

ADMINISTRATION OF AQUEOUS *Moringa oleifera* LEAF AND SEED EXTRACTS: EFFECTS ON THE SERUM GLUCOSE AND PROTEIN OF MALE HERITAGE TURKEYS.

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ABSTRACT

This study examined the effects of *Moringa oleifera* leaf and seed extracts on the serum glucose as well as total protein levels of male heritage turkey. A total of 36 male turkeys were used for the study which was assigned into four treatment groups. 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). Blood samples were collected at 36 weeks of age. The result showed that the glucose level was significantly ($p < 0.05$) high in T₁ (control) 144.33 ± 2.03 , T₂ (147.67 ± 4.63), T₃ (151.00 ± 1.16) than T₄ (leaf extracts) 130.66 ± 4.48 . The total protein levels differed significantly ($p < 0.05$) among the treatments. T₄ 3.933 ± 0.090 was highest ($p < 0.05$) when compared to T₂ 3.10 ± 0.20 and T₃ 3.26 ± 0.14 and then T₁ 2.34 ± 0.09 . This shows that the *Moringa* leaf and seed extracts had effects on the male turkey serum glucose and total protein levels. The leaf extract lowered the serum glucose level most, while improving the protein quality of the blood at the same time. Thus, confirming that the plant *Moringa* has the ability to lower glucose levels in the blood.

Keywords. Blood, glucose, protein, extracts, turkeys.

INTRODUCTION

Examination of blood gives the opportunity to investigate the presence of several metabolites and other constituents in the body of animals and it plays a vital role in the physiological, nutrition and pathological status of an organism (Aderemi, 2004; Doyle, 2006). Quality of blood is influenced by so many factors such as gene, environment and nutrition. Various plant materials can aid in improving the quality of animal life. Such plants include *Moringa oleifera* which is believed to be good source of minerals (phosphorous, chloride and calcium) and vitamins C (Abdukarim *et al.* 2015). It is also rich in antioxidant properties like lutein, alphaorotine, beta-carotene, xanthine and chlorophyll (Fugile, 1999). It stimulates the immune system and develops the gastrointestinal tract to improve the overall production performance of the body system (Amad *et al.*, 2011). The phyto - chemical analysis of *Moringa* reveals that the plant is rich in simple sugar compounds (Rhamnose) high amount of polyphenols (antioxidant compound) (Bennett *et al.*, 2003). The leaf extract is capable of reducing hyper glycaemia and lowering cholesterol (Mehta, *et al.*, 2003). All the parts are cardiac and circulatory stimulants as well as anti -tumor agents (Pfaffet *et al.*, 2015). Therefore exploring its effect on the heritage male turkeys' serum glucose and total protein is apt.

MATERIALS AND METHODS

The experiment lasted for 154 days. It was approved and supervised by the Michael Okpara University of Agriculture Umudike (College of Animal Science and Animal Production CASAP) 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 power 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 their management

Thirty six (36) local male 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 Ikenga, Aguata Local Government Area 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 36 male turkeys were randomly assigned into treatments. There were four (4) treatments in all with nine (9) turkeys per treatment. Each treatment group was replicated three times to contain three (3) turkeys per replicate.

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 male 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 14 weeks 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_u) 12,500.00, Vitamin D₃ (i_u) 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.

Data collection

Blood for serum glucose and total protein biochemistry was collected through the wing vein of the male local turkeys using sterile needles and syringes and were analyzed within 2 hours of collection. The blood serum level of total protein (TP) was determined following standard procedures (Evans, 1996). Blood glucose level was determined using ACCU-CHEK^(R) glucometer (Roche Diagnostics GmbH, Germany).

Data analysis

This was performed using one way ANOVA (SAS, 2015) with dietary treatments (T₁, T₂, T₃, T₄) as independent variables, while all data obtained on serum glucose and total protein levels were regarded as dependent variables. Duncan HSD test was used for testing difference of means. The treatment effect was considered significant if P-values were less than 0.05.

RESULTS AND DISCUSSIONS

Table 2: mean values of serum glucose and total protein of male turkeys administered aqueous *Moringa oleifera* seed and leaf extracts.

Parameters	T ₁	T ₂	T ₃	T ₄
Glucose (mg/dl)	144.33±2.03 ^a	147.67±4.61 ^a	151.00±1.16 ^a	130.67±4.48 ^b
Total Protein (g/dl)	2.34±0.09 ^c	3.10±0.20 ^b	3.26±0.14 ^b	3.93±0.09 ^a

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

The glucose level was significantly (p<0.05) highest in T₁ (control) 144.33± 2.03, T₂ (147.67± 4.63), T₃ (151.00 ±1.16) than T₄ (leaf extracts) 130.66 ± 4.48. The total protein levels differed significantly (p<0.05) among the treatments. T₄ 3.933 ± 0.090 was highest (p< 0.05) when compared to T₂ 3.10 ± 0.20 and T₃ 3.26 ± 0.14 and then T₁ 2.34 ± 0.09.

The glucose levels were significantly higher in treatments T₁, T₂ and T₃. T₄ (130.667 ± 4.484) had the least level of glucose in the study. The result in this study was however similar with Reece and Swason (2004) reported range of 130 – 270 mg/dl on avian. The observed result from the study was in line with the general finding of Priya and Gomathy (2008) but lower than Grey (2014), Sonawane *et al.* (2017) reports. Serum glucose has been observed by Sonawane *et al.* (2017) and Priya and Gomathy (2008) to increase in turkey with advancement in age. The predominantly lower (P<0.05) level noticed in T₄ goes to affirm that *Moringa* leaves have effect on the glucose level of the turkeys thus confirming the anti-diabetic properties (Sahoo *et al.*, 2014) of the *Moringa* leaves.

The total protein level of male turkeys fed *Moringa oleifera* extract differed significantly among the treatment groups. Total protein levels were higher (P<0.05) among the *Moringa* treated groups. The serum protein levels are usually affected by the presence of severe liver damage or prolonged dietary protein deficiency (Johnson *et al.*, 2001) or even dehydration (Ashraf, 2017). These abnormalities were not witnessed in this study. Rather *Moringa* extract boosted the serum protein levels of the turkeys, with the leaf extracts group being the best. The protein levels of turkeys in the *Moringa* administered group were close to the reported ranges of 30.2 – 37.8g/l as was reported by Damaziak *et al.* (2017) and 3.60 – 3.80g/dl on turkeys by Etuk *et al.* (2012) on turkeys. All the treatment groups were in conformity with the reported range of 2.4 -5.2g/dl of Grey (2014) and Miesle (2018) on avian and 2.32 – 4.68g/dl (Priya and Gomathy 2008) on turkeys. The findings from the study corroborate the observations of Abdulkarim *et al.* (2015) that *Moringa* reduces glucose levels in the blood. Therefore *Moringa* extracts especially the leaf extract reduced the glucose level of male turkeys while improving the total protein quality of the blood samples.

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