

Growth and Performance of Broiler Chickens Supplemented with *Moringa oleifera* Tea

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ABSTRACT

This study explored the potential of *Moringa oleifera* tea in enhancing the growth performance of broilers by evaluating the effect of varying concentration of moringa decoction given as a tea relative to their growth responses (final weight, total gain in weight and growth rate), cumulative feed consumption, feed conversion ratio and dressing percentage and determine which among the specified amount of leaves used for decoction could enhance the given performance parameters. Following the Completely Randomized Design (CRD), 120 day-old broiler chicks per trial were randomly distributed to four (4) treatments with three (3) replications each. Treatments for moringa Tea decoction (weight by volume as grams fresh moringa leaves (FML) per liter of water) were: T₁ (Control) with water soluble commercial vitamin – mineral supplement; T₂: 25 g FML; T₃: 50 g FML and T₄: 75 g FML. ANOVA (p-values) and Least Significant Difference (LSD) were used for data analysis. Broilers given moringa Tea decoction (Trial 1) significantly differed over T₁ (Control) in final weight, total gain in body weight, feed conversion ratio and yielded insignificant dressing percentage (with and without giblets). Trial 2 revealed comparable results in the different performance parameters. The T₃ (50g FML) in moringa Tea decoction gave the best results to broilers. Thus, moringa Tea can be used as an inexpensive and safe alternative nutrient supplement to enhance growth and performance of broiler chicken.

INTRODUCTION

Backyard broiler raising is one productive activity that can help augment family income. A shorter rearing period of broiler chicken means shorter waiting time for their return on investment with a guaranteed market and profit. Thus, broiler raising is a popular past time among rural folks during lull periods in farming. In Quirino province, backyard broiler raising is promoted by the provincial government to help alleviate poverty. Quirino Livelihood for Everyone (Q-LIFE) program has around 200 beneficiaries for the past three years who opted to engage in backyard poultry raising.

While the growth of the commercial broiler industry in the country has been impressive, the backyard broiler farming sector continues to lag behind owing to problems and practices impeding production. Moreover, due to financial constraints, raisers tend to avoid added production costs, like buying vitamin-mineral supplements needed for optimum growth of broilers. Research activities could therefore be geared toward cost-efficient production technology which will also help optimize performance of broilers.

“Malunggay” in the Philippines, “Sajina” in the subcontinent and “moringa” or “horseradish” in English, moringa thrives everywhere and is known to contain beneficial

nutrients. The crude protein (CP) content varies across the plant parts with seeds having the highest CP followed by flowers, leaves, whole plant, stems and pods (Moreki and Gabanakgosi, 2014). The leaves are very rich in carbohydrate, protein, fat, crude fiber, minerals like calcium (Ca), phosphorus (P), iron (Fe) and vitamins β -carotene, A, C, thiamine, riboflavin, niacin (FNRI, 1997). The leaves are also good sources of the amino acids methionine and cysteine (FNRI, 1997). Moringa contains the anti-nutrients tannins, phytates, trypsin inhibitors, saponins, oxalates and cyanide but in negligible level (Ogbe and Affiku, 2013).

While its uses and benefits in humans had been fully established and the dietary supplementation of moringa in poultry is receiving attention, moringa tea as an alternative nutrient supplement for broilers needs to be investigated. Moringa tea could be given to broilers in two forms, as a decoction or powder tea. Considering all the beneficial nutrients it offers and with the current trend towards organic farming, the potentials of moringa tea in enhancing growth and performance of broiler chickens need to be explored.

This study aimed to evaluate the effect of moringa tea (decoction) on the growth and performance of broiler chickens. Specifically, the study intended to: a) assess the effect of moringa decoction offered as a tea to broilers in terms of final weight, total gain in weight, growth rate, cumulative feed consumption and feed conversion ratio; and b) determine which among the specified amount of leaves used for moringa tea decoction could enhance the given performance parameters in broilers

MATERIALS AND METHODS

Experimental Design

120 day old Cobb broiler chicks (100 Cobb broiler chicks for Trial 1) were randomly assigned to four treatments replicated thrice

with 10 birds per replication.

The treatments were as follows:

Moringa Tea Decoction (weight by volume as grams FML per liter of water):

T₁: water soluble vitamin-mineral supplement (Control)

T₂: 25 grams FML

T₃: 50 grams FML

T₄: 75 grams FML

Collection, Preparation and Administration

Moringa Tea Decoction. Mature (dark green in color, found at the lowest part of the stem) fresh moringa leaves (FML), were collected, washed and weighed daily. Rural folks prepare moringa tea by boiling a handful of FML (about ½ cup or >10 g) in 1 ½ cup water (375 ml). Working on this premise, 25 g FML; 50 g FML and 75 g FML were boiled separately for five minutes in a litre of water, strained and offered as a Tea to the experimental birds every morning from day 1 to 35th day. Due to wet droppings, deviation from Trial 1 was done in Trial 2 where only 500 ml of the original one litre moringa decoction was given to the birds during the two-week brooding period. The amount of moringa tea was then restored back to one litre per treatment for the remaining days of the study. Fresh water was given *ad libitum* after tea consumption.

Data Gathered

The experimental birds were evaluated based on their growth response in terms of final weight, total gain in weight and growth rate. Other performance parameters include cumulative feed consumption, feed conversion ratio and dressing percentage (with and without giblets). Data were recorded relative to the broilers' responses to the three different concentrations of moringa decoction, i.e. 25 g FML / li, 50 g FML / li and 75 g FML /li on the given growth and performance parameters.

Statistical Analysis

Using the MEGASTAT software, data were subjected to one - way Analysis of

Variance (p-values) for CRD and considered to be significant if p – values < 0.05 and insignificant if p-values > 0.05. Differences between and among treatments in parameters found significant were compared using the Least Significant Difference (LSD) test.

RESULTS AND DISCUSSION

Moringa Tea Decoction

Growth Response. Growth response of broiler chicken (Trial 1 and Trial 2) in terms of final weight, total gain in weight and growth rate relative to varying concentrations of Moringa Tea for the treatment period of 35 days are presented in Table 1.

Birds in T₂, T₃ and T₄ -Trial 1 differed significantly over T₁ (Control) in terms of final weight, total gain in weight and growth rate with T₃ yielding the heaviest weight (final and total) and better growth rate. Treated groups in Trial 2, however, compared well with the Control group. Improved growth performance of broilers in Trial 1 and the comparable results obtained in Trial 2 emphasized the equal if not better benefits moringa tea offers over commercial water soluble supplements. Positive results are attributed to the nutrients present in moringa tea extracted from the leaves after boiling as evidenced by the significant decrease in nutrient content of boiled moringa leaves (FNRI, 1997). Gernah and Sengev (2011) also recorded a significant decrease in all nutrients and anti-nutrient contents of moringa leaves after boiling. Further, Ogbe and Affiku (2012) had emphasized the valuable role of Moringa with its essential nutrients and minerals in preventing diseases that are related to malnutrition.

Findings agree with reported significant weight gain of the birds due to dietary inclusion of *Moringa oleifera* Leaf Meal (MOLM) (Banjo, 2012; Donkor, *et al.*, 2013 Portugaliza and Hernandez, 2012). Donkor *et al.* (2013) attributed weight increase to the provision of vital biochemical minerals from Moringa that is lacking or inadequate in the diet. In contrast,

Olugbemi *et al.* (2010), Gadzirayi *et al.* (2012) and Zanu *et al.* (2012) reported significant decrease in final weight and weight gain of broilers as level of MOLM inclusion increases in soybean meal (SBM), cassava based diet and when MOLM was used as partial substitute for fishmeal. Tesfaye *et al.* (2013) had further recounted that 10- 20 % MOLM substitution to SBM can lead to reduced growth rate of the birds.

Cumulative Feed Consumption and Feed Conversion Ratio

The data for the cumulative feed consumption and feed conversion ratio of the experimental birds supplemented with Moringa Tea are reflected in Table 2.

Moringa Tea in both trials did not cause any ill effects on the birds' feed intake. Instead, current study showed an improved appetite of the birds *i.e.*, with higher cumulative feed intake of the treated group over the Control group. Results however remained insignificant. Moringa Tea decoction on the other hand significantly improved the Feed Conversion Ratio (FCR) of the experimental birds in Trial 1 with the broilers in T₃ (50 g FML) needing the least amount of feeds (1.76 kg) to produce a kilogram of meat. Comparable FCR was observed in Trial 2.

Increase in feed intake with comparable results was also reported by other authors (Olugbemi *et al.*, 2010; Gadzirayi *et al.*, 2012; Zanu *et al.*, 2012). This is probable due to the insignificant anti- nutrient content of Moringa leaves (Gernah and Sengev, 2011; Ogbe and Affiku, 2013). Anti-nutrients like Saponin could affect feed intake and growth rate of broilers while dietary Tannins are said to reduce feed efficiency and weight gain in chicks (Ogbe and Affiku, 2013). Increased feed intake may also be attributed to the increased bulk and lower metabolizable energy of the diet, *i.e.*, with increased inclusion of MOLM in the diet (Olugbemi *et al.*, 2010; Gadzirayi *et al.*, 2012). In contrast, Portugaliza and Hernandez (2012) reported a significant decrease in feed

Table 1. Growth response of broilers supplemented with varying concentration of Moringa Tea decoction (grams)

Treatment	Parameters							
	Trial 1				Trial 2			
	Initial weight (g)	Final Weight (g)	Total Gain in Body weight (g)	Growth Rate (g/d)	Initial weight (g)	Final Weight (g)	Total Gain in Body weight (g)	Growth Rate (g/d)
T ₁ : water soluble vit-min (Control)	36.54	1435.30 ^c	1398.75 ^c	39.96 ^c	46.69	1448.33	1401.64	40.05
T ₂ : 25 g FML	38.20	1493.92 ^b	1455.72 ^b	41.59 ^b	46.96	1472.67	1425.71	40.73
T ₃ : 50 g FML	38.50	1601.05 ^a	1562.55 ^a	44.64 ^a	46.65	1465.33	1418.68	40.53
T ₄ : 75 g FML	39.58	1574.57 ^a	1534.99 ^a	43.85 ^a	47.46	1517.0	1469.54	41.99
<i>p</i> -value	0.125	0.001	0.000	0.000	0.599	0.083	0.087	0.107
CV (%)	3.5	1.4	1.4	1.4	1.7	1.93	1.98	2.04

Table 2. Cumulative feed consumption and feed conversion ratio of broilers supplemented with moringa tea decoction

Treatment	Trial 1		Trial 2	
	Cumulative Feed Consumption (g)	Feed Conversion Ratio (g)	Cumulative Feed Consumption (g)	Feed Conversion Ratio (g)
T ₁ : water soluble vit-min (Control)	2652.64	1.90 ^a	2,202.03	1.58
T ₂ : 25 g FML	2656.54	1.82 ^b	2544.82	1.79
T ₃ : 50 g FML	2751.41	1.76 ^c	2551.26	1.80
T ₄ : 75 g FML	2788.33	1.82 ^b	2630.40	1.79
<i>p</i> -value	0.562	0.006	0.356	0.606
CV (%)	4.69	1.81	11.93	12.62

consumption of the broilers given the 90 ml Moringa Aqueous leaf extract (MoALE) in drinking water. Portugaliza and Hernandez supplemented Cobb broiler diet with varying concentrations of MoALE through the drinking water and found that at 90 ml MoALE, feed intake was consistently lower than the control group. Their findings have also shown that the live weight of broilers given 30 ml, 60 ml and 90 ml MoALE were significantly higher than the control group. Further, MoALE treated

broilers were shown to be more efficient converters of feeds into meat than the control group.

Feed conversion ratio (FCR) refers to the amount of feeds needed to produce a kilogram of meat. FCR in Trial 2 differs with the findings of Gadzirayi *et al.* (2012) who noted significant FCR differences between treatments as a result of increasing inclusion of MOLM in the broiler diet. Portugaliza and Hernandez (2012) reported a decrease in feed

consumption of the broilers given the 90 ml MoALE but significant increase in live weight and FCR. The discrepancy may be ascribed to the route of inclusion (drinking water vs. dietary feeds) and the varying environmental conditions at the time of the study. Gyamfi et al (2011) emphasized the effect of the method of preparation or processing on the concentration and availability of nutrients in the leaves.

Dressing Percentage

The dressing percentages (with and without giblets) of broiler chicken supplemented with Moringa Tea are reflected in Table 3.

Birds in the control group (Trial 1 and Trial 2) yielded higher dressing percentage (with giblets) than the treated groups but differences remained comparable among treatments. The result implies that Moringa tea does not encourage excessive fat deposition as noted in the higher dressing percentage of the treated birds over the control after evisceration.

Dressing percentage of the broilers can be associated to the profitability of the enterprise and as such is affected by the live weight and carcass yield of the birds. In his study, Gadzirayi *et al.* (2012) noted significant difference between the control and the broilers given 100 % MOLM i.e. due to the low carcass

values of the birds. Thus for better results, an inclusion limit of up to 25% MOLM to SBM for broilers was recommended.

CONCLUSION AND RECOMMENDATIONS

Conclusion

As shown in the study, Moringa given as a tea can be a good, natural and cheap alternative source of vitamin-minerals and other nutrients for broilers in backyard production. Moringa tea showed no adverse effects but rather can help enhance the growth performance (body weight, total gain in weight and growth rate), feed consumption and feed conversion ratio of broiler chicken on the first three weeks of rearing period. The higher amount of fresh moringa leaves (50 g /li and 75 g/ li) for moringa tea preparation yielded better results hence can be adopted for use.

Recommendations

For a lesser production cost and optimum production performance, daily supplementation of 50 g *Moringa oleifera* tea per 100 birds is recommended in backyard broiler chicken production. With its comparable

Table 3. Dressing Percentage of broilers supplemented with varying concentration of moringa tea decoction

Treatment	Dressing Percentage			
	Trial 1		Trial 2	
	With giblets	Without giblets	With giblets	Without giblets
T ₁ : water soluble vit-min (Control)	94.54	79.42	94.54	79.42
T ₂ : 25 g FML	91.30	79.45	91.30	79.45
T ₃ : 50 g FML	93.24	79.90	93.24	79.90
T ₄ : 75 g FML	91.36	79.22	91.36	79.22
<i>p</i> -value	0.539	0.739	0.809	0.096
CV (%)	3.3	1.0	3.3	1.0

results to the 75 g/ li, the 50 g/li proportion can be adopted for use in moringa tea preparation for broilers.

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