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MAP 023 : Growth performance, nutrient digestibility and organoleptic properties of finisher broilers administered aqueous extract of *moringa oleifera* leaf

Alabi O. J., Muhammad, A.B., Ayanwale, B.A, Jiya, E. Z. and Ibrahim M. J.

Dept of Animal Production, Federal University of Technology, P.M.B. 65, Minna, Niger State, Nigeria

ABSTRACT

The effect of aqueous extract of *Moringa oleifera* leaf on performance, nutrient digestibility and organoleptic properties of Hubbard broiler chickens were carried out using a total of 240-day-old Hubbard broiler chicks. They were randomly assigned to six treatments. Each treatment group werefurther replicated four times, with forty birds per replicate over a period of 8 weeks. Treatment 1 served as the control (having the antibiotics), while treatment two was given ordinary water to serve as $AEMOL_0$ (Aqueous extract of *Moringa oleifera* leaf). Treatment 3, 4, 5 and 6 were treated with 30ml, 60ml, 90ml and 120ml of aqueous extract of *Moringa oleifera* leaf (AEMOL) respectively. At the end of the trial, two birds per replicate were slaughtered to evaluate the organoleptic properties of the meat, parameters such as appearance, flavour, juiciness, tenderness and general acceptability were observed and subjected to one-way analysis of variance (ANOVA) based on the completely randomized design (CRD), using statistical analysis system (SAS, 2013). Where significant differences occurred at $P<0.05$, they were separate using Duncan Multiple Range Test (SAS, 2013). The results of this study showed that aqueous extractof *Moringa oleifera* leaf inclusion had effect on all the parameters measured except for the initial weight and mortality. Aqueous extract of *Moringa oleifera* leaf inclusion levels up to 90ml/l can be used to replace antibiotic growth promoter without compromising the advantages of antibiotic growth promoter in team of performance, digestibility and organoleptic parameters.

Key words: Digestibility, organoleptic properties, broiler, aqueous extract, *Moringa oleifera*

Email: alabioj@gmail.com. Phone Number: 09091695003.

INTRODUCTION

Poultry production plays a major role in bridging the protein gap in developing countries (1).Therefore the production of highly reproductive animals such as poultry (broilers) with short generation intervals might help to solve the problem of animal protein deficiency in the diet of an average Nigerian (2). Antibiotics are known to be synthetic or semi-synthetic compounds with antimicrobial activities (3). These chemo-therapeutic compounds are not only used to treat poultry diseases but are more commonly used as growth promoter. However, the use of synthetically-produced substances especially antibiotic as growth promoters was found to have objectionable side-effects (4). Thus, the European Union in 1997, initiated a ban on sub-therapeutic usage of the antibiotic (avoparcin) in animal production, and subsequently the ban of all antibiotic growth promoters on January 1, 2006 (5).In the past two decades, phytogenic additives in animal nutrition have attracted attention for their potential role as alternatives to antibiotic growth promoters.A promising herb as animal growth enhancer could be found in *Moringa oleifera* which is the most widely cultivated species of the genus *Moringa*. (6). *Moringa* contains active substances that can improve digestion and metabolism and possess bacterial and immunostimulant activities (7). There is, however, limited information on the use of extract of *Moringa* in the drinking water of broiler chickens. The objective of this study was to investigate the growth performance of broiler chickens, their nutrient digestibility, organoleptic properties of broiler chickens administered aqueous extract of *Moringa oleifera* leaf.

MATERIALS AND METHODS

This study was carried out at Abeezainab Integrated Farms Minna-Bida road, Niger state, Nigeria. The leaves of *Moringa oleifera leaf* was purchased from Minna town and environs. The leaves of *Moringa oleifera* were air-dried for three days and were subsequently ground to powder using mortar and pestle. The dry ground *Moringa* leaf was soaked in water for 24 hours at 60 g per litre of water [8]. 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 T1 (control), Treatments 2, 3, 4, 5 and 6 contained aqueous extract of *Moringa oleifera* leaf (AEMOL) quantities of 0, 30, 60, 90 and 120 ml/l, respectively, and were tagged T2, T3, T4, T5 and T6, respectively. Each treatment was replicated four times and each replicate had ten birds. All necessary management requirements were strictly followed. The birds were on super starter feed containing a crude protein of 26.60 % and metabolizable energy of 559.13kcal/100 g of 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 585.68kcal/100 g was given during fifth week of age till the sixth week. Feeds were given *ad libitum* and shifting from one form of feed to another was done gradually to avoid digestive disorder.

The initial live weights of the birds were taken at the beginning of experiment and at weekly intervals thereafter. Feed intake, growth rate, feed conversion ratio and digestibility were determined according to the procedures of (9).Digestibility trial was conducted by the sixth week of age using total collection method. Two birds were randomly picked from each replicate to determine the nutrient digestibility. Metabolic cage was used for this process, and the birds were kept in the cage for seven days, out of which three days were for adjustable period before data collection started. Total droppings voided were collected for four days. Feed was allocated to all the birds on equal basis. The feed rejected was weighed before giving another fresh feed every day of the trial. Faecal samples collected separately per day for each replicate. Proximate composition of faecal samples collected was determined by the procedures of (10).

At 42 days of age two birds per replicate were slaughtered by cervical dislocation. Meat samples from each breast part of the slaughtered bird were taken and stored in the refrigerator for sensory evaluation. Meat samples which had been frozen at -20 °C were thawed for 24 hours in a room temperature for organoleptic evaluation. The samples were broiled (grilled) on the oven rack set for 120 °C. The oven was allowed to preheat for 20 minutes. The meat samples were grilled for 40 minutes and turned every 10 minutes. Tongs were used for turning to avoid piercing which could let the moisture to escape. The samples were cut into smaller pieces of 1.5 cm thick according to their treatments and replicates. A taste panel of assessors evaluated the meat for appearance, flavour, juiciness, tenderness and general appearance according to the procedures of (11). The Sensory Evaluation Panel consisted of members of staff and students of the Animal Production Department of the Federal University of Technology, Minna. Panellists rated the samples on a nine-point scale according to the (11)

Dry matter contents of the diets, refusals and faecal samples were determined as described by (10). The gross energy of the diets and faecal samples were determined (10) using a bomb calorimeter. The apparent metabolisable energy contents of the diets were determined according to (10).

All data were analysed by one-way analysis of variance (12). Treatment means were separated using the Duncan range multiple test at 95 % confidence level.

RESULTS AND DISCUSSION

The performance results (Table 1) indicated that the birds in T2 had the highest final weight and weight gain and was followed by T5, T1, T4, T3 and T6, respectively. They were all significantly ($P<0.05$) different from one another. This result is in line with most literatures consulted which indicated that *Moringa oleifera* inclusion levels resulted in higher final weights than the control (13).

The current study result shows an irregular pattern in feed intake among the treatments, the birds on T2 had the highest feed intake and were significantly ($P<0.05$) higher than all the other treatments. This could be the reason the birds in this treatment had the highest final weight and weight gain. However, birds in T4 had the least feed intake. Birds on this treatment also had better feed conversion ratio than those on T2 which had the highest feed intake and weight gain. This implies that extract of *Moringa* exert an influence on the bird. Researches had shown that *Moringa* has anti bactericidal properties which makes it to exact the same influence synthetic antibacterial does when used in chicken feeds. Results of the water intake indicated that birds on T1 and T2 had higher ($P<0.05$) intake than those on T3. The reason for this is not well known, however, studies have shown that *Moringa* extract is bitter and birds have taste buds, thus, it might be the reason for the lower water intake.

Table 3: Effect of aqueous extract of *Moringa oleifera* leaf on organoleptic evaluation of Hubbard broiler meat

Parameters	T1 (Control)	T2	T3	T4	T5	T6	SEM
Appearance	7.05^{ab}	7.60^{a}	7.35^{a}	7.45^{a}	7.10^{ab}	6.55^{b}	0.11
Flavour	7.00^{ab}	7.50^{a}	7.25^{ab}	7.25^{ab}	6.65^{bc}	6.16^{c}	0.11
Juiciness	6.75^{ab}	7.45^{a}	7.15^{a}	6.65^{ab}	7.00^{a}	6.25^{b}	0.11
Tenderness	7.20^{ab}	7.85^{a}	7.70^{ab}	6.95^{ab}	7.15^{abc}	6.40^{c}	0.12
General Acceptance	7.25^{b}	8.30^{a}	7.65^{ab}	7.20^{b}	7.25^{b}	6.30^{c}	0.11

a,b,c,d,e,f: Means within row with different superscripts are significantly different ($p<0.05$), AEMOL: Aqueous extract of *Moringa oleifera* leaf. SEM: Standard error of mean

CONCLUSION

The results of this study showed that aqueous extract of *Moringa oleifera* leaf inclusion levels up to 90ml/l can be used to replace antibiotic growth promoter without compromising the advantages of antibiotic growth promoter.

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MAP 024 : Evaluation of the growth performance of grass-cutters fed diet containing *Moringa oliefera* leaf meal and/ or soya bean meal

Amaefule, B.C., Ozioko, C.M. Uzochukwu, I. E., and Ugwu, S.O.C.

Department of Animal Science, University of Nigeria, Nsukka

ABSTRACT

This study was conducted to compare the growth performance of grass-cutters (Thryonomysswinderianus) fed diets containing *moringa oliefera* leaf meal (MLM) and soya bean meal (SBM). A total of 12 six week old grass-cutters were used for the experiment. The grass-cutters were randomly assigned to three treatment groups of four grass-cutters each. Animals in treatment 1, 2, and 3 were fed diets containing 15% MLM, 15% SBM, and 10% MLM plus 10% SBM respectively. Feed and water were given to the animals *ad libitum*. Body weights and feed intake were measured and recorded during the course of the study. There were significant difference in the final body weight (FBW) and cumulative body weight (CBW) and daily weight gain (DWG). Weekly and daily feed intake, feed conversion ratio, body length and chest girth did not differ across the groups. Animals in T3 had the highest significant FBW, CBW, and DWG which differed significantly from other groups. T1 had the least significant FBW, CBW, and DWG which also differed significantly from T2.

From the result, it was concluded the combined feeding of grass-cutters with 10% moringa and 10% soya bean meal enhanced growth of grass-cutters.

Keywords: grass-cutter, moringa leaf meal, soya bean meal, growth performance, evaluation.

Corresponding author: Amaefule, B.C. (bright.amaefule@unn.edu.ng; Tel: +2348034435785)

INTRODUCTION

The acute shortage of protein in Nigeria and the rapidly increasing demand for livestock products could be solved through the production of different types of micro-livestock including the grass-cutter (Adekola and Ogunsola, 2009; Owen and Dike, 2012). The high promise of a source of good quality animal protein from grass-cutters notwithstanding, nutrition has always posed a serious challenge to livestock production. It has been reported that productivity of animals (particularly those in captive) is majorly affected by the quality and availability of feed (Keunen*et al.*, 2002). According to Tespe (2006), about 70% of the national population of grass-cutters in captivity are in the hands of smallholder grass-cutter farmers. This farmers are faced with nutritional problems, such as low availability of forages during the dry season (Adu*et al.*, 1999) and nutritional imbalances caused by feeding mainly *Panicum maximum* to the stock (Adu and Wallace, 2003). Poor nutrition can lead to high mortality especially in young ones, low body weight at birth and at maturity (Ansah*et al.*, 2012). Unfortunately, the constraint imposed by nutrition on grass-cutter production has resulted to significant proportion of grass-cutter meat consumed in the country depending on hunting from the wild.

Grass-cutters are strictly herbivores, and prefer mainly thick-stemmed grass species (Schrage and Yewadan, 1999). The use of forages such as Leucena, Gliricidia, sugarcane, sweet potato vines, Stylosanthes, and *Moringa* leaves and soybean meals due to their availability all year round have been proposed as ways of addressing nutritional constraint and improving productivity in grass-cutter production (Schrage and Yewadan, 1999; Banaszkiewicz, 2011). *Moringa oleifera* (also known as fodder) is one of the most effective additives to animal feed for nutrient provision (Moringa source, 2011). This is because of its relatively low cost, exceptional nutrient density, and high nutrient absorption rates in animal and human consumers. Soybean meal on the other hand is the best vegetable protein source for animal feed formulation considering its quality and high availability. Soybean is the most widely used protein supplement in the diet of ruminants. Its crude fiber content (about 6%) is lower in comparison to other vegetable protein feeds (Banaszkiewicz, 2011). It is the standard for the comparison of other vegetable protein sources (Newkirk, 2010), and has one of the highest (47.6%) levels of essential amino acids among the common plant protein supplements used in animal feeds (Schwab, 1999). It is important to investigate the performance of micro-livestock such as grass-cutter