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EFFECT OF GONADOTROPHIN (PERGONAL(R)) ON LIVER AND KIDNEY FUNCTIONS, BODY CONFORMATION AND SERUM PROTEIN VALUES OF YANKASA RAMS TREATED FOR SPERM PRODUCTION

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Abstract. Three groups of 6 healthy mature yankasa rams aged 2.0–2.60 years weighing between 30.50 kg and 30.60 kg were assigned to either 49.50 I.U (T_2), 99.00 I.U (T^3) or 148.50 I.U (T_4) Pergonal injection (Ferring labs, USA) each divided into 3 doses and given for three consecutive days. Another group of 6 rams was given normal saline (1 mL) during the same period to serve as control (T_1). All treatments were given to study the effect of the drug on body conformation, liver function and serum protein values. All the treatments were given by intramuscular injection. The results showed that there were no significant differences (P>0.05) among the treatment groups in body weight gain. However, there were significant differences (P<0.05) among the treatment groups in scrotal circumference, height at the withers, heart girt and hip width values. The results also showed that there were significant differences (P<0.05) among the treatment groups in serum total protein, albumin and globulin values. The result further showed that there were significant differences (P<0.05) among the treatment groups in Alkaline phosphatase, Alanine transaminase, Aspartate transaminase activities, sodium, chloride, potassium, biocarbonate and creatinine values. The results of this study showed that Gonadotrophin (Pergonal(R)) administration to Yankasa rams for spermatogenesis did not result in any hepatoxic or nephrotoxic effects.
Keyword*:* Yankasa rams, Pergonal®, Liver and kidney function, Serum protein, Body conformation.

Introduction

Yankasa is the predominant breed of sheep indigenous to the Guinea and Sudan Savannah belt of West Africa. According to Iheukwumere and collab., the use of Yankasa rams to upgrade the smaller village sheep in the habitat has extended this breed to southern Nigeria [IHEUKWUMERE *et al.*, 2008].

The Nigerian Yankasa rams are typically tall, exceeding a height of 50–70 cm at the withers and weigh 30–50kg with an outstanding sexual agility; hence they have been widely used for artificial insemination programs [OSINOWO, 1990].

Linear body measurement of meat animals gives an indication of their live weight gain, skeletal size, reproductive performance and carcass characteristics.

The live body weight and linear body measurements of meat animals have been found useful in quantifying body size and shape [IBE and EZEKWE, 1994].

The size and shape measurements are necessary in animal breeding programmes for estimating certain genetic parameters. Linear body measurements have been used in health and feed managements and it provides basis for production performance monitoring and marketing of animal products [EBEGBULEM, 2012]. Besides an evaluation of the relationship existing among the various live body measurements could be used as the basis of a genetic improvement in the animal. In our local markets where scales are lacking, animals are appraised visually and their economic values determined.

Such visual assessment is subjective and might not reveal the true economic value of such animal.

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Banat's Journal of Biotechnology
2016, VII(14)

An objective assessment which involves the analysis of relationships existing among the various live body traits would be more appropriate.

Though studies have been documented on the relationship among live body traits in animals [TIAMIYU, *et al.*, 2000; CHINEKE, 2000, 2002, and 2005; ABDULLAH *et al.*, 2003; ATANSUYI *et al.*, 2011; HENRY *et al.*, 2011; EBEGBULEM *et al.*, 2011, and ORHERUATA & OLUTOGUN 1994], there is no information on the effect of Gonadotrophin on such parameters in Yankasa rams. Serum biochemical analysis is used to determine the level of heart attack, liver and kidney function as well as to evaluate protein quality and amino acid requirements in animals [ETIM and OGUIKE, 2011].

Human menopausal gonadotrophin (Pergonal®), a fertility drug also known as Humagon or Mentrophin and with similar constituents as Plusset® is a gonadotrophin preparation lyophilized in vials containing a mixture of gonadotrophins consisting of follicle stimulating hormone (FSH) and Luteinizing hormone (LH) in a ratio 1:1 [DIXON and HOPKINS, 1996, BUTNARIU and GIUCHICI, 2011].

FSH and LH present in Pergonal® play vital role in the initiation of spermatogenesis. The hormone preparation is cheap, readily available and does not require cold chain storage [IHEUKWUMERE, 2005. BUTNARIU and BOSTAN, 2011].

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 and liver functions, body conformation and serum proteins values of the rams.

This study was therefore carried out to determine the effect of Pergonal® administration on kidney and liver functions, body conformation and serum protein values of mature Yankasa rams.

Material and methods

Management of Animals. Twenty–four healthy sexually mature Nigerian Yankasa rams aged 2–2.6 years were used for this study. The animals were purchased from the local markets and housed in clean pens constructed in such a way that the rams could come outside during the day for access to sunlight and forage. The animals were dewormed and routine inspection for cleanliness was carried out.

Freshly cut forage consisting of *Panicum maximum, Aspilia africana, Pennisetum purpureum* (Elephant grass) was fed as basal diet and a concentrate ration of Grower Mash was used as supplement.

The animals were fed twice daily, in the morning and evening, salt lick was provided as mineral supplement. Water was given *ad libitum* to the animals.

Experimental Design and Drug Administration. The twenty–four rams were divided into 4 treatment groups consisting of 6 rams per group.

These groups were assigned to 4 level of Pergonal® as treatments.

The levels of Pergonal® were 0, 49.50 I.U, 99.00 I.U and 148.50 I.U Pergonal® represented as T_1, T_2, T_3 and T_4 respectively. T_1 which contained no served as the control. The rams were treated by intramuscular injection.

The injections were given as follows:

- Pergonal was supplied in 13 vials, each vial containing FSH 75 I.U and LH 75 I.U. The content of the first vial was dissolved in 1mL of physiological saline solution immediately prior to use, resulting in a solution of PFSH 75 I.U plus PLH 75 I.U per mL.
- Group$T_{1:}$ Each ram received 1.00 mL of physiological saline for 3 days. Group T_2: Each ram received 8.25 I.U of PFSH and 8.25 I.U of PLH (0.11 mL) on the first day; 2nd day the group received 8.25 I.U of PFSH and 8.25 I.U of PLH (0.11 mL). While on the 3rd day, the group received 8.25 I.U of PFSH and 8.25 I.U of PLH (0.11 mL) giving a total of 49.50 I.U of PFSH and PLH (0.33 mL) Pergonal injection within three days.
- Group T_3: Each ram received 16.50 I.U of PFSH and 16.50 I.U of PLH (0.22 mL) on the first day. 2nd day, the group received 16.50 I.U of PFSH and 16.50 I.U of PLH (0.22 mL). While on the 3rd,

the group received 16.50 I.U of PFSH and 16.50 I.U of PLH (0.22 mL) giving a total of 99.00 I.U of PFSH and PLH (0.66 mL) Pergonal injection within 3 days

- Group T_4: Each ram received 24.75 I.U of PFSH and 24.75 I.U of PLH (0.33 mL) on the first day. 2nd day, the group received 24.75 I.U of PFSH and 24.75 I.U of PLH (0.33 mL). While on the 3rd day the group received 24.75 I.U of PFSH and 24.75 I.U of PLH (0.33 mL) giving a total of 148.50 I.U of PFSH and PLH (0.99 mL) Pergonal injection within 3 days.

All treatments were administered intramuscularly on the hind leg (thigh) of each ram using a one mL syringe with 0.01 mL graduation.

Blood Collection and Serum Biochemical Evaluation. The twenty–four Yankasa rams were bled one week after Pergonal® injection between 9 am and 10:30 am from a punctured jugular vein using needle and syringe and aspirated about 5 mL of blood from each ram. Each blood sample was poured in plane bottle without anti-coagulant and allowed to coagulate.

The bottles of coagulated blood were subjected to standard method of serum separation and the harvested sera were used for biochemical evaluation. Creatinine concentration was determined following method described by Baker and Silverton [BAKER and SILVERTON, 1986].

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 method of Baker and Silverton [BAKER and SILVERTON, 1986].

Aspartate transaminase, Alanine transaminase and Alkaline phosphatase activities were determined using spectrophotometric method as described by Rej and Hoder [REJ and HODER, 1983].

Serum total protein was determined by Goldbery refractometer method as described by Randox [RANDOX, 2006].

Body weight and body size measurements. The body weights of the animals were measured in kg using a hanging scale. Scrotal circumference (SC) was measured in (cm) using a measuring tape at the broadest part of the scrotum.

Also withers height, heart girt and hip width were measured in (cm) using a measuring tape.

Data analysis. Data collected on body size, liver enzyme activity, kidney function and serum proteins of Yankasa rams were subjected to one–way analysis of variance (ANOVA) using the technique of Steel and Torrie [STEEL and TORRIE, 1980]. Significant treatment means were separated using Duncan's New Multiple Range Test as described by Obi [OBI, 1990].

Results and discussion

The results of gonadotrophin (Pergonal®) administration on kidney and liver functions of Yankasa rams are shown in Table 1.

There were significant differences ($P<0.05$) among the treatment groups in sodium, potassium, chloride, bicarbonate, creatinine, Alkaline phosphatase Aspartate transaminase and Alanine transaminase values.

Rams on T_2 recorded the highest sodium value of 44.33 (mmol/L) and this differed significantly ($P<0.05$) from rams on T_3 and T_4 which were similar ($P>0.05$) to each other in sodium value.

There was no significant difference ($P>0.05$) between rams on T_2 and T_1 (40.60 mmol/L) in sodium value.

The lowest value of 36.00(mmol/L) in sodium content was observed in rams on T_4. The sodium values obtained in this study were lower than the normal range of 139–152 (mmol/L) reported in sheep by Kaneko and collab. [KANEKO *et al.*, 1997].

This may be as a result of decreased sodium reabsorption in the kidney caused by insufficient release of the hormone aldosterone responsible for sodium reabsorption in the kidney. Rams on T_2 recorded the highest potassium value of 4.50 (mmol/L) and this differed significantly ($P<0.05$) from rams on T_1. There were no significant differences ($P>0.05$) among rams on T_2, T_3 and T_4 in potassium values. The lowest value of 3.85 (mmol/L) in potassium content was

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Banat's Journal of Biotechnology
2016, VII(14)

observed in rams on T_1. The potassium values obtained in this study were within the normal range of 3.9–5.4(mmol/L) reported in sheep by Kaneko and collab. [KANEKO *et al.*, 1997]. Potassium is excreted in the kidney and elevation of plasma potassium is indicative of under excretion suggesting kidney impairment.

Table 1.

Liver and Kidney Functions of Yankasa Rams Treated with Gonadotrophin (Pergonal ®)

Treatment (Pergonal®) Parameters	T_1 0.00 I.U	T_2 49.50 I.U	T_3 99.00 I.U	T_4 148.50 I.U	SEM
Sodium (mmol/L)	40.60^{a}	44.33^{a}	38.00^{b}	36.00^{b}	1.80
Potassium (mmol/L)	3.85^{b}	4.50^{a}	4.40^{a}	4.48^{a}	0.15
Chloride (mmol/L)	96.26^{b}	96.60^{b}	98.50^{a}	98.50^{a}	0.60
Bicarbonate (mmol/L)	20.00^{b}	23.00^{a}	23.30^{a}	23.24^{a}	0.77
Creatinine (mmol/L)	53.00^{a}	45.00^{bc}	51.00^{ab}	44.00^{c}	2.21
Alkaline Phosphatase (iu/L)	43.15^{a}	43.00^{a}	43.00^{a}	32.00^{ab}	2.76
Aspartate Transaminase (iu/L)	68.25^{b}	78.00^{a}	77.00^{a}	78.35^{a}	1.39
Alanine transaminase	65.00^{b}	73.00^{a}	67.00^{b}	71.00^{a}	1.83

$^{abc:}$Means in the same row with different superscript are significantly (P<0.05) different.
SEM = Standard error of mean.

Rams on T_3 and T_4 recorded the highest serum chloride value of 98.50 (mmol/L) and this differed significantly (P<0.05) from rams on T_1 and T_2 which were similar (P>0.05) to each other in chloride value.

The lowest value of 96.26 (mmol/L) in serum chloride was observed in rams on T_1. The serum chloride values obtained in this study were within the normal range of 95–103 (mmol/L) reported by Kaneko and collab. [KANEKO *et al.*, 1997] in sheep.

Rams on T_3 recorded the highest serum bicarbonate value of 23.30 (mmol/L) and this differed significantly (P<0.05) from rams on T_1.

There were no significant differences (P>0.05) among rams on T_3, T_2 and T_4 in serum bicarbonate values. The bicarbonate values obtained in this study were within the normal range of 20–25 (mmol/L) reported in sheep by Kaneko and collab. [KANEKO *et al.*, 1997].

Bicarbonate is used in the buffering system in the blood, extracellular fluid and kidney [BRACKETT, 2005]. Rams on T_1 recorded the highest serum creatinine value of 53.00 (mmol/L) and this differed significantly (P<0.05) from rams on T_2 and T_4 which were (P>0.05) to each other in creatinine value.

There was no significant difference (P>0.050) between rams on T_1 and T_3. Rams on T_3 were also similar (P>0.05) to rams on T_2 in creatinine value.

The lowest value of 44.00 (mmol/L) in serum creatinine was observed in rams on T_4. The creatinine values obtained in this study were lower than the normal range 106–168 (mmol/L) reported in sheep by Kaneko and collab. [KANEKO *et al.*, 1997]. Creatinine measurement is used exclusively in the assessment of kidney function.

The rate of production of creatinine is constant and elevation of plasma creatinine is indicative of under excretion, suggesting kidney impairment.

Depressed levels of plasma creatinine are clinically significant. Rams on T_1 recorded the highest Alkaline phosphatase value of 43.15 (IU/L) and this differed significantly (P<0.05) from rams on T_4.

There were no significant differences (P>0.05) among rams on T_1, T_2 and T_3 in Alkaline phosphatase values. The lowest value in serum A lkaline phosphatase was observed in rams on T_4 (32.00 IU/L).

The highest Alkaline phosphatase value obtained in this study was lower than the normal range of 68–387 (IU/L) reported by Radostits and collab. [RADOSTITS *et al.*, 1997] for sheep and lower than the value 49.67 (IU/L) reported by Oguike and Ude [OGUIKE and UDE, 2008] in WAD ewes.

Alkaline phosphatase assay is useful in the diagnosis of obstructive liver diseases [MURRAY *et al.*, 2003]. Rams on T_4 recorded the highest value in Aspartate

transaminase (78.35 IU/L) and this differed significantly (P<0.05) from rams on T_1.

There were no significant differences (P>0.05) among rams on T_4, T_2 and T_3 in Aspartate transaminase value. The lowest value in Aspartate transaminase was observed in rams on T_1 (68.25 IU/L).

Aspartate transaminase values obtained in this study were within the normal range of 60–280 (IU/L) reported in sheep by Kaneko and collab. [KANEKO *et al.*, 1997].

In this regard, Pergonal can be considered safe for the rams. Rams on T_2 recorded the highest Alanine transaminase value of 73.00 (IU/L) and this differed significantly (P<0.05) from rams on T_1 and T_3 which similar (P>0.05) to each other in Alanine transaminase value.

There was no significant difference (P>0.05) between rams on T_2 and T_4 in Alanine transaminase value.

The lowest value in Alanine transaminase was observed in rams on T_1 (65.00IU/L). Alanine transaminase values obtained in this study were higher than the average of 30±4.0 (IU/L) reported in sheep by Kaneko and collab. [KANEKO *et al.*, 1997].

Increase in Alanine transaminase values would signify necrosis or myocardial infarction [SOKUMBO and EGBUNIKE, 2000].

This disparity in the value of Alanine transaminase may be attributed to breed, nutritional and physiological status of these rams. Alanine transaminase assay is important in the diagnosis of liver damage caused by drug toxicity or harmful chemicals [NELSON and COX, 2005].

The results of gonadotrophin (Pergonal®) administration on body conformation of Yankasa rams are shown in Table 2. There were significant differences (P<0.05) among the treatment groups in scrotal circumference, heart girth, height at the withers, body length, hip width, and body weight gain.

However, there were no significant differences (P>0.05) among the treatment groups in initial body weight and final body weight.

Rams on T_1 and T_4 recorded the highest numerical value of 28.45 kg in initial body weight. The lowest numerical value of 28.43 kg was observed in rams on T_3.

The initial body weight values obtained in this study were lower than the normal range of 30–50 kg reported by Iheukwumere and collab. [IHEUKWUMERE *et al.*, 2008] in Yankasa rams; this disparity in body weight may not be unconnected to the differences in environment and nutritional status of these Yankasa rams.

Table 2.

Effect of Pergonal® on Body Conformation of Yankasa Rams.

Treatment (Pergonal®)					
Parameters	T_1 0.00 I.U	T_2 49.50 I.U	T_3 99.00 I.U	T_4 148.50 I.U	SEM
Initial body weight (kg)	28.45	28.44	28.43	28.45	0.03
Final body weight (kg)	30.60	30.55	30.55	30.60	0.02
Weight gain (kg)	2.15^{a}	2.11^{b}	2.12^{a}	2.15^{a}	0.01
Scrotal circumference (cm)	27.50^{a}	26.50^{b}	27.50^{a}	26.50^{b}	0.29
Heart girth (cm)	24.00^{a}	22.50^{b}	23.00^{c}	23.00^{c}	0.31
Height at withers (cm)	63.50^{b}	65.00^{bc}	70.00^{a}	69.00^{bc}	1.56
Body length (cm)	54.00^{a}	53.00^{b}	56.00^{a}	56.00^{a}	0.75
Hip width (cm)	81.50^{ab}	85.50^{a}	86.00^{a}	77.50^{b}	1.98

^{abc}:Means in the same row with different superscript are significantly (P<0.05) different.
SEM= Standard error of mean

Rams on T_1 and T_4 recorded the highest numerical value of 30.60 kg in final body weight. The lowest final body weight of 30.55 kg was observed in rams on T_2 and T_3.

The final body weights obtained in this study were within the normal range of 30–50 kg reported by Iheukwumere and collab. [IHEUKWUMERE *et al.*, 2008] in Yankasa rams.

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Banat's Journal of Biotechnology
2016, VII(14)

Rams on T_1 and T_4 recorded the highest value of 2.15 kg in weight gain and this differed significantly (P<0.05) from rams on T_2 which had 2.11 kg.

There were no significant differences (P>0.05) among rams on T_1, T_3 and T_4 in weight gain.

Rams on T_1 and T_3 recorded the highest scrotal circumference value of 27.50 cm and this differed significantly (P<0.05) from rams on T_2 and T_4 which were similar (P>0.05) to each other in scrotal circumference values.

The lowest value of 26.50 cm in scrotal circumference was observed in rams on T_2 and T_4.

The scrotal circumference values obtained in this study were higher than the mean value of 22.40±0.54 cm reported by Iheukwumere and collab. [IHEUKWUMERE *et al.*, 2008] in Yankasa rams.

This disparity may not be unconnected to the differences in environment and nutritional status of the Yankasa rams. Rams on T_1 recorded the highest value in heart girth (24.00 cm) and this differed significantly (P<0.05) from rams on T_2, T_3 and T_4. Rams on T_3 and T_4 were similar (P>0.05) to each other, but were significantly different (P<0.05) from rams on T_2 in heart girth value.

The lowest value in heart girth was observed in rams on T_2 (22.50 cm).

Rams on T_3 recorded the highest value in height at the withers (70.00 cm) and this differed significantly (P<0.05) from rams on T_1 and T_2 which were similar (P>0.05) to each other in height at the withers.

Rams on T_2 was similar (P>0.05) to rams on T_4 in height at the withers.

There was no significant difference (P>0.05) between rams on T_3 and T_4 in height at the withers.

The lowest value of 63.50 cm in height at the withers was observed in rams on T_1.

The values of height at the withers obtained in this study were within the normal range of 50–70 cm reported by Iheukwumere and collab. [IHEUKWUMERE *et al.*, 2001] in Yankasa rams.

Rams on T_3 and T_4 recorded the highest value in body length (56.00 cm) and this differed significantly (P<0.05) from rams on T_2.

However, there were no significant differences (P>0.05) among rams on T_3, T_4, and T_1 in body length.

The lowest value in body length was observed in rams on T_2 (53.00 cm).

Rams on T_3 recorded the highest value in hip width (86.00cm) and this differed significantly (P<0.05) from rams on T_4 (77.50 cm) which were similar (P>0.05) to rams on T_1 (81.50 cm) in hip width.

There were no significant differences (P>0.05) among rams on T_3, T_2 and T_1 in hip width values.

The lowest value in hip width was observed in rams on T_4. The results of gonadotrophin (Pergonal® administration on serum protein values of Yankasa rams are shown in Table 3.

Table 3.

Serum Protein Values of Yankasa Rams Treated with Gonadotrophin (Pergonal®)

Treatment (Pergonal®)					
Parameters	T_1 0.00 I.U	T_2 49.50 I.U	T_3 99.00 I.U	T_4 148.50 I.U	SEM
Serum total Protein (g/L)	77.30^{a}	77.30^{a}	74.20^{a}	66.00^{b}	1.17
Albumin (g/L)	43.60^{a}	36.00^{b}	42.00^{a}	40.00^{ab}	1.64
Globulin (g/L)	36.20^{a}	36.40^{a}	18.50^{ab}	10.30^{b}	6.54
Albumin/Globulin Ratio	0.63^{b}	0.75^{a}	0.73^{a}	0.74^{a}	0.03

^{ab}Means in the same row with different superscript are significantly (P<0.05) different.
SEM=Standard error of mean.

There were significant differences (P<0.05) among the treatment groups in serum total protein, albumin, and globulin values, and albumin/globulin ratio.

Rams on T_1 and T_2 recorded the highest value of 77.30 g/L in serum total protein and these differed significantly ($P<0.05$) from rams on T_4.

There were no significant differences ($P>0.05$) among rams on T_1, T_2 and T_3 in serum total protein values.

The lowest value in serum total protein was observed in rams on T_4 (66.00 g/L).

Serum total protein values obtained in this study were within the normal range of 60.0–79.0 (g/L) reported in sheep by Kaneko and collab. [KANEKO *et al.*, 2008]. Serum total protein is the protein retained in an animal's body [ESONU *et al.*, 2001]. Blood protein content has been shown to depend on the quantity and quality of dietary protein [ESONU *et al.*, 2001].

Rams on T_1 recorded the highest serum albumin value of 43.60 (g/L) and this differed significantly ($P<0.05$) from rams on T_2.

There were no significant differences ($P>0.05$) among rams on T_1, and rams on T_3 and T_4 in serum albumin values. The lowest value in albumin was observed in rams on T_2 (36.00 g/L).

Serum albumin values obtained in this study were higher than the normal range of 24.0–30.0 (g/L) reported by Kaneko and collab. [KANEKO *et al.*, 2008] in sheep.

Low albumin suggests poor clothing ability of blood and hence poor prevention of haemorrhage [ROBERT *et al.*, 2000].

Rams on T_2 recorded the highest value of 36.40 (g/l) in serum globulin and this differed significantly ($P<0.05$) from rams on T_4. There were no significant differences ($P>0.05$) among rams on T_2, T_1 and T_3 in serum globulin values.

Rams on T_3 and T_4 were similar ($P>0.05$) to each other in serum globulin value. The lowest value of (10.30 g/L) in globulin was observed in rams on T_4.

Serum globulin values obtained in the groups that received higher doses of the test drug were lower than the normal range of 35.0–57.0 (g/L) reported for sheep by Kaneko and collab. [KANEKO *et al.*, 1997, CRISTINA *et al.*, 2014].

Serum globulin level in this study reduced with increased levels of the test drug.

This is an indication that administration of this drug could result in mortality in the animals if used in high levels. Iheukwumere and collab. [IHEUKWUMERE *et al.*, 2005] inferred that a decrease in serum globulin is an indication of reduced disease fighting ability of the body system and could lead to mortality.

Rams on T_2 recorded the highest value of 0.75 in albumin–globulin ratio and this differed significantly ($P<0.05$) from rams on T_1 which had 0.63.

There were no significant differences ($P>0.05$) among rams on T_2, T_3 and T_4 in albumin–globulin ratio. The lowest value of 0.63 in albumin–globulin ratio was observed in rams on T_1.

The values for albumin–globulin ratio obtained in this study were slightly lower than the literature values (1.14–1.60) for different classes of livestock [CHINEKE *et al.*, 2002; GRAW HILL, 2000; CHEESBROUGH, 2004; SINGGH, 2004].

This may be attributed to environment and nutritional status of the animals. Serum albumin and globulin vary both among breeds and within breeds depending on location [ORJI *et al.*, 1987].

Conclusions

The results of this study showed that the administration of gonadotrophin (Pergonal®) to Yankasa rams had no hepatotoxic or nephrotoxic effects and was not detrimental to the body conformation and serum protein values, except globulin level which reduced progressively with increased doses of the test drug indicating that administration of this Pergonal® could result in mortality in the animals if used in high levels.

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