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The Potential Of *Moringa Oleifera* Leaf Meal In The Diets Of Growing Quails (*Cotunix Cotunix)*

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Abstract: This study was conducted to determine the effect of inclusion of Moringa leaf meal in the diets of 2weeks quails on growth and blood indices. Two hundred and forty, 2weeks quails were randomly assigned to four treatment groups. The treatment groups were M_1, M_2, M_3 and M_4 which contained 0, 1, 2 and 3 % inclusion of Moringa leaf meal (MOLM) respectively.. Completely randomized design was used for the trial and each treatment was replicated thrice with 20 quails per replicate. Feed intake (FI), weight gain (WG), feed conversion ratio, dressing percentage, blood indices among others were data collected. The mean total feed intake was not significantly affected by the varying inclusion of MOLM in the diet ($P>0.05$). Significant differences were observed in the mean weight gain ($P<0.05$) The mean total weight gain of the quails was better in the diet containing MOLM. The lowest weight was recorded in the control treatment. The feed conversion ratio (FCR) was better in the diet containing 3% inclusion level of MOLM. The heart weight in all the treatments showed no significant differences as observed in Table 3 ($P>0.05$). The liver weight and the lung weight across the treatment were not also affected by dietary treatments ($P>0.05$). The dressing percentage was significantly influenced the inclusion of MOLM in the diets. Birds fed diet containing MOLM showed significant increase in the dressing percentage. The blood calcium was significantly influenced the dietary treatments ($P<0.05$). The blood calcium increased progressively as the level of MOLM increased from 0 to 3% in the diets. The blood magnesium also followed the same trend with Blood calcium. It could be concluded that inclusion of Moringa leaf in the diet of quails improved the weight gain, feed conversion efficiency and dressing percentage.

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Introduction

The supply of animal protein is very important as the population increases everyday. Protein is very important in growth, reproduction and day-to-day activities. Poultry is one of the major sources of animal protein and generally accepted worldwide. Chicken, duck, guinea fowl, turkey are the major classes of poultry (Ahmad *et. al.,* 2017). In the recent time, attempts are being made to domesticate and popularize quails production in Nigeria. Quail is a small bodied bird of weight varying between 150 – 700g when fully matured. It has feathers and the female lay small size eggs of less than 15g compared to egg laying chicken of about 40 – 60g (Bakoji *et. al.,* 2013; Douglas, 2013). The meat is a delicacy and highly nutritious (Bakoji *et. al.,* 2013; Douglas, 2013). Good management practices such as feeding, biosecurity and health management are very important factors for improved productivities in livestock production. Synthetic antibiotic is the major medication in the diets of livestock production, and the residual effects on man can lead to health challenges. Most of the countries has placed ban on the use of the synthetic drugs and encourage the promotion of organically produced meats with high priced valued. Moringa oleifera is a naturally growth plants that can be planted at least cost (Mabruk et al 2016; Moyo et al 2016). The leaf is rich in protein, calcium, magnesium. Inclusion of moringa oleifera as antibiotics in the diets of poultry has been carried out by different authors (Ogbe and John 2016; Abbas, 2013, Ahmad *et. al.,* 2017). Moringa leaves contain crude protein of about 20-30% depending on the variety, stages of development and season (Mabruk *et. al.,* 2016; Moyo *et. al.,* 2016). The crude fibre ranges between 12 – 30% depending on the period and stage of harvesting. A lots of work have been done on the use of MOLM as feed additive in broilers and egg laying chicken with good results in terms of weight gain, feed efficiency and blood indices such as white blood cell, blood calcium and protein (Onunkwo and George 2015, Ogbe and John 2016; Ahmad *et. al.,*

2017) There is little information about the use of MOLM in the diet of quails hence the study was conducted to determine the effects of inclusion of MOLM in the diet of quails on growth, carcass and blood indices.

Methodology

The experiment was carried out at the Quail Unit of the Institute of Agricultural Research and Training (I.A.R.& T.), Moor Plantation, Ibadan which is located on Longitude 03°51E, Latitude 07°23N and Altitude 650" lies in the humid zone of the rainforest belt 0703.25 of South-western Nigeria with mean annual rainfall of 1220 mm and mean temperature of 26°C. Two hundred and forty, 2weeks quails were randomly assigned to four treatment groups. The treatment groups were M_1, M_2, M_3 and M_4 which contained 0, 1, 2 and 3 % inclusion of Moringa leaf meal (MOLM) respectively.. Completely randomized design was used for the trial and each treatment was replicated thrice with 20 quails per replicate. Gross composition of the experimental diet is shown in table 1. Data were collected on the growth performance (feed intake, weight gain and feed conversion ratio), Daily Feed intake was calculated by deducting the leftover feed from a weighed quantity of feed supplied daily. The birds were weighed at weekly intervals with the use of weighing balance. Feed conversion ratio (FCR) was calculated as the ratio of feed intake to weight gain.

Blood Analysis

Blood samples were analyzed for haematological parameters at the end of the 12th week, blood samples were collected from 16 quails in each experimental group (i.e. 4 quails per replicate) for the determination of the haematological and serum biochemical parameters. The quails randomly selected were fasted from 6.00 pm to 6.00 am and bled early in the morning to avoid temporary elevation of blood metabolites by feeding. Serum was obtained after the blood was allowed to stand for 2 hour at room temperature and centrifuged at 2,000 revolutions per minute (r.p.m) for 10 minutes to separate the cells from the serum (Scalm, *et. al.,* 1975). Haematological parameters included the packed cell volume (PCV), red blood cells (RBC), haemoglobin concentration (Hb) and white blood cells (WBC) Total protein, according to routinely available clinical methods (Scalm, *et. al.,* 1975; Mitruka and Rawnsley 1997).

Carcass characteristics

Sixteen birds were randomly selected from each treatment and slaughtered for carcass analysis After slaughtering, the birds were de-feathered and eviscerated. The organs such as gizzard, heart, pancreas and liver were weighed.

Chemical and statistical analysis

The chemical composition of the feed and the meat were determined according to the method of A O A C (2014). All data were subjected to statistical analysis using analysis of variance and the means were separated if they are significantly different using Duncan Multiple Range Test (SAS, 1999).

RESULTS AND DISCUSSION

The chemical composition of the experimental diet is as shown in table 2. The crude protein reported was relatively the same with protein requirement for quails as reported by (Douglas, 2013).

Table 1. Gross Composition of The Diet

Nutrients	**M_1%**	**M_2%**	**M_3%**	**M_4%**
Maize	52.00	52.00	52.00	52.00
Soya beans cake	8.00	8.00	8.00	8.00
Groundnut cake	15.30	14.30	13.8	13.30
Maize offal	15.00	15.00	15.00	14.00
MOML	0.00	1.0	2.00	3.0
Bone meal	3.00	3.00	3.00	3.00
Oyster shell	6.00	6.00	6.00	6.00
Salt	0.20	0.20	0.20	0.20
Methionine	0.15	0.15	0.15	0.15
Lysine	0.10	0.10	0.10	0.10
Premix	0.25	0.25	0.25	0.25
Total (kg)	**100.00**	**100.00**	**100.00**	**100.00**
Cal. Composition				
Crude protein (%)	18.1	18.1	18.1	18.1
ME (Kcal/g)	2.65	2.65	2.65	2.65

Table 2: Determined Proximate Composition of the MOLM and Experimental Diets (% dry matter basis)

Parameters	MOLM	M_1	M_2	M_3	M_4
Dry matter	93.7	93.7	93.8	94.8	93.9
Crude protein	28.7	18.3	18.3	18.3	18.2
Crude fibre	6.98	4.67	4.68	4.70	4.71
Ether Extract	4.35	4.79	4.79	4.78	4.75
Ash	14.4	9.67	9.98	10.7	11.1
Nitrogen free extract	45.9	62.5	62.2	61.6	61.2

Table 3: Growth performance of quails fed diet with different inclusion of *Moringa oleifera* leaf meal

Parameters (Means)	M_1	M_2	M_3	M_4	±SEM	p
Initial weight. (g)	30.01	30.02	30.10	30.07	1.32	0.05
Finalweight.(g /45days)	262^{b}	263^{b}	268^{a}	268^{a}	3.27	0.05
Total weight gain (g)	232^{b}	233^{b}	238^{a}	238^{a}	2.79	0.05
Daily Weight gain (g)	5.17^{b}	5.18^{b}	5.29^{a}	5.30^{a}	0.10	0.05
Daily feed intake (g)	21.6	21.6	21.6	21.5	1.12	0.05
Total feed intake (g/45 days)	970	969	969	969	7.89	0.05
Mortality (%)	0.0	0.0	0.0	0.00		
Feed conversion ratio	4.17^{a}	4.16^{a}	4.07^{b}	4.06^{b}	0.06	0.05
Dressing percent (%)	67.3^{b}	67.6^{b}	68.6^{ab}	68.7^{a}	1.03	0.05
Heart weight (%)	0.56	0.56	0.57	0.56	0.06	0.05
Liver weight (%)	2.35	2.34	2.35	2.34	0.13	0.05
Lung weight (%)	1.57	1.57	1.58	1.59	0.11	0.05

[a,b,c] Treatment means within the same row with different superscripts significantly P<0.05; SEM = Standard error of mean

The results of growth performance of the quails fed varying inclusion levels of MOLM in the diet is shown in Table 3. The mean total feed intake was not significantly affected by the varying inclusion of MOLM in the diet (P>0.05). The values ranged between 13.51 to 13.56g/day/ the value was in accordance with the reports of some author (Bakoji *et. al.,* 2013; Douglas, 2013). Significant differences were observed in the mean weight gain (P<0.05) The mean total weight gain of the quails was better in the diet containing MOLM. The lowest weight was recorded in the control treatment. The feed conversion ratio (FCR) was better in the diet containing 3% inclusion level of MOLM. The better performance in terms of weight gain and feed efficiency in diet containing MOLM was a result of increased addition of MOLM in the diets. It was observed by (Onunkwo and George 2015; Ogbe and John 2016) that there was appreciable weight gain and better feed utilization when Moringa leaf was added to the diet of broilers. It was also reported that the number of egg laid and size were of increase as the level of MOLM increased in the diet of egg laying chickens (Ahmad *et. al.,* 2017). Zero mortality was recorded in all the treatments which indicates that MOLM did not have negative effect on the quails. This observation also buttressed the fact that inclusion of *Moringa oleifera* has no deleterious effect on performance of the quails. The heart weight in all the treatments showed no significant differences as observed in table 3 (P>0.05). The liver weight and the lung weight across the treatment were not also affected by dietary treatments (P>0.05). Organ weights such as liver, lung and liver could be a standard for health status in livestock management. Higher or lower of these organs could be an indication of diseases (Mitruka and Rawnsley 1977). The dressing percentage was significantly influenced the inclusion of MOLM in the diets. Birds fed diet containing MOLM showed significant increase in the dressing percentage as shown in Table 3, this result was in accordance with the report of other authors that Moringa leaf improves carcass yield (Onunkwo and George 2015; Ogbe and John 2016). The mean haemoglobin was not significantly influenced by the dietary treatments, the values varied between 12.23 and 12.57g/dl. The mean white blood cell was relatively low in M_1 compared to M_2, M_3 and M_4.

The PCV of the blood of the experimental birds was not influenced by the inclusion of MOLM in

the diets (P>0.05) and values ranged between 41.36 and 41.89%. The white blood corpuscle was greatly influenced (P<0.05) by inclusion of MOLM in the diets of the growing quails. The WBC was 18.43 in M1 while the highest was recorded in the diet containing 4% MOLM.

Table 4 Haematology and Serum biochemical parameters of quails fed diet with different inclusion of *Moringa oleifera* leaf meal.

Parameters (Means)	M_1	M_2	M_3	M_4	± SEM	P	Normal range
PCV (%)	41.4[b]	41.4[b]	41.3[a]	41.3[a]	0.48	0.05	4.5 - 9.0
R.BC(x 10^6/µ1)	3.32[b]	3.38[b]	3.49[a]	3.52[a]	0.11	0.05	3.5 -9.5
Haemoglobin (g/dl)	13.5[b]	13.5[b]	13.7[a]	13.72[a]	0.14	0.05	11 -17
WBC (x 10^3/µ1)	18.4[b]	18.4[b]	18.9[a]	18.9[a]	0.23	0.05	15 - 24
Total protein (g/dl)	4.36	4.38	4.48	4.98	5.98	0.05	3.5-6.9
Globulin (g/dl)	2.68	2.69	2.74	2.94	0.34	0.05	2.5 - 5.0
Albumin g/dl	2.38	2.39	2.40	2.67	0.51	0.05	10 - 25

[a,b,c,] Treatment means within the same row with different superscripts significantly P<0.05; SEM = Standard error of mean

Significant difference was observed in blood protein as shown in table 4. The blood total protein was higher in the diet with *Moringa Oleifera* leaf meal compared to the control (P<0.05). The blood calcium was significantly influenced the dietary treatments (P<0.05). The blood calcium increased progressively as the level of MOLM increased from 0 to 3% in the diets. The blood magnesium also followed the same trend with Blood calcium as reflected in table 4. The results of blood indices buttress the facts the report of Douglas, 2013 that blood globulin, calcium and protein levels of birds were significantly influenced by increasing levels of Moringa leaf in the diets.

Conclusion:

The weight gain, feed utilization, dressing percentage packed cell volume, red and white blood cells and blood albumin increased as the level of *Moringa oleifera* meal in the diet of quails increases.

Conflicts of Interest

The authors thereby acknowledge the fact that there is no conflict of interest existing.

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