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Malunggay Aqueous Leaf Extract in Broiler Production

Reniel U. Sacramento[1*] and Rommel U. Sacramento[2]

[1]Cagayan State University, Lal-lo Campus, Cagayan, Philippines. E-mail: renielumengansacramento@gmail.com
[2]Teacher 3, Aparri East National High School, Cagayan, Philippines. E-mail: rommel.sacramento@deped.gov.ph

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Abstract

The study was conducted from September 21, 2022, to October 19, 2022. It is aimed to determine the effect of malunggay aqueous leaf extract as dietary supplement on the production performance of broiler chicken. Specifically, it aimed to evaluate its growth response and the economic performance in broiler production. The study was laid out following the Completely Randomized Design (CRD). Seventy-two (72) heads of broiler chicken were used in the four (4) treatments with three (3) replications. The treatments were $Treatment_1$ – Pure water (control), $Treatment_2$ – 120 mL Malunggay Aqueous Leaf Extract (MALE) + 880 mL water, $Treatment_3$ – 150 mL Malunggay Aqueous Leaf Extract (MALE) + 850 mL water and $Treatment_4$ - 180 mL Malunggay Aqueous Leaf Extract (MALE) + 820 mL water. Based on the results of the study, no significant difference was observed in all the parameters tested. However, in terms of final weight, total weight gain, and average daily gain the treatment groups 2, 3 and 4 were better than the control group. Furthermore, in spite of the fact that there no significant difference in terms of dressing percentage, broiler supplemented with 120 mL malunggay aqueous leaf extract had the highest dressing percentage of 74.73 and reached a higher level than the industry standard of 70 – 72%. Therefore, it was concluded that supplementation of malunggay aqueous leaf extract in broilers improved performance in terms of weight gain, feed efficiency, and dressing percentage. It is recommended that further studies be conducted to verify the effect of malunggay aqueous leaf extract as a dietary supplement on the growth performance and carcass quality of broiler chicken.

Keywords: *Broiler production, Malunggay aqueous leaf extract, MALE*

1. Introduction

Broiler production is an important economic sector in most countries, including the Philippines. People rely on poultry production as a source of food and an alternate source of income. According to *Philippine Statistics Authority* (PSA, 2021), the country's total chicken population as of October 1, 2021, was estimated at 190.74 million birds or 2.4% more than the previous year's same period count of 186.33 million birds. Broiler chicken inventory at 64.82 million birds or 34% share. Broiler chicken inventory was highest in Central Luzon with 14.97 million birds. In Cagayan Valley broiler chicken inventory at 1.13 million birds or 1.8% share.

* *Corresponding author: Reniel U. Sacramento, Cagayan State University, Lal-lo Campus, Cagayan, Philippines. E-mail: renielumengansacramento@gmail.com*

However, the advantage of using antibiotics as growth promoters has certain drawbacks, such as medication toxicity, aftereffects, and the emergence of microorganisms resistant to them (Ogbe and John, 2012). Due to these issues, the European Union has prohibited the use of antibiotics as growth promoters (Butaye *et al.*, 2000; Catalá-Gregori *et al.*, 2008). Thus, interest in safe and all-natural substitutes for antibiotics, such as plants (phytobiotics), is growing. According to reports, the leaves of the *Moringa oleifera* plant may include antioxidant phytochemicals including chlorogenic acid and caffeic acid as well as prebiotic benefits (Siddhuraju and Becker, 2003).

The nutritional value of *Moringa oleifera Lam* leaves have been the subject of a significant amount of research, according to Moyo *et al.* (2011), with varying results. A variety of nutrients, including calcium, magnesium, potassium, iron, vitamin A, and vitamin C, have been linked to *Moringa oleifera*, as well as a crude protein content that ranges from 16 to 40% (Foidl *et al*., 2001; Marcu and Pharm, 2005; Rweyemamu, 2006). According to Aregheore (2001), supplementing *Moringa oleifera* can enhance livestock performance by increasing voluntary intake and digestibility. Hence, this study aimed to determine the effect of malunggay aqueous leaf extract as dietary supplement on the production performance of broiler chicken.

2. Objectives of the Study

2.1. General Objectives

Generally, the study aimed to determine the effect of Malunggay Aqueous Leaf Extract (MALE) as dietary supplement on broiler production.

Specifically, it aimed to determine the effect of malunggay aqueous leaf extract interms of gain in weights, feed consumption, feed efficiency, dressing percentage and cost and return analysis.

2.2. Significance of the Study

The results provided science based data and information to farmers, poultry raisers, student researchers and anyone who wants to venture on broiler production using malunggay aqueous leaf extract as dietary supplement.

2.3. Scope and Delimitation of the Study

The study focused on the effects of malunggay aqueous leaf extract as dietary supplement on the growth performance of broiler chicken. The study was terminated when the experimental birds reached the minimum marketable weight of 1.5 kg body weight.

2.4. Time and Locale of the Study

The study was conducted at Cagayan State University Lal-lo Campus, Sta. Maria, Lal- lo, Cagayan from September 21, 2022, to October 19, 2022.

3. Research Methodology

3.1. Materials

The materials and supplies used in the study were seventy two (72) heads broiler chicken, malunggay aqueous leaf extract, brooding cage, feeding and drinking troughs, commercial feeds, electric bulb, hard broom, empty sacks, disinfectant, sprayer, record book, weighing scale, measuring cup and muslin cloth.

3.2. Experimental Design and Treatments

The study was laid out following the Completely Randomized Design (CRD) with four (4) treatments and three (3) replications. Seventy two (72) heads of broilerchicken were used as the experimental birds and randomly distributed in all treatments. Each replication is composed of six (6) experimental birds. The treatments were labeled as follows;

Treatment $_1$ – Pure water (control)

Treatment $_2$ – 120 mL Malunggay Aqueous Leaf Extract (MALE) + 880 mL Water Treatment $_3$ – 150 mL Malunggay Aqueous Leaf Extract (MALE) + 850 mL Water Treatment $_4$ – 180 mL Malunggay Aqueous Leaf Extract (MALE) + 820 mL Water

3.3. Methods

3.3.1. Preparing the Experimental Shed and Cage

The dimension of the experimental shed is 6 m length and 5 m width and 6 m height. The experimental cages with a dimension of 1 m x 4 m each was provided for the experimental birds. Each cage was subdivided into four (4) compartments. The experimental cages were thoroughly cleaned and disinfected seven days before the experimental birds arrived.

3.3.2. Procurement and Selection of Experimental Animals

The experimental birds were purchased from a reliable raisers/hatchery in the community. In selecting the stock, the broiler chicks must have bright eyes, clean, uniform in size, dry naval, and should be active.

3.3.3. Brooding the Experimental Birds

The experimental birds were brooded for fourteen (14) days to provide artificial light and heat source necessary for the growth and development of the chicks. Upon arrival of the experimental birds, they were placed in a brooding cage with a dimension one (1) meter width and two (2) meters length. Clean drinking water diluted with sugar was also given to relieve the experimental birds from transportation stress. The appropriate brooding temperature was also given to maintain the body temperature of the experimental birds. They were fed with chick booster using *ad libitum* feeding throughout the brooding period.

3.3.4. Transferring the Experimental Birds to the Cages

After brooding, the initial weight of the experimental birds was taken before they were randomly distributed to the 4 treatments. The birds were leg banded for identity purposes.

3.3.5. Feeding the Experimental Birds

The experimental birds in all treatments were fed based on the standard feeding requirement. *Ad libitum* method of feeding was done, and any feeds left over were recorded. The ration given were based on the feeding guide as shown in Table 1 below.

Table 1: Feeding Guide in Broiler Chicken Production

Broiler Feeds	Age (Days)	Average Daily FeedIntake
Chick Booster	1 – 7 days	28 – 30 g
	8 – 14 days	48 – 50 g
Broiler Starter	15 – 21 days	76 – 80 g
Broiler Finisher	22 – 28 days	105 g
	29 – 35 days	132 – 135 g
	40 days	152 – 155 g

Source: BMEG Feed Corporation (2021)

3.3.6. Preparation of Malunggay Aqueous Leaf Extract

The malunggay leaves were gathered within the locality. The leaves were air- dried until they reached the desirable dryness and ground into fine particles using an electric blender and sieved in 1mm. Sixty (60) g of the malunggay powder was then soaked in one liter of water for 24 h (Alabi *et al.*, 2017). The fermented solution was filtered using a muslin cloth to separate the debris from the filtrate and the extracts were place in clean containers. Afterwhich, it was diluted using clean water (volume/volume) to form 120, 150, and 180 mL/1000 mL water for Treatments 2, 3 and 4, respectively. This procedure was carried out daily and the filtrate served to the experimental birds in their drinking water.

3.3.7. Phytochemical Screening of Malunggay Aqueous Leaf Extract

The malunggay aqueous leaf extract was submitted to the Central Analytical Laboratory at Cagayan State University, Andrews Campus, Tuguegarao City, Cagayan. To measure the phytochemical composition of malunggay aqueous leaf extract.

3.3.8. Giving Water to the Experimental Birds

Fresh and potable drinking water was provided for the experimental birds. However, for the birds in Treatment 2, 3 and 4 malunggay aqueous leaf extract was mixed in the drinking water as shown in the treatments.

3.3.9. Disease Prevention and Control

The experimental poultry house, cages and its surroundings were cleaned weekly. Disinfection of the housing including the pens were applied before the birds were transferred to their cages to prevent possible multiplication of pathogen and microorganisms. The feeding and drinking troughs were cleaned daily. The animal waste and other waste were collected daily and placed in a used sack to minimize foul odor and properly disposed. A foot bath was provided at the entrance of the experimental house to prevent possible introduction of pest and diseases carried by the visitor and by the researcher.

4. Data Analysis

The data gathered was analyzed using Analysis of Variance (ANOVA) of theCompletely Randomized Design (CRD).

5. Results and Discussion

5.1. General Observation

When the treatments were introduced to the experimental birds, on its first week of treatment, it was observed that there were leftovers of malunggay aqueous leaf extract in treatment groups. However, the experimental birds were able to adapt to their respective treatments.

On the fourth week of the study, due to erratic weather conditions, mortality and morbidity occurred but at a very low rate particularly in Treatment 1 and Treatment 2 only.

5.2. Initial Weight (g)

The initial weight (g) of broiler chicken is presented in Table 2. Experimental birds in Treatment 4 (180 mL MALE + 820 mL water) had the heaviest initial mean weight of 321.67 g. This was followed by Treatment 3 (150 mL MALE + 850 mL water) and Treatment 1 (Pure water (control) with a corresponding means of 320.00 and 315.56 g, respectively. The lightest group of experimental birds was recorded in Treatment 2 (120 mL MALE + 880 ml water) with a mean value of 313.33 g. Analysis of variance reveals no significant difference among the treatments tested.

Table 2: Mean Initial Weight (G) of Broilers Supplemented with Malunggay Aqueous Leaf Extract. CSU, Lal-lo, Cagayan, April to May 2022

Treatments	Mean (g)
T_1 – Pure water (control)	315.55
T_2 – 120 mL MALE + 880 mL water	313.33
T_3 – 150 mL MALE + 850 mL water	320.00
T_4 – 180 mL MALE + 820 mL water	321.67
Statistical Inference – ns CV (%) – 2.02	

5.3. Weekly Weight Increment (g)

The weekly weight increment (g) of broiler chicken supplemented with malunggay aqueous leaf extract is shown in Figure 1. The weekly weight increment on the first, second, and third was increasing. On the other hand, the weekly weightincrement for the fourth week has decreased gradually. The analysis of variance of the weekly weight increment reveals no significant differences among the treatments evaluated.

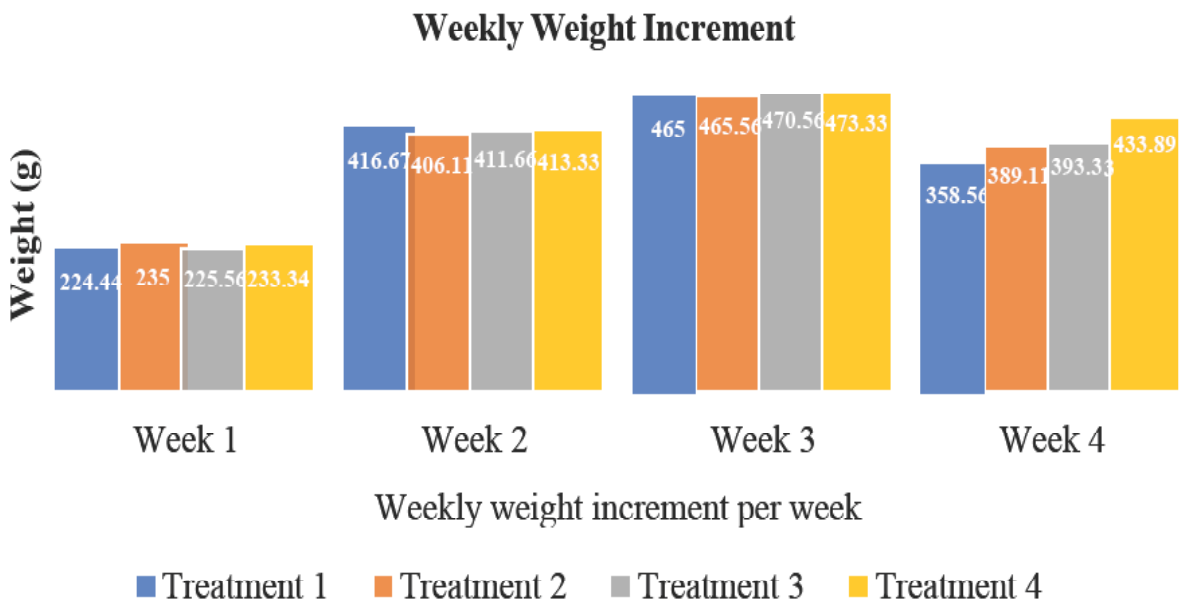

Figure 1: Weekly Weight Increment (g) of Broilers Supplemented With Malunggayaqueous Leaf Extract. CSU, Lal-lo, Cagayan, April to May 2022

5.4. Final Weight (g)

The final weight of the broiler chicken used in the study is presented in Table 3. Experimental birds under Treatment 4 (180 mL MALE + 820 mL water) obtained the highest final weight of 1,875.56 g. This was followed by Treatment 3 (150 mL MALE + 850 mL water) and Treatment 2 (120 mL MALE + 880 mL water) with a corresponding means 1,821.11 and 1,809.11 g, respectively. The lowest final weight was recorded in Treatment 1 (Pure water) with a mean of 1,780.22 g. Analysis of variance showed no significant difference existed among the treatments evaluated.

Table 3: Mean FInal Weight (g) of Broilers Supplemented With Malunggay Aqueous Leaf Extract. CSU, Lal-lo, Cagayan, April to May 2022

Treatments	Mean (g)
T1 - Pure water (control)	1,780.22
T2 - 120 mL MALE + 880 mL water	1,809.11
T3 - 150 mL MALE + 850 mL water	1,821.11
T4 - 180 mL MALE + 820 mL water	1,875.56
Statistical Inference – ns CV (%) – 2.06	

5.5. Total Weight Gain (g)

The total weight gain of the broiler chickens used in the study is presented in Table 4. Experimental birds supplemented with 180 mL MALE + 820 ml water (Treatment 4) obtained the highest total weight gain of 1,553.89 g. This was followed by Treatment 3 (150 mL MALE + 850 mL water) and Treatment 2 (120 mL MALE + 880 mL water) with a corresponding means 1,501.11 and 1,495.78 g, respectively. The lowest total weight gain was recorded in Treatment 1 (Pure water) with the corresponding mean of 1,464.67 g. Analysis of variance showed no significant difference existed among the treatments evaluated.

Table 4: Mean Total Weight Gain (G) of Broilers Supplemented with Malunggay Aqueous Leaf Extract. CSU, Lal-lo, Cagayan, April to May 2022

Treatments	Mean (g)
T1 - Pure water (control)	1,464.67
T2 - 120 mL MALE + 880 mL water	1,495.78
T3 - 150 mL MALE + 850 mL water	1,501.11
T4 - 180 mL MALE + 820 mL water	1,553.89
Statistical Inference – ns CV (%) – 2.30	

5.6. Average Daily Gain (ADG)

The average daily gain (g) of the broiler chicken used in the study is presented in Table 4. Experimental birds supplemented with 180 mL MALE + 820 mL water (Treatment 4) obtained the highest average daily gain of 55.50 g. This was followed by Treatment 3 (150 mL MALE + 850 mL water) and Treatment 2 (120 mL MALE + 880 mL water) with a corresponding means 53.61 and 53.42 g, respectively (Table 5). The lowest average daily gain was recorded in Treatment 1 (Pure water) with the corresponding mean of 52.31 g. Analysis of variance showed no significant difference existed among the treatments evaluated.

Table 5: Mean Average Daily Gain (ADG) of Birds Supplemented with Malunggay Aqueous Leaf Extract. CSU, Lal-lo, Cagayan, April to May 2022

Treatments	Mean (g)
T1 - Pure water (control)	52.31
T2 - 120 ml MALE + 880 mL water	53.42
T3 - 150 mL MALE + 850 mL water	53.61
T4 - 180 mL MALE + 820 mL water	55.50
Statistical Inference - ns CV (%) – 2.30	

5.7. Feed Consumption and Feed Efficiency

Table 6 shows the feed consumption and Feed Conversion Ratio (FCR) of the broilers supplemented with malunggay aqueous leaf extract. In the results of feedconsumption for 28 days feeding, experimental birds under Treatment 1

Table 6: Mean Feed Consumption and Feed Efficiency (FCR) of Birds Supplemented with Malunggay Aqueous Leaf Extract. CSU, Lal-lo, Cagayan. April to May 2022

Treatments	Feed Consumption (g)	Feed Efficiency (FCR)
T_1 – Pure water (control)	2,964.89	2.02
T_2 – 120 mL MALE + 880 mL water	2,960.89	1.98
T_3 – 150 mL MALE + 850 mL water	2,963.56	1.98
T_4 – 180 mL MALE + 820 mL water	2,961.56	1.91
Statistical Inference	ns	ns
CV (%)	0.1211	2.29

(control) consumed the highest amount of ration with a mean of 2,964.89 g followed by Treatment 3 (150 mL MALE + 850 mL water), Treatment 4 (180 mL MALE + 820 mL water) and Treatment 2 (120 mL MALE + 880 mL water) with a mean of 2,963.56 g, 2,961.56 g, and 2,960.89 g, respectively. The results of the analysis of variance showed no significant difference on the feed consumption between the different treatments.

In terms of feed efficiency, experimental birds under Treatment 4 (180 mL MALE + 820 mL water) were the best feed converter, as manifested in the computed FCR of 1.91 compared with the other treatments. This was followed by Treatment 3 (150 mL MALE + 850 mL water), and Treatment 2 (120 mL MALE + 880 mL water) had the same FCR value of 1.98. The poorest feed conversion ratio was recorded in Treatment 1 (pure water) with an FCR of 2.02. Statistical analysis revealed no significant differences.

5.8. Slaughter Weight, Dressed Weight, and Dressing Percentage

The result of slaughter weight dressed weight, and dressing percentage of the broiler chicken used in the study is presented in Table 7. Experimental birds under Treatment 2 (120 mL MALE + 880 ml water) obtained the highest slaughter weight of 1,820.00 g, followed by Treatment 3 (150 mL MALE + 850 mL water) and Treatment 4 (180 mL MALE + 820 mL water) with a corresponding means 1,766.67 and 1,740.00 g, respectively. The lowest slaughter weight was recorded in Treatment 1 (pure water) with a mean of 1,720.00 g.

After dressing, the weights of the carcasses from the treatment 2 obtained the highest dressed weight of 1,360.00 g, followed by Treatment 3 and Treatment 4 with a corresponding means 1,316.67 and 1,290.00 g, respectively. The lowest slaughter weight was recorded in Treatment 1 with a mean of 1,263.33 g.

The dressing percentage of Treatment 2 (120 mL MALE + 880 mL water) obtained the highest dressing percentage of 74.73%. This was followed by Treatment 3(150 mL MALE + 850 mL water) and Treatment 4 (180 mL MALE + 820 mL water) with a corresponding mean 74.44 and 74.10%, respectively. Treatment 1 (pure water) recorded the lowest dressing percentage of 73.32%.

Analysis of variance showed no significant difference in terms of slaughter weight, dressed weight, dressing percentage. However, values of the different treatments on its dressing percentage are apparently higher than the industry standard which is 70-72%.

Table 7: Mean Slaughter Weight (G), Dressed Weight (G), Dressing Percentage (%) of Birds Supplemented with Malunggay Aqueous Leaf Extract. CSU, Lal-lo, Cagayan. April to May 2022

Treatments	Slaughter Weight (g)	Dressed Weight (g)	Dressing Percentage (%)
T_1 – Pure water (control)	1,720.00	1,263.33	73.32
T_2 – 120 mL MALE + 880 mL water	1,820.00	1,360.00	74.73
T_3 – 150 mL MALE + 850 mL water	1,766.67	1,316.67	74.44
T_4 – 180 mL MALE + 820 mL water	1,740.00	1,290.00	74.10
Statistical Inference	ns	ns	ns
CV (%)	7.25	9.07	2.03

Table 8: Cost and Return Analysis of Birds Supplemented With Malunggay Aqueous Leaf Extract. CSU, Lal-lo, Cagayan. April to May 2022

Treatments	Gross Income (₱)	Total Cost of Production (₱)	Net Return (₱)	ROI (%)
T_1 – Pure water (control)	4,806.60	3,372.60	1,434.00	42.52
T_2 – 120 mL MALE + 880 mL water	4,884.60	3,735.49	1,149.11	30.76
T_3 – 150 mL MALE + 850 mL water	4,917.00	3,737.03	1,179.97	31.58
T_4 – 180 mL MALE + 820 mL water	5,064.00	3,735.88	1,328.12	35.55

5.9. Cost and Return Analysis

The cost and return analysis of broilers supplemented with malunggay aqueous leaf extract is shown in Table 8. Based on its result, Treatment 1 (pure water) had the highest Return on Investment (ROI) of 42.52%. This was followed by Treatment 4 (180 mL MALE + 820 mL water) with a total ROI of 35.55%, and Treatment 3 (150 mL MALE + 850 mL water) with a total ROI of 31.58%. The lowest Return of Investment was obtained in Treatment 2 (120 mL MALE + 880 mL clean water) with a total ROI of 30.76%.

6. Summary, Conclusion and Recommendation

6.1. Summary

The study was conducted at Sta. Maria, Lal-lo, Cagayan from September 21, 2022, to October 19, 2022, to determine the effect of malunggay aqueous leaf extract as a dietary supplement on the growth performance of broiler chicken. Specifically, it aimed to evaluate its effect in terms gain in weights, feed consumption, feed efficiency, dressing percentage and cost and return analysis.

The study was laid out following the Completely Randomized Design (CRD). A total of seventy two (72) heads broiler chicken was used in four (4) treatments with three (3) replications. The four (4) treatments were labeled as follows; Treatment 1 (pure water), Treatment 2 (120 mL malunggay aqueous leaf extract (MALE) + 880 mL water), Treatment 3 (150 mL malunggay aqueous leaf extract (MALE) + 850 mL water) and Treatment 4 (180 mL malunggay aqueous leaf extract (MALE) + 820 mL water).

The results of the study revealed no significant difference in all the parameters tested. However, the broiler chickens supplemented with 180 mL malunggay aqueous leaf extract (MALE) + 820 mL water obtained highest final weight, total weight gain, average daily weight, and the most efficient feed converter. In terms of slaughterweight, dressed weight, dressing percentage, Treatment 2 (120 mL MALE + 880 mL water) recorded the highest. For its return on investment, Treatment 1 has the highest, followed by Treatment 4 then Treatment 3, which are 42.52%, 35.55%, and 31.58%, and the least was obtained by Treatment 2 at 30.76% ROI.

6.2. Conclusion

Based on the results of the study, statistically, no significant difference was found in all parameters evaluated. However, adding malunggay aqueous leaf extract to the drinking water as a dietary supplement for the broilers showed positive results in terms of final weight, total weight gain, average daily weight, feed conversion ratio and dressing percentage.

6.3. Recommendation

Based on the results of the study, it is recommended that similar studies be conducted to verify the results generated from this research and that additional data be gathered on the effects of malunggay aqueous leaf extract on growth performance and carcass quality as a supplement for the birds. It is recommended that the malunggay aqueous leaf extract be concentrated and stored properly to prolong its lifespan.

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