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EFFECT OF DIFFERENT DIETARY PROTEIN SOURCES ON MORPHO-HISTOMETRY OF TESTIS AND EPIDIDYMIS, LIBIDO AND EPIDIDYMAL SPERM FUNCTION IN SHEEP

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SUMMARY

This study aimed to evaluate the effect of different protein sources, cotton seed meal (CSM), soybean (SBM) and dried distiller's grains with soluble (DDGS) in diet of growing male lambs on morpho-histological characteristics of the testis and epididymis, characteristics of epididymal spermatozoa and serum testosterone concentration. Total of 20 growing cross breed (Romanov x Rahmani) lambs (about 8 months old and 33 kg LBW) were assigned into four groups. Lambs in all groups were fed diets containing differed sources of 50% of protein in concentrate feed mixture, being sun flower meal in the 1st group (control, G1), CSM in G2, SBM in G3 and DDGS in G4 for 120 days as an experimental period. At the end of the experimental period, lambs were slaughtered and testes were collected for morpho-histological study. Blood was collected for testosterone determination in blood serum and epididymal spermatozoa were recovered by slicing. Results revealed that testicular weight and size in terms of length and width were the highest ($P<0.05$) in G3, moderate in G1 and G2 and the lowest in G4. Dietary protein source had insignificant effect on weight and measures of epididymis or its segments, in particular length and width of epididymal cauda testes of G3 showed higher ($P<0.05$) values of the largest and smallest diameters and the widest average diameter of the seminiferous tubules (ST) and the highest ($P<0.05$) thickness of spermatogenic layer as compared to other groups. The largest, smallest and average diameters of epididymal cauda ductules (ED) was higher ($P<0.05$) and the lining epithelial layer of epididymal cauda was thicker ($P<0.05$) in G3 and G4 than in G1 and G2. Percentages of progressive motility and livability of spermatozoa recovered from the epididymal cauda were the highest ($P<0.05$) in G3, moderate in G1 and G2, and the lowest in G4. Percentages of abnormality and acrosome damage of epididymal spermatozoa were not affected by dietary protein source. Serum testosterone concentration was the highest ($P<0.05$) in G3 and the lowest in G4. In conclusion, feeding CSM or DDGS should not be supplied to growing male lambs for breeding. Feeding diet containing sun flower meal (Control diet) or soybean meal as sources of dietary protein had save effect on growing male lambs for breeding.

Keywords: *Sheep, protein source, testis, epididymis anatomy, histology, sperm.*

INTRODUCTION

Small ruminants (sheep and goat) are numerically important domesticated animals due to their contribution of meat, milk, skin, fiber and manure and as the sole or subsidiary source of livelihood for a large number of small and marginal farmers and landless labourers. They therefore contribute significantly to subsistence and socio-economic livelihoods of a large human population in low-input, small holder production systems in developing countries (Workneh, 2000; Tibbo, 2006).

Reproduction is one of the most important factors affecting livestock production and its success greatly depends on a mixture of factors including genetic merit, physical environment, nutrition and management (Rasbech, 1984). Fertility and productivity of any herd are mainly associated with the reproductive performance of males, libido, sperm production and its fertilizing capacity (Salgueiro and Nunes, 1999). It was reported that reproductive performance of farm animals is largely dependent on their nutritional status. There are some nutritional factors, which are crucial for their important effects on reproductive performance (Alabi, 2005; Kheradmand *et al*., 2006).

Cottonseed (CS) cake is used as an alternative to soybean because of its low cost and accessibility in areas, where it is grown (Hagens, *et al* 2009). Although CS derivatives are good source of protein and energy along with other contents, such as Ca, P, Fe, and vitamins, the presence of gossypol (an anti-

nutritional factor) is one of the major problems when the whole CS or some of its derivatives is used in animal feeding. During processing the CS meal (CSM), the gossypol binds to proteins and its free form is predominant in the whole CS (Calhoun *et al*., 1995). All gossypol in the whole CS is found in free form, after intake, it is readily absorbed and acts on the metabolism of amino acids, binding to proteins with free amino acids (Kerr, 1989). Gossypol is considered less toxic in the bound form, because its absorption by the digestive tract is impaired (Mena *et al*., 2001), but the evidence that the free form could be obtained from the bound form during the ruminal fermentation was reported by Blackwelder *et al*. (1998).

Negative effects of gossypol on semen quality, in term of decreased sperm motility and sperm count (Randel, 1992), was due to degeneration of testicular tissue, which decreased the number of spermatozoa that reach maturity and increased percentage of morphological defects (Chase *et al*., 1994). In this respect, Cunha *et al*. (2012) evaluated the influence of dietary inclusion of the whole CS on libido and semen quality (the macroscopic, microscopic and morphology of semen) of Santa Ines sheep, with breeding age.In addition, CSM and DDGS are used as alternatives to soybean meal (SBM) because of its low cost and energy and protein contents. The tested simple and cheap system for feeding dairy ewes with forages plus DDGS, as a source of protein, and whole grain, as source of energy, allows equal or tendency for better performance. This system allows easy balancing of the rations according to energy and nutrients requirements, and is attractive for the farmers (Dimova *et al*., 2009). The DDGS are rich in protein and fat contents (Schingoethe, 2006a). Dietary inclusions of 20 to 25% can often meet the crude protein requirements of finishing lambs and ewes in lactation. Actual inclusion rates depend on crude protein content of other dietary ingredients and specific animal needs. The DDGS is also a good source of ruminally undegradable intake protein, which is sometimes referred to as by-pass protein (Held, 2006).

Until recently, use of DDGS in lamb growing for breeding and finishing diet formulation has been limited and published researches in this area scarce. The rising expense of traditional protein supplements has encouraged producer interest in including DDGS in lamb diets to supply protein more economically (Zelinsky *et al*., 2006; Schauer *et al*., 2008). Therefore, the current study aimed to evaluate the effect of different protein sources (cotton seed meal, soybean and dried distiller's grains with solubles) in diet of growing ram lambs on anatomical and histological characteristics of the testis and epididymis, serum testosterone and characteristics of epididymal spermatozoa.

MATERIALS AND METHODS

Animals and feeding system:

Total of 20 growing cross breed (Romanov x Rahmani) lambs (about 8 months old and 33 kg body weight) were assigned randomly into four experimental groups. All lambs were kept under semi-open sheds and restricted daily feeding was applied. Lambs in all groups were fed the same amount of concentrate feed mixture (CFM, 40%) plus clover hay and rice steam (60%), but differed in source of 50% of protein in CFM, being sun flower meal in the 1st group (control, G1), cotton seed meal in the 2nd group (CSM, G2), soybean meal in the 3rd group (G3, SBM) and DDGS in the 4th group (G4, DDGS).

Lambs were feed according to NRC (1994) for growth. Fresh water was available freely through the experimental period which lasted 135 days. The CFM was individually weighed for each animal and offered twice daily. Feed allowance was adjusted weekly according to the change in body weight. Chemical analysis of different fed stuffs and calculated chemical composition of the experimental rations are presented in Table (1).

Slaughter procedures:

Testes collection and transportation:

At the end of the experimental period (12-13 months of age), 12 lambs were slaughtered (three lambs from each group). Blood samples were collected from all slaughtered lambs. The collected blood samples were centrifuged at 4000 rpm for 20 minutes. Thereafter, serum were separated and stored at -20 ^{o}C for testosterone assay with a double antibody radioimmunoassay (Diagnostic Products Corporation Kits).

Total of 24 testes (on the right side) were immediately removed, and trimmed of adhering connective tissue and fats, then transported to the laboratory. In the laboratory, 12 testes were used for collection of epididymal spermatozoa, while other 12 testes were used for histological samples. The time between the removal of the testes and arrival at laboratory was approximately 10-15 minutes.

Table (1): Ingredients of concentrate feed mixture containing different protein sources in experimental rations.

Ingredient	CFM			
	R1 (control)	R2 (CSM)	R3 (SBM)	R4 (DDGS)
Yellow corn	30	37	26	21
Wheat bran	39	20	5	20
Sun flower meal	26	-	-	-
Soybean meal	-	-	16	-
Cotton seed meal	-	27	-	-
DDGS	-	-	-	26
Undecorticated	-	10	35	15
Molasses	2	3	15	15
Limestone	2	2	2	2
Common salt	1	1	1	1
Total (100%)	100	100	100	100
CP	14.00	14.27	14.89	14.20
TDN	65.00	66.52	66.8	66.79

Morpho-metric measurement:

Pre-slaughter body weight of lambs was recorded and testicular characteristics of each testis were taken immediately after slaughter. Weight, length and width of each testis with epididymis were determined. Testicular measurements were taken using a measuring tape rule. After separating each epididymis from each testis, weight, length and width of the epididymis were recorded (caput, corpus and cauda). Samples from the testes and epididymal cauda were taken for histological evaluation.

Histo-metric measurements:

Representative samples were taken from the median part of each testis or epididymal cauda, fixed in Bouin's solution (24 h), washed, dehydrated in ascending grades of ethyl alcohol, cleared and embedded in paraffin wax. Thereafter, the samples were sectioned at 7-8 microns, stained by hematoxylin and eosin stains (H&E) and histologically examined using the routine method after Bancroft and Stevens (1982).

Largest and smallest diameter of seminiferous tubules (ST) or epididymal cauda ductules (ECD) as well as thickness of spermatogenic layer of ST and lining epithelial layer of ECD were measured in of about 10 in each field x 3 slides of each animal using microscope with eye-piece.

Sperm recovery from the epididymis:

In the laboratory, each testicle was dissected away from its tunica vaginalis and other extraneous tissue, then washed 3 times by tap water and finally washed with ethyl alcohol (70%). Various incisions in the tail of epididymis were performed with a scalpel and then, by pressing that region manually the spermatozoa were released and collected by aspiration with sterile disposable (5 ml) syringe containing 2 ml Phosphate buffer Saline, (PBS) medium. The recovered spermatozoa were placed in a 5 ml tube.

Percentage of progressive motility, livability, abnormality and damage acrosome of epididymal spermatozoa was determined.

Statistical analysis

Results were statistically analyzed using one way design (SAS, 2004) according to Snedecor and Cocharn (1982). However, the significant differences among treatments were tested using Duncan's Multiple Range Test (1955).

RESULTS AND DISCUSSION

Morphometry of the testis and epididymis:

Results presented in Table (2) revealed that testicular weight and size in terms of length and width were affected significantly ($P<0.05$) by source of dietary protein, being significantly ($P<0.05$) the highest in G3, moderate in G1 and G2 and the lowest in G4. These findings mean that feeding growing lambs on diet containing SBM resulted in the best anatomical characteristics of lamb testes, while using DDGS as a dietary protein source had significantly ($P<0.05$) negative effect on anatomy of the testes. On the other

hand, dietary protein source had insignificant effect on weight and measures of epididymis or its segments, in particular, length and width of epididymal cauda (Table 2).

Table (2): Effect of dietary protein source on testicular and epididymal weight and measurements of lambs.

Item	G1 (control)	G2 (CSM)	G3 (SBM)	G4 (DDGS)
Animal weight (kg)	50.0±3.06	51.0±3.00	51.7±0.67	52.3±7.33
Testicular weight (g):				
Absolute weight (g)	156.7±9.8ab	155.5±23.7ab	212.3±13.1a	133.2±25.8b
Relative weight, g/kg	0.322±0.04ab	0.301±0.05ab	0.420±0.04a	0.251±0.02b
Testicular size (cm):				
Length	10.2±0.17bc	10.87±0.19b	12.08±0.44a	9.20±0.49c
Width	8.40±0.25ab	8.73±0.96ab	9.03±0.71a	8.65±0.56b
Epididymal characteristics:				
Weight (g)	24.67±1.69	26.33±5.70	28.67±3.35	21.0±0.76
Length (cm)	13.28±0.24	14.30±0.37	13.35±1.01	14.70±0.05
Epididymal cauda size:				
Length (cm)	4.85±0.25	4.98±0.41	4.85±0.15	5.17±0.47
Width (cm)	2.37±0.29	1.98±0.20	2.20±0.03	1.97±0.07

a, b and c: Means denoted within the same row are significantly (P<0.05) different.

Based on the chemical analysis of experimental diets (Table1), all experimental diets contained nearly similar crude protein (CP) and energy (TDN) contents, but differed in source of protein and consequently shoed wide variation in their amino acid contents, quantity and qualitatively. The present results indicated the heaviest and biggest testes in lambs fed SBM diet versus the lowest ones for those fed DDGS diet. Also, testicular weight relative to LBW may indicate superiority of lambs in SBM group in their testicular weight and size. Although, DDGS can replace soybean meal as protein source without affect on productivity of dairy sheep (Morricall, 2008), on ewe body condition or LBW of suckling lambs (Held, 2006) and on testicular weight and scrotal circumference of bulls fed whole CS containing about 30 g of gossypol daily (Chase *et al*., 1989), the present results indicated negative effect of CSM and DDGS on testicular weight and size as compared to SBM.

In accordance with the present results, Andreazzi *et al*. (1995) observed smaller scrotal circumference (SC, indicator of testicular width) in goats receiving 30% of whole cottonseed in relation to the control diet from weaning (20-30 days) until 18 months of age. Similar results were obtained by Kramer *et al*. (1989), with pubescent rams receiving gossypol in the diet. However, Cunha *et al*. (2012) reported that SC and the length of the testis were not influenced by the levels of whole CS. In the same way, Jimenez *et al*. (1989), working with bulls, observed that gossypol intake had no influence on the SC, compared to the control animals. Moreover, Nasir *et al*. (2014) found reduction in testicular weight by increasing the level of CSM in diet of goat bucks. Accordingly, CSM and DDGS probably had significantly negative effects on testicular morphometry. However, Cunha *et al*. (2012) reported that the SC and the length of the testis were not influenced by the levels of whole CS.

Histometry of the testis and epididymal cauda:

Data shown in Table (3) cleared that testes of lambs fed SBM diet (G3) showed significantly (P<0.05) higher values of the largest and smallest diameters and consequently the widest average diameter of the seminiferous tubules (ST) as compared to other groups. However, the corresponding values were significantly (P<0.05) the lowest in lambs fed DDGS (G4, Plates 1-4). These results revealed an association of histological characteristics with the anatomical characteristics including testicular weight and size (Table 2).

In addition, results in Table (3) showed that ST in the testes of lambs fed SBM also showed significantly (P<0.05) the highest thickness of spermatogenic layer as compared to other groups (Plates 4-8). Concerning the histometry of epididymal cauda ductules (ED, Table 3), the largest, smallest and average diameters of ED was significantly (P<0.05) higher in epididymis of lambs fed SBM (G3) and DDGS diets (G4) than in those fed control (G1) and CSM (G2). Also, the lining epithelial layer of epididymal cauda was significantly (P<0.05) thicker in lambs of G3 and G4 than in G1 and G2 (Plates 9-12).

Concerning the histometric characteristics, lambs fed SBM diet showed the best results concerning average diameter and thickness of spermatogenic layer in ST as compared to those fed CSM and DDGS diets. In this line, Chase *et al*. (1994) mentioned an increase in the lumen diameter, with lower density of germinal epithelium, and lower amount of Leydig cells in the animals that received gossypol, leading to the conclusion that the gossypol did not affect the quality of the semen, but caused damages to testicular morphology. Also, some authors found that lumen diameter, wall thickness, number of cell layers in the ST and size of Sertoli and Leydig cells were reduced as compared to tissues from controls rams and bulls (Kramer *et al*., 1989).

Table (3): Effect of dietary protein source on histometry of seminiferous tubules and epididymal cauda ductules of lambs.

Group	Largest diameter (µm)	Smallest diameter (µm)	Average diameter (µm)	Layer* thickness (µm)
Testicular seminiferous tubules:				
G1 (control)	400.0±33.50b	237.1±13.96b	318.6±19.38b	81.2±4.12b
G2 (CSM)	467.4±51.82b	260.4±10.92b	363.9±27.15b	76.2±4.58b
G3 (SBM)	874.1±24.20a	546.2±18.93a	705.2±15.20a	187.1±13.99a
G4 (DDGS)	371.1±33.86b	224.7±15.17b	297.9±18.86c	77.3±4.23b
Epididymal cauda ductules:				
G1 (control)	678.9±27.99b	573.2±25.24b	626.6±22.74b	52.8±12.62b
G2 (CSM)	782.8±74.71b	538.3±51.98b	660.6±55.44b	31.3±3.69b
G3 (SBM)	1141.4±51.32a	876.9±48.71a	1009.2±46.46a	107.2±7.58a
G4 (DDGS)	1189.8±78.25a	764.0±66.57a	976.9±66.15a	102.9±21.47a

a, b and c: Means denoted within the same column are significantly (P<0.05) different. Thickness of spermatogenic layer in seminiferous tubules and lining epithelial layer in epididymal cauda ductules.

Additionally, Arshami and Ruttle, (1989) have verified abnormalities, such as the wider diameter of the lumen, low number of Leydig cells, smaller size of Sertoli cells, and thinner walls of seminiferous tubules by feeding sheep with 0 or 12% of CSM in the diet, for 26 weeks.

The histological examination in the current study revealed some features of the testis under the experimental diets. Slides (1-4) revealed normal structures as described by Kessler (1992). These included the seminiferous tubules, and spermatogenic cell layer. Also, findings of Nasir *et al*. (2014) showed that inclusion up to 10-20% of CS cake in the diets of the bucks have no deleterious effect on the histology of the testes.

Lowest in G4. However, percentages of abnormality and acrosome damage of epididymal spermatozoa were not affected by dietary protein source.

In association with enhancing morpho-histometric characteristics of the testes in lambs fed SBM diet, all characteristics of epididymal spermatozoa of these lambs also improved in terms of the highest percentages of progressive motility and livability beside the lowest percentages of sperm abnormality and damage acrosome as compared to those fed CSM or DDGS. Lower quality of epididymal spermatozoa in CSM group may be attributed to that gossypol inhibited sperm motility, decreased sperm concentration in human (Paso *et al*., 1980) and monkeys (Shandilaya *et al*., 1982) and resulted in infertility in 99.9% of males. A diet containing 12% CSM increased percentage of abnormal sperm in rams fed CSM compared with controls (National Coordinating Group on Male Anti-fertility Agents, 1978). In the same line, Cunha *et al*. (2012) reported that the progressive sperm motility and abnormality had been influenced by the whole CS (P<0.01). They concluded that the use of whole CS in diets of sheep influences the quality of the semen, especially the progressive motility, leading to an increase in the percentage of total defects in the sheep semen. Santos *et al*. (2008) registered a reduction in sperm motility and an increase of total defects of sperm cells for bulls fed diet containing whole CS. Also, Zahid *et al*. (2003) observed that dietary gossypol had affected significantly (P<0.05) motility, and percentage of morphologically abnormal spermatozoa of goats. Finally, Maugh (1981) evidenced that the gossypol alters the spermatogenesis, causing oligospermia and aspermia, by inhibiting the lactate dehydrogenase, an enzyme that plays a key role in spermatozoa metabolism. Chenoweth *et al*. (1994) working with Young cattle, a group without gossypol, and another receiving 8.2% of free gossypol a day, for 11 weeks, have concluded that the supplementation with CS meal had adverse effect on the sperm morphology and spermatogenesis.

Table (4): Effect of dietary protein source on epididymal sperm characteristics of lambs.

Group	Sperm motility (%)	Live sperm (%)	Abnormal sperm (%)	Acrosome damage (%)
G1 (control)	61.67±4.7[b]	71.33±3.2[ab]	6.33±2.906	2.00±0577
G2 (CSM)	55.00±2.9[bc]	65.33±1.2[bc]	4.67±0.333	3.00±0.577
G3 (SBM)	80.00±4.8[a]	85.33±5.6[a]	2.33±0.333	1.33±0.333
G4 (DDGS)	45.00±7.6[c]	56.00±5.5[c]	8.67±2.333	4.00±1.528

a, b and c: Means denoted within the same column are significantly (P<0.05) different.

On the other hand, no differences in sperm evaluations of bulls fed whole CS (Chase *et al*., 1989) or on semen quality and spermatogenesis of yearling Holstein bulls fed a diet providing 30 mg gossypol/kg of BW/d (Jimenez *et al*., 1989). It is well documented that reproductive well-being and performance of farm animals is largely dependent on their nutritional status. Evidence from the present study may indicate the suggestion that source of dietary protein is one of the most crucial in terms of its direct effect on reproductive phenomenon (Alabi, 2005; Kheradmand *et al*., 2006).

Testosterone concentration:

Results shown in Table (5) revealed significant (P<0.05) effect of dietary protein source on testosterone concentration in blood serum of lambs, being significantly (P<0.05) the highest in G3 and the lowest in G4. This means that lambs fed SBM diet had beneficial effect on testosterone production from the interstitial cells within the testis, while those fed DDGS showed an opposite trend.

It is worthy noting that increasing testosterone concentration significantly (P<0.05) in serum of lambs in G3 was in relation with improving histometry and epididymal sperm characteristics significantly (P<0.05) in this group as compared to other groups. On the other hand, feeding lambs on DDGS diet had negative effect on testosterone concentration beside other unsatisfied effects on anatomy and histometry of the testis and epididymis as well as sperm characteristics.

Therefore, the present investigation of the testes in this study and those in the literature indicated that dietary protein sources used cleared marked effect of feeding the CSM or DDGS on impairing spermatogenesis in growing lambs. However, SBM had beneficial effects on these findings, which may be in association with increasing testosterone concentration in blood serum of lambs fed SBM (Abdel-Khalek *et al*. 2000)

Table (5): Effect of dietary protein source on testosterone concentration in blood serum of lambs at slaughter.

Group	Testosterone (ng/ml)
G1 (control)	2.163±0.201[bc]
G2 (CSM)	3.773±0.685[b]
G3 (SBM)	5.366±0.730[a]
G4 (DDGS)	1.860±0.022[c]

a, b and c: Means denoted within the same column are significantly (P<0.05) different.

CONCLUSION

According to the forgoing results, it could be concluded that feeding diets containing cotton seed meals or DDGS for growing male lambs influences negatively morpho-histometry of the testes and consequently the quality of the semen, especially the progressive motility, leading to an increase in the percentage of sperm abnormality in the sheep semen; therefore it should not be supplied to animals for breeding. Feeding diet containing sun flower meal (Control diet) or soybean meal as sources of dietary protein had save effect on growing male lambs for breeding.

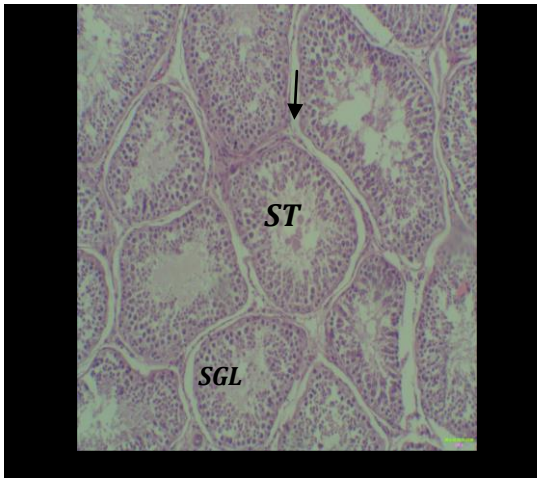

Plate (1): Section of the testis of a lamb in G1 showing intact seminiferous tubules (ST) with moderate diameter and thickness of spermatogenic cell layer (SGL) as well as lower intact interstitial spaces (→). (H and E x 100)

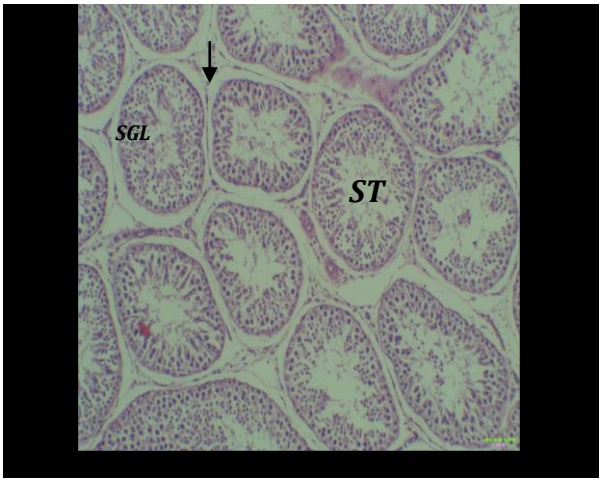

Plate (2): Section of the testis of a lamb in G2 showing intact seminiferous tubules (ST) with moderate diameter and thickness of spermatogenic cell layer (SGL) as well as lower intact interstitial spaces (→). (H and E x 100)

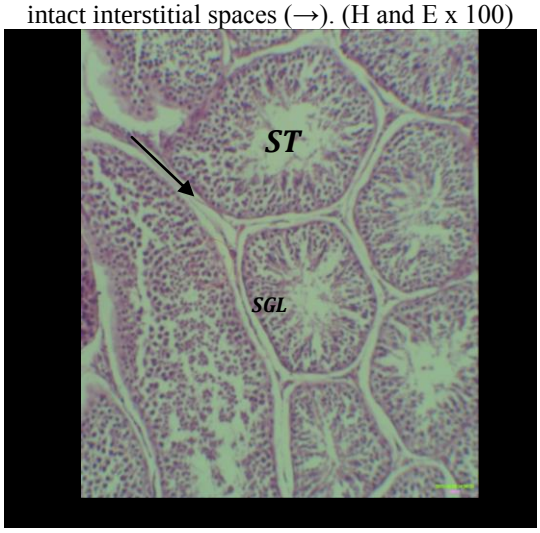

Plate (3): Section of the testis of a lamb in G3 showing intact seminiferous tubules (ST) with the highest diameter and thickness of spermatogenic cell layer (SGL) as well as the lowest intact interstitial spaces (→). (H and E x 100)

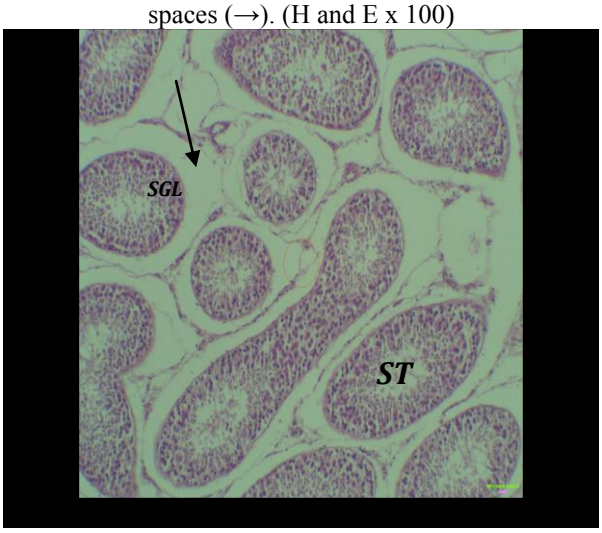

Plate (4): Section of the testis of a lamb in G4 showing intact seminiferous tubules (ST) with the lowest diameter and thickness of spermatogenic cell layer (SGL) as well as the highest intact interstitial spaces (→). (H and E x 100)

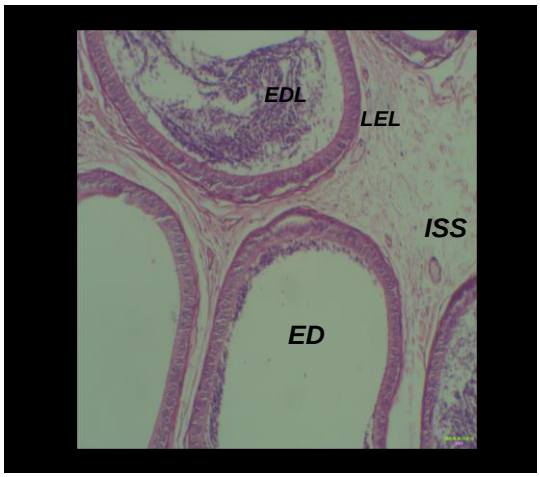

Plate (5): Section of epididymal cauda of a lamb in G1 showing normal epididymal ductules (ED) with normal diameter and thickness of lining epithelial layer (LEL) as well as lower content of sperm cells in their lumen (EDL) and higher interstitial spaces (ISS). (H and E x 100)

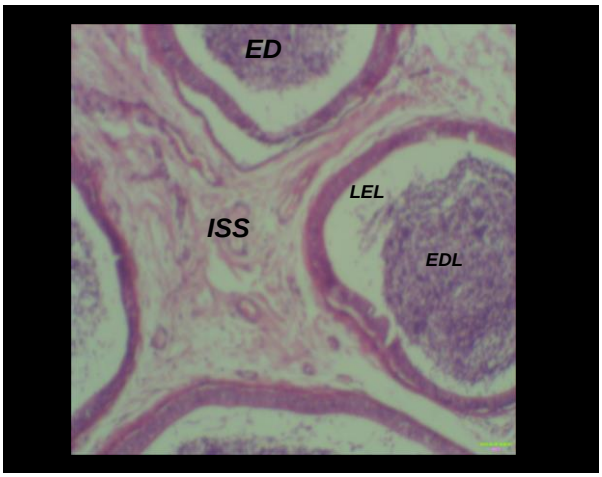

Plate (6): Section of epididymal cauda of a lamb in G2 showing normal ED with normal diameter and thickness of lining epithelial layer (LEL) as well as higher content of sperm cells in their lumen (EDL) and higher interstitial spaces (ISS).
(H and E x 100)

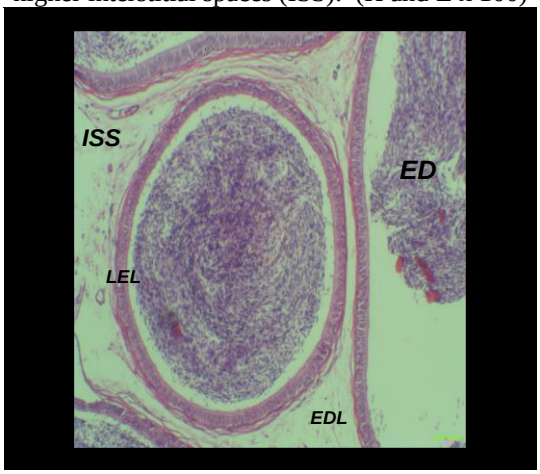

Plate (7): Section of epididymal cauda of a lamb in G3 showing normal epididymal ductules (ED) with wider diameter and thicker lining epithelial layer (LEL) as well as the highest content of sperm cells in their lumen (EDL) and lower interstitial spaces (ISS). (H and E x 100)

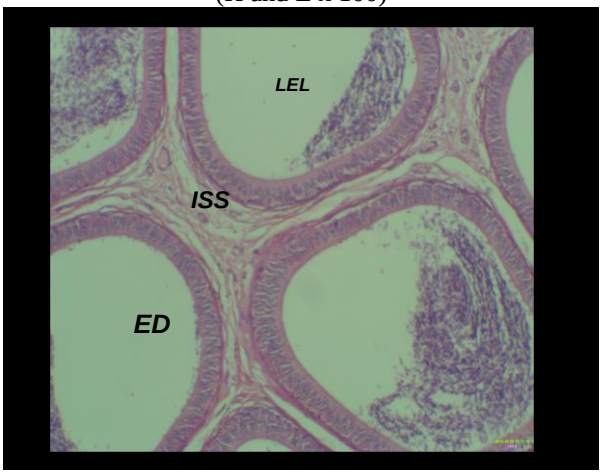

Plate (8): Section of epididymal cauda of a lamb in G4 showing normal and wider epididymal ductules (ED) with thicker lining epithelial layer (LEL) as well as lower content of sperm cells in their lumen (EDL) and interstitial spaces. (ISS)
(H and E x 100)

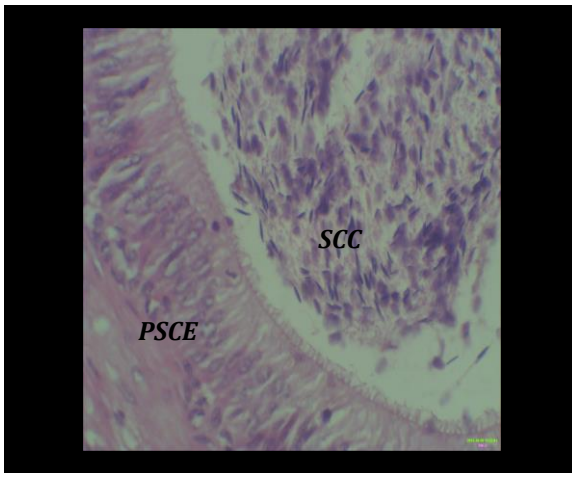

Plate (9): Section of epididymal cauda of a lamb in G1 showing normal lining layer in type of pseudo-stratified ciliated epithelium (PSCE) and normal concentration of sperm cells in their lumen. (H and E x 400)

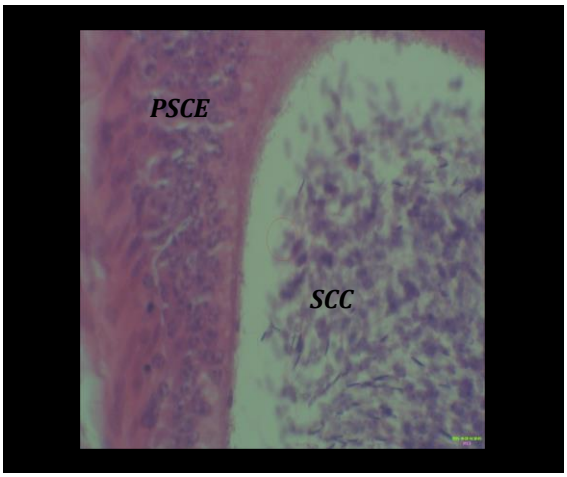

Plate (10): Section of epididymal cauda of a lamb in G2 showing normal lining layer in type of pseudo-stratified ciliated epithelium (PSCE) and moderate concentration of sperm cells in their lumen. (H and E x 400)

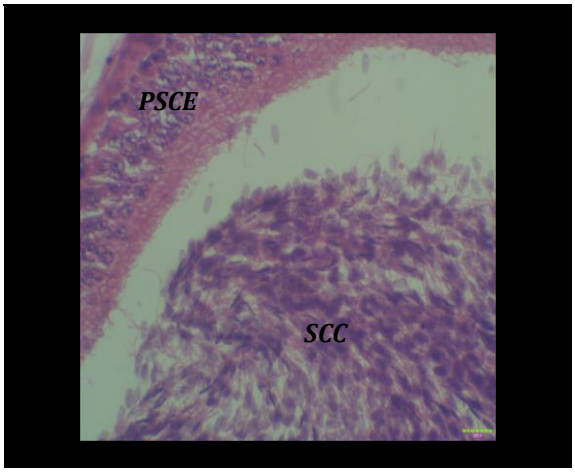

Plate (11): Section of epididymal cauda of a lamb in G3 showing normal lining layer in type of PSCE and the highest sperm cell concentration (SCC) in their lumen. (H and E x 400)

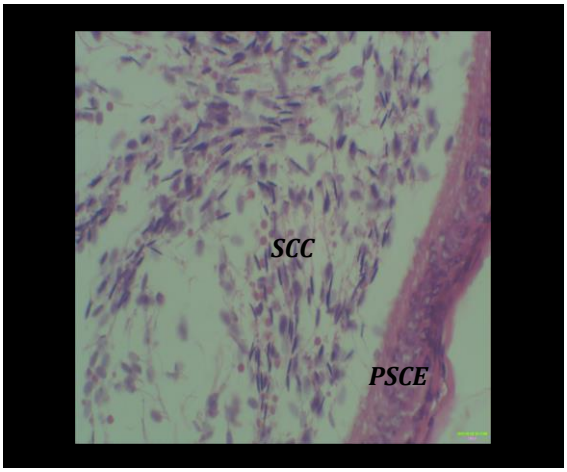

Plate (12): Section of epididymal cauda of a lamb in G4 showing normal lining layer in type of PSCE and the lowest sperm cell concentration (SCC) in their lumen. (H and E x 400)

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تأثير التغذية على مصادر مختلفة من البروتينِ الغذائي على التركيب المورفولوجي والهستولوجي للخصيةِ والبربخِ ووظيفة الحيوان المنوي المستخرج من البربخ في الأغنام.

حلمى قطب زغلول

المعهد العالى للتعاون الزراعى – بشبرا- مصر

تهدّف هذه الدراسةِ لتَقييم تأثير مصدر البروتينِ، بذرةِ قطن (CSM) ، فول الصويا (SBM) النواتج العرضية لتقطير الأذرة كمصدر للطاقة في تغذية المجترات (DDGS) في عليقه الحملانِ النامية على الخصائص التشريحيةِ ,والهستولوجية للخصيةِ والبربخِ، وخصائص الحيوانات المنوية للبربخ وتركيز التستسترون في سيرم الدم. استخدم في هذه الدراسة 20 من الحملان النامية الخليط (روما نوف x رحماني) (بعمر حوالي 8 أشهرٍ و33 كيلوجرامِ وزن حي) قسمت إلى أربع مجاميع.

غُذّيتْ الحملان على العلقة المركزة مع تغير 50 % من البروتين بالمصادرَ المُختَلَفةَ ،على أنْ تَكُونَ عباد الشمسِ في المجموعةِ الأولى (كنترول) ، كسب بذرة القطن المجموعة الثانية وكسب فول الصويا المجموعة الثالثة ,(DDGS)المجموعةالرابعة (لمدة 120 يومِ فترة التجربة.

في نهايةِ الفترةِ التجربةِ، تم ذبح الحملان وجمعت الخصية لدراستها ظاهريا وتشريحيا وتم جُمِعَ عينة دمّ لتقدير التستسترون في السيرم وتم استرداد الحيوانات المنوية من البربخ بطريقة التشريح.

وأشارت النَتائِجَ بأنّ وزنَ وحجمَ الخصية (الطولِ والعرضِ) كَانا الأعلى معنويا (P<0.05) في G3، ومعتدل في G1 و G2ومنخفضا في G4. التغذية على مصادر مختلفة من البروتين لم يكن له تأثيرُ معنوي على وزن ومقياسِ البربخِ أَو اجزائة، بشكل خاص طول وعرض زيل البربخ.

كانت الخصية أعلى في الحجم عند معنوية (P<0.05) والأصغر في القطر و متوسطِ قطر الأنابيب المنوية وعالية بمعنوية (P<0.05) في سُمك طبقةِ الحيوانات المنوية spermatogenic فى المجموعة الثالثة بالمقارنة مع المجموعاتِ الأخرى.

متوسط القطر والقطر الأصغر والأكبر لقناة ذيل البربخ كَانتْ أعلى معنوية (P<0.05) في G3 و G4 عن G1 وG2. أيضاً الطبقة الطلائيةَ المبطنة لذيل البربخ كانت اسمك معنويا (P<0.05) في G3 و G4 عن G1 وG2.

النسبة المئوية للحركة التقدمية والحي من الحيوانات المنوية المستردة من ذيل البربخ كانت اعلي عند معنوية (P<0.05) في G3 و G4 عن G1 وG2. أيضا الطبقة الطلائيةَ المبطنة لذيل البربخ كانت اسمك معنويا (P<0.05) في G3 ومعتدل في G1 و G2 واقل في وG4.

النِسَبة المئوية مِنْ الحيوانات المنوية للبربخ سواء الشاذة أو تالفة الاكروسوم لَمْ تتأثّر بمصدرِ البروتينِ. . تركيز التستسترونِ كَانَ الأعلى معنويا (P<0.05) في G3 والأقل في G4.

نستخلص من هذه الدراسة : إن التغذية على عليقه تحتوى على كسب بذرة القطن أو DDGS لم يدعم نمو ذكور الحملانِ لاستخدامها في التلقيح. وإن التغذية على عليقه تحتوى على كسب عباد الشمسِ (الكنترول) أَو فول صويا كمصدر للبروتينِ دعم نمو ذكورا لحملان لاستخدامها في التلقيح.