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# Comparitve Effects of *Moringa Oleifera* Pods, Probiotics and Vitamin E/selenium on Body Weight Gain of Abor- Acre Broiler Chickens

**[1]*MUSA, I.W., 1BELLO, Y.M. and [2]ANDAMIN, A.D.**

[1]Department of Veterinary Medicine, Ahmadu Bello University, Zaria
2Department of Animal Health and Production Technology, Federal College of Horticultural Technology, Dadin-kowa, Gombe State.

## ABSTRACT

Phytonutrients are reliable solutions to public health concerns on antibiotic resistance and adverse effects of synthetic growth promoters. This study evaluated the effects of Moringa oleifera pods and probiotic on the growth performance of broiler chickens. A total of 100-day-old ABOR-ACRE broiler chicks with average weight of 38 grams were purchased from a hatchery in Ibadan and used for this study. The chicks were randomly divided into 4 groups (A, B, C and D). Group A was fed basal diet supplemented with air dried Moringa oleifera pods powder at inclusion rate of 50g/kg, group B fed basal diet supplemented with a commercial probiotic (Bactofort®) at 0.5g/kg, group C that was fed commercial feed and supplemented vit E/Selenium in drinking water while group D fed only commercial feed served as control. Chickens in all groups were served same quantities of feed and water ad-libitum. Birds were vaccinated against Newcastle disease (B1 and la Sota live vaccines-IZOVAC®) on days 7, 14 and 28. The birds were weighed weekly and feed intake evaluated. Data were analyzed using simple descriptive statistics and two-way ANOVA. Results showed significant difference ($p<0.05$) of weight gain of birds fed M. oleifera and probiotic. M. oleifera pods powder significantly improved live weight gain thus serving as alternative to commercial growth promoters in broilers.

**Keywords:** Moringa oleifera, Probiotics, Vitamin E, Growth performance, Broilers.

***Correspondence to Author:**
MUSA, I.W. Department of Veterinary Medicine, Ahmadu Bello University, Zaria
Email: ibwazkalt @yahoo.co.uk

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## INTRODUCTION

The poultry subsector is believed to contribute up to 25% of the agricultural gross domestic products of the Nigerian economy and currently Nigeria is rated as the leading country in Africa in commercial egg production and fourth in broiler production with an estimated production of above 550,000 metric tonnes of poultry meat per annum (FAO, 2010). Unfortunately many of the Nigerian poultry infrastructures have become idle in recent years for reasons partly associated with high cost of inputs particularly feed raw materials and working capital as well as competition from cheap imports (Nuhu, 2010). Furthermore, many feed raw materials used in the formulation of poultry diets contain anti-nutritive factors which may cause inconsistencies and sub-optimal growth in especially broiler chickens (Khempaka *et al*., 2009; Selle *et al*., 2010; Moyo *et al*., 2011). Reports indicated that synthetic growth enhancers and supplements in poultry nutrition are expensive, usually unavailable and may as well possess adverse effects in birds and humans (Ghazalah and Ali 2008; Lee *et al*., 2008). Probiotics for example are viable single or mixed cultures of micro-organisms that when administered to animals would exert beneficially affects by improving nutrient utilization and enhance the beneficial properties of the gastrointestinal miroflora (Kyriakis *et al.,* 1999; Lee *et al*., 2008), however, improper storage and administration, indiscriminate use of antibiotics may affect the desired effects of probiotics. It has therefore become imperative to carefully source stable, cheap, locally available and highly nutritive feed ingredients needed for poultry feed formulations.

Phytogenic feed additives (PFAs) are plant based components that are of nutritive and medical values and which seem efficient in meeting up the current challenges of livestock feeds (van der Klis, 2015). For a long time, plant proteins are identified as cheap and are most naturally available in the tropics (Esonu *et al* 2006; Iheukwumere *et al*., 2008; Gadziriya *et al*., 2012). Leaf meals obtained from many tropical plants such as *Moringa* are affordable sources of protein and micronutrients in human diets, and have therefore stimulated a lot of interest in poultry nutrition research (Abou-Elezz *et al*., 2011; Olugbemi *et al*., 2012). However, most studies conducted on moringer plant seems to have been on the leaves (Du *et al.,* 2007; Kasolo *et al*., 2010; Nuhu, 2010; Olugbemi *et al*., 2010; Moyo *et al*., 2011; Gadzirayi *et al*., 2012; Mukumbo *et al.,* 2014) with little or no research on moringer pods that is often allowed to mature into seeds for propagation or sometimes thrown away together with uneatable branches. This study was therefore carried out to find whether *Moringa oleifera* pods could be a good locally sourced alternative nutrient to probiotics to be used for body weight gain in broilers.

## MATERIALS AND METHODS

### Study Area

The experiment was carried out in the Department of Medicine, Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria, Nigeria. Zaria is located in the Northern Guinea Savannah zone of Nigeria between longitude 7°42'E and latitude 11°3'N with an altitude of 550-700 metres above sea level. It has a total land mass of 300 square kilometers characterized by a tropical climate, a monthly mean ambient temperature range of 13.8-36.7°C and an annual rainfall of 1,092.8 mm. (Clackson, 1957*)*.

### Source of *Moringa oleifera* pods

Fresh immature pods of *Moringa oleifera* was collected from Tudun wada in Sabon Gari Local Government Area of Kaduna state. The pods were air dried at room temperature, ground to powder and sieved into finer particles before use.

### Source and management of broiler chickens

Total of 100, day-old Abor-acre broiler chicks with an average weight 38 grams were managed and subjected to a total of 42-day

experimental period. The chicks were randomly divided into four experimental groups of 25 housed in a locally constructed zinc pen and managed intensively in deep litter system with an equivalent floor space of 0.10 square metre per bird typical of farmers' management approach. The floor was covered with newspapers for the first two weeks of life and then wood shavings for the rest of the experimental period. Properly washed and disinfected four each of feeding trays and small size plastic round drinkers were used. Continuous warmth and light were provided throughout the experimental period by 200 watts electric bulbs at center floor per each 25 chicks in each partition. This was continuously adjusted upwards away from floor as the birds' age. Chicks in all the groups were fed broiler starter feed from day 1 to 28, and broiler finisher feed from day 29 to 42 at-libitum. The same quantity of basal diet was fed to the chicks in all the groups.

**Experimental Design**

This study was conducted for the period of six weeks from April 22 to May 27, 2016. The birds were grouped into four groups (A, B, C and D) of 25 birds. Group A were fed basal diet supplemented with *Moringa* pods at a inclusion rate of 50g/kg, Group B with were fed with basal diet supplemented with commercial Bactofort® probiotic, containing *Lactobacillus acidophilus* (77 × $10^9$ cfu/kg), *Enterococcus faecium* (44 × $10^9$ cfu/kg), *Saccharomyces cerevisiae* (5000 × $10^9$ cells/kg), *Bacillus subtilis* (2.2 × $10^9$ cfu/kg) manufactured by Biofeed Technology Inc., Brossand, QC, Canada, mixed at the rate of 0.5g/kg according to manufacturer's recommendation. Group three were given commercial vitamin E and Selenium (Vit.E/Se® 100/50) manufactured by MIAVIT Gmbh Germany, at 2ml/4 litres for 3 days in drinking water and repeated after every 14 days according to manufacturer recommendation. Birds in group four served as the control and were fed with only basal diet. During the experimental period the birds were weighed weekly using electric weighing balance and feed intake determined and recorded at the same time. Feed intake per group was arrived at as the difference between the amount of feed supplied and the remaining feed at the end of each week. Body weight and body gain were calculated as the difference between the final and initial bird weight. Feed conversion ratio (FCR) was calculated as the ratio between feed intake and body gain at the end of each week (NRC 1994).The birds were vaccinated against IBD using IZOVAC(R) live vaccine on days 14 and 28 and Newcastle by B1 and lasota live vaccines by IZOVAC(R) on days 7, 14 and 28.

**Data Analyses**

All data were expressed as means and their standard error of mean (SEM) using Graph Pad prism version 5.0 Difference between group mean was determined using analysis of variance (ANOVA) followed by Tukey's post-hoc for multiple comparison test. Value of $p < 0.05$ was considered statistically significant in this experiment.

## RESULTS

Results of feed consumption and weight gain of broilers supplemented with *Moringa oleifera* pods, Probiotic and Vitamin E and Selenium is as presented in table 1. There was no statistically significant difference of the body weight gain among all the groups at the end of week 1. The body weight gain of the chickens in group A was significantly higher (P≤0.05) than those in the other 3 groups at the end of week 2. Chickens in group A and those in group B were observed to have higher (P≤0.05) body weight gain compared to those in group C and D at the end of 3 weeks. It was noticed that chickens in group A had significantly higher (P≤0.05) body weight gain than those in the other 3 groups as from days 28 till 42. However, chickens in group B had higher (P≤0.05) body weight gain than those in groups C and D at days 21 and 28 but a decrease in weight gain was noticed at day 35 and later an increase in weight gain at day 42.

There was no statistical significant difference in weight gain of chickens in group C compared with chickens in group D at day 14 and 21 days respectively.

**Table 1.** Comparative feed consumption and weekly average weight gain of broilers supplemented with *Moringer oleifera* pods, probiotics, vitamin E/selenium, and control.

| | Group A | | Group B | | Group C | | Group D | |
|---|---|---|---|---|---|---|---|---|
| Age (days) | Feed consumed (Kg) | Weight gain (g) | Feed consumed (Kg) | Weight gain (g) | Feed consumed (Kg) | Weight gain (g) | Feed consumed (Kg) | Weight gain (g) |
| 7 | 2037 | 219 | 2214 | 222 | 2108 | 190 | 2201 | 204 |
| 14 | 3393 | 536 | 3548 | 524 | 3697 | 466 | 3563 | 483 |
| 21 | 6233 | 925 | 6351 | 901 | 6425 | 780 | 6348 | 819 |
| 28 | 9951 | 1150 | 1055 | 1129 | 1058 | 973 | 1049 | 1073 |
| 35 | 13113 | 1487 | 14568 | 1409 | 14532 | 1243 | 14604 | 1398 |
| 48 | 19498 | 1708 | 20953 | 1682 | 20918 | 1402 | 20990 | 1592 |

Key: A (*M. oleifera*) B (Probiotics) C (Vitamin E/Selenium) D (Control-commercial feed)

**Table 2:** Comparative effects of *Moringer oleifera* pods and vitamin E/Selenium supplementation on weight gain (MEAN ± SEM) by age in days of Abor Acre broiler chickens.

| Age | Group A | Group B | Group C | Group D |
|---|---|---|---|---|
| **7** | $219 \pm 3.33^{a}$ | $222 \pm 4.50^{a}$ | $190 \pm 1.93^{a}$ | $204 \pm 5.14^{a}$ |
| **14** | $536 \pm 10.62^{b}$ | $524 \pm 5.31^{a}$ | $466 \pm 7.77^{a}$ | $483 \pm 4.62^{a}$ |
| **21** | $925 \pm 11.51^{b}$ | $901 \pm 7.50^{b}$ | $780 \pm 22.59^{a}$ | $816 \pm 2.38^{a}$ |
| **28** | $1150 \pm 20.13^{b}$ | $1129 \pm 5.0^{b}$ | $973 \pm 6.59^{b}$ | $1073 \pm 3.55^{a}$ |
| **35** | $1487 \pm 16.12^{b}$ | $1409 \pm 32.60^{a}$ | $1243 \pm 10.27^{b}$ | $1398 \pm 1.74^{a}$ |
| **42** | $1708 \pm 30.42^{b}$ | $1682 \pm 10.60^{b}$ | $1402 \pm 21.63^{b}$ | $1592 \pm 5.82^{a}$ |

Key: A (*M. oleifera*) B (Probiotics) C (Vitamin E/Selenium) D (Control-commercial feed)
SEM= standard error of means. In each row, means with different superscript letters are significantly different ($P \leq 0.05$)

## DISCUSSION

Herb extracts have been reported to significantly improve body weight gain, feed conversion ratio as well as broiler carcass dressing percentages (Omar *et al*., 2016). Photogenic feed additives containing essential oils, spices and saponins have been reported to significantly influence nutrient digestibility in

broiler birds. Plant derived feeds are believed to possess antioxidant properties that improve nutrient absorption by cells, strengthen cellular defense and minimize damages by oxidative stress which consequently leads to improvement in health status of animals (van der Klis, 2015). Results of this study showed that *M. Oleifera* pods inclusion to broiler diet had decreased feed intake but improved live weight gains in broiler chickens. The least feed intake as well as the highest weight gain was noticed in *moringer* pod treated group as compared to other treatment groups and the control thus suggesting *moringer* pods to be of economic value especially in terms of its probable feed conversion efficiency. Lannaon 2007 reported high improvement in daily weight gain, final weight gain and profit on the performance of Stabro broilers given *M. oleifera* leaf. Worthy of noting also is the work of Du *et al*., (2007) who evaluated the eff ect of dietary supplementation of *M. oleifera* on growth performance, blood characteristics and immune response of Abore acre strain of broilers. He found out that increasing supplem entation of *M. oleifera* decreases the contents of uric acids, triglycerides and albumin ratio in the serum of broilers. Hence, immune response of broilers increased significantly. Also Yang *et al*., (2007) evaluated the effect of *M. oleifera* on growth performance, immune function and ileum microflora in broilers. Results showed that dehydrated leaves of *M. oleifera* when given in diet, revealed significant enhancement of duodenum traits, increased lactobacillus counts in the ileum while reducing *E. coli* and enhancement of immune system in broilers. However, *Moringa* seed pod has also been reported to be a source of activated carbon used to treat poisons in addition to its rich source of vitamins A, B and C, protein, sulphur containing amino acids, calcium, phosphorus and iron (Mohammed, 2013) which most likely could account for its nutritive value that led to higher weight gain observed in this study. It is also noted that the improvement in body weight gain in moringer treated group could be due to improved feed conversion or reduced amount of feed required to produce one unit of meat.

Probiotics on the other hand are live non-pathogenic and non-toxic microorganisms, which when administered through the digestive route favour the host's health (Guillot, 1998). In this study a brand of probiotic 'Bactofort®' was obtained from commercial source and used in comparison to moringer pod powder and vitamin E/selenium in broilers. The probiotic treated group was second to moringer treated group in terms of body weight gain and also recorded a higher feed consumption compared to moringer treated group. This may imply the body weight gain superiority of moringer pod in treated broilers. The addition of probiotics especially Bactofort® and Anthox® to livestock feed were reported to improve the nutritive quality of feed and performance of animals by Martin *et al.,* 1989 and Glade and Sist, 1998. This study supports this finding in broiler birds. Today non-antibiotic growth promoters such as organic acids and probiotics are increasingly being produced and used for animal nutrition worldwide (Windisch *et al.,* 2008). The cost may hinder many backyard poultry farmers in especially developing nations and therefore moringer pods may be an excellent alternative. One of the major reasons for increased interest in the use of probiotics in livestock in recent years is because they are natural alternatives to antibiotics and for their growth promotion effects in especially poultry (Barnes, *et al*., 1972).

Rajmane and Ranade (1994) found that the inclusion of vitamin E and C at 150 mg/kg and 200 mg/kg in poultry diet respectively improved growth rate as well as immune response of vaccinated chickens. Futhermore, Choct *et al*. in 2004 reported that inclusion of selenium in poultry diet markedly reduced feed conversion ratio due to the fact that it significantly lowered feed intake but found it to have improved eviscerated carcass weight. Contrary to this study, Mahmoud and Edens (2005) reported

that selenium yeast improved body weight and feed conversion ratio in broilers. In this study however, it was found out that broilers treated with vitamin E/Selenium had a high feed consumption with a concomitant least body weight gain agreeing closely to the findings of Choct *et al*. in 2004. Vitamin E and selenium may therefore be of little or no value in enhancing body weight gain in broilers.

## CONCLUSION

The Moringer pod powder evaluated in this study had two major advantages when supplemented to broilers. These were: significant improvement in body weight and decreased feed intake. The pod powder therefore, had relative economic efficiency and could serve as an excellent alternative to commercially available growth promoters.

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