Some morphometric and histological description of the seminiferous ,striaghted and rete testis tubules in the testis of indogenous male goats (two years old)

Abdul Hadi Sallal Mohammed* Dalal Abdul Husian Kadium**
Ashwaq Kadium Ebed**

*Technical Institute Kufa Clinical pathology Dept.
**Education College for Girls, Kufa University

Abstract:

The present Study was carried out on (15) testis indogenous male goats(two years)old . The testes was surrounded by capsule mean thickness (230±3.5) micrometer.The internal structures of the testes represented by seminiferous tubules mean diameters (258±1.9) micrometer.The wall of seminiferous tubules consist of spermatogenic cells and supporting cells(Sertoli cells). The spermatogenic cells included spermatogonia and primary spermatocytes (mean diameters 10.5±1.7, 16.3± 2.3) micrometer respectively. Difficult to determine the secondary spermatocytes,due to remain for short time , because they converse quickly to spermatids ,therefore ;diameters of secondary spermatocytes were thought approximately equal the diameters of spermatids and spermatids(mean diameter 9.52±1.49) micrometer.The mean diameter of supporting cells was (13 .58±2.11) micrometer.

Among the seminiferous tubules there are interstitial tissue was occupied by interstitial cells (Leydig´s cells) the mean diameter (12.32±3.85) micrometer.The seminiferous tubules were opened into striaghted tubules which lined by epithelium was graduated from stratified cuboidal endothelium to simple cuboidal endothelium when striaghted tubules connected with rete testis tubules .The mean diameters of striaghted tubules were (156.3± 2.36) micrometer.The rete testis were lined by simple squamous endothelium(the mean diameter 74±1.48) micrometer.

بعض الوصف النسجي والقياسات الشكلية للنبيبات الناقلة للمني والنبيبات المستقيمة ونبيبات الشبكة الخصوية ، لخصى ذكور الماعز المحلي (بعمر سنتين)

عبد الهادي صلال محمد* دلال عبد الحسين كاظم**
اشواق كاظم عبيد**

* قسم التحليلات المرضية، المعهد التقني، كوفة
**كلية التربية للبنات، جامعة الكوفة

الخلاصة:

أجريت الدراسة الحالية على خصى (15) ذكر ماعز محلي بعمر (سنتين). تحاط الخصية بمحفظة معدل سمكها (3.5 ±230) مايكروميتر. تتمثل التراكيب الداخلية للخصية بالنبيبات الناقلة للمني معدل أقطارها (9.1±258) مايكروميتر .يتالف جدارها من خلايا منشئة للنطف وخلايا ساندة (خلايا سرتولي). تضمنت الخلايا المنشئة للنطف كل من سليفات النطف والخلايا النطفية الاولية (معدل اقطارها 10.5 , 1.7± 2.3 ±16.3) مايكروميتر على التتالي. الخلايا النطفية الثانوية لم ترصد بسبب المدة القصيرة اذ تتحول بسرعة الى اروماات نطف ، لذلك يعتقد ان اقطارها تقارب اقطار اروماات النطف (معدل قطرها 1.49±9.52) مايكروميتر في حين وجد ان معدل قطر خلايا سرتولي (2.11 ±13.58) مايكروميتر.

يوجد مابين النبيبات الناقلة للمني نسيج بيني (خلالي) يشغل بالخلايا البينية (خلايا لايدك) معدل قطرها 3.85 ±12.32 مايكروميتر. تفتح النبيبات الناقلة للمني في النبيبات المستقيمة،وتبطن بظهارة تتدرج من الظهارة الطباقية المكعبة الى الظهارة المكعبة البسيطة عند ارتباط النبيبات المستقيمة بنبيبات الشبكة الخصوية.كان(معدل قطر النبيبات المستقيمة 2.36±156.3) مايكروميتر .تبطن نبيبات الشبكة الخصوية بظهارة حرشفية بسيطة. (معدل قطر هذه النبيبات 1.48±74) مايكروميتر.

Introduction:

Spermatogenesis is a process of division and differentiation by which spermatozoa are produce in seminiferous tubules .A measure of efficiency of spermatogenesis is the estimated number of by Spermatozoa are produced per day per gram of testicular parenchyma. Seminiferous tubules are composed of Somatic cells (myoid cells and Sertoli cells),and germ cells (spermatogenia, spermatocytes and Spermatids)(Johnson,1995).The quantitative morphology of the ovine seminiferous tubules epithelium were studied by (Worble et al., 1995). The ultrastructural features and morphometric values of ovine Sertoli and spermatogenic cells are recorded with special reference to the six stages of the seminiferous epithelial cycle , ovine seminiferous tubules occupied about (83%) of testicular paranchema and average tubular diameter bout (275 micrometer)and epithelial height bout (95 micrometer). Nakanishi, (1995) was investigated the mammalian spermatogenic pathway ,he mentioned this pathway is a complex process that Involves the meiotic proliferation of spermatogenia,the meiotic division of spermatocytes, chromosomal condensation,the production of specific proteins ,and the morphogenic differentiation of spermatids to mature sperm. Testicular composition,a number of A-spermatogenia, germ cells ratio and number of spermatids in three different breed of boars was reported by (Okwun et al.,1996).

Previous histological Study of the mammals testis had been extensively investigated in human (Prince,1990), bull (Humphrey and Ladds,1974), Stallion (Swierstra et al.,1974), Ovine(Steger and Worble, 1996).The literature on the seminiferous tubules of the male goat is rather deficient.The present Study aim to provide the basic data and

informations for the histology of the seminiferous tubules of the male goat which would be of value for further investigations.

Materials and methods:

Testis from fifteen male goat aged two years old were collected . The age of animal was estimated through examination of teeth, the male goat before slaughtering were given adequate clinical observation by experienced veteranarian of Najaf slaughtering house .The sexual organs were removed from carcasses . The testis was dissected free along the attachment of the scrotum and spermatic cord,then perfused with normal saline followed by fixation in 10% formalin solution .The testis was sectioned and processed for routine histological examination ,five micrometer sections were prepare, and then stain with hemotoxylin and eosin (Luna,1978). An ocular micrometer used to measure the diameter of seminiferous tubules(Galigher.and Kozloff, 1964).

Results:

The testis of the male goat (2) years old consist of lobules ,each lobule contain one or more seminiferous tubules was irregular or round –shaped ,arranged in testicular lobules.The seminiferous tubule was lined by multilayer of germinal epithelium .(figure 1). The testis was surrounded by a thick tunica albugenia of dense collagenous fibers with fibroblasts and few bundles of elastic, reticular fibers and smooth muscle fibers .Many large branches of testicular blood vessels was appeared in the testicular capsule and the layer of capsule which contains blood vessels called Tunica Vasculosa (figure 2).The septules of the testis became thick the mediastinum ,The average thickness of testicule capsules were (230±3.5) micrometer (table 1).The internal structure of the goat testis was revealed seminiferous tubules,the average diameter of rounded seminiferous tubules were (258±1.9) micrometer (table 1).

The wall of seminiferous tubule was lined by many layers of spermatogenic cells and supporting cells(Sertoli cells).The process of Spermatogenesis was represented by different spontanously stages of differentiation in male primary germinal cells,they start with the spermatogonium were small cells,had irregular chromatin in their nuclei,when nuclear chromatin dusty in appearance this spermatogonium type A,while the chromatin was appeared crusty this represented spermatogonium type B,the average diameter of spermatogonium and their nuclei were(10.5±1.7, 5.7 ± 1.8) micrometer respectively.The spermatogonium was resting on basal lamina of the basement membrane which belonge to seminiferous tubule.Above single layer of spermatogonia there are the developmental stages of the primary spermatocytes ,were large cells with large rounded nuclei. The average

diameter of primary spermatocytes and their nuclei were(16.5±2.3,8.1 ±2.4) micrometer respectively (table 2).Each primary spermatocyte divided to two secondary spermatocytes,these cells were smaller than primary,and they divided into two spermatids.The spermatid could be distinguished by their small in diameter and their nuclei with opaque chromatin and the situation of spermatids near the lumen of seminiferous tubules.The new spermatid had pale nucleus, while the nucleus of old spermatid appeared darkly stained with Hemotoxylin and Eosin (figure 3).

Some spermatozoa were observed in the lumen of seminiferous tubules or attached to supporting cells (figure 4). The average diameter of spermatids and their nuclei were mentioned in(table 2). The spermatogenic cells and Sertoli cells were occupied the wall of the seminiferous tubules from exterior to the lumen,and enclosed by thin layer of fibrous connective tissue with myoid cells,fibroblasts, and smooth muscle attached to the basal lamina of each seminiferous tubule.There are vascular connective tissue among the seminiferous tubules which contain aggregation of epitheliod cells represent the interstitial cells(figure 3).

The interstitial cells were located in the space among the seminiferous tubules and accumulates in groups which appeared polygonal shaped,different in size and richly supplied by blood capillaries. The mean diameter of interstitial cells and their nuclei were(13.3 ± 3.8,6.8 ± 1.1) micrometer. The average number of interstitial cells in microscopic fields were(21 ± 4).

In (figure 4)that revealed Sertoli cells in the male goat seminiferous tubules,these cells were appeared pyramidal shaped with ovoid nuclei,the cytoplasmic process of the Sertoli cells extended among spermatogenic cells. Spermatogonia and primary spermatocytes were occupied the basal regions of Sertoli cells,while the apical regions of Sertoli cells showed the accumulation of the spermatids and spermatozoa.The residual bodies were found in the lumen of the seminiferous tubules. The average diameter of Sertoli cells and their nuclei were mentioned in (table 2). The seminiferous tubules in male goat were convoluted and opened in striaghted tubules (average diameter was 156.3± 2.36 micrometer) .The epithelial lining of striaghted tubules, in the testis of male goat was graduated from stratified cuboidal among the testicule lobules to simple cuboidal when striaghted connected into rete testis (figure 5,6).The rete testis of male goat (2 years)old was found in the mediastinum testis, and consist of two part,the first part composed of anastomosing network of many tubules lined by simple squamous endothelium and surrounding by abundant collagenous and few elastic fibers which represented the components of the mediastinum

testis and extended in to the anterior pole of the testicule.

The second part of rete testis was appeared as sacules next to efferent ductules and seemed large sacules which lined by simple squamous epithelium and connected with efferent ductules. Some striaghted tubules was extended in the testicular spetules exterior to testicular lobules until to open in the rete testis, The diameter of rete testis tubules mentioned in (table 2).

Table 1:- Capsule thickness,diameters of seminiferous tubules, striaghted tubules and rete testis tubules in male goat testis (2 years)old.

Parameters	Mean ± SD
Capsule thickness	230 ± 3.5
Diameter of seminiferous tubules	258 ± 1.9
Diameter of striaghted tubules	156.3 ± 2.36
Diameter of rete testis tubules	74 ± 1.48

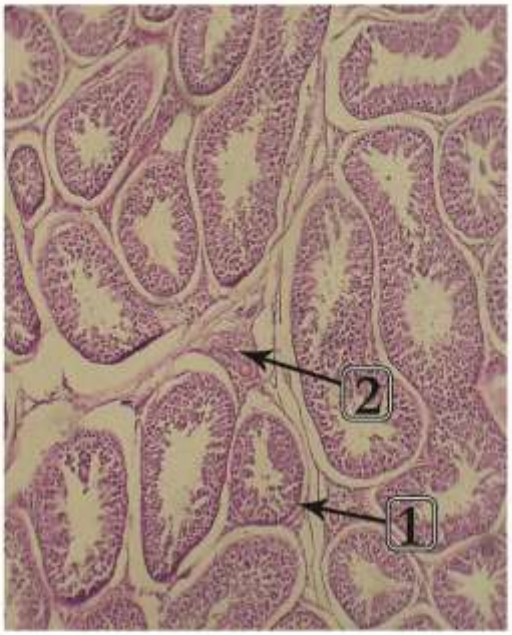
±SD:standard deviation.
Note:*(measurements by micrometer).

Table2:- Diameters of permatogenic cells , Sertoli cells, interstitial cells with diameter of their nuclei in male goat testis (2 years)old.

Parameters	Mean ± SD
Diameter of spermatogonia	10.5±1.72
Diameter of spermatogonia nuclei	5.7 ± 1.84
Diameter of primary spermatocytes	16.3 ± 2.31
Diameter of primary spermatocytes nuclei	8.1 ± 1.42
Diameter of spermatids	9.52 ± 1.49
Diameter of spermatids nuclei	6.19 ± 1.82
Diameter of Sertoli cells	13.58 ± 2.11
Diameter of Sertoli cells nuclei	7.88 ± 1.22
Diameter of interstitial cells	12.32 ±3.85
Diameter of interstitial cells nuclei	6.8 ± 1.14

±SD:standard deviation.
Note:*(measurements by micrometer).

Figure (1) Seminiferous tubules intestis of goat male . (H+E.125x)
1 - Semini ferous tubules.
2 - Interstitial Cell.



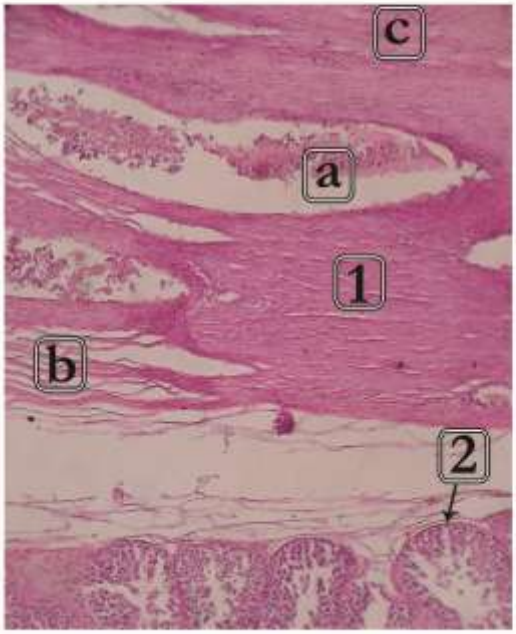
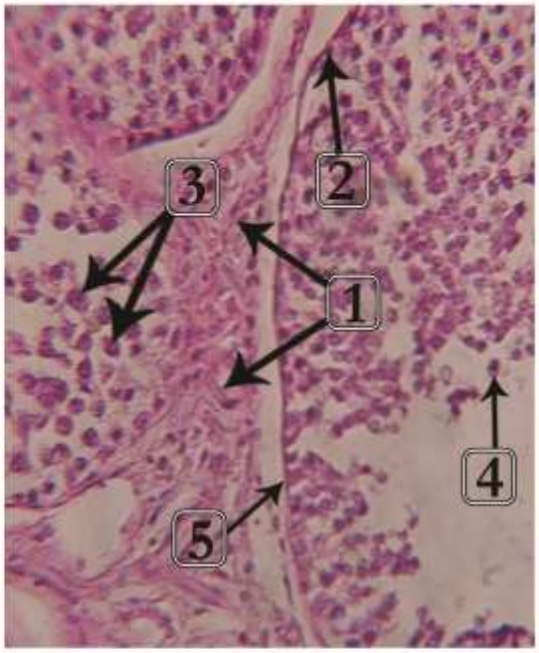


Figure (2) Seminiferous tubules intestis of goat male . (H+E.125x)
1 - Capsule.
a - Large Vein.
b - Elastic Fibers.
c - Collagen Fibers.
2 - Seminiferous tubules.

Figure (3) Seminiferous tubules intestis of goat male . (H+E.250x)
1 - Leydigs Cells.
2- Spermatogonia.
3 - Primary Spermatocyte.
4 -Spermatid.
5 - Seminiferous tubule.



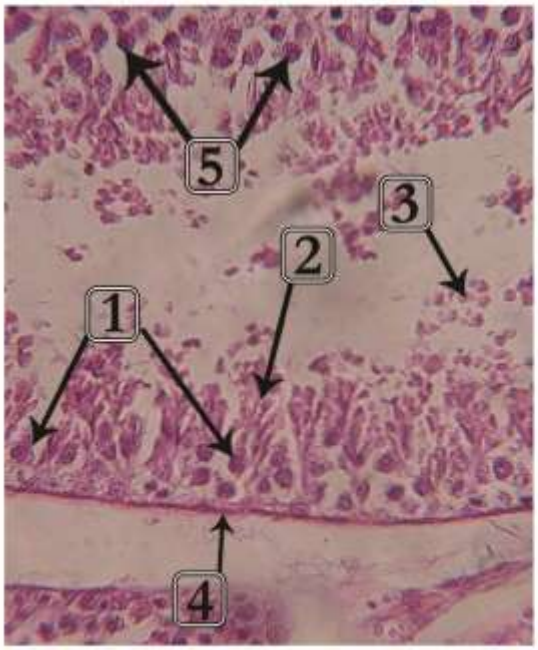
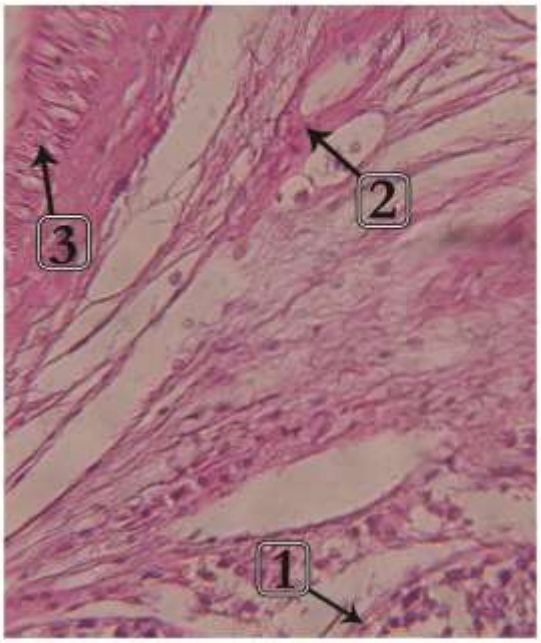


Figure (4) Seminiferous tubules with sertoli cells in testis of goat male . (H+E.450x)
1 - Sertoli Cell.
2 - Spermatozoa.
3 - residual bodies.
4 - Seminiferous tubule.
5 - primary spermatocyte.

Figure (5) Seminiferous tubules and extra striaghted tubules and rete testis in testis of goat male . (H+E.250x)
1 - Seminiferous tubules.
2 - Connective tissue.
3 -Striaghted tubule.



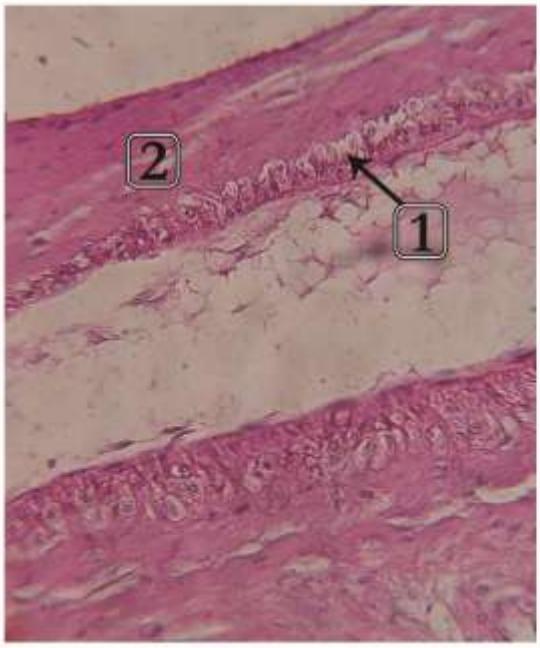


Figure (6) Extra striaghted tubules in testis of goat male . (H+E.450x)
1 - Striaghted tubule.
2 - Connective tissue.

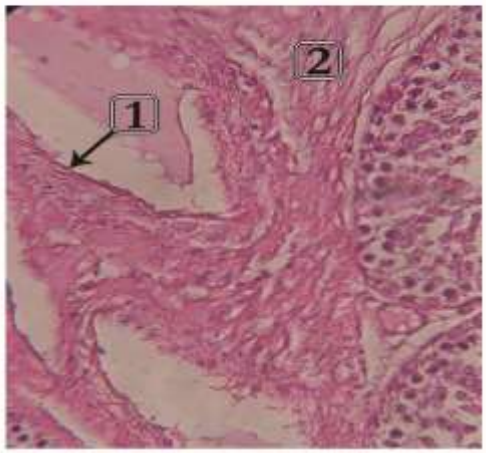


Figure (7) Seminiferous tubules and intra rete testis in testis of goat male . (H+E.250x)
1 - Rete testis lined by simple Squamous endothelium.
2- Connective tissue with reticular fibers.

Discussion:

In many countries goats consider as a good sources of meat and milk production. The male goat is called a "buck"or "billy". Nishimura,(2009) mentioned that the earliest age of the buck should be used for breeding is one year of age,in the other hand, Nishimura, (2009) was studied the testicule development and onest of puberty in the male tokara (Japanese native)goat,and observed large number of spermatozoa were always present in the seminiferous tubules and epididymal ducts from four month of age.

In the present study, the mean diameter of seminiferous tubules (258 ±1.9) micrometer in goat testicule.We suggest that when the a male goat advance in the age,the diameter of seminiferous tubules are increase,this suggestion may be corresponding with previous results were done by (Nishimura,2009),who recorded the diameter of seminiferous tubules in Japanese native goat and mentioned their diameter increased from (133 ± 9.9) micrometer at three months to (198 ± 1.0) micrometer at six mounth with little increased there after.

The testis of the male goat was surrounded by thick capsule which represent the tunica albugenia, the capsule send testicular septa to divide the parenchyma of the testis into testicular lobules, The septa reach to mediastinum testis.This histological findings are similar to previous study when described the testicular capsule of rabbit(Al-Zobaidy, 2009).

The cyclic events of the spermatogenic cells which occurred in the seminiferous tubules in male goat may be identical with those of small ruminant and domestic animals. Worble et al(1995) and Worble et al(1993). They studied cyclic events in the seminiferous tubules of rams and male deer. They mentioned presence three types of spermatogonia (type A ,B and intermediate)and six stages of primary spermatocytes during first mitotic division.

The present study described the morphology of Sertoli cells in the seminiferous tubules of male goat ,it seemed ovoid or pyramidal shaped; with oval-shaped nucleus these findings have been confirmed with results of Keer (1992). when describe Sertoli cells in man (Keer ,1992), buffalo(Pawar and Worble,1991). when studied ,the morphology of male buffalo Sertoli cells.They mentioned,the size of Sertoli cells was changed during the beginning of Spermatogenesis and the free surface of Sertoli cells,was contained indentation which support the nutritional and phagocytic function of Sertoli cells.

Our histological findings were noticed the interstitial cells which occupied the spaces among the seminiferous tubules in male goat, as well as the spaces contained on connective tissue consist of collagenous fibers and blood vessels.This findings came agreement with previous investigations were reported by Zayed et al (1995). They observed the morphology of the Leydigs cells during the seasons,but they mentioned,that the Leydigs cells was located in the spaces among the camel seminiferous tubules as groups of polyhedral cells or soliatory cells.

The present histological observation was showed ,the epithelial lining of striaghted tubule in the testis of male goat was graduated from stratified cuboidal in the primary portion and converted to simple cuboidal among the testicule lobule to simple cuboidal epithelium when open in the rete testis,the later lined by simple squamous epithetlium, and the rete testis tubules which surrounded by collagenous fibers,when rete testis tubules connected with efferent ductules became as sacules and enlarge in size .These observations were identical to results of(Goyal et al.,1992).

References:

(1)-Johnson,L.(1995).Efficiency of Spermatogenesis.Microsc-Res-Tech, 32:385-422.

(2)-Worble, K. ; Reichold , J . ; and Schimmel ,M. (1995).Quantitative morphology of the ovine seminiferous epithelium.Anat-Anz,177:19-32.

(3)-Nakanishi,Y.(1995).Study on the mammalian Spermatogenic pathway.zakugaku-Zasshi,115:420-430.

(4)-Okwun,O.;Igboeli,G.;Lunstra,D.; Ford,G.and Johnson,L. (1996). Testicular composition,number of

spermatidsin dirrerent breeds of boars.J.Androl,17:301-309.

(5)-Prince,F.(1990).Ultrastructural evidence of mature Leydig´ cells and Leydig´ cells regression in the neonatal human testis.Anat.Rec-228:405-417.

(6)-Humphrey,J.and Ladds,P. (1974). A quantitative histological study of changes in the bovine testis and epididymis associated with age.Res.Vet.Sci.,19:135- 141.

(7)- Swierstra , E. ; Gebauer ,M. and Pickett,B.(1974).Reproductive physiology of composition.J. Reprod. Fertil.;pp the Stallion.1- Spermatogenesis and :113-123.

(8)-Steger,K.and Worble,K.(1996). Postnatal development of ovine seminiferous tubules:an electron microscopical and morphometric study. Ann. Anat. 178:201-213.

(9)-Luna,L.(1978).Manual of histologic staining methods of armed forces institute of pathology .3rd ed.McGraw-Hill Book company. Newyork. pp36.

(10)-Galigher ,A. and Kozloff,E. (1964). Essential of practical microtechnique.1sted.Lea and Febiger.philadelphia.pp:41-45.

(11)-Nishimura,S.(2009). Testis development in male Tokara (Japanese native) goat. Animal Reproduction science,64:127-131.

(12)-Al-Zobaidy,A.(2009). Anatomical and Histological study of testis and epididymi of Rabbits pre and post pubertal.Msc.thesis.Vet.Med. collage, Al-Qadisiya university.

(13)-Worble, K. ; Kebler , M. ; and Schimmel , M. (1993) .Quantitative evaluation ofthe tubular epithelium in the testis of the fallow deer(Dama dama).Reprod.Dom.Anim,28:1-13.

(14)-Keer,j,(1992).Functional cytology of human testis.Baillieres Clin. Endocrinol.Metab.6:235-250.

(15)- Pawar,H. and Worble,K. (1991).The Sertoli cells of water buffalo(Bubalus bubalus) during the Spermatogenic cycle.Cell.Tissue-Res.265:43-50.

(16)-Zayed,A.;Hifny,A.;Abou-Elmaged,A.and Worble,K.(1995). Seasonal changes in the intertublar tissue of camel testis(Camelus dromrdarius).Ann.Anat.,177:199-212.

(17)-Goyal,H;Hutto,V.and Robinson, D.(1992).Re- examination of the morphology of the axtra testicular rete and ductuli efferents in the goat. Anat.Res.333:53-60.