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ORIGINAL RESEARCH

Effect of *Moringa Oleifera* Leaf Meal as Feed Additive on Layers Performance

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ABSTRACT
The experiment was conducted to assess the effect of *Moringa oleifera* Leaf Meal (MOLM) as feed additive on layers performance. Twenty seven laying birds were allocated randomly to three dietary treatments of nine (9) birds per treatment with three replicates and fed ad-libitum for four (4) weeks. The study was carried out in the Teaching and Research farm of the Niger Delta University. Three diets were used. Diet one (treatment 1) was commercial concentrate only which was the control; diet two (treatment 2); commercial concentrate + 2% MOLM; diet three (treatment 3); commercial concentrate + 6% MOLM. Data obtained were subjected to statistical analysis, using one way Analysis of Variance (ANOVA).The results showed that there were significant differences ($P<0.05$) in body weight, percentage egg production but not mean egg weight ($p>0.05$). Treatment three had the highest body weight and percentage egg production and treatment two had the highest mean egg weight.

KEY WORDS: *Moringa oleifera, Feed additives, Eggs, Layers, Leaf meal, Concentrate*

Introduction

Poultry refers to all birds of economic value to man as source of meat, egg and fibre. Table egg production involves the use of good layer birds (Ogunlade and Adebayo, 2009). Eggs are major sources of protein in human diet. Poultry goes a long way in providing animal protein for the population because it yields quickest return and provides meat and eggs in very short time (Oji and Chukwuma 2007). Esmingner (1992) and Banerjee (1992) added that poultry eggs nearly approach a perfect balance of all good food nutrients. The yolk and albumen contain 17.5% and 10% protein respectively by weight. It was also found that eggs rank second to cow milk in terms of nutritive value and are the most economically produced animal protein (FAO, 1990). Globally, egg production is growing rapidly (39% over the years) with Asian countries in particular having high rates of increase; China and India with increase of 42% and 67% respectively (Scanes, 1981). Nigeria produce more than 45% of the poultry consumed in West Africa Sub-region and it's poultry population is estimated at 140-160 million comprising of 72.4 million chicken, 118 million ducks , 4.7 million guinea fowl, 15.2 million pigeon and 0.2 million turkeys (FAO,2006). This figure accounts for 71.38% of the total livestock kept in the country and supplies 17% of animal protein need of the population (Oji and Chukwuma, 2007). One of the challenges facing poultry farmers is the issue of diseases and infection. This has caused a high rate of mortality and lack of productivity in poultry production such as table egg production. Restrictions imposed by the food industry and regulatory agencies on the use of some synthetic food/feed additives have led to renewed interest in searching for alternatives, as natural antimicrobial compounds, particularly

from plants (Delaquis and Mazza, 1995; Hammer *et al.*,1999).Studies by Hermogenes *et al* (2012) on the effect of diet supplemented with varying levels of *Moringa oleifera* leaf and twig powder on chicken laying performance and efficiency showed consistent trend on laying percentage and better yolk colour. According to Opara (1996) leaf meal does not only serves as protein sources but also provides some necessary vitamins, minerals and also oxy-carotenoid which causes yellow colour of broiler skin, shank and egg yolk. Proximate analysis of *Moringa oleifera* Leaf Meal (MOLM) shows that it contains protein. It also serves as a phytobiotic (antibiotic). Apart from being a good source of vitamins and amino acids, it has medicinal uses (Makkar and Beaker 1999; Francis *et al.,* 2005). It's leaves and green pods are rich in carotene and ascorbic acid with good profile of amino acids (Makker and Berker 1996). Kakenji *et al* (2003), Murro *et al* (2002), Oduro *et al* (2008), Alikwe and Omotosho (2013) observed that *MOLM* contains 86-90.67% dry matter (DM), 18.29 -29.7% crude protein (CP), 19.25-22.5% crude fiber (CF), 43.88- 44.52 % (nitrogen free extract (NFE), 2.23- 7.65 % ether extract (EE), 7.13-13.67 % Ash, and caloric value of 1296.00kj/g (305.62 cal/g and most important is that the protein is of high quality having significant quantities of all the essential amino acids and containing significant quantities of vitamins A, B and C. Alikwe and Omotosho (2013) observed that the phytochemical composition, especially the presence of anti-physiological factors in the leaf meal were: alkaloid 1.24 ± 0.141%; Flavonoids, 4.90 ± 0.20%; Saponins, 0.69 ± 0.124% ; Tannins 0.03 ± 0.118% and Cyanoglycosides 0.25 ± 0.112 %. They also indicated the mineral content as Ca (0.49%), P (0.36%), Zn (46.70ppm) Iron (145ppm) and Cu (14.80ppm), which were moderately high for a leaf meal. However, despite the high nutrient content of MOLM; there are few reports in literature on feeding trials with layers. Therefore, this study was designed to assess the effect(s) of *MOLM* as additive in commercial concentrate to improve egg quality and enhance productivity in table egg production.

Materials and Methods

The experimental study was carried out in the Teaching and Research Farm of Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria for a duration of four weeks. The birds were housed in 1.2×1.2m^2 low walled, and concrete floored pens in a well-ventilated poultry house with waterproof at the side wall to prevent wind, rain, cold, excessive exposure to sunlight (temperature control). Wire mesh was used to cover the top, sides and doors of the pens to prevent the birds from flying out and rodents and snakes from entering. Wood shavings were used as bedding and to avoid the birds from having direct contact with the floor. In the pens, feeds and drinking troughs were provided and washed daily. The litter was replaced on weekly basis to maintain proper hygiene and for the comfort of the birds.

Experimental Birds and Diet

Twenty seven Isa brown birds at forty two weeks of age were used in the study. The experimental birds were randomly distributed in three dietary treatments in complete randomized design (CRD) with three replicates per treatment group at three layers per replicate.

The experimental treatments (T) are as follows: T1: Basal Diets (control), T2: 2% *MOLM*, T3: 6% *MOLM*. The birds were fed *ad libitum* with commercial concentrate (Top feeds) obtained from Yenagoa. Each treatment was fed 360gm/d for treatment 2, 7.2gm of MOLM in powdered form was added to give a concentration of 2% while treatment 3 had 21.6gm of MOLM to provide 6%. The diet of T2 and T3 were thoroughly mixed to ensure even distribution of the MOLM with the concentrate feed. Fresh feeds were offered daily and remnants were weighed daily.

Statistical Analysis of Data

Data on feed intake, weight gain and Egg-laying performance were obtained and subjected to statistical analysis, using analysis of variance (ANOVA). Significant means were separated using Duncan's Multiple Range Test (DMRT).The level of significant difference was generally taken to be at the 95 percent confidence interval($p<0.05$) as described by Snedecor and Cochran (1973) using the software SPSS v16 (SPSS Inc, Chicago, USA) .

Results

The result shows the consistent trend in which the highest egg production rate and the highest statistical mean value were obtained from diet three (6% MOLM) followed by diet 2 and 1. The percentage egg production from Diet 3 (86.51 ± 3.04) was significantly higher ($p<0.05$) than production from Diet 1 (75.33 ± 4.53) but was not significantly different from Diet 2 (82.54 ± 2.22).

Table 1: Weekly % egg production

Treatment	Week 1 (%)	Week 2 (%)	Week 3 (%)	Week 4 (%)	Mean ± SEM
Diet 1	74.6	84.13	77.78	59.52	75.33^{a} ± 4.53
Diet 2	77.78	84.13	82.54	87.30	82.54^{ab}± 2.22
Diet 3	84.13	84.12	88.89	92.06	86.51^{b} ± 3.04

Mean differently lettered differ significantly (p<0.05)

Table 2 shows the weekly average body weight gain per diet given for the laying birds.There were significant differences in body weight gained in week 1, 2,3 and 4 while in the initial weight there was no significant difference (p>0.05). Diet three which was commercial concentrates + 6% MOLM had the highest in body weight gain followed by diet 1 and 2. Although, Diet 3 had an initial lesser weight than Diet 1, but after four weeks, its weight became significant larger (P<0.05) than Diet 1. However, Diet 2 at the end of the 4th week had a lower body weight than Diet 1 which was offered 100% commercial concentrate.

Table 3 summarizes the mean weights of eggs laid by the birds in the course of the experiment.There were no significant differences in the weight of the eggs. However, diet 2 was observed to have the highest mean weight of eggs (59.67 ± 1.20) followed by diet 3 (52.33 ± 8.17) while diet 1 had the lowest weight of eggs (51.00 ± 9.45).

Table 2: Weekly average body weight per treatment

Treatment	Initial weight (kg)	Week 1 (kg)	Week 2 (kg)	Week 3 (kg)	Week 4 (kg)	Mean ± SEM
Diet 1	1.709	1.771	1.747	1.733	1.85	1.7564^{a}± 0.1696
Diet 2	1.658	1.669	1.722	1.75	1.771	1.7083^{a} ± 02616
Diet 3	1.669	1.863	1.867	1.878	1.922	1.8392^{b} ± 03180

Mean differently lettered differ significantly (p<0.05)

Discussion

The use of *Moringa oleifera* leaf meal as feed additive on layers performance was due to earlier observation (Hermogenes *et al* 2012; Opara 1996; Kakenji *et al* 2003) that MOLM had good effect on egg production rate and improved yolk colour.

The highest feed consumption was recorded in treatment three containing 6% MOLM followed by treatment one containing 100% commercial concentrate (control). While the treatment containing 2% MOLM had the least feed consumption from observation. The heap of leftover (remnant) was always more in treatment two than that of one and three. However, Hermogenes *et al* (2012) reported that feed consumption was not significantly affected by the use of MOLM as ingredient in the diet of layers. This probably could be as a result of environmental temperatures since the study was conducted during dry season (February – May 2013).

Table 3: Weight of eggs per treatment

	Week 2 (gm)	Week 3 (gm)	Week 4 (gm)	Mean ± SEM
Diet 1	55	65	33	51.00^{a} ± 9.45
Diet 2	62	58	59	59.67^{a} ± 1.20
Diet 3	36	58	60	51.33^{a} ±7.68

The highest feed consumption on commercial concentrate + 6% MOLM resulted in the highest weight gain. Hermogenes *et al* (2012) reported that broilers fed diet supplemented with MOLM had better body weight gain than the control.

The highest mean egg production was obtained from Diet 2. However, Hermogenes *et al* (2012) reported that layers diet using MOLM as a source of dietary vitamins did not show significant effect on egg production. It was observed that diets with MOLM gave better output compared with the control.

Treatment two had the highest mean value of egg weight. This could be as a result of the unequal size of eggs laid in diet 3. Hermogenes *et al* (2012) reported that there was no significant difference on the weight of eggs and ration does not have effect on weight of eggs. It was also observed that the size of some of the eggs from treatment three (6% MOLM) were smaller than that of diet 2 and 1. It may also be that higher production in diet 3, affected the sizes of the eggs.

The colour of the yolk from each treatment varies from light yellow, yellow and thick yellow in colour and there was no consistency in colouration between treatments. This is in agreement with Hermogenes *et al* (2012) who reported that the yolk colour of the treated and control groups were similar. Therefore, using the MOLM as feed additive for the birds before point of lay might yield a better result because their system will get used to it and it will boost their productivity.

It is therefore evident from this experiment that MOLM could serve as additive for increased egg yield in layers since MOLM addition to the commercial concentrate showed consistent and significant increase from week one to the fourth week of the experiment though with higher feed intake. Therefore, using MOLM as additive for layers is advantageous.

It is concluded that MOLM at 6% inclusion in layers feed improved egg production and body weight. It is recommended that more extensive work with larger number of birds from point of lay to the end of lay and higher levels of MOLM be carried out for more authentic conclusion and recommendation.

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