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

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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 T_1 (control) administered with 1.00ml physiological saline (0.00 i.u Diclair®), T_2 , administered with 13.50 i.u Diclair®, T_3,administered with 27.00i.u Dicliar®T4, administered with 40.50 i.u Dicliar(R), 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 fro-m each treatment groupand 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 expect 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 gallopara*) 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 Diclair® injection as treatments. The levels of Diclair® were 0.00i.u, 20.25i.u, 40.50i.u, and 60.75i.u Diclair® represented as T_1, T_2, T_3, and T_4 respectively. The group which received 0.00i.u Diclair® (T_1) served as the control.

Diclair® 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 DFSH 75I.U plusDLH 75I.U per ml.

Table.1: Doses of Diclair® 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 Diclair® (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 Diclair(R)injections between 9am and 10.30am from punctured wing vein and aspirated about5ml 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

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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 grows.

Turkeys on T_2 recorded the highest value of 147.10 (mmol/L) in serum Sodium and this differed significantly (P< 0.05) from turkeys on T_1, T_3 and T_4 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 T_4 (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 Iheukwumere *et al.* (2006) in Nigerian indigenous chickens, but higher than the range of 56-59(mmol/L) reported by Iheukwumere *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 T_4 recorded the highest value of 5.12 (mmol/L) in serum potassium and this differed significantly from turkeys T_1,T_2 andT_3 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 T_1 (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 Iheukwumere *et al.* (2006) in Nigeria indigenous chickens and higher than the range of 1.55 – 1. 80 (mmio/L) reported by Iheukwumere *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 T_1 recorded the highest value of 96.13 (mmol/L) in serum chloride and this differed significantly (P< 0.05) from turkeys on T_2, T_3 and T_4 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 T_4 (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 Iheukwumere *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 Ihekwumere *et al.* (2006) in Nigerian indigenous chickens.

Turkeys on T_3 recorded the highest value of 22.65 (mmol/L) in serum bicarbonate and this differed significantly (P< 0.05) from turkeys on T_1, T_2 and T_4 which were also significantly different (P< 0.05) from each other in bicarbonate values.The lowest value serum bicarbonate was observed in turkeys on T_1 (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 Iheukwunwre *et al.* (2006) in Nigerian indigenous chickens and higher than the range of 14.80 – 15.60 (mmol/L) reported by Iheukwumere *et al.* (2002) in broiler chickens. Bicar6bonate 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 T_2 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 T_4. 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 Ihekwumere *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.

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

Parameters	Treatment of (Diclair® i.u)				
	T_1 0.00	T_2 13.50	T_3 27.00	T_4 40.50	SEM
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)				
	T_1	T_2 13.50	T_3 27.00	T_4 40.50	SEM
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)				
	T_1 0.00	T_2 13.50	T_3 27.00	T_4 40.50	SEM
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 T_4 recorded the highest valve of 14.03kg in final body weight and this differed significantly (P< 0.05) from turkeys on T_1, T_2 and T_3 which were similar (P> 0.05) to each other in body weight.The lowest value of 13.33kg in final body weight was observed inturkeys on T_1.

Turkeys on T4 recorded the highest value of 2.73kg in body weight gain this differed significantly (P<0.05) from turkeys on T_1, T_2 and T_3 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 T_1.

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.

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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/albumun ration.

Turkeys on T_2 recorded the highest value of 4.43g/L in serum albumin and this differed significantly (P< 0.05) from turkeys on T_1, T_3 and T_4. Turkeys on T_1 and T_4 were similar (p > 0.05) to each other in serum albumin values, but they differed significantly (P< 0.05) from those on T_3. The lowest value in serum albumin was observed in turkeys on T_4 (3.112g/L). The serum albumin values obtained in this study were within the range of 3.1±0.27–3.5 ± 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 T_1 recorded the highest value of 2.61g/L in serum globulin and this differed significantly (P< 0.05) from turkeys on T_2, T_3andT_4 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 T_2 (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 T_1 recorded the highest globulin/albumin ratio of 0.82 and this differed significantly (P< 0.05) from turkeys on T_2 which were similar (P> 0.05) to turkeys on T_3 and T_4 in globulib/albumin ratio There were on significant differences (P>0.05) among turkeys on T_1, T_3 and T_4 in globulin/albumin ratios. The lowest globulin/albumin ratio of 0.38 was observed in turkeys on T_2

Turkeys on T_3 recorded the highest value of 6.67 (g/l) in serum total protein and this differed significantly (P< 0.05) from turkeys on T_1, T_2 and T_4 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 T_4 . The serum total protein values obtained in this study were lower than the range of 7.6 ± 0.2.27 – 8.2 ± 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.

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