

EGG QUALITY OF LOCAL FEMALE TURKEYS ADMINISTERED AQUEOUS MORINGA OLERIFERA LEAF AND SEED EXTRACTS.

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ABSTRACT

A total of two hundred and twelve (212) days trial was conducted to evaluate the effect of *Moringa oleifera* leaf and seed extracts on egg qualities of female local turkeys. A total of 36 female local turkeys of about 8 - 9 weeks old were used for the study. There were nine turkeys per treatment group, grouped as; T1 (control no extract), T2 (1% seed w/v), T3 (0.5% leaf and 0.5% w/v) and T4 (1% leaf w/v). Each group was replicated three times with three turkeys per replicate. Data collection was done on the external and internal qualities of the egg as well number of eggs laid during the trial period. On the external egg qualities, only the shell weight and the shape index differed significantly ($P < 0.05$). The weight of the shell was improved by the administration of *Moringa* extract. All the internal egg qualities (percent shell, yolk weight (g), yolk diameter (mm), yolk depth) did not differ significantly ($P > 0.05$). Egg lying was highest in T3 while T2 (122) had the least number of egg. Therefore, from the results of the experiment, it could be safe to say that the egg quality were not affected by the *Moringa* per se, but the egg lying ability was improve most by combination of the leaf and seed extracts.

Key words: Turkey, Egg, *Moringa oleifera*.

INTRODUCTION

Moringa oleifera belongs to the order Brassicales and family, *Moringaceae* (Mgbemena and Obodo, 2016). It is called “Zogale” in Hausa “Ewe ile” among the Fulanis and “Okwe oyibo” in Igbo (Olagbemide and Philips, 2014). It is also called Horseradish (Alemede *et al.*, 2014) and miracle plant. *Moringa oleifera* is a multipurpose plant that is widely cultivated species among *Moringa* plants throughout the tropics (Junick and Robert, 2008). The leaves and seeds of *Moringa* have been used to cure many diseases due to their anti-ulcerative (Pal *et al.*, 1995) anti-hypertensive (Dahot, 1988) anti-oxidant (Nickon *et al.*, 2003) and anti-diabetic (Sahoo, *et al.*, 2014) properties. According to Nickon *et al.*, (2003) it also possesses antibacterial cum anti-fungi properties. Even folk medicine practioners use the plant in curing tumors (Gupta *et al.*, 2005). Nutritionally, the fresh *Moringa* leaves contain more than twice the amount of protein (2.8g/100g) found in spinach (Olugbemi *et al.* 2010). The leaves contain magnesium, potassium and all the essential amino acids like cysteine, histidine, arginine, methionine, lysine, phenylalanine, leucine, isoleucine and valine (Alemede *et al.*, 2014). It also has anti-oxidants like β – *carotinoids*, lutein and xanthine (Fuglie, 1999). Hence using it to improve the fertility of local female turkeys wouldn't be a bad idea.

MATERIALS AND METHODS

The experiment lasted for 212 days. It was approved and supervised by the Michael Okpara University of Agriculture Umudike College of Animal Science Research and Experiment committee and was carried out at the Poultry unit of Chirex Agro Services Limited in Abakuru, Ohaji-Egbema Local Government Area of Imo State Nigeria.

Collection and Preparation of Experimental material

The freshly harvested leaves and seeds were sorted to remove contaminants sand particles and dead matter. They were shade dried in an open well ventilated room for about one week at room temperature. The seeds and the foliage were ground separately into powder and stored in separate clean dry containers. Treatment one (T₁) was the control group with no *Moringa* powder. One gram of the seed powder was diluted in 1000mls of clean water, sieved with cheese cloth and served as drinking water for treatment two (T₂). Treatment three (T₃) had 0.5g of leaf powder and 0.5g seed powder diluted with 1000mls of clean water sieved with cheese cloth and served as drinking water. One gram of the leaf powder was diluted in 1000mls of clean water, sieved with cheese cloth and served as drinking water for treatment four (T₄).

Experimental Animals and management.

Thirty six (36) local female strains of turkeys of white, black and lavender plumage averagely eight (8) weeks old were used for the study.

The local turkeys were procured from a reputable farm, in Anambra State. Before commencement of the experiment, the local turkeys were quarantined and allowed to acclimatize for 14 days in the Poultry unit. During the acclimatization period, the turkeys were given routine management practices which included deworming with Ivermectin solution (1%w/v) against endo and ecto parasites. Suitable vaccinations for their age were also given prior to the commencement of the experiment.

The treatment groups were administered 0 gram of *Moringa* (T₁), 1 gram of *Moringa* seed alone (T₂) combination of 0.5g of *Moringa* seed and 0.5gram of *Moringa* leaf (T₃) and lastly 1 gram of *Moringa* leaf alone (T₄) . Experimental material was given to the female turkeys at 10 weeks of age. The treatment was administered to the turkeys via drinking water between hours of 7am to 10am after which they were given clean drinking water throughout the rest of the day. The turkeys were given commercial feed during the first 14weeks of the experiment. From 24 weeks of age formulated ration in Table 1 was used. The feed sample was determined to ensure quality assessment in Table 1 by livestock feeds Plc with the aid of the apparatus; DA1650 near infra-red Spectrophotometer.

Table 1: Feed Formula for the Experimental Diet

Ingredients	(%)
Groundnut	21.00
Fish meal	2.00
Maize	35.00
Wheat offal	37.00
Bone meal	2.50
Oyster shell	1.50
Methionine	0.25
Lysine	0.25
Salt	0.25
Vitamin Mineral Premix	0.25
Total	100
Determined values	
Crude protein -	19.85
Crude fibre -	7.44
Fat -	5.01
Moisture -	8.28
Ash -	6.99
Energy -	3018.8 kcal/kg

Vitamins and trace mineral declaration: 2.5kg of premix contains.

Vitamin A (I μ) 12,500.00, Vitamin D₃ (i μ) 2,500,000.00, vitamin E (mcg) 40,000.00, Vitamin K₃ (mg) 2,000.00, vitamin B (mg) 3,000.00, vitamin B₂ (mg) 5,500, vitamin B₆ (mg) 5,000, Nicocin (mg) 55,000.00, calcium pantothenate (mg) 11,500.00, Vitamin B₁₂ (mg) 25,000, Chlorine Chloride (mg) 500,000.00, Folic acid (mg) 1,000.00, Biotin (mg) 80.00, Manganese (mg) 120,000.00, Iron (g) 100,000.00, Zinc (mg) 80,000.00. Copper (mg) 8,500.00, Iodine (mg) 1,500.00, Cobalt (mg) 300.00, Selenium (mg) 120.00, Antioxidant (mg) 120,000.00.

Experimental Design

The experiment was completely randomized design (CRD). It consisted of four treatments; T₁, T₂, T₃ and T₄ containing 0g, 1g of seed, combination of 0.5g of seed and 0.5g of leaf and 1gram of leaf, respectively. There were nine male turkeys in each treatment with 3 replicates of 3 turkeys per replicate.

Data Collection

As from 196 days of age (126 days into the study) that egg laying started. Egg collection was done three times per day and each of the collected eggs was labeled. The eggs were stored in a clean crate at room temperature and were analyzed within 48 hours of collection.

a. External egg parameters

Egg weight and shell weight were determined with the aid of Ohaus electronic weighing scale. The egg length and width were measured with venier calipers. Shell thickness was measured with micrometer screw gauge. Egg volume was ascertained using the Archimedes principles of water displacement.

b. The Internal egg parameters

The yolk diameter, albumen depth were measured with the Venier calipers.

The yolk weight, albumen weight were weighed with Ohaus electronic scale. The yolk; albumen ratio was obtained by; $\frac{\text{Yolk weight}}{\text{Albumen Weight}}$.

$$\text{Percent Yolk} = \frac{\text{Weight of Yolk}}{\text{Weight of whole Egg}} \times 100$$

$$\text{Percent Albumen} = \frac{\text{Weight of albumen}}{\text{Weight of whole egg}} \times 100$$

Specified gravity of the egg was obtained by dividing the weight of the egg by the weight of equal volume of water displaced by the egg.

$$\text{Specific Gravity (Sg)} = \frac{\text{Weight of Egg}}{\text{Volume of Egg}}$$

$$\text{Egg Shape Index (EI)} = \frac{\text{Weight of Egg}}{\text{Length of Egg}}$$

$$\text{Percent Shell} = \frac{\text{Shell Weight}}{\text{Egg Weight}} \times 100$$

Results and Discussion

Table 2: Mean Values of external Egg parameters of female Turkeys administered *Moringa* leaf and seed extracts.

Parameters	T ₁	T ₂	T ₃	T ₄
Egg Weight (g)	63.18±0.48	62.18±1.32	64.27±1.37	65.93±1.92
Egg Length (g)	59.26±0.39	60.43±0.67	59.55±0.32	60.69±0.79
Egg width (g)	44.34±0.67	42.943±0.32	44.21±0.93	44.20±0.58
Shell weight (g)	7.69±0.40 ^{ab}	7.033±0.32 ^b	7.63±0.35 ^{ab}	8.12±0.096 ^a
Shell Thickness (mm)	0.65±0.08	0.6800±0.04	0.68±0.09	0.79±0.11
Shape Index	0.75±0.02 ^a	0.7103±0.00 ^b	0.74±0.01 ^{ab}	0.73±0.00 ^{ab}
Egg Volume	60.58±1.15	59.447±1.75	61.62±1.36	62.98±2.22

Means with different superscripts ^{a, b, c} or ^d on the same row are significantly different (P<0.05).

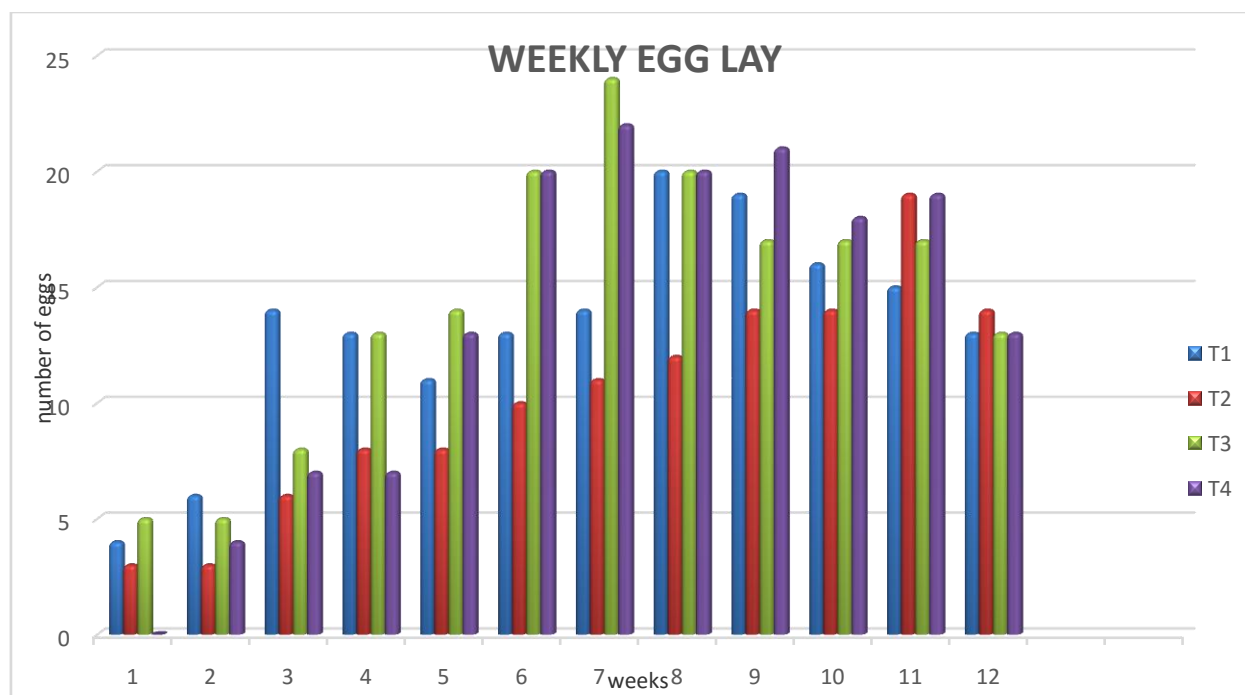
The result of the mean values of external egg parameters of female local turkeys administered *Moringa* leaf and seed extracts were shown in Table 2. The egg weight, egg length, egg width, shell thickness as well as egg volume were not significantly (P > 0.05) affected by the administration of *Moringa* leaf and seed extracts. Egg shape index was negatively influenced by *Moringa* extracts significantly (P<0.05) when compared with the control. The shell weight, shape index and length increased better in the *Moringa* leaf extracts than on the seed extracts as well as combination of both leaves and seeds effect. The egg weights were within the range of 62.3-79.5 reported by Adeyeye (2009) on turkeys. This was also consistent with the report of Kakengi *et al.* (2007) and the work of Tete *et al.* (2016) report on ISA Layers with *Moringa* leaves. These improvements may be due to rich amino acid profile found in the leaves of *Moringa*. Gupta *et al.* (2005) and Foidl *et al.* (2001) observed that anti-nutrients like and oxalates have less chelating effect on feed calcium, hence improves calcification of egg shells.

Table 3: Mean Values of Internal Egg parameters of female Turkeys administered *Moringa* leaf and seed extracts.

Parameters	T ₁	T ₂	T ₃	T ₄
Percent Shell	12.17±0.60	11.33±0.65	11.85±0.40	12.41±0.23
Yolk Weight (g)	20.33±0.84	19.67±0.17	19.67±1.16	21.11±0.49
Yolk Diameter (mm)	40.49±0.28	40.92±0.63	40.51±1.03	42.50±0.90
Yolk Depth (mm)	14.89±0.59	14.88±0.63	15.03±0.36	15.41±0.56
Percentage Yolk	32.19±1.37	31.65±0.42	30.61±1.69	32.19±1.10
Albumen Weight (g)	34.56±0.80	34.33±0.83	36.89±1.17	40.82±4.22
Albumen Depth (mm)	9.10±0.93	9.45±0.23	9.58±0.46	10.22±0.73
Percent albumen	54.67±1.24	55.17±0.43	57.33±1.13	56.77±1.73
Albumen : Yolk Ratio	0.59±0.04	0.57±0.01	0.54±0.04	0.57±0.021
Specific Gravity	1.07±0.05	1.05±0.02	1.04±0.02	1.05±0.01

Means with different superscripts ^{a, b, c} or ^d on the same row are significantly different (P<0.05).

The results of mean internal egg qualities of local female turkeys administered *Moringa* leaf and seed extracts are shown in Table 3. The percent shell, yolk weight, yolk diameter, yolk depth, percentage yolk, albumen weight, albumen depth, percentage albumen, albumen to yolk ratio specific gravity did not differ significantly (P>0.05) among the treatments. This confirms the report of Teteh *et al.*, (2016) on ISA layers who observes that 1% *Moringa* leaves level of inclusion improved the egg qualities of the birds. According to the reports of Gupta *et al.* (2005) and Foidl *et al.* (2001) the level of the leaves extracts should be low so as not to attract the effect of anti- nutrients like phylates and oxalates which usually leads to chelating effect on feed calcium hence reducing shell quality, this incidence was not witnessed in our study.

Figure 1: Weekly egg lay of female turkeys administered *Moringa* leaf and seed extracts

Egg production was increased by the combination effect of *Moringa* leaf and seed extracts with 173 eggs laid in 12 weeks (figure 1). Turkeys administered leaf extracts alone laid 164 eggs, followed by the control groups which laid 154 eggs and the seed extracts alone laid 122 eggs. These results show that combination of leaf and seed extracts treatment mostly improved the turkey hen egg laying ability. This may be due to the rich steroid content of the leaves and seeds of *Moringa*, which supported egg laying. These results confirm the reports of Yakubu *et al.* (2014) who claimed that the

intake of some amount of estrogenic substances in *Moringa oleifera* inhibits the secretion of LH (Luteinizing hormone) and FSH (follicle stimulating hormone) and reduces, subsequently, endogenous oestrogen and progesterone levels. Hence these lower levels of sexual hormone may have played a serious role in the lower number of follicles and low weight of ovarian grape and oviduct seen in T₄ group. Therefore combination of the two extracts brought better results in terms of egg laying ability of the female turkeys. Although lower egg laying ability of T₂ might be due to anti-nutrients which is nutritional problem that have been observed by Nys and Guyot (2011) to be responsible for reduced rate of egg production synthesis that is very sensitive to these nutritional abnormalities.

CONCLUSION

The study on effect of *Moringa oleifera* seed and leaf extract on the egg quality of local female turkeys show that *Moringa* leaf (T₄) improved egg shell weight most. Combination of leaf and seed extracts improved the egg lying ability most. Therefore to improve number of eggs laid among female turkeys there is need to use *Moringa oleifera* seed and leaf extracts at 0.5% leaf and 0.5% seed w/v.

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