MAP 056 : Effect of aqueous extract of *moringa oleifera* leaf (aemol) on growth and serum biochemistry of broiler chickens

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ABSTRACT

A six weeks study was conducted to evaluate the effects of varying concentration of aqueous extract of *Moringa oleifera* leaf (AEMOL) on growth, haematology and serum biochemistry of broiler chickens. A total of 240 day-old Hubbard broiler chicks were weighed and allotted to six (6) different treatments in a completely randomized design. The treatments were varying concentrations of aqueous extract of *Moringa oleifera* leaf of 0, 30, 60, 90 and 120 %, represented $AEMOL_0$, $AEMOL_{30}$, $AEMOL_{60}$, $AEMOL_{90}$ and $AEMOL_{120}$, respectively. Gentox @ 1.25g/l was used as the control. The treatments were replicated four times with 10 birds per replicate. The results showed that the final body weight, weight gain, total feed intake, feed conversion ratio (FCR) and water intake were influenced ($p<0.05$) across all the treatments. Serum biochemistry results showed that potassium, bilirubin conjugated, ALT, AST, total protein and albumin were influenced ($p<0.05$). Results from the study showed that most of the parameters measured in birds on aqueous extract of *Moringa oleifera* leaf compared very well with birds on control treatment which implied that aqueous extract of *Moringa oleifera* leaf can be used to replace antibiotic as growth promoter. Aqueous extract of *Moringa oleifera* leaf improved performance by reducing the feed intake and increasing the efficiency of feed utilisation. It is thus, recommended that poultry farmers particularly broiler chickens producers could administer aqueous extract of *Moringa oleifera* leaf (AEMOL) at a concentration of 60 ml/1000 ml (v/v) to improve performance efficiency without any detrimental effect on broiler chickens.

Key words: Broiler chickens, performance, serum biochemistry, aqueous extract, *Moringa oleifera*
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INTRODUCTION

Poultry products (meat and eggs) were reported to have provided the much needed animal protein; they have short generation intervals [1] which might help to address the challenge of animal protein deficiency in the diet of an average Nigerian [2]. The use of antibiotic growth promoter in broiler diets improved growth performance by 4 % and feed efficiency by 5 % [3]. However, the use of synthetically-produced substances such as antibiotic growth promoters was found to have detrimental side effects which include increasing number of resistant bacteria in humans [4]; and this led to a ban by the European Union (EU) on the use of all antibiotic growth promoters on January 1, 2006 [5]. As a result, study on non-synthetic growth promoters [6] and herbal alternatives such as *Moringa oleifera* became pertinent.

Haematological constituents of livestock are indicators used to determine the response of livestock to the diet they are fed [7]; and variations in these parameters are important in assessing the responses of animals to different physiological and disease conditions [8], and in determining stresses due to nutrition and other factors [9].

The objective of the study therefore, was to determine the effect of varying concentration of aqueous extract of *Moringa oleifera* leaf on growth and serum biochemistry of broiler chickens.

MATERIALS AND METHODS

The experiment was carried out at Abee-Zainab Integrated Farms, along Minna/Bida Road Minna, Nigeria. *Moringa oleifera* leaves were collected from Minna and environs. The plant materials were air-dried at room temperature for five days and then ground into fine powder using a hammer mill grinding machine and stored for later use. The dry ground *Moringa* leaf was soaked in water for 24 hours at 60 g per litre of water [10]. After that, the soaked *Moringa* leaf was filtered using a muslin cloth. A total number of 240 day old Hubbard broiler chickens were randomly allocated to six treatments in a completely randomized design. Treatment 1 contained antibiotic (Gendox®) at 1.25 g/l and was tagged control, Treatments 2, 3, 4, 5 and 6 contained aqueous extractof *Moringa oleifera* leaf (AEMOL) quantities of 0, 30, 60, 90 and 120 ml/l respectively and were tagged $AEMOL_0$, $AEMOL_{30}$, $AEMOL_{60}$, $AEMOL_{90}$, and $AEMOL_{120}$, respectively. Each treatment was replicated four times and each replicate had ten birds. All necessary management requirements were strictly followed. In terms of feeding, a super starter feed containing a crude protein of 26.60 % and metabolizable energy of 559.13kcal/100 g was given during the first two weeks and the starter feed during the third and fourth week. Finisher feed containing crude protein of 24.85 % and metabolizable energy of 585.68 kcal/100 g was given during fifth week of age till the sixth week. Feeds were given *ad libitum* and shifting from one form of feeds to another was done gradually to avoid digestive disorder.

Initial weights of the birds were recorded at the start of the experiment and body weight change were recorded weekly while feed intake was measured daily according to the methods of [11].

Blood samples were aseptically collected from two birds per replicate through the wing vein using a 5 ml syringe and transferred into clean labelled test tube bottles for each bird. The blood sample was placed inside sterile test tubes without anticoagulant to produce sera for blood chemistry measurements according to the methods of [12].

RESULTS AND DISCUSSION

The results of growth performance are presented in Table 1. The results showed that the final body weight, weight gain, total feed intake, feed conversion ratio (FCR) and water intake were influenced ($p<0.05$) across all the treatments. The results obtained for final weight and weight gain showed a linear increasing trend on birds on $AEMOL_{30, 60}$ and $_{90}$ treatments, respectively, then declined on birds treated $AEMOL_{120}$ which indicated that maximum limit for the inclusion of *Moringa oleifera* for performance might have been reached. These results were synonymous with the reports of [13] who reported that inclusion of *Moringa oleifera* leaf meal at 10 % in slow-growing chickens improved growth performance while decreased performance is observed at higher rates. It also agreed with the reports of [14, 15] who reported a declined performance when *Moringa oleifera* leaf meal is included at 20% or above in the diet. Highest total feed intake was recorded on birds treated $AEMOL_0$ compared to other treatments.This implies the extract might have led to reduction in the feed intake a character similar to the antibiotic growth promoter. Similar results were reported by [16]. The results of the FCR showed that the extract at 60 and 90 ml had similar ($P>0.05$) with the control and where better than the control and other treatments. This might mean that extract of *Moringa oleifera* leaf at 60 and 90 ml/ litre can be used to substitute antibiotic growth promoter, since this level has similar effect with that of antibiotic in term of FCR. Birds on $AEMOL_{30}$ had significantly ($P<0.05$) lower water intake compared with the control and $AEMOL_0$. However, they had similar water intake compared with other AEMOL treatments. The reason for this is not well known.

TABLE 1: Effect of aqueous extract of *Moringa oleifera* leaf on growth performance (g), water intake (ml) and mortality rate (%) of Hubbard broiler chickens

Parameters	Treatments						SEM
	Control	$AEMOL_0$	$AEMOL_{30}$	$AEMOL_{60}$	$AEMOL_{90}$	$AEMOL_{120}$	
Initial weight	138.75	140.00	138.75	136.25	141.25	136.25	1.57
Final weight	2350^{c}	2392^{a}	2200^{e}	2242^{d}	2367^{b}	2042^{f}	25.28
Weight gain	2211^{c}	2252^{a}	2061^{e}	2105^{d}	2225^{b}	1905^{f}	25.04
TFeed intake	3212.47^{bc}	3549.45^{a}	3300.42^{b}	3082.50^{c}	3351.29^{b}	3315.42^{bc}	51.55
FCR	1.45^{a}	1.58^{b}	1.60^{bc}	1.46^{a}	1.50^{ab}	1.69^{c}	0.02
Water intake	509.07^{a}	516.08^{a}	430.89^{b}	498.04^{ab}	490.39^{ab}	492.29^{ab}	11.63
Mortality	0.00	0.00	0.42	0.42	2.5	0.83	0.02

^{a,b,c}: Means within rows with different superscripts are significantly different ($p<0.05$)
SEM: Standard Error of Mean; AEMOL: Aqueous extract of *Moringa oleifera* leaf
TFeed intake: Total feed intake; FCR: Feed conversion ratio

Results obtained from serum biochemistry are presented in Table 2. Results for serum biochemistry showed aqueous extract of *Moringa oleifera* leaf had no effect on glucose, urea, sodium, chloride, cretine, cholesterol, triglyceride, bilirubin total and alkaline phosphate. These results are similar to the findings of [17, 18] who reported that no significant differences were noticed for most of the serum biochemistry parameters studied for laboratory animals fed experimental diets containing *Moringa oleifera* leaf meal or crude extract from *Moringa oleifera* leaves. However, treatments affected ($P<0.05$) potassium, bilirubin conjugated, serum enzymes (AST and ALT), total protein and albumin values. The birds on $AEMOL_{60}$ had the lowest values in most of these parameters. This might mean that this dosage is most adequate for liver enzymes since elevations of these markers for liver indicate that something is wrong with the liver. Total serum protein obtained were significantly similar except for birds treated $AEMOL_{120}$. This result concord with the reports of [19] who reported that total serum protein, albumin and globulin syntheses were not affected by sources of dietary protein. Birds on AEMOL treated group and control treatment had similar ALT mean values. The results corroborates with the report of [18] who observed that serum enzyme activities of gestating and lactating rabbits administered crude *Moringa* extract were not significantly different from the control. The serum biochemistry results showed that they are all within the range for domestic chickens.

CONCLUSION

Results from the study showed that most of the parameters measured in birds on aqueous extract of *Moringa oleifera* leaf compared very well with birds on control treatment which implied that aqueous extract of *Moringa oleifera* leaf can be used to replace antibiotic as growth promoter. Aqueous extract of *Moringa oleifera* leaf improved performance by reducing the feed intake and increasing the efficiency of feed utilisation.

RECOMMENDATIONS

From above study, it is recommended that poultry farmers particularly broiler chickens producers could administer aqueous extract of *Moringa oleifera* leaf (AEMOL) at a concentration of 60 ml/1000 ml (v/v) to improve performance efficiency without any detrimental effect on broiler chickens

Table 2: Effect of aqueous extract of *Moringa oleifera* leaf on haematology and serum of Hubbard Broiler chickens

Parameters	Treatments						SEM
	Control	$AEMOL_0$	$AEMOL_{30}$	$AEMOL_{60}$	$AEMOL_{90}$	$AEMOL_{120}$	
Serum biochemistry							
Glucose (mmol/l)	2.60	2.00	3.35	2.30	3.40	3.05	0.22
Urea (mmol/l)	3.30	3.70	4.15	4.15	5.35	4.90	0.31
Sodium (mmol/l)	119.50	120.00	120.00	121.00	122.00	125.50	1.21
Potassium (mmol/l)	3.15^{a}	2.95^{ab}	2.95^{ab}	2.15^{b}	3.35^{a}	2.75^{ab}	0.13
Chloride (mmol/l)	91.00	87.50	50.90	93.00	95.00	89.00	7.03
Cretine	0.80	0.65	0.70	0.65	0.65	0.95	0.04
Cholesterol (mmol/dl)	4.75	4.20	4.90	3.90	3.80	4.55	0.16
Triglyceride (mmol/dl)	1.20	0.90	1.10	1.30	1.10	1.55	0.11
Bilirubin Total	15.45	13.80	14.25	11.30	12.70	15.15	0.56
Bilirubin Conjugated	8.40^{ab}	6.65^{bc}	6.95^{abc}	6.10^{c}	7.40^{abc}	8.55^{a}	0.31
Alkaline Phosphate (µ/l)	51.50	27.45	50.00	43.20	47.45	47.45	3.84
AST (µ/l)	50.55^{a}	40.95^{abc}	46.65^{ab}	40.00^{abc}	31.35^{c}	34.25^{bc}	2.31
ALT (µ/l)	28.85^{b}	19.00^{c}	29.00^{b}	29.95^{b}	40.55^{a}	28.25^{b}	1.90
Total Protein (g/dl)	6.55^{b}	7.05^{ab}	7.05^{ab}	6.60^{b}	6.70^{b}	7.50^{a}	0.11
Albumin (g/dl)	4.45^{ab}	3.75^{abc}	4.70^{a}	3.50^{bc}	3.35^{c}	4.20^{abc}	0.17

a,b,c: Means within rows with different superscripts are significantly different ($p<0.05$)
SEM: Standard Error of Mean , AEMOL: Aqueous extract of *Moringa oleifera* leaf AST: Aspartate amino transferase, ALT: Alanine amino transferase

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