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Growth Performance, Blood Dynamics and Sensory Characteristics of Broilers Fed with Madre de Agua (*Trichanthera gigantea*) Leaf Meal

Freddie O. Libatique

Isabela State University

Corresponding author email address: freddie.o.libatique@isu.edu.ph

ABSTRACT

This study was done to examine the influence of Trichanthera gigantea Leaf Meal (TGLM) on broilers. The different treatments used were: T1 – Control Home-mixed Feeds (HF) + 0% TGLM, T2 – HF + 5% TGLM, T3 – HF +10% TGLM, and T4 – HF +15% TGLM. The chicks were dispersed into four (4) treatments and was repeated three (3) times with ten (10) chicks per repetition. A not significant result was noted from the initial up to the 3rd week, however, a highly significant (P<0.001) result was recorded by 10% TGLM and 15%TGLM from the 4th up to the 6th week of study, gain in weight, cumulative feed consumption and FCR of the broilers however, a highly significant (P<0.001) result was obtained by 15% TGLM on the FCE of the broilers. No toxin was found as shown by a not significant result on the liver weight, pancreas weight and blood dynamics (Red Blood Count and Packed Cell Volume) of the broilers. As to the aroma and flavor, feeding of 15% TGLM obtained the rating of "like extremely" from the taste panelists while not significant result was observed on the other sensory parameters with a description of "Like very much ". For the economic examination, broilers fed with 15% TGLM obtained the best return on investment among the imposed treatments.

Keywords *- growth performance, sensory characteristics, trichanthera gigantea*

Introduction

Broiler plays a very vital part in the provision of protein required by man to meet his daily protein requirement and the most popular species reared is broiler because the capital in broiler business is swiftly returned. After all, broilers are reared for a short period, fast converters, efficient feed converters, and unlike pigs, are not discriminated against both religiously and nutritionally. However, the main problem that challenges the broiler raisers is the unstable and high price of feed ingredients.

Approximately 70 % of the total production cost go to broiler feeds, hence are part of major costs in modern broiler production (Sugiharto, 2019). Any increase in the prices of feeds would result in a rise in total cost of production and a subsequent decrease in profit of the broiler industry. Latest research suggests that incorporation of by-products of agro-industry can lessen the cost of a protein and energy source of feed ingredients (Sugiharto and Rajitkar 2019), on the other hand, the high fiber content and low protein content might limit the digestibility of such feed ingredients (Sugiharto, *et al*, 2018a). Similarly, its inclusion in diet can greatly influence the cost of production as well as the growth performance of the broilers (Abdulsalam, *et al*, 2015; Aroche, *et al*, 2018; Mustafa 2019). In contrast, leaf meal have higher crude protein composition over the agro-industrial by-products (Tesfaye, *et al*, 2013; Sugiharto, *et al*, 2018a). This may be an option to lessen the burden of using expensive source of protein as part of ingredients in the broiler diet. Some research observations suggest that leaf meal encompasses numerous bioactive substances (Vergara-Jimenez, *et al*, 2017) which as a positive effect on the health conditions of most animals (Rama Rao, *et al*, 2019). Hence, using leaf meal as source of feed ingredients may not only lessen the

cost of production but it can also boost the wellness of almost all animals.

Nevertheless, broilers seem to respond differently on the percentage of inclusion of leaf meal, subject to the source of leaf meal and ratio of combinations and based from recent findings, the inclusion of 20% *Moringa oleifera* can increase the rate of growth of broilers (Alnidawi, *et al*, 2016), similarly, the addition of 10% *Alchornea cordifolia* leaf meal is suggested without causing any detrimental effect on the performance of most animals (Oloruntola, *et al*, 2018).

Nowadays, as feed price continues to rise, specially the protein-rich feed ingredients, animal nutritionists suggest right proportion of leaf meal as a source of feed ingredients must be included in broiler daily rations (Sebola *et al* 2019; Ubua *et al* 2019).

The feed crises facing the poultry industry in our country strongly indicate the need to investigate and utilize cheap and easily obtainable feed resources. One of such feed resources is *trichanthera gigantea.* The leaves may be fed to farm animals as the solution in the form of leaf meal. Heuzé V et al, (2017) noted that supplementation of 6% *trichanthera gigantea* on the corn grains substituted by rice by-products can improve egg quality and egg production of layers. In contrast, the inclusion of 15% T. gigantea leaf meal on the diet of broilers obtained the best feed conversion efficiency (FCE) compared to commercial feeds which obtained the highest feed consumption resulting to poor FCE and return above feed and chick cost (Francisco & Buctot, 2018). Morbos *et al*, (2016) found that although TGLM is palatable, it is not enough to augment the nutrients requirements for a similar weight gain with the commercial feeds thus, it is suggested that 5-10% level is realistic.

Trichanthera is abundant in the humid tropical environment. The leaf of *trichanthera gigantea* has a crude protein, ranging from 18-22 % These are true proteins and a good amino acid which were directly absorb in the animal body. Trichanthera leaves has 2.8% crude fat, 4.4% crude fiber, 19.7% ash, and 37.0% NFE.

The result of the study would be of help to poultry farmers especially those living in far-reaching areas by offering them alternatives to reduce their feedstuffs expenses by utilizing this unconventional protein and energy source. Hence, the need to conduct this research to investigate the potential use of *Trichanthera Gigantea* leaf meal in broiler production.

Objectives

Generally, the study was made to assess the performance of broilers fed ration with varying percentage of *trichanthera gigantea* leaf meal.

Specifically, it aimed:

1. To find out the best percentage of Trichanthera leaf meal inclusion that influence the performance of broilers; and
2. To find out the economics of using *trichanthera gigantea* leaf meal in terms of return above feed costs.

Methods

Experimental Poultry House

The broiler house was constructed with semi-permanent materials with G.I. sheet roofing, lumber, plastic chicken wire, and sliced plastic chicken wire was used in the study.

Before the arrival of the chicks, a dimension of 15 X 10 feet (5 x 2 feet per cage) brooder house was constructed to accommodate the 120 heads of day-old Cobb broiler chicks at 10 heads per cage for the brooding period. The brooder cage was provided with an old newspaper that served as feeding troughs for the chicks in the first three days of their life. It was changed daily to avoid the mixture of feces with the feeds. The brooder cage was provided with a 50-watt bulb to warm up the chicks during cold weather and nighttime. The brooder cage was curtained with canvas to avoid exposure to extreme conditions. The brooder house was also used as a growing house in order not to bring stress to chicks when transferring.

Collection and Preparation of Trichanthera gigantea) Leaf Meal

Leaves of *trichanthera gigantea* were gathered within the vicinity of Isabela State University, Echague, Isabela. The leaves were totally air-dried at 12% moisture content for 5 days, and finely ground. Ground *trichanthera gigantea* leaves were mixed with other ingredients to compose the home mixed feeds for the broilers based from the imposed treatments.

Experimental Design

The chicks were dispersed by four (4) treatments and was repeated three (3) times with ten (10) chicks per repetition. It was arranged as follows;

T1 (control)- Home mixed ration without Madre de Agua (Trichanthera gigantean) leaf meal
T2 – Home mixed ration with 5 % Madre de Agua (Trichanthera gigantean) leaf meal
T3 – Home mixed ration with 10 % Madre de Agua (Trichanthera gigantean) leaf meal
T4 – Home mixed ration with 15 % Madre de Agua (Trichanthera gigantean) leaf meal

Health and Sanitation

The poultry house was cleaned daily. The waste of the experimental birds was disposed properly to prevent contamination and infestation of pests and existence of diseases.

Feeding Management

The experimental birds were fed with Home-mixed starter feeds with *trichanthera gigantea* leaf meal every feeding period base on the imposed treatments in Treatment 1, Treatment 2, Treatment 3, and Treatment 4. Feeding was *ad libitum* and light was provided to facilitate good sight when feeding at night.

Feed Formulation

An all-mash starter (20% CP) home-mixed feeds were formulated in the study. The ingredients used were the common feedstuffs which are abundant in the locality with the inclusion of the different levels of *trichanthera gigantea* (Tab. 1).

Table 1. The Experimental Diets.

Ingredients	Treatments			
	T1	**T2**	**T3**	**T4**
Maize Bran (37% starch)	56.84	54.02	51.16	48.31
SBM 44/7	26.00	24.70	23.40	22.10
Rice bran 1-9%	9.00	8.55	8.10	7.65
Fishm. (S.Am.)	1.00	0.95	0.90	0.85
Molasses (Cane)	2.00	1.90	1.80	1.70
DiCalc.Ph.	0.45	0.43	0.40	0.38
Limestone	1.83	1.74	1.65	1.55
Salt	0.30	0.29	0.27	0.25
DL-meth.	0.08	0.07	0.07	0.06
Used oil	2.50	2.35	2.25	2.12
Trichanthera gigantea	0.00	5.00	10.00	15.00
Total	100.00	100.00	100.00	100.00

Table 2. Analysis of the Experimental Diets.

Crude Prot.	20.01	20.01	20.01	20.00
Lysine	1.10	1.05	1.00	0.94
Methionine	0.42	0.40	0.38	0.35
Calcium	1.00	0.97	0.94	0.90
Phosphorus	0.70	0.67	0.64	0.60
Crude Fiber	5.65	5.38	5.10	4.83
Metabolized Energy	2532.66	2567.31	2605.44	2643.59

Providing Drinking Water

Freshwater was made available to the birds at all times. There were no multivitamins, antibiotics, and other synthetic chemicals that were mixed into the drinking water.

Data Gathering

A. Growth Parameters

The following data were gathered and recorded for analysis and evaluation:

1. Initial and weekly body weight

The initial body weight of the day-old chicks was taken 4 hours after their arrival. Thereafter, the body weight was recorded weekly up to the end of the experiment.

2. Feed consumption

The weekly feed consumption of the birds in the different treatments was carefully recorded by considering data of the amount of feeds given and the left-over. The left-over was deducted from the total feeds given in order to determine the actual feed consumed.

3. Gain in weight

The gain in weight of the birds was taken by subtracting the initial weight of the birds from the final weight.

4. Feed conversion ratio and efficiency

The feed conversion ratio and efficiency of the birds was determined by using the Biddle and Juergueson's formula which are as follows:

$$\text{FCR (kg)} = \frac{\text{feed consumed}}{\text{gain in weight}}$$

$$\text{FCE (\%)} = \frac{\text{gain in weight}}{\text{feed consumed}} \times 100$$

5. Average dressing percentage (with and without giblets)

One (1) sample from each replication was taken and given corresponding tags in the shank. The weight of the samples was properly recorded which serves as basis in computing the dressing percentage of the birds with and without giblets.

6. ***Liver and Pancreas***

The data on liver and pancreas weights were gathered and make as a basis in determining any possible toxic substance present on the supplement feeds.

7. Return Above Feed and Chick Costs

The return above feed cost was computed at the end of the experiment by considering the value of the bird per head less the cost of feeds and additives consumed.

B. Blood Collection

Blood collection was conducted at the end of the experimental for the hematological parameters. A 3 ml blood was extracted from the wing vein. Prior to collection, the area was sterilized by a 20% zonrox diluted in water. The blood was placed in rubber top vacutainers containing Ethylenediamine tetraacetic acid (EDTA). Red blood cell count was performed using the hemocytomer method. A portion of the uncoagulated blood was aspirated into a hematocrit tube and it was centrifuged at a rate of 10,000rpm for 5 minutes. The samples were analyzed using the hematocrit tube reader.

Blood samples were sent to the 4J Clinical Laboratory #13 City Road, Calao West, Santiago City Isabela for hematological evaluation.

This evaluation was done to examine the health status of the broilers under study specifically the red blood cell count and packed cell volume. Whether the RBC and PCV were on the normal values which is a good indicator that they are not suffering from any abnormalities specifically anemia brought about by improper nutrition and toxicity.

C. Sensory Characteristics

One (1) broiler breast meat from each replication was selected at random, properly prepared and cooked for 1 hour in an oven at 75 degrees Celsius. The samples were cooked without as it is (no seasoning or flavoring) for a credible examination of real samples by the taste panelists.

There were fifty (50) professional taste panelists composed of faculty and staff at Isabela State University, Echague Campus. They were asked to differentiate the taste of the meat in the taste test chamber without knowing which were under the control and the experimental samples respectively. Questionnaires were provided for their evaluation on general appearance, aroma, flavor, juiciness and tenderness. A hedonic scale was used with 9 "Like extremely" 8 "Like very much" 7 "Like moderately" 6"Like slightly" 5 "Neither like or dislike" 4 "Dislike slightly" 3 "Dislike moderately" 2 "Dislike very much" and 1 "Dislike extremely".

Statistical Analysis of Data

All data gathered were analyzed using the Analysis of Variance (ANOVA) following the Completely Randomized Design (CRD). The Least Significant Differences (LSD) was used to test the significance among the treatment means.

Results

A. Growth Parameters

1. Body Weights. The initial and weekly body weights of broilers fed ration with *trichanthera gigantea* leaf meal (TGLM) is presented in Table 3.

A not significant result was recorded starting the initial week up to the 3rd week of the experimental study however, a highly significant *(P<0.001)* result was obtained by T3 and T4 on the 4th, 5th, and 6th week of the study. The data (Tab. 3) showed that the inclusion of 10 % and 15 % *trichanthera gigantea* leaf meal produced the heaviest body weights.

The effect of nutrition on the experimental animals was similar to the findings of Sebola, *et al*, (2019) that as feed price continues to rise, specially the protein-rich feed ingredients, animal nutritionists suggest right proportion of leaf meal as a source of feed ingredients must be included in broiler daily rations

Table 3. Initial and Weekly Body Weights of Broilers Fed Ration with Varying Percentage of *Trichanthera gigantea* Leaf Meal (TGLM)

TREATMENTS	Initial (grams)	WEEKLY BODY WEIGHTS (grams)					
		1st	2nd	3rd	4th	5th	6th
T1 – 0% TGLM (Control)	41.10	125.24	321.74	366.26	604.93b	816.18b	1336.81b
T2 – 5% TGLM	41.10	124.63	342.85	440.29	633.76b	894.77b	1395.67b
T3 – 10% TGLM	41.10	117.51	339.47	438.00	684.63a	970.62a	1547.40a
T4 – 15% TGLM	41.10	122.56	329.40	448.00	752.43a	1072.7a	1667.94a
ANOVA RESULT	ns	ns	ns	ns	**	**	**
C.V. (%)	0.34	5.79	3.60	8.38	3.75	3.76	3.45
LSD					48.88	68.38	99.31

ns = not significant ** = highly significant

2. The gain in Weight. The gain in weight of broilers fed ration with *trichanthera gigantea* leaf meal (TGLM) is presented in Table. 4.

The total gain in weights at the 6th week of the study was significantly affected by the inclusion of TGLM on their diets. The birds fed with (T3)10% and (T4) 15% TGLM obtained the highest total gain

weight with means of 1533.30 grams and 1626.84 grams, respectively (Table 4).

The diets used in this study signify that as the treatment level increased, a high increase in gain in the weight was also observed because of their palatability and nutrients contents, supporting the findings of Heuzé et al (2017) which revealed that TGLM contains several nutrients necessary for poultry and livestock. The crude protein contents in leaf meals is much higher than farm by-products (Tesfaye *et al*, 2013; Sugiharto, *et al*, 2018a). It has been acknowledged that specific foliages contain several bioactive compounds that are advantageous to the health of chickens (Rao et al, 2019). These compounds include vitamins, phenolic acids, flavonoids, isothiocyanates, tannins as well as saponins (Vergara-Jimenez, *et al*, 2017). The increasing level of *trichanthera gigantea* brought positive effect on the gain in weight of birds (Francisco F. Buctot Jr., 2018).

Table 4. Gain in Weight of Broilers Fed Ration with Varying Percentage of *Trichanthera gigantea* Leaf Meal (TGLM)

TREATMENTS	Gain in Weight (grams)
T1 – 0% TGLM (Control)	1295.61b
T2 – 5% TGLM	1354.57b
T3 – 10% TGLM	1533.30a
T4 – 15% TGLM	1626.84a
ANOVA RESULT	**
C.V. (%)	13.24
$LSD_{0.01}$	98.24

** = highly significant

3. Feed Consumption. Table 5 presents the weekly and cumulative feed consumption of broilers fed ration with TGLM.

A not significant result was observed on the feed consumption of the birds from the 1st week up to the 6th week of the experimental study. This result was synonymous with the finding of Naghshi, *et al*. (2014). Moreover, the inclusion of 5-15% azolla did not significantly affect the broilers' feed consumption. Siswanto *et al.* (2017) who conducted an economic analysis of male broiler chickens fed diets supplemented with 6-18% *Salvinia molesta*

However, a highly significant *(P<0.01)* result was noted on the cumulative feed consumption of the birds which means, minute differences if accrued will appear. T1 with a mean of 2548.33 grams consumed the highest amount of feeds which was comparable with T2 with a mean of 2530.63 grams. T4 consumed the least amount of feeds with a mean of 2449.33 grams which was comparable with T3 with a mean of 2476.13 grams.

Table 5. Weekly and Cumulative Feed Consumption of Broilers Fed Ration with Varying Percentage of *Trichanthera gigantea* Leaf Meal (TGLM)

TREATMENTS	WEEKLY FEED CONSUMPTION (grams)						Cumulative
	1st	2nd	3rd	4th	5th	6th	
T1 – 0% TGLM (Control)	98.43	180.10	350.13	466.33	683.53	769.80	2548.33a
T2 – 5% TGLM	99.00	210.37	324.87	461.67	653.33	781.40	2530.63a
T3 – 10% TGLM	96.53	194.67	307.03	454.97	639.07	783.87	2476.13b
T4 – 15% TGLM	107.80	202.77	319.33	467.50	647.23	704.70	2449.33b
ANOVA RESULT	ns	ns	ns	ns	ns	ns	**
C.V. (%)	10.47	9.72	6.42	1.19	5.72	4.65	0.34
LSD							0.162

ns = not significant ** = highly significant

4. Feed Conversion Ratio (FCR) and Feed Conversion Efficiency (FCE). The feed conversion ratio and the feed conversion efficiency of broilers fed ration with *trichanthera gigantea* leaf meal (TGLM) is presented in Table 6.

The feeding of TGLM significantly *(P<0.01)* influenced the feed conversion ratio wherein the birds in Treatments 4 and 3 had the better FCR with means of 1.51 kg. and 1.69 kg., respectively. The inclusion of 15% and 10% TGLM has a comparable effect which were better than T2 and T1 because it need only 1.51 kg. and 1.69 kg., respectively to produce 1 kg of weight while T2 and T1 need 1.87 kg. and 1.97 kg., respectively to gain 1 kg. of weight.

A highly significant *(P<0.01)* result was recorded on the FCE of the broilers. The broilers fed with 15% TGLM had the highest FCE with a mean of 66.40%. It is implied that birds' effect with 15% TGLM were efficient in converting feeds into a kilo of meat. The birds fed with 10%, 5% and 0% TGLM were comparable and had the lower FCE with a means of 59.20 %, 53.60% and 50.90%, respectively.

The data show that there was a normal decrease as the rate of inclusion decreases in terms of feed conversion ratio while normal increase as the rate of inclusion increases in terms of feed conversion efficiency which indicates that the birds performed well during the duration of the study. This is incomparable with the findings of Siswanto I S, *et al.* (2017) that the FCR of birds fed with a higher level of Azolla become poorer because of the high fiber and lignin content in the ration. The increasing level of *trichanthera gigantea* brought positive effect on the feed conversion ratio and effciency of birds (Francisco F. Buctot Jr., 2018).

Table 6. Feed Conversion Ratio and Feed Conversion Efficiency of Broilers Fed Ration with Varying Percentage of *Trichanthera gigantea* Leaf Meal (TGLM)

TREATMENTS	Feed Conversion Ratio (kg)	Feed Conversion Efficiency (%)
T1 – 0% TGLM (Control)	1.97a	50.90b
T2 – 5% TGLM	1.87a	53.60b
T3 – 10% TGLM	1.69b	59.20b
T4 – 15% TGLM	1.51b	66.40a
ANOVA RESULT	**	**
C.V. (%)	4.02	3.48

** = highly significant

5. Dressing Percentage. The dressing percentage of broilers fed ration with TGLM is shown in Table 7.

The data showed, the birds fed ration with different levels of TGLM had no variation with the birds in the control. A not significant result was observed on dressing percentage with and without giblets with a mean values ranging from 73.09% to 74.35% and 67.67% to 69.68%, respectively.

The data indicates that there were no significant differences between treatments for dressing percentage with and without giblets of broilers fed ration with different levels of TGLM as shown by almost similar height of bar graphs which is similar with the findings of Languido L.S, *et al.* (2020) that inclusion of oregano leaf meal has no effect on the dressing percentage of broilers. Ansari J, *et al*. (2012) found out that supplementation of leaf meal and antibiotics has comparable effect on broilers from day 1 up to the 28^{th} day.

Table 7. Dressing Percentage with and without Giblets of Broilers Fed Ration with Varying Percentage of *Trichanthera gigantea* Leaf Meal (TGLM)

TREATMENTS	With Giblets (%)	Without Giblets (%)
T1 – 0% TGLM (Control)	73.09	67.67
T2 – 5% TGLM	73.57	68.93
T3 – 10% TGLM	73.69	69.10
T4 – 15% TGLM	74.35	69.68
ANOVA RESULT	ns	ns
C.V. (%)	1.36	1.74

ns- not significant

6. Pancreas and Liver Weights. The pancreas and liver weights of broilers fed ration with different levels of TGLM are shown in Table 8.

The result showed, the different treatments did not affect the weight of the pancreas as reflected by a not significant result with means of 3.5 grams to 5.00 grams.

A similar result was obtained in terms of the weight of the liver wherein the liver of broilers fed with TGLM and the control had the same weights of the liver with means of 33.47 grams and 43.33 grams.

The not significant result implied that the TGLM given to the birds had no toxic components which was also confirmed by Heuzé V., Tran G., Boudon A., Bastianelli D. (2017).

Table 8. Pancreas Weight (grams) and Liver Weights (grams) of Broilers Fed Ration with Varying Percentage of*Trichanthera gigantea* Leaf Meal (TGLM)

TREATMENTS	Pancreas	Liver
T1 – 0% TGLM (Control)	3.50	33.47
T2 – 5% TGLM	4.33	42.50
T3 – 10% TGLM	4.00	37.17
T4 – 15% TGLM	5.00	43.33
ANOVA RESULT	ns	ns
C.V. (%)	15.02	14.01

ns- not significant

7. Return Above Feed and Chick Costs. The return above feed costs of broilers fed ration with *trichanthera gigantea* leaf meal (TGLM) is presented in Table 9. Based on the financial evaluation, broilers fed with 15% TGLM obtained best return on investment among the imposed treatments with ₱110.23 followed by T3 with ₱96.08, and T2 with ₱78.37, The least return of investment was recorded by T1 (control) with only ₱70.25.

The findings is synonymous with the study made by Ubua, *et al.* 2019) that inclusion of leaf meal in the animal diet may lessen expenses in feeds (Sugiharto, *et al.* 2018a; Sugiharto 2019; Sugiharto and Rajitkar 2019). The increasing level of *trichanthera gigantea* brought positive effect on the gain in weight of birds (Francisco F. Buctot Jr., 2018).

Table 9. Return Above Feed and Chick Costs of Broilers Fed Ration with Varying Percentage of *Trichanthera gigantea* Leaf Meal.

ITEM	T1	T2	T3	T4
Average Final Weight of Chicken	1.34	1.40	1.55	1.67
Return per Chicken (Php)*	134.00	140.00	155.00	167.00
Total amount of Feeds Consumed except T. gigantea LM(kg)	2.55	2.40	2.23	2.08
Cost of Homemixed Feeds per kilogram (kg)**	25.00	24.36	23.76	23.17
Amount of T. gigantea LM consumed (Php 5.00/ kg)	0.00	126.50	248.00	367.50
Cost of Feeds Consumed (Php)	63.75	61.63	58.92	56.77
Return Above Feed and Chick Costs (Php)	70.25	78.37	96.08	110.23

*Computed based on current price of chicken at PhP100.00/kg live weight.
** Computed based on the current cost of ingredients used in the study.
*** *trichanthera gigantea* Leaf Meal estimated price at PhP5.00/kg

B. Blood Dynamics. Blood Dynamics of Broilers Fed Ration with varying percentage of *Trichanthera gigantea* Leaf Meal (TGLM) is presented in Table 10.

1. Red Blood Cell (RBC) Count and Packed Cell Volume (PCV)

Analysis of Variance shown a not significant result in RBC count and PCV of broilers fed with varying percentage of TGLM with treatment means ranging from 42.82 cells / µL to 42.99 cells / µL and from 35.35% to 37.92%, respectively (Tab. 11). The RBC counts and the PCV of the different treatments were under the normal values which range of 40.24±4.21 cells / µL for RBC count and *36±1.5% for PCV.

The result of the study confirms that the inclusion of TGLM on the diet of broilers has no negative effect on the health condition instead, it plays a significant role in the good health and wellness of broilers. Likewise, the result of the study was comparable to the observations made by Heuzé V., Tran G., Boudon A., Bastianelli D. (2017) that leaf meals, aside from source of high crude protein, it also contains essential compounds that is beneficial to broilers. As to the saponin content of leaf meal, Manjaniq, *et al*. (2017) discovered that saponin found in Moringa leaf meal can repair and protect the normal functioning of erythrocytes as well as it hinders the destruction of erythrocytes brought about by free radicals. Some leaf meals contain specific bioactive compounds which are favorable for the health of broilers (Rama Rao et al 2019).

Table 10. Red blood Cell Count and Packed Cell Volume of Broilers Fed Ration with Varying Percentage of *Trichanthera gigantea* Leaf Meal (TGLM)

TREATMENTS	RBC Count (cells/ µL) * 40.24±4.21 cells/µL	PCV (%) *36±1.5%
T1 – 0% TGLM (Control)	42.82	35.35
T2 – 5% TGLM	42.89	35.57
T3 – 10% TGLM	42.98	36.70
T4 – 15% TGLM	42.99	37.92
ANOVA	ns	ns
C.V. (%)	0.61	6.63

ns = not significant * = normal values

C. Sensory Characteristics

The sensory evaluation of broilers fed ration with varying percentage of *trichanthera gigantea* leaf

meal (TGLM) was conducted by the group of 50 taste panelists as to appearance, odor, taste, tenderness, juiciness, and acceptability of cooked meat of broilers fed ration with different levels of TGLM is shown in Table 11.

The data showed a not significant result on the general appearance, juiciness, and tenderness of oven-cooked meat of broilers fed with varying percentage of TGLM and was rated "Like Very Much" by the taste panelists, however, a highly significant result (P<0.001) was found out on the aroma and flavor of oven-cooked meat of broilers fed with 15% TGLM and was rated by the taste panelist a qualitative description of "Like Extremely" (Table 11). The results of this analysis were similar with the findings of Mustafa (2019) in the inclusion of 1% *Eucalyptus camaldulensis* leaf meal. The inclusion of 1% *Eucalyptus camaldulensis* leaf meal can enhanced the sensory characteristics in terms of flavor and juiciness of cooked meat. The phenolic substances present in leaf meal can improved the sensory and nutritional potentials of cooked meats (Starčević et al 2015).

Table 11. Sensory Characteristics of Cooked-meat of Broilers Fed Ration with Varying Percentage of *Trichanthera gigantea* Leaf Meal (TGLM)

TREATMENTS	General Appearance	Aroma	Flavor	Juiciness	Tenderness
T1	6.22	6.32b	6.22b	6.32	6.25
T2	6.26	6.36b	6.28b	6.38	6.28
T3	6.32	6.43b	6.37b	6.38	6.36
T4	6.34	6.63a	6.58a	6.42	6.42
GRAND MEAN	6.29	6.44	6.36	6.38	6.33
QUALITATIVE DESCRIPTION	Like very much	Like extremely	Like extremely	Like very much	Like very much
ANOVA	ns	**	**	ns	ns

ns= not significant ** = highly significant

Conclusion and Future Works

Based from the result of the study, it was concluded that the inclusion of 10% and 15% of *trichanthera gigantea* leaf meal (TGLM) on the diet of broilers was economically viable in broiler production because it obtained appreciable result in terms of body weight, gain weight, feed conversion ratio, and feeds conversion efficiency. No toxic effect in the inclusion of TGLM on the ration of broilers as manifested on the insignificant result on the weights of pancreas and liver as well as the blood dynamics (red blood cell count and packed cell volume).

The inclusion of 15% TGLM on the diet of broilers obtained the highest return above feed and chick costs.

The acceptability of the broilers' meat in terms of the different parameters on sensory evaluation were “Like Extremely” and "Like Very Much" which means, the inclusion of TGLM especially at 15% level in the diet of broilers were appropriate as per evaluation of the taste panelists.

B. Future Works

A follow-up experiment applying a higher level of TGLM to verify whether or not it can perform well at optimum level is recommended to come up with more conclusive results.

Ethical Considerations

The author confirms that he has followed all appropriate protocols and regulations for the protection of animals used for scientific purposes. Required laboratory health and safety procedures have been complied with in conducting this study.

Author Bionote

Dr. Freddie O. Libatique is a professor and concurrently the director of the Cagayan Valley Cattle Artificial Insemination Research and Training Center at the ISU Echague. He holds a doctorate in Agricultural Sciences, major in Animal Science.

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