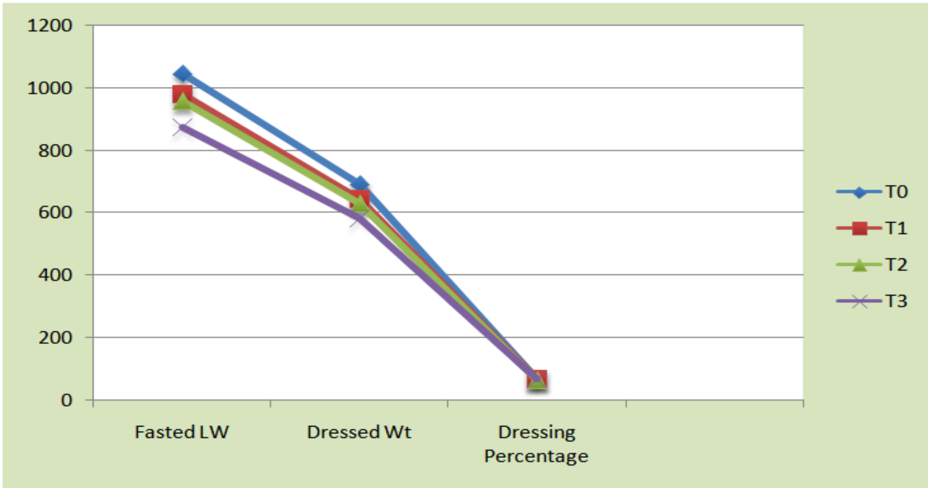

Figure 5: Fasted live weight and dressed weight of broilers supplemented with leaf meals from different plant sources (*T. gigantea, M. oleifera, A. pintoi*).

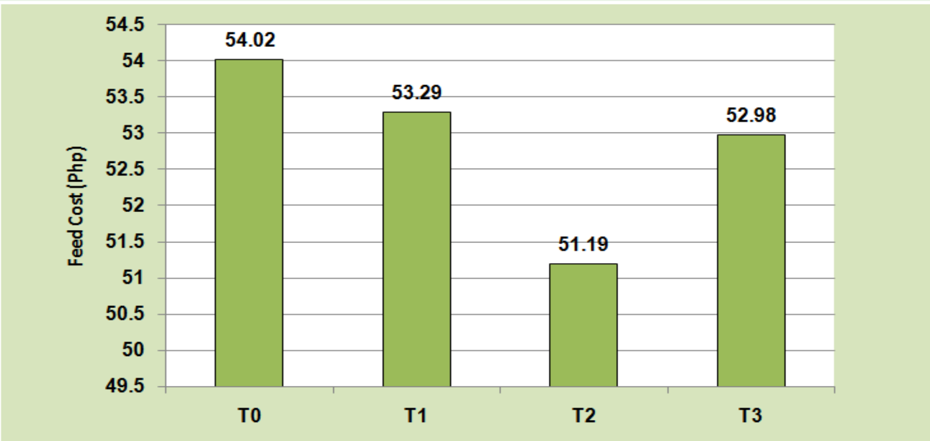

Figure 6: Average feed cost incurred on broilers supplemented with leaf meals from different plant sources (*T. gigantea, M. oleifera, A. pintoi*).

meals from different plant sources *(T. gigantea, M. oleifera, A. pintoi)* disclosed significantly ($p<0.05$) highest ADG on broilers fed with commercial ration alone (38.56 g). It should be noted that lowest ADG was obtained on broilers supplemented with 10% ALM (29.17 g). Morbos [16] stated that the average daily gain of native chicken was not significantly affected by dietary regimes of TLM, and several studies showed the same results that utilization of MLM in broiler diet showed no significant effect [18-20]. In contrast, study conducted by Banjo [21] showed improved performance in terms of growth rate, and Melesse et al., [22] also reported significant ($p > 0.05$) increase in growth rate of Rhode Island Red chicks given MLM. There was no scientific study available on the utilization of ALM in poultry specifically for broiler chickens [23].

Results indicated that broilers with commercial diet performed better over the broilers with leaf meals in the diet (Figure 4). Some studies revealed the same conclusion obtained from the experiment. For instance studies on the inclusion of MLM in broilers' diet by Cwayita and Olugbemi et al., [18,19] showed that its utilization did not produce significant effect on feed conversion ratio. Moreover, the same conclusion was revealed by Juniar et al., and Abbas and Ahmed [17,20] that utilization of MLM at 10% did not produce positive effect on feed conversion ratio.

Generally, heavier fasted live weight and dressed weight were observed on broilers fed commercial ration than those supplemented with leaf meals from different plant sources (Figure 5). The dressing percentage of broilers reflected no significant difference among treatment diets. Juniar et al., [20] supported the result of the study citing that MLM did not produce significant effect on dressing percentage when supplemented in broiler diets showed that dressing percentage is positively genetically correlated to pre-slaughter live weight.

Gross marginis defined as the difference between revenue and cost before accounting for certain other costs. Generally, it is calculated as the selling price of an item less the cost of goods sold [24]. Broilers fed with different leaf meals had relatively lower ($p< 0.01$) feed cost compared to broilers given pure commercial diet (Figure 6). Result further exhibited lowest feed cost on broilers supplemented with

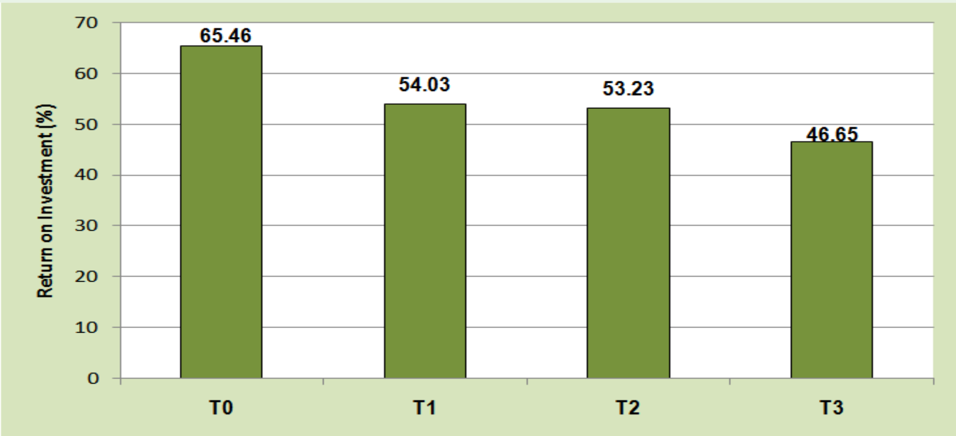

Figure 7: Return on investment of broilers supplemented with leaf meals from different plant sources (*T. gigantea, M. oleifera, A. pintoi).*

Table 1: Gross income, total operating cost, net income and return on investment of broilers supplemented with leaf meals from different plant sources *(T. gigantea, M. oleifera, A. pintoi).*

Treatment	Gross Income (Php)	Total Operating Cost (Php)	Net Income (Php)	Return on Investment (%)
T_0 = commercial feed alone, control	235.03	142.02	93.01	65.46[a]
T_1 = commercial feed + 10% TLM	217.67	141.29	76.38	54.03[ab]
T_2 = commercial feed + 10% MLM	213.38	139.19	74.19	53.23[ab]
T_3 = commercial feed + 10% ALM	206.75	140.98	65.78	46.65[b]
p - value				0.0126

*Column means with no common superscripts are significantly different ($p < 0.05$).

10% MLM (51.19 PhP). It should be noted that the incorporation of leaf meals at 10% level into a commercial ration has the potential of reducing feed cost in broilers without any detrimental effects [25]. This coincides with Moreno [26] who reported that increasing the level of TLM into the diet of commercial hens resulted to a corresponding decrease in total feed cost.

Meanwhile, results presented in Table 1 and Figure 7 displayed slightly lower Return on Investment (ROI) on broilers supplemented with leaf meals from different plant sources. The reduction in feed cost did not offset the higher gain in weight on broilers fed with commercial ration. Broilers supplemented with 10% ALM (46.65%) as the lowest however mentioned other factors like market age and flock size which are negatively and positively associated with net profit, respectively.

Conclusion

Supplementation of leaf meals from different plant sources at 10% level of inclusion in to the commercial ration has the potential of reducing feed cost in broilers without any detrimental effects. However, the reduction in feed cost on broiler rations supplemented with leaf meals could not offset the higher gain in weight on broilers feed with commercial ration which resulted to significantly higher ROI.

References

1. Raghavan V. Malaysia feed industry-issues and challenges. In Proceedings of 3rd International Conferences on Animal Nutrition (ICAN) 2008: Enhancing Feed Utilization through Technology (MARDI Serdang). 2009; 3-14.

2. Preston TR. Tropical Animal Feeding: A Manual for Research Workers. Animal Production and Health FAO, Rome. 1995; 26.

3. Wong HK, Tan SL. Status of the poultry industry in Malaysia. In Food Security Malaysia, AC Soh and HS Yong, eds. (AkademiSains Malaysia, Kuala Lumpur). 2009; 13-23.

4. Rosales M, Rios CI. Research into variation in nutritive value of provenances of Trichanthera gigantea. In: Conf. Electr. FAO Agroforesteríapara la producción animal en Latinoamérica. 1999.

5. Rosales M. Trichanthera gigantea (Humboldt & Bonpland.) Nees: A review. Livest. Res. Rural Dev., 1997; 9.

6. Nguyen Xuan BA, Le Duc Ngoan. Evaluation of some unconventional trees/plants as ruminant feeds in Central Vietnam. Livest Res Rural Dev. 2003; 15.

7. Yameogo CW, Bengaly MD, Savadogo A, Nikiema PA, Traore SA. Determination of chemical composition and nutritional values Moringaoleifera leaves. Pak J Nutr. 2011; 10: 264-268.

8. Caribbean Agricultural Research and Development (Card) Institute. A manual on Integrated Farming Systems. 2010.

9. Hess HD, Monsalve LM, Lascano CE, Carulla JE, Diaz TE, Kreuzer M. Supplementation of a tropical grass diet with forage legumes and Sapindussaponaria fruits: effects on in vitro ruminal nitrogen turnover and methanogenesis. 2003; Aust J Agric Res. 54: 703-713.

10. Valentim JF, Andrade CMS, Mendonça HA, Sales MFL. Speed of establishment of accessions of forage peanut in the Western Amazon. Rev Bras Zoot. 2003; 32: 1569-1577.

11. Ferreira AL, Mauricio RM, Fernandes FD, Carvalho MA, Ramos AKB, Guimaraes R. Ranking Contrasting Genotypes Of Forage Peanut Based On Nutritive Value And Fermentation Kinetics. Anim Feed Sci Technol. 2012; 175: 16-23.

12. Silva VP, De Almeida FQ, Morgado ED, Rodrigues LM, Dos Santos TM, Ventura HT. In situ caecal degradation of roughages in horses. Rev Bras Zootec. 2010; 39: 349-355.

13. Khamseekhiew B, Liang JB, Wong CC, Jalan ZA. Ruminal and intestinal digestibility of some tropical legume forages. Asian-Aust J Anim Sci. 2001; 14: 321-325.

14. Ladeira MM, Rodriguez NM, Borges I, Goncalves LC, Saliba EDS, Brito SC, et al. Evaluation of Arachispintoi hay using in vivo digestibility trial. Rev Bras Zootec. 2002; 31: 2350-2356.

15. Sarria P, Preston TR. A chick assay method for the evaluation of non-conventional protein sources derived from nacedero (Trichantheragigantea) and azolla (Azollafiliculoides). Livest Res Rural Dev.1995; 7: 6.

16. Morbos CE. Growth Performance and Meat quality of Philippine native chickens fed with diets supplemented with different levels of Trichanthera (*Trichantheragigantea*Nees) leaf meal. 2015.

17. Abbas TE, Ahmed ME. Use of *Moringaoleifera*seeds in broilers diet and its effects on the performance and carcass characteristics. Inter J Appl Poult Res. 2012; 1: 1-4.

18. Cwayita W. Effects of feeding Moringaoleifera leaf meal as an additive on growth performance of chicken, physic-chemical shelf-life indicators, fatty acids profile and lipid oxidation of broiler meat. 2013.

19. Olugbemi TS, Mutayoba SK, Lekule FP. Effect of Moringa (Moringaoleifera) inclusion in cassava based diets fed to broilers chickens. Inter J Poult Sci. 2010; 9: 363-367.

20. Juniar I, Widodo E, Sjofjan O. Effect of Moringaoleifera leaf meal in feed on broiler production performance. Jurnal Ilmuilmu Peternakan Brawijaya. 2008; 18: 238-242.

21. Banjo S. Growth and performance as affected by inclusion of Moringaoleifera leaf meal in broiler chick diet. J Biol Agric Healthcare. 2012; 2: 35-38.

22. Melesse AW, Tiruneh T, Negesse. Effects of feeding Moringasteno petala leaf meal on nutrient intake and growth performance of Rhode Island Red chicks under tropical climate. Trop Subtrop Agroeco. 2011; 14: 485-492.

23. CIAT. Biology and agronomy of forage Arachis. CIAT publication 240. Edited by P.C. Kerridge and B. Hardy. Centro Internacional de Agricultura Tropical, Cali (Colombia). 1994; 209.

24. Farris PW, Bendle NT, Peeifer PE, Reibstein DJ. Marketing Metrics: The Definitive Guide to Measuring Marketing Performance. New Jersey, Pearson Education, Inc. 2010.

25. Bestil LC. Broiler performance fed low-protein diets with lysine and methionine supplementation. Proceedings on the 19th Annual Scientific Seminar and Convention as cited by Morbos. 2015.

26. Moreno CKW. Egg Quality and Laying Performance of Commercial Hens fed with Varying Levels of *Trichanther agigantea (*Nees) Leaf Meal. Master's Thesis. Visayas State University. 2015.