

Kidney Function Test, Weight Gain and Serum Protein Values of Mature Male Turkeys Treated with Gonadotrophin (Diclair[®]) For Sperm Production

Egu U. N.

Department of Animal Science and Fisheries, Abia State University, PMB 7010, Umuahia, Nigeria

Abstract— Sixteen sexually matured (12 months old) healthy male turkeys were used to determine the effect of Gonadotrophin (Diclair[®]) on kidney function, weight gain and serum protein values. The turkeys were divided into 4 treatment groups, identified as T₁ (control) administered with 1.00ml physiological saline (0.00 i.u Diclair[®]), T₂, administered with 13.50 i.u Diclair[®], T₃, administered with 27.00i.u Dicliar[®]T₄, administered with 40.50 i.u Dicliar[®], with one turkey per replicate in a completely Randomized Design (CRD). The injections were divided into 3 doses each and administered intramuscularly in the thigh for three consecutive days. Blood was collected one week after Diclair[®] administration. Four turkeys were randomly selected from each treatment group and bled to collect blood for blood chemistry analysis. The turkey were weighed every week for five weeks and their weight recorded. The result showed that there were significant differences ($P < 0.05$) among the treatment groups in all parameters for kidney function test: chronicle, potassium, sodium, bicarbonate except creatinine which was similar ($p > 0.05$) among the treatment groups. The results further showed that there were no significant differences ($p > 0.05$) among the treatment groups in initial body weight. However, there were significant differences ($P < 0.05$) among the treatment groups in final body weight and weight gain. Similarly there were significant differences ($P < 0.05$) among the treatment groups in all the serum protein values measure: albumin, globulin, serum total protein as well as albumin/globulin ratio. The results of the study showed that Diclair enhanced kidney function and weight gain without any deleterious effects on serum protein values of the male turkeys.

Keywords— Diclair[®], Kidney function, weight gain, serum proteins male turkeys.

I. INTRODUCTION

Turkeys (*Meleagris galloparya*) are birds that originated in North America, that were domesticated in Europe and are now an important source of food in many parts of the world (Brant, 1998). Turkey occupies an important position next to chicken, duck, guinea fowl and quail in contributing to the most evolving sector which is playing a significant role in augmenting the economic and nutritional status of varied population (Katie and Frazer, 1988). All over the world turkeys are reared for their tasty and high quality meat (probakaran, 2003). Hence they are kept because of the economic service they render (Okendo, 2005) such as eggs, meat, feathers and sometimes pet.

In order to carry out any sustainable improvement in livestock, there should be methods of ensuring the repeatability and multiplication of desired traits in subsequent generations. To get the fullest benefits from the breeding turkenys therefore, a good knowledge of their sperm production is essential as well as their sperm output. In view of the increasing use of livestock for specialized production, there is need for more practical and batter control methods of reproduction.

For several decades natural or synthetic hormones have been used to improve the productive and reproductive potentials of animals. In reproductive management of farm animals, human menopausal gonadotriophin is reputed to be effective in improving semen quality of local cocks (Abu *et al.*, 2006).

Diclair[®], also known as Humegon or mentrophim is a human menopausal gonadotrophin lyophilized in vials containing a mixture of follicle stimulating hormone (FSH) and luteinizing hormone (LH) in a ratio 1:1 (Dixon and Hopkins, 1996). Follicle stimulating hormone and LH present in Diclari[®] play vital role in the initiation of spermatogenesis. The hormone preparation is cheap readily

available and does not require cold chain storage (Iheukwumere, 2005).

It has not been determined if the administration of the hormone preparation for spermatogenesis and semen production would induce any side effects on the kidney function, weight gain and serum protein values of the turkeys. This study was therefore carried out to determine the effect of Diclair® administration on kidney function, body weight gain and serum proteins of mature male turkeys.

II. MATERIALS AND METHODS.

Experimental Birds and their Management

Sixteen healthy sexually matured male turkeys aged 12 months were used for this study. The turkeys were purchased from the local markets and housed in clean pens. Routine management practices were carried out which include deworming, daily observation of birds to identify sick ones, maintaining clean and dry litter and vaccination

against diseases. The turkeys were fed Grower Mash. Feed and water were provided *ad libitum* throughout the 28 days duration of the experiment. They were weighed every week and their weights were recorded.

Experimental Design and Drug Administration

Sixteen male turkeys were divided into 4 treatment groups consisting of 4 turkeys per group with one turkey per replicate in a Completely Randomized Design (CRD). These groups were assigned to 4 levels of Dicclair® injection as treatments. The levels of Dicclair® were 0.00i.u, 20.25i.u, 40.50i.u, and 60.75i.u Dicclair® represented as T₁, T₂, T₃, and T₄ respectively. The group which received 0.00i.u Dicclair® (T₁) served as the control.

Dicclair® was supplied in 3 vials, each containing FSH 75i.u and LH 75i.u. The content of each vial was dissolved in 1ml of physiological saline solution immediately prior to use, resulting in a solution D_{FSH} 75I.U plus D_{DLH} 75I.U per ml.

Table.1: Doses of Dicclair® Administered to Mature Male Turkeys

Day	Treatment Dosage (ml)			
	T ₁	T ₂	T ₃	T ₄
1	0.00	0.03	0.06	0.09
2	0.00	0.03	0.06	0.09
3	0.00	0.03	0.06	0.06
Total	0.00	0.09	0.18	0.27

Table.2: concentration of Diclar® on Mature Male Turkeys

Day	concentration of Dicclair® (i.u)			
	T ₁	T ₂	T ₃	T ₄
1	0.00	4.50	9.00	13.50
2	0.00	4.50	9.00	13.50
3	0.00	4.50	9.00	13.50
Total	0.00	013.50	27.00	40.50

All treatments were administered intramuscularly in the breast muscle of each turkey using a one ml syring with 0.01 ml graduation

Blood collection and Evaluation of Blood chemistry

The turkeys were bled one week after Dicliar^(R) injections between 9am and 10.30am from punctured wing vein and aspirated about 5ml of blood from each turkey. The blood samples were poured into plain bottles and were allowed to coagulate to produce sera for blood chemistry analysis. The bottles of coagulated blood were subjected to standard methods of serum separation and the harvested sera were used for biochemical evaluation. The standard flame

photometry using Gallenkamp analysis was used to determine serum sodium (Na⁺) ion and potassium (K⁺) ion. While bicarbonate and chloride ions were assayed according to the methods of Baker and Silverton (1986). Creatinine concentration was also determined following methods described by Baker and Silverton (1986). Serum total protein was determined by Goldbery refractometer method as described by Kohn and Allen (1995). Albumin and globulin were determined using bromocresol green (BCG) method as described by Randox (2006).

Body weight measurement

Body weight of the birds were measured in kilogram using a 20kg weighing scale.

Data Analysis

Data collected on kidney function test, body weight and serum protein values of mature male turkeys were subjected to one-way analysis of variance (ANOVA) using the technique of steel and Torrie (1980). Significant treatment means were separated using Duncant's New Multiple Range Test as described by Obi (1990).

III. RESULTS AND DISCUSSION

The results of Diclair[®] administration on kidney function of mature male turkeys are shown in table 3.

There were significant difference ($P < 0.05$) among the treatment groups in all the parameters measured for kidney function: Sodium, potassium, Chloride and carbonate. Serum creatinine was similar ($P > 0.05$) among the treatment groups.

Turkeys on T₂ recorded the highest value of 147.10 (mmol/L) in serum Sodium and this differed significantly ($P < 0.05$) from turkeys on T₁, T₃ and T₄ which were also significantly different ($P < 0.05$) from each other in sodium values. The lowest value in serum sodium was observed in turkey on T₄ (126.13mmol/L). The sodium values obtained in this study were lower than the range of 148-163 (mmol/L) reported by Jain (1993) for birds, and lower than the range of 131.30-136.14 (mmol/L) reported by Ihekumere *et al.* (2006) in Nigerian indigenous chickens, but higher than the range of 56-59(mmol/L) reported by Ihekumere *et al.* (2002) This could be attributed to breed and physiological status of the birds. Serum electrolytes play important roles in physiological processes involved in homeostasis.

Turkeys on T₄ recorded the highest value of 5.12 (mmol/L) in serum potassium and this differed significantly from turkeys T₁,T₂ andT₃ which were also significantly different($P < 0.05$) from each other in potassium values.The lowest value in serum potassium was observed in turkeys on T₁ (4.05 mmol/L). The potassium values obtained in this study were within the range of 4.6- 6.5 (mmol/L) reported by Jain (1993) for birds, but higher than the range of $1.43 \pm 0.02 - 1.74 \pm 0.15$ (mmol/L) reported by Ihekumere *et al.* (2006) in Nigeria indigenous chickens and higher than the range of 1.55 - 1.80 (mmio/L) reported by Ihekumere *et al.* (2002) in broiler chickens. Potassium is excreted in the kidney and elevations of plasma potassium

is indicative of under excretion suggesting kidney impairment. When plasma protassium is low, the level of sodium in plasma is elevated. Thus they help in depolarization and repolarization in the nerve cells and muscle cells and in the transmission of impulses in the nerve cells, intracellular and extracellular fluids.

Turkey on T₁ recorded the highest value of 96.13 (mmol/L) in serum chloride and this differed significantly ($P < 0.05$) from turkeys on T₂, T₃ and T₄ which were also significantly different ($P < 0.05$) from ach other in chloride values. The lowest value in serum chloride was observed in turkeys on T₄ (81.07 mmol/L). The serum chloridle values obtained in this study were higher than the range of 33.00 - 34.10 (mmol/L) reported by Ihekumere *et al.* (2002) in broiler chickens, but lower than the range of 144-120 (mmol.L) reported in Thai chickens by simaraks *et al.* (2004) and lower than the range of $130.38 \pm 0.17 - 132.30 \pm 1.27$ (mmol/L) reported by Ihekumere *et al.* (2006) in Nigerian indigenous chickens.

Turkeys on T₃ recorded the highest value of 22.65 (mmol/L) in serum bicarbonate and this differed significantly ($P < 0.05$) from turkeys on T₁, T₂ and T₄ which were also significantly different ($P < 0.05$) from each other in bicarbonate values.The lowest value serum bicarbonate was observed in turkeys on T₁ (21.99 mmol/L). The serum bicarbonate values obtained in this study were higher than the range of $13.44 \pm 0.38 - 15.60 \pm 0.22$ (mmol/L) reported by Ihekunwre *et al.* (2006) in Nigerian indigenous chickens and higher than the range of 14.80 - 15.60 (mmol/L) reported by Ihekumere *et al.* (2002) in broiler chickens. Bicarbonate is used in the buffering system in the blood, extracellular fluid and kidney (Brackett, 2005).

There were no significant differences ($P > 0.05$) among the treatment groups in serum creatimine. Turkeys on T₂ recorded the highest numerical value of 4.84 (mmol/L) in serum creatinine. The lowest numerical value of 1.35 (mmol/L) in serum creatinine was observed in turkeys on T₄. The serum creatinine values obtained in this study were higher than the range of 1 - 2 mg/dl reported for birds (Reece and swenson, 2004; Banerjee, 2005), but lower than the range of 18.00 - 18.50 mg/100ml reported by Ihekumere *et al.* (20002) in broiler chickens. Creatinine measurement is used almost exclusively in the assessment of kidney function. The rate of production of creatinine is constant and elevations of plasma creatinine are indicative of under excretion suggesting kidney impairment.

Table.3: Effect of Diclair® on Kidney function of Mature Male Turkeys

Parameters	Treatment of (Diclair® i.u)				SEM
	T ₁	T ₂	T ₃	T ₄	
	0.00	13.50	27.00	40.50	
Sodium (mmol/L)	134.33 ^c	147.10 ^a	145.13 ^b	126.13 ^d	0.45
Potassium(mmol/L)	4.05 ^d	4.63 ^b	4.17 ^c	5.12 ^a	0.05
Chloride (mmol/L)	96.13 ^a	82.10 ^c	82.97 ^b	81.07 ^d	0.21
Bicarbonate (mmol/L)	21.99 ^d	22.17 ^c	22.63 ^a	22.46 ^b	0.02
Creatinine (mmol/L)	1.42	4.84	1.52	1.35	1.81

^{abcd}: Means within row having different superscript are significantly (P< 0.05) different. SEM = standard error of means

Table.4: Effect of Diclar® on Body Weight Gain of Mature Male Turkeys

parameters	Treatment Diclar® i.u)				SEM
	T ₁	T ₂	T ₃	T ₄	
		13.50	27.00	40.50	
InitialbodyWeigh(kg)11.20		11.23	11.23	11.30	0.09
Final body weight (kg)	13.33 ^b	13.37 ^b	13.53 ^b	14.03 ^a	0.16
Body Weight gain (kg)	2.13 ^b	2.14 ^b	2.30 ^b	2.73 ^a	0.14

^{ab}: Means within row having different superscripts are significantly(P<0.05) different.SEM = Standard error of means.

Table.5: Effect of Diclair® on Serum Protein Values of Mature Male Turkeys

parameters	Treatment Diclar® i.u)				SEM
	T ₁	T ₂	T ₃	T ₄	
	0.00	13.50	27.00	40.50	
Albumin (g/L)	3.20 ^c	4.43 ^a	4.32 ^b	3.12 ^C	0.03
Globulin (g/L)	2.61 ^a	1.67 ^d	2.36 ^{ab}	1.97 ^c	0.00
Globulin/Abumin ratio	0.82 ^a	0.38 ^b	0.56 ^{ab}	0.63 ^{ab}	0.09
Serum total protein (g/L)	5.73 ^c	6.13 ^b	6.67	5.17 ^a	0.03

^{abcd}: Means within row having different superscript are significantly (P< 0.05) different. SEM = Standard error of means.

The results of Diclair® administration on body weight gain of mature male turkeys are shown in Table 4. There were significant differences (P< 0.05) among the treatment groups in final body weight and weight gain. However, there were no significant differences (P> 0.05) among the treatment groups in initial body weight.

Turkey on T₄ recorded the highest value of 14.03kg in final body weight and this differed significantly (P< 0.05) from turkeys on T₁, T₂ and T₃ which were similar (P> 0.05) to each other in body weight. The lowest value of 13.33kg in final body weight was observed in turkeys on T₁.

Turkeys on T₄ recorded the highest value of 2.73kg in body weight gain this differed significantly (P<0.05) from turkeys on T₁, T₂ and T₃ which were similar (P>0.05) to each other body weight gain. The lowest value of 2.13kg in weight gain was observed in turkeys on T₁.

The observation in this study that the group that received the highest dose of Diclair® recorded the highest final body weight and weight gain suggest that 40.50 i.u/ turkey within 3 days given in this study could have increased metabolism and efficient utilization of nutrients that resulted in increase final body weight and weight gain.

The results of Diclair[®] administration on serum protein values of mature male turkeys are shown in Table 5. There were significant differences ($P < 0.05$) among the treatment groups in all the serum proteins measured: albumin, globulin, serum total protein as well as globulin/albumin ratio.

Turkeys on T₂ recorded the highest value of 4.43g/L in serum albumin and this differed significantly ($P < 0.05$) from turkeys on T₁, T₃ and T₄. Turkeys on T₁ and T₄ were similar ($p > 0.05$) to each other in serum albumin values, but they differed significantly ($P < 0.05$) from those on T₃. The lowest value in serum albumin was observed in turkeys on T₄ (3.112g/L). The serum albumin values obtained in this study were within the range of $3.1 \pm 0.27 - 3.5 \pm 0.22$ (mg/dl) reported by Iheukwumere *et al.* (2005) for Nigeria chicken. Low albumin suggests poor clotting ability of blood and hence poor prevention of haemorrhage (Robert *et al.*, 2000).

Turkeys on T₁ recorded the highest value of 2.61g/L in serum globulin and this differed significantly ($P < 0.05$) from turkeys on T₂, T₃ and T₄ which were also significantly difference ($P < 0.05$) from each other in globulin values. The lowest value in serum globulin was observed in turkeys on T₂ (1.67g/L).

The serum globulin values obtained in this study were within the range of 2.1 – 3.7 g/dl reported for birds by Banerjee (2005). Babatunde and Oluyemi (2006) opined that the higher the value of globulin, the better the ability to fight against diseases.

Turkeys on T₁ recorded the highest globulin/albumin ratio of 0.82 and this differed significantly ($P < 0.05$) from turkeys on T₂ which were similar ($P > 0.05$) to turkeys on T₃ and T₄ in globulin/albumin ratio. There were no significant differences ($P > 0.05$) among turkeys on T₁, T₃ and T₄ in globulin/albumin ratios. The lowest globulin/albumin ratio of 0.38 was observed in turkeys on T₂.

Turkeys on T₃ recorded the highest value of 6.67 (g/l) in serum total protein and this differed significantly ($P < 0.05$) from turkeys on T₁, T₂ and T₄ which were also significantly different ($P < 0.05$) from each other in serum total protein. The lowest value of 5.17g/l in serum total protein was observed in turkeys on T₄. The serum total protein values obtained in this study were lower than the range of $7.6 \pm 0.27 - 8.2 \pm 0.30$ mg/dl reported by Iheukwumere *et al.* (2006) in Nigerian chickens. The variation in values of serum total protein may not be unconnected to the differences in breed and nutritional status of the birds (Esonu *et al.*, (2001). Serum total protein is the protein

retained in an animal's body (Esonnu *et al.*, 2001; Kaneko *et al.*, 1997). Blood protein content has been shown to depend on the quality of dietary protein (Esonu *et al.*, 2001; Iheukwumere *et al.*, 2006).

IV. CONCLUSION

From the results of this study, it can be concluded that Diclair[®] improved kidney function and body weight gain of mature male turkeys at the level of 40.50 i.u without any deleterious effects on serum protein values.

REFERENCES

- [1] Abu, A.H., M. Ameh, and F.C. Iheukwumere, (2006). Semen quality of Nigeria Local cocks treated with human menopausal gonadotrophin (Pergonal[®]). Livestock Research for Rural Development
- [2] Babatunde, B.B. and J.A. Oluyemi, (2006) Comparative Digestibility of Three commonly used Fibrous ingredients in Maize, Soybean Meal and fish Diet by Broiler Chicks *Trop J. Anim Sci*, 3:105-111.
- [3] Baker, F.J. and R.F. Silvertop, (1986). Introduction to Medical Technology 6th Edn. Butter- Worth England.
- [4] Banerjee, G.C. (2005). A text book of Animal Husbandry 8th Edition pp.124
- [5] Brackett, B. G. (2005). Physiology of Domestic Animals Twelfth Edition William O. Reece Editor PP. 670-691
- [6] Brant, A.W. (1998). A brief history of turkey, *Word's Poultry Science* 44:365 – 373
- [7] Dixon, T.A. and G.J. Hopkins, (1996). Super Ovulation in Cattle using Porcine Pituitary gonadotrophin Preparation (Plusset Serono) in Plusset Scientific Literature Serono Veterinary Rome, Italy, PP.22-23
- [8] Esonu, B.O., O.O. Emelalom, A.B.T. Udedibi, I.C. Okoli, and F.C. Iheukwumere, (2001). Performance and blood chemistry of Weaner Pgs fed raw mucuna Bean (Velvet bean) meal. *Trop. Anim. Prod. Invest*, 4:49-54
- [9] Iheukwumere, F.C., U. Herbert, and C. Ewulu, (2002). Effect of Quantitative feed Restriction on Broiler Chickens *J. Sustainable Trop Agric Res*, 4:56 – 60
- [10] Iheukwumere, F.C. (2005). Super Ovulation in Goats in: Afam Anene and Nwaigbo, L.C (eds). Issues in Sustainable Agriculture in Nigeria. Osprey Publication Centre Owerri, Nigeria, 1-9
- [11] Iheukwumere, F.C., I.C. Okoli, G.A. Anyanwu, and B.O. Esonu, (2005). Growth Performance, haematological and Serum Biochemical constituents

- of grower Rabbits Fed *Microseisms puberula*, Hook – Euphorbiaceae. Animal Research Advances 1 (1): 24-31.
- [12]Iheukwumere, F.C., A.H. Abu, and M. Ameh, (2006). Effect of Human Menopausal Gonadotrophin on Haematology and Serum biochemical Parameters of Nigerian Indigenous Chickens. *International Journal of Poultry Science* 5 (7): 632-634
- [13]Jain, N.C.(1993). Essential of Veterinary Haematology, Lea and Ferbiger Philadelphia
- [14]Kaneko, J.J., J.W. Harvey, and M.I. Bruss, (19997). Clinical Biochemistry of Domestic Animals 5th Edition. Academic Press San Diego, Carlifona P. 885-905
- [15]Katie, T, and A. Frazer, (1998). The Complete book of raising Livestock and Poultry Macmillan Publishers Ltd.
- [16]Kohn, R.A. and M.S. Allen, (1995). Enrichment of Proteolytic Activity Relative to Nitrogen in Preparation from the Rumen for in Vitro studies, Anim. Food Sc. Tech. 52 (112): 1-4
- [17]Obi, I.U., (1990). Statistical Method of Dctecting Differences between Treatment Means. Snaap Press 2nd Ed. Enugu, Nigeria 24-35.
- [18]Okeudo, N.J (2005). Emperical Studies of Living condition of domestic animals in Nigerian, results from Nigerian in U.C Amalu and Gottwal, F.(eds). Studies of sustainable Agriculture and Animal Science in Sub Sahara Africa. Peter Lang, Europals Cher Verlay der Wissen Shaften. Germany.
- [19]Probakaran, R. (2003). Good Practices in Planning and Management of integrated Commercial Poultry Production South Asia FAO Animal Production and health paper – 259, pp.71-86
- [20]Randox (2006). WWW. Randox. Com/Randox. Laboratory Ltd. Users' Manual
- [21]Reece, W.O. and M.J. Swenson, (2004). The Composition Function of Blood in Reece, W.O (ed) ducks.
- [22]Robert, K.M., K.G. Daryl, A.M. Peter, and W.P. Victor, (2000). Mayers Biochemistry, 25th Edn. Mc Graw Hill. New York, pp. 763 – 765.
- [23]Simaraks, S.,O. Chinrasri, and S. Aengwanich, (2004). Haematological, Electrolyte and Serum Biochemical Values of the Thai Indigenous Chickens (*Gallus domestica*) in Nort eastern Thailand. Song Klanakarim J. Sci. Tec, 26: 425-430.
- [24]Steel, R.G.D. and J.H. Torrie, (1980). Principles and Procedures of Statistics. A Biometric Approach 2nd Ed. Mc. Graw – Hill Book Co. Inc. New York.