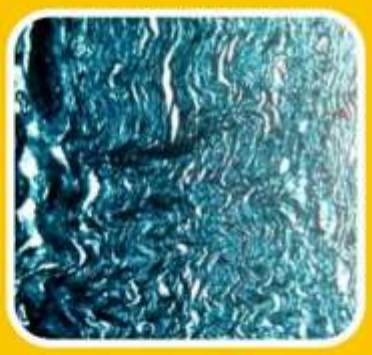
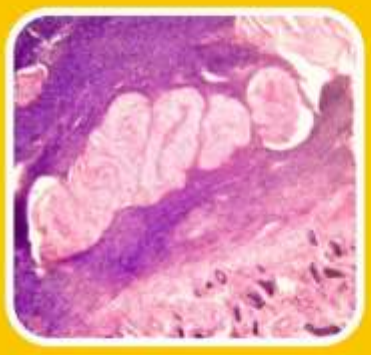
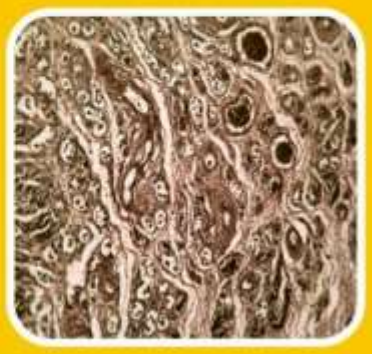
Pathomorphological Study of Female Genital Tract in Cattle


Editor

Dr. Anita Rathore

Kripa Drishti Publications, Pune.

Pathomorphological Study of Female Genital Tract in Cattle

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College of Veterinary and Animal Science,
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Book Title: **Pathomorphological Study of Female Genital Tract in Cattle**

Authored by: **Dr. Anita Rathore, Dr. Hemant Dadhich, Dr. Sunita Rani**

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PREFACE

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From Dean's pen

College of Veterinary and Animal Sciences, Navania, Udaipur (RAJUVAS) is one of the prestigious College in Udaipur, Rajasthan concerned with animal welfare activities, animal health and production with areas of education, research and extension. It is dedicated to provide quality education to the aspirants of Veterinary profession. The primary motive of the college is to produce competent Veterinarians who are endowed with skills that would help them fulfill the state's commitment to increase livestock productivity in the state, in particular and in the country, in general and ensure increase farmers' income in years to come. The college thrives to keep in pace with the new developments in science and other contemporary disciplines which are relevant to realize the objectives of the College.The College has well organized departments with qualified faculty and latest laboratory infrastructure suitable for practical training of veterinary professionals.

Veterinary Pathology is an important discipline of Veterinary Sciences for the beginning student in Veterinary Pathology, to introduce new scientific information on mechanisms of general tissue injury into the clinical medicine. Chapters on Occurrence and Pathology of various carcinoma conditions of Uterus and Ovary like Adenomyosis, Granulosa tumor, Foetal Mummification, Persistent Corpus Luteum, Haemorrhagic lesionsin Female Genital Tract of Cattlehave been reconstructed to this edited book. Animals are the back bone of Agriculture economy of our country. Cattles are prone to various infectious and non-infectious diseases which lead to drop in production and economy. Histomorphological lesions in genital organs with or without apparent gross lesions lead to disturbances in reproductive cycle and disturbed cycle results in a large proportion of failure of conception and are an important cause of sterility. Female genital tract has many diseases, which are very important clinically as well as pathologically also. In Rajasthan, so far very little efforts have been made to study the etiology, occurrence and pathology of various lesions in genital tract of cattle. Therefore, it becomes pertinent to study the genital tract affections in cattle. So, it is a matter of pleasure that the Department of Veterinary Pathology, College of Veterinary and Animal Science, Navania,

Vallabhnagar, Udaipur, RAJUVAS, Bikaner is going to Publish its "Pathomorphological study of Female Genital Tract in Cattle" as edited book.

The College has made magnificent improvement in infrastructure suitable for focusing on research on the priority areas of animal health and management. All efforts are concentrated in making College of Veterinary Sciences as a Centre of Excellence in Teaching, Research and Extension, as well as in Human Resource Development.

Good Luck to All

Prof. (Dr.) Rajeev Kumar Joshi

DEAN

CVAS, Navania, Udaipur

Acknowledgement

I am highly grateful to honorable Vice Chancellor Prof.(Dr.) Satish Kumar Garg RAJUVAS, Bikaner for his constant support and motivation in bringing out this Book.

My sincere thanks to Dr. Sunita Rani, Dr. Hemant Dadhich, Dr. Indu Vyas, Dr. Manisha Mathur Department of Veterinary Pathology, Rajuvas, Bikaner, Dr. Kamal Purohit, Dr. Goverdhan Singh, Dr. Mamta Kumari Department of Veterinary Pathology, CVAS, Navania, Udaipur, Dr. Rohitash Dadhich, Dr. Sarjna Meena, Department of Veterinary Pathology, PGIVER, Jaipur for their valuable suggestions and constant help during the course of study. I am highly grateful to the kindness of Dr. Tribhuvan Sharma, Dr. R.K. Dhuria, Department of Animal Nutrition, Dr. A. P. Singh, Department of Veterinary Medicine, CVAS, Bikaner for providing all the facilities needed and his valuable guidance.

My sincere thanks to Dr. B.N. Shringi, Department of Veterinary Microbiology and Biotechnology, Dr.J.S. Mehta, Dr.G.N.Purohit Department of Veterinary Gynaecology and obstetrics, Dr. Rajani Joshi Department of Veterinary Public Health, Bikaner for their valuable suggestions and constant help during the course of study.

I wish to pay my sincere thanks and regards to all my faculty members for their contribution and relatives who have been associated with this work directly or indirectly. At last but above all I praise and thanks almighty GOD who bestowed me with his benign blessing from time to time and enabled me to present this manuscript.

Dr. Anita Rathore

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1. Occurrence and Pathology of Various Carcinoma Conditions of Female Genital Tract in Cattle

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Abstract:

The present investigation was carried out from May 2009 to October 2009. During this period a total number of 390 samples of female genital tract were examined from cattle of different age and breeds. Out of these 156 samples showing gross lesions were collected and tissue sections from these were subjected to histopathological examination. The overall occurrence of various carcinoma conditions affecting the female genital tract of cattle was observed as Granulosa cell tumor 1.92% in ovary, Fibroma 0.64% and Adenocarcinoma 0.64% in Uterus.

Keywords:

Cattle, Histopathological, Carcinoma, Granulosa, Fibroma, Adenocarcinoma.

1.1 Introduction:

India is an agriculture dependent country and rearing of livestock is subsidiary to agriculture. Animals are the back bone of Agriculture economy of our country. The population of cattle in Rajasthan is 12.41 million according to 18th Indian Livestock census, 2007[1]. Cattles are prone to various infectious and non-infectious diseases which lead to drop in production and economy. Histomorphological lesions in genital organs with or without apparent gross lesions lead to disturbances in reproductive cycle and disturbed cycle results in a large proportion of failure of conception and are an important cause of sterility.

Female genital tract has many diseases, which are very important clinically as well as pathologically also.

The disorders of genital tract in female cattle are multietiological in origin and there are many predisposing factors, which may be genetic, anatomical, physiological and infectious agents. The conditions of Carcinoma in Cattle include Granulosa cell tumor in ovary, Fibroma and Adenocarcinoma in Uterus. In Rajasthan, so far very little efforts have been made to study the etiology, occurrence and pathology of various lesions in genital tract of cattle. Therefore, it becomes pertinent to study the genital tract affections in cattle.

1.2 Materials and Methods:

The specimens of organs of female genital tract of cattle for the proposed investigation were collected from the carcasses of cattle irrespective of age and breeds. The samples were collected from various municipal areas of Bikaner, Jodhpur and Kota districts. The samples were also collected from the carcasses submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Science, Bikaner for routine post-mortem examination.

During post mortem examination, the samples were thoroughly examined visually and manually for various pathological abnormalities such as color, consistency, shape and size, presence of tumors and ulcers etc.

The study was conducted from May 2009 to October 2009. For histopathology the fixed tissues were processed mechanically for paraffin embedding by Acetone and Benzene technique (Lillie, 1965)[2]. The sections of 4-6 micron thickness were cut and stained with routine Hematoxylin and Eosin staining method. As far as possible, results were recorded by gross observations and photomicrographs.

1.3 Results and Discussion:

For the present investigation, a total number of 390 specimens of female genital tract of cattle were collected from various municipal areas of Bikaner, Jodhpur, Kota districts irrespective of age and breeds.

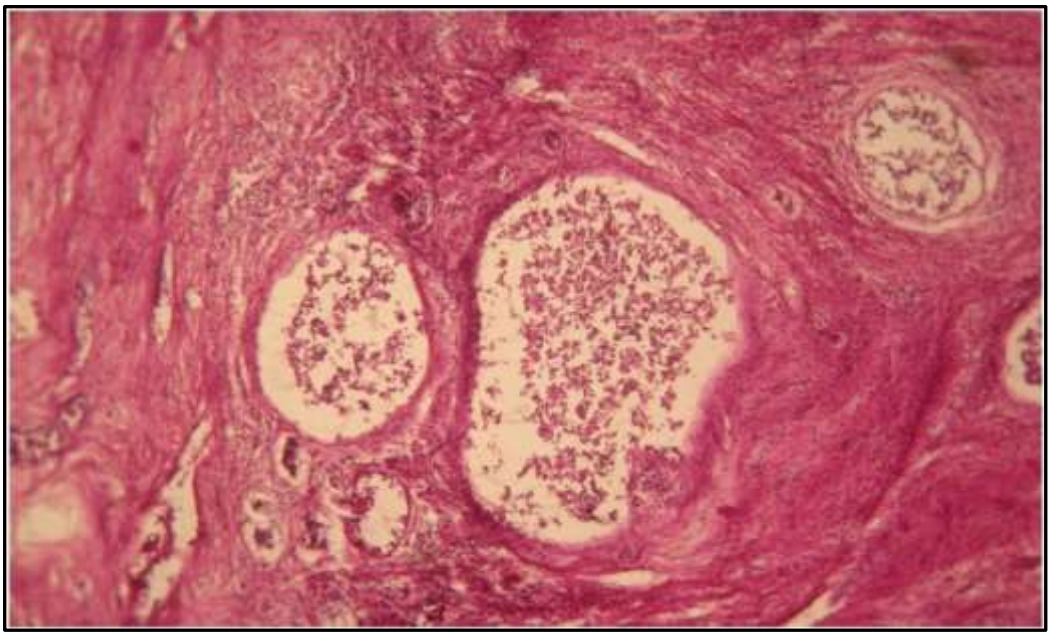

Figure 1.1: Photomicrograph of granulosa cell tumor showing rosette formation around call exner bodies. H&E, 100X.

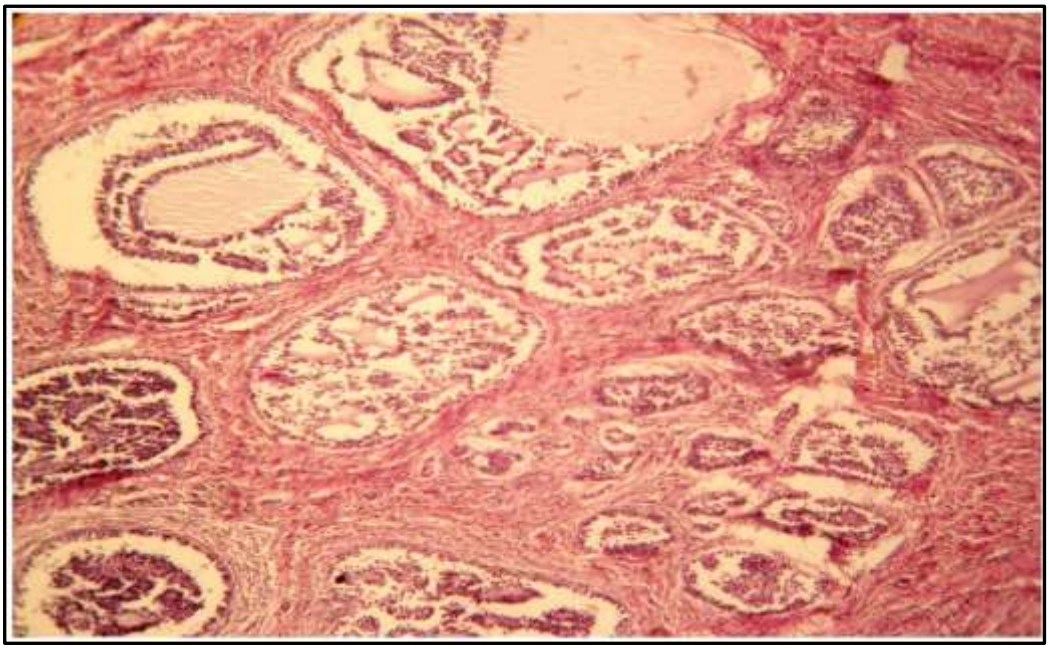

Figure 1.2: Photomicrograph of ovary showing granulosa cells which are surrounded by a thecal cells. H&E, 100X.

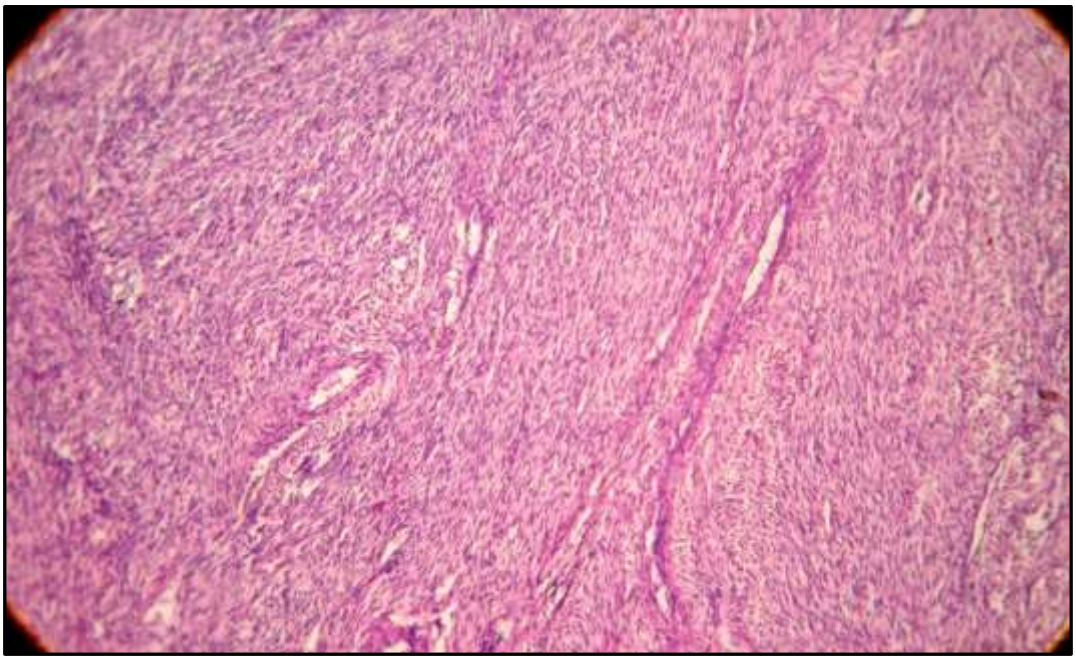

Figure 1.3: Photomicrograph of uterine fibroma showing interlacing bundles of fibroblasts. H&E, 100X.

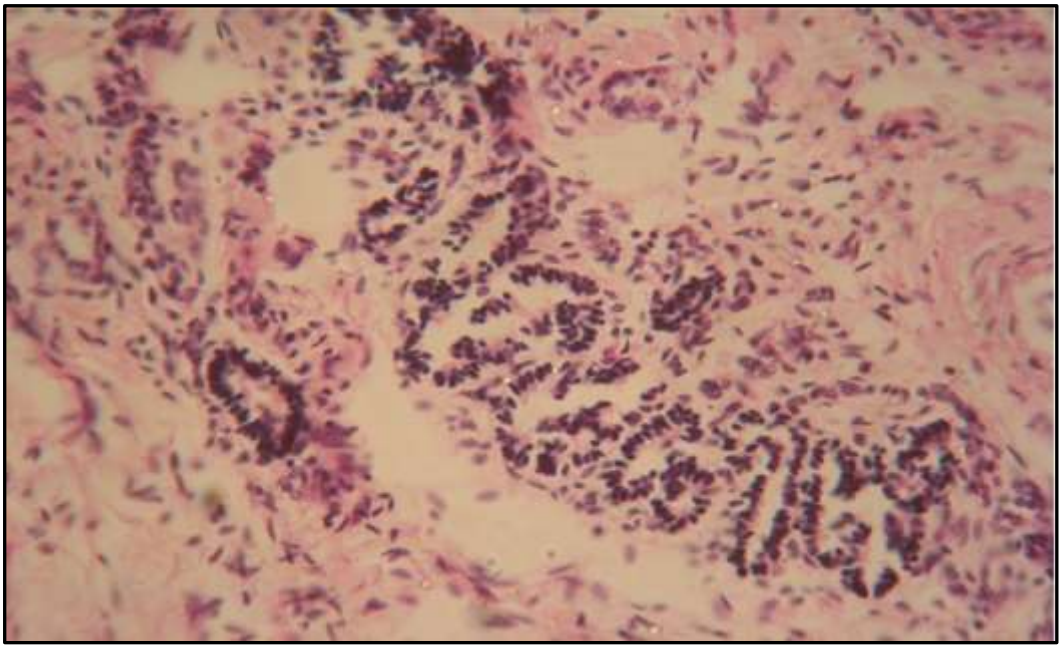

Figure 1.4: Photomicrograph endometrium showing hyperchromatic nuclei in endometrium. H&E, 400X.

Out of these 390 specimens, 156 specimens suspected for abnormalities were further processed for histopathological examination which revealed several overlapping conditions. These genital tracts were examined grossly and 156 selected organs were preserved in 10 % formalin and finely submitted to histopathology.

All organs revealed several overlapping conditions, may be of hormonal as well as infectious origin. The overall occurrence of various carcinoma conditions affecting the female genital tract of cattle was observed as Granulosa cell tumor 1.92% in ovary, Fibroma 0.64% and Adenocarcinoma 0.64% in Uterus. Granulosa cell tumor was recorded in 1.92 per cent cases. Higher incidence was recorded by Mukherjee (1980)[3] as 5.70 per cent. Two cases of granulosa cell tumor was reported by Wahid *et al.* (1991)[4]. Grossly, granulosa cell tumor was rounded and lobulated.

Microscopically, granulosa cell tumor consists of round; central nuclei and cytoplasm there were places where fewer cells cluster radially around a tiny open space, producing a formation called a rosette. A small spherical eosinophilic mass, so called call-exner body, lies in the center of the rosette.

Tumor was lined by granulosa cells, which were surrounded by thecal cells. Similar findings were recorded by Jones *et al.* (1997)[5] and Jubb *et al.* (2007)[6]. Uterine fibroma was observed in 0.64 per cent case. Rao and Rajya (1976b) [7] reported uterine fibroma in 0.01 per cent cases. The higher percentage of fibroma during present study might be attributable to the less number of genitalia examined.

Grossly, a hard ovoid shaped encapsulated mass was located on the tip of right horn of uterus. The outer surface was smooth and shining. The cut surface was dull and fleshy, having fibers running in different directions.

Microscopically, tumor cells were long, spindle shaped with elongated nuclei. The characteristic arrangement of whorls and interlacing bundles of fibroblasts and collagen fibers were seen. The collagen fibers were dense and long. Similar observations were recorded by Rao and Rajya (1976a) [8], Purohit *et al.* (2004)[9] and Saxsena (2004)[10] with difference in shape and size of fibroma.

Uterine adenocarcinoma was observed in 0.64 per cent case. Grossly, uterine adenocarcinoma was a firm mass and constricting one of the uterine horns. Microscopically, carcinoma was a dense collagenous connective tissue exceeding the malignant epithelial tissue. The endometrial glands occur in islands in small solid nests or glandular pattern, had hyperchromatic nuclei and were invading adjacent tissue. Similar observations were recorded by Jones *et al.* (1997)[5].

Table 1.1: Incidence of Various Carcinomas of Female Genital Tract in Cattle

Sr. No.	Name of condition	No. of cases	Percentage
1.	**OVARY**	**55**	**1.92**
1.1	Granulosa cell tumor	3	1.92
2.	**UTERUS**	**64**	**1.28**
2.1	Fibroma	1	0.64
2.2	Adenocarcinoma	1	0.64

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2. Pathology of Certain Conditions of Female Genital Tract in Cattle

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Abstract:

Rathore, A., Khatri, A., Dadhich, H. and Rani, S. (2013). Pathology of certain conditions of female genital tract in cattle. Indian J. Vet. Pathol., 37(1): 70-71. The present investigation was carried out from May 2009 to October 2009. During this period a total number of 390 samples of female genital tract were examined from cattle of different age and breeds. Out of these, 27 samples showing gross lesions were collected and tissue sections from these were subjected to histopathological examination. Cervix revealed pathological conditions in 11.53% cases as chronic cervicitis. Vagina and vulva revealed pathological condition in 5.76% cases as granular vulvovaginitis.

Keywords:

Cattle, cervix, pathological conditions, vagina, vulva.

2.1 Introduction:

The cattle husbandry and dairying is an important thrush to rural economy in this arid region of Rajasthan and the population of cattle in Rajasthan is 12.41 million according to 18th

Indian Livestock census, 2007[1]. Cattles are prone to various infectious and non-infectious diseases which lead to drop in production and economy. Histomorphological lesions in genital organs with or without apparent gross lesions lead to disturbances in reproductive cycle and disturbed cycle results in a large proportion of failure of conception and are an important cause of sterility. Female genital tract is prone to many diseases, which are very important clinically as well as pathologically. The disorders of genital tract in female cattle are multietiological in origin and there are many predisposing factors, which may be genetic, anatomical, physiological and infectious agents. The most frequently encountered pathological conditions of the cervix in bovine practice are chronic cervicitis and in vagina and vulva is granular vulvovaginitis. In Rajasthan, so far very little efforts have been made to study the etiology, occurrence and pathology of various lesions in genital tract of cattle. Therefore, it became pertinent to study the genital tract affections in cattle. The female genital tract of cattle for the proposed investigation were collected from the cattle carcasses of different municipal areas of Bikaner, Jodhpur & Kota district irrespective of age and breeds. It also included samples from the carcasses submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Science, Bikaner for routine post-mortem examination. During post mortem examination,

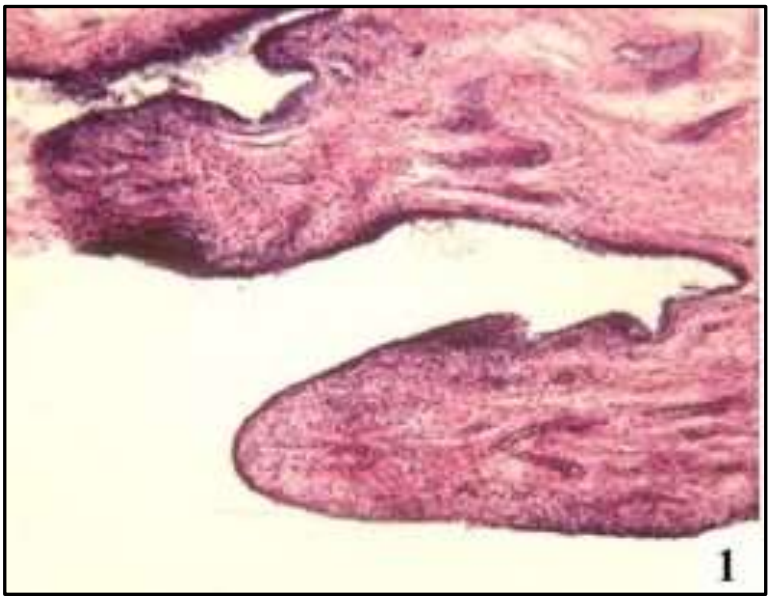

Figure 2.1: Photomicrograph of cervical fold showing hyperplastic epithelium. H&E 100X,

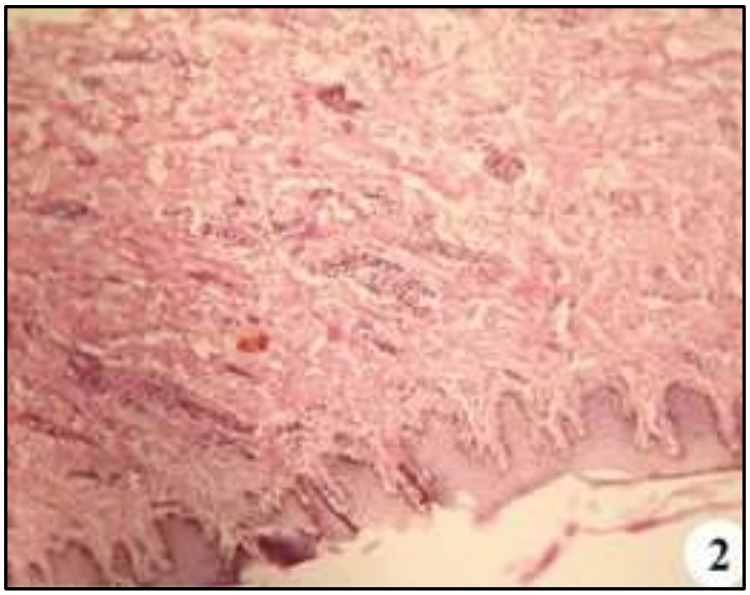

Figure 2.2: Photomicrograph of vagina showing mononuclear cell infiltration in sub mucosa and desquamation of vulvar epithelium. H&E 100X.

Table 2.1: Incidence of various pathological conditions of cervix, vagina and vulva in female genital tract in cattle.

Sr. No.	Name of Condition	No. of Cases	Percentage
1.	Cervix	18	11.53
1.1	Inflammatory conditions	18	11.53
1.1.1	Chronic cervicitis	18	11.53
2.	Vagina & Vulva	9	5.76
2.1	Inflammatory conditions	9	5.76
2.2	Granular vulvovaginitis	9	5.76

the samples were thoroughly examined for various pathological abnormalities such as colour, consistency, shape, size, presence of tumors and ulcers, if any. The study was conducted from May 2009 to October 2009. For histopathology, the fixed tissues were processed for paraffin embedding by Acetone and Benzene technique[2]. The sections of 4-6 micron thickness were cut and stained with hematoxylin and eosin staining method.

Out of these 390 specimens, 27 specimens suspected for abnormalities were further processed for histopathological examination which revealed several overlapping conditions. All organs revealed several overlapping conditions, may be of hormonal as well as infectious origin.

2.2 Chronic Cervicitis:

This condition was observed in 11.53 per cent cases (Table 2.1). Similar incidence was reported by Mukherjee[3] in 11.50 per cent cases. In available literature, this incidence varied from 1.35 percent[4] to 45.12 percent[5]. Grossly, cervix was hard enlarged and indurated. Microscopically, cervical mucosal folds were covered with mucus secreting hyperplastic epithelial cells (Figure 2.1).

Lymphocytic infiltration was present in mucosa. Chronic cervicitis resulted in stenosis of cervical canal and this condition was coexisted with chronic endometritis[6,7]. Since cervix occupied a position between the uterus and vagina, infection of either organ could cause some degree of cervicitis[8.]

2.3 Granular Vulvovaginitis:

This condition was seen in 5.76 per cent cases (Table 2.1) while 7.60 per cent incidence of granular vulvovaginitis was recorded by Mukherjee[3]. Grossly, mucosa was oedematous and congested with numerous pinhead sized raised, yellowish white spots, smeared with thick yellowish mucinous exudate. Microscopically, vulvar epithelium is desquamated, lymphocytic infiltration in submucosa and mild inflammation of the vulvar mucosa (Figure 2.2). Similar observation described by Jones *et al.*[6] and Jubb *et al.*[7].

2.4 References:

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3. Occurrence and Pathology of Various Conditions of Uterus in Cattle

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Abstract:

The present investigation was carried out between May to October. During this period a total number of 390 samples of female genital tract were examined from cattle of different age and breeds. Out of these 64 samples showing gross lesions were collected and tissue sections from these were subjected to histopathological examination. Uterus revealed pathological conditions in 41.02% cases as: acute endometritis 0.64%, subacute endometritis 1.92%, chronic endometritis 18.58%, metritis 3.84%. fibroma 0.64%, adenocar- cinoma 0.64%. hydrometra 2.56%, mucometra 3.20%, cystic glandular hyperplasia 0.64%, adenomatous hyperplasia 0.64%, atrophy 3.20%, haemorrhage 3.20% and mummified foetus 0.64%.

Keywords:

Cattle, pathological conditions, uterus, hyperplasia, mucometra.

3.1 Introduction:

India is an agriculture dependent country and rearing of livestock is subsidiary to agriculture. Animals are the back bone of agriculture economy of our country. The population of cattle in Rajasthan is 12.41 million according to 18th Indian Livestock census, 2007.

Cattle are prone to various infectious and non- infectious diseases which lead to drop in production and economy. Histomorphological lesions in genital organs with or without apparent gross lesions lead to disturbances in reproductive cycle and disturbed cycle results in a large proportion of failure of conception and are an important cause of sterility. Female genital tract has many diseases, which are very important clinically as well as pathologically also.

The disorders of genital tract in female cattle are multietiological in origin and there are many predisposing factors, which may be genetic, anatomical, physiological and infectious agents. Uterine disorders are inflammatory conditions, neoplastic conditions and other conditions such as mucometra, hydrometra, macerated foetus, mummified foetus.

Among inflammatory conditions of uterus, chronic endometritis is the most common. In Rajasthan, so far very little efforts have been made to study the etiology, occurrence and pathology of various lesions in genital tract of cattle. Therefore, it becomes pertinent to study the genital tract affections in cattle.

3.2 Materials and Methods:

The specimens of organs of female genital tract of cattle for the proposed investigation were collected from the carcasses of cattle irrespective of age and breeds. The samples were collected from various municipal areas of Bikaner, Jodhpur and Kota districts. The samples were also collected from the carcasses submitted to the Department of Veterinary Pathology,College of Veterinary and Animal Science, Bikaner for routine post-mortem examination.

During post mortem examination, the samples were thoroughly examined visually and manually for various pathological abnormalities such as colour, consistency, shape and size, presence of tumours and ulcers etc.

The study was conducted from May to October. For histopathology the fixed tissues were processed mechanically for paraffin embedding by acetone and benzene technique (Lillie, 1965).

The sections of 4-6 micron thickness were cut and stained with routine hematoxylin and eosin staining method. As far as possible, results were recorded by gross observations and photomicrographs.

3.3 Results and Discussion:

For the present investigation, a total number of 390 specimens of female genital tract of cattle were collected from various municipal areas of Bikaner, Jodhpur, Kota districts irrespective of age and breeds.

Out of these 390 specimens, 64 specimens suspected for abnormalities were further processed for histopathological examination which revealed several overlapping conditions.

These genital tracts were examined grossly and 64 selected organs were preserved in 10% formalin and finely submitted to histopathology. All organs revealed several overlapping conditions, may be of hormonal as well as infectious origin.

In the present study various kinds of affections, recorded in uterus to the extent of 41.02 per cent which were slightly lower than that recorded by Mukherjee (1980) as 42.1 per cent. In available literature this incidence varied from 1.67 per cent (Rao and Rajya, 1976) to 50 per cent (Tafti and Darahshiri, 2000).

Major part of pathology of uterus includes inflammatory conditions, which are produced by close connection to external environment or by bad management just after parturition.

Because of careless management after parturition animal gets different types of endometritis. Many organisms may cause endometritis like Corynebacterium pyogenes, Staphylococcus aureus and Trichomonas foetus (Baptista et al., 1971).

In present study, endometritis was divided into acute, subacute and chronic endometritis. Similar pattern of classification of endometritis was described by Sharma et al., (1967) and Tafti and Darahshiri, (2000). Acute endometritis was observed in 0.64 per cent case, which is similar than 0.34.

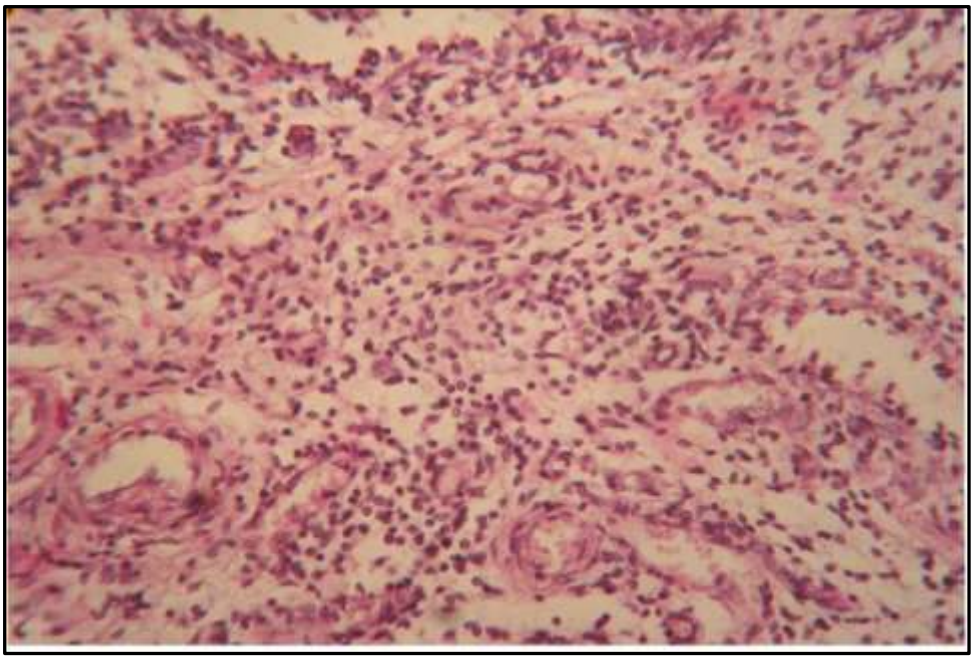

Figure 3.1: Photograph of endometrium showing mononuclear cell infiltration (H&E, 400X)

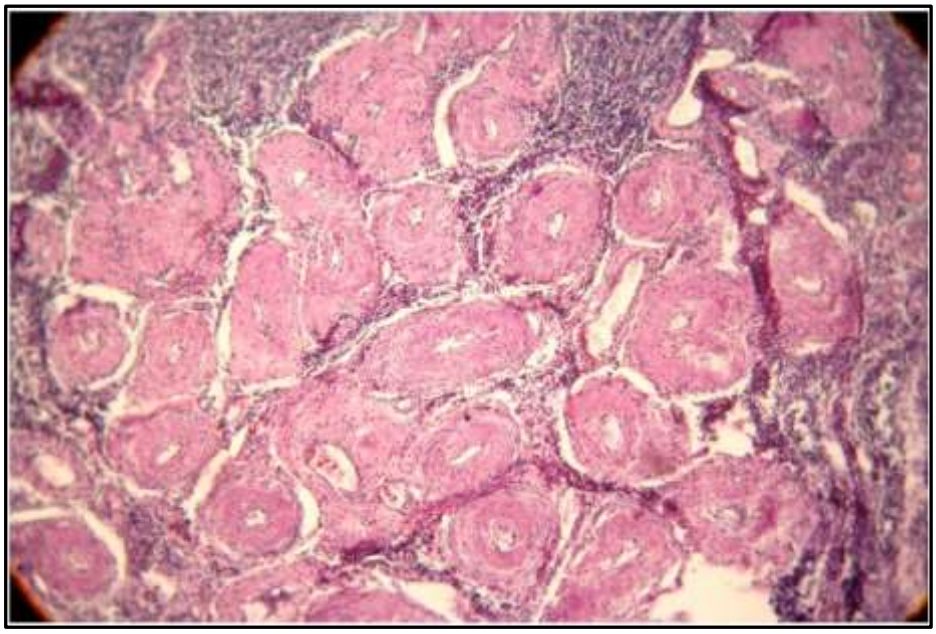

Figure 3.2: Photograph of endometrium showing thick walled sclerotic vessels (H&E, 100X)

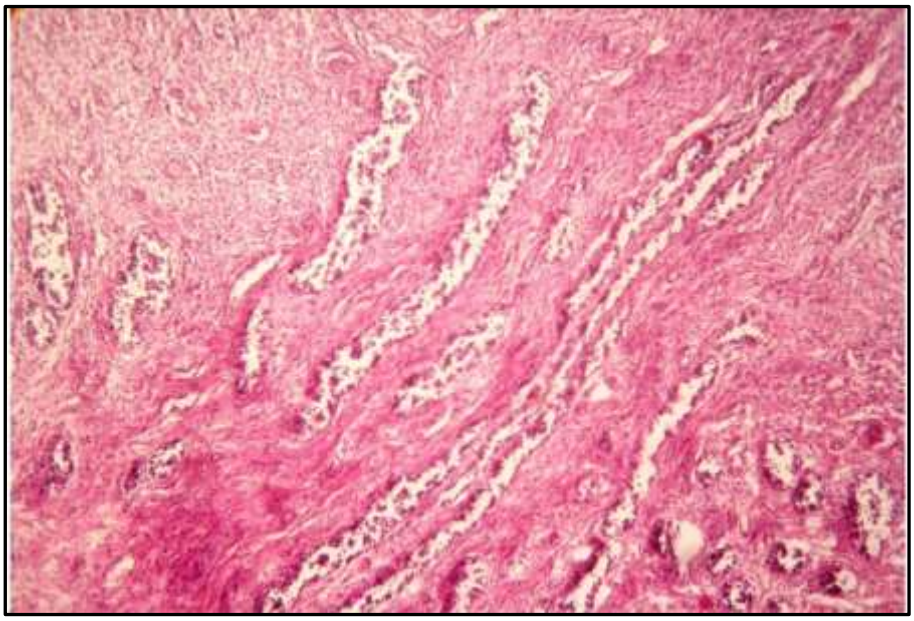

Figure 3.3: Photograph of uterus showing adenomatous hyperplasia in glandular epithelium (H&E, 100X)

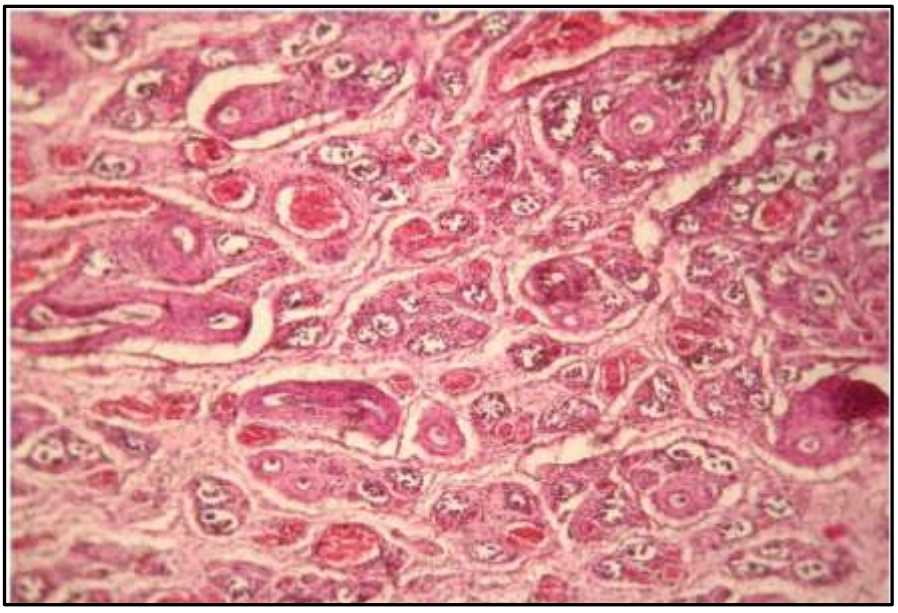

Figure 3.4: Photograph of endometrium showing nesting of glands and congested blood vessels (H&E, 100X)

per cent recorded by Dwivedi and Singh (1975). Higher incidence recorded by Mukherjee (1980) as 5.70 per cent cases. Subacute endometritis Incidence of this conditions in present study was seen in 1.92 per cent cases, while in available literature 1.90 per cent incidence of subacute endometritis was reported by Mukherjee (1980). Chronic endometritis was recorded in 18.58 per cent cases, while 12 per cent cases of chronic endometritis were observed by Dwivedi and Singh, (1975). Similar incidence was observed by Mukherjee (1980) as 19.20 per cent. Metritis was observed in 3.84 per cent cases. Higher incidence was recorded by Mukherjee, (1980) as 9.60 per cent. However, in available literature the incidence of metritis varied from 1.58 per cent Farooq et al. (2000) to 9.60 per cent Mukherjee (1980). Present observations revealed that in case of metritis, all layers of uterus were affected. Metritis as inflammation of the entire thickness of the wall of uterus Jubb et al. (2007). Uterine fibroma was observed in 0.64 per cent case. Rao and Rajya (1976) reported uterine fibroma in 0.01 per cent cases. The higher percentage of fibroma during present study might be attributable to the less number of genitalia examined. Uterine adenocarcinoma was observed in 0.64 per cent case. Similar observations were recorded by Jones et al. (1997). During present investigation, hydrometra was reported in 2.56 per cent cases. Similar observations were recorded by Sharma et al. (1967) as 2.60 per cent cases. Mucometra was reported in 3.20 per cent cases, similar observations were recorded by Khan et al. (1992) as 3.33 per cent cases. Adenomatous hyperplasia was seen in 1.28 per cent cases which include 0.64 per cent case of cystic glandular hyperplasia and 0.64 per cent case of adenomatous hyperplasia. In available literature 0.40 per cent incidence of cystic glandular hyperplasia was recorded by Nair and Raja (1976) and 2.00 per cent incidence was recorded by Tafti and Darahshiri (2000). Perhaps endometrial hyperplasia is an exaggeration of the normal proliferative activity of the endometrium in response to ovarian hormones or it may be because of any chronic infection. Adenomyosis was observed in 0.64 per cent case. Lower incidence recorded by Nair and Raja (1976) as 0.16 per cent cases. In some cases, it is a malformation and in other it arises by hyperplastic overgrowth of the endometrium (Jubb et al., 2007). Atrophy was seen in 3.20 per cent cases. Slightly lower incidence recorded by Nair and Raja (1976) as 2.16 per cent cases. Haemorrhage was recorded in 3.20 per cent cases. Similar observation recorded by Khan et al. (1992) as 3.33 per cent cases. Haemorrhage might be due to torsion, inversion, during difficult parturition by

Table 3.1: Incidence of various pathological conditions of uterus in female genital tract of cattle

Sr. No	Name of condition	No. of cases	Percentage
1.	Uterus	64	41.02
1.1	Inflammatory conditions	39	25.00
1.1.1	Acute endometritis	1	0.64
1.1.2	Subacute endometritis	3	1.92
1.1.3	Chronic endometritis	29	18.58
1.1.4	Metritis	6	3.84
1.2	Neoplasm	2	1.28
1.2.1	Fibroma	1	0.64
1.2.2	Adenocarcinoma	1	0.64
1.3	Miscellaneous conditions	23	14.74
1.3.1	Hydrometra	4	2.56
1.3.2	Mucometra	5	3.20
1.3.3	Endometrial glandular hyperplasia	2	1.28
1.3.3.1	Cystic glandular hyperplasia	1	0.64
1.3.3.2	Adenomatous hyperplasia	1	0.64
1.3.4	Adenomyosis	1	0.64
1.3.5	Atrophy	5	3.20
1.3.6	Haemorrhage	5	3.20
1.3.7	Mummified foetus	1	0.64

the tearing of blood vessels, inflammatory processes in the endometrium and when inflammation has led to closure of the cervix, there may be a large accumulation of blood in uterine cavity (Cohrs, 1967). Mummified foetus was observed in 0.64 per cent case. Lower incidence recorded by Nair and Raja (1976) as 0.08 per cent cases.

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4. Pathology and Occurrence of Uterine Atrophy in Cattle

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Abstract:

Rathore, A., Dadhich, H., Rani, S. and Dadhich, R. (2015). Pathology and occurrence of uterine atrophy in cattle. Indian J. Vet. Pathol., 39(4): 352-353.

The present investigation was carried out from May 2009 to October 2009. During this period a total number of 390 samples of female genital tract were examined from cattle of different age and breeds, of which 156 were found to have various abnormalities. Out of these, 64 samples revealed pathological lesions in the uterus, of which 5 cases (3.2%) were of atrophic uterus. Grossly, the serosal surface of uterus appeared lusterless, with comparatively hard wall. The mucosa was devoid of mucosal folds and showed numerous small, hard, closely arranged cotyledons. Microscopically, mucosa contained few small inert glands as well as cystically dilated glands lined by flat epithelium. Thick walled sclerotic endometrial vessels with reduced lumina were also noticed.

Keywords:

Atrophy, cattle, histopathology, uterus.

4.1 Introduction:

India is an agriculture dependent country and rearing of livestock is subsidiary to the agriculture. The population of cattle in Rajasthan is 12.41 million according to 18th Indian Livestock census, 2007[1].

Cattle are prone to various infectious and non-infectious diseases which lead to drop in production and economy. Female genital tract has many diseases, which are very important clinically as well as pathologically also. The disorders of genital tract in female cattle are multietiological in origin and there are many predisposing factors, which may be genetic, anatomical, physiological and infectious agents.

Study of pathological conditions of genital tract in cattle gives guideline to the proper diagnosis of the genital diseases. The present study reports the occurrence of atrophic condition in the uterus of cattle. The specimens of organs of the female genital tract of cattle were collected from the carcasses of cattle irrespective of the age and breeds. The samples were collected from various municipal areas of Bikaner, Jodhpur and Kota districts.

The samples were also collected from the carcasses submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Science, Bikaner for routine post-mortem examination. During post mortem examination, the samples were thoroughly examined visually and manually for various pathological abnormalities such as color, consistency, shape and size, presence of tumors, ulcers, any other lesions etc.

The study was conducted from May 2009 to October 2009. During this period, 390 specimens of female genital tract of cattle were examinedand out of these, 64 samples showing frank macroscopic lesions were collected and preserved in 10% formalin for further histopathological examination.

For histopathology the formalin-fixed tissues were processed routinely for paraffin embedding by Acetone and Benzene technique[2]. The paraffin embedded tissue sections of 4-6 micron thickness were obtained and stained with Hematoxylin and Eosin (H&E) method.

For the present investigation, a total number of 390 specimens of female genital tract of cattle were collected from various municipal areas of Bikaner, Jodhpur, Kota districts irrespective of the age and breeds. During this period a total of 390 female genital tracts were examined from cattle of different age and breeds, of which 156 were found to have various abnormalities.

Out of these, 64 samples revealed pathological lesions in the uterus, including atrophy, adenomyosis, haemorrhage, adenomatous hyperplasia etc. Atrophic conditions wereseen in 5 cases (3.2%). Grossly, the serosal surface was slightly brown, pale and lusterless (Figure 4.1). The wall wascomparatively hard. The mucosa was pale and showednumerous small, hard, closely arranged cotyledons. Themucosa was flat and devoid of mucosal folds.

Microscopically, mucosa contained few small inert glands as well as cystically dilated glands lined by flat epithelium. In addition, thick walled sclerotic endometrial vessels with reduced lumina were also noticed (Figure 4.2).

Duplicate paraffin sections were stained with Masson's Trichrome to confirm sclerotic blood vessels, which depicted bluish-green stained extensive fibrous tissue proliferation around the vessels (Figure 4.3). Sharma *et al.*[3] described that in the atrophy of uterus thesize was decreased and there was uniform thinning of the uterine musculature resulting in thin uterine wall and lumen of the uterus was smooth without any folds in it.

Figure 4.1: Gross appearance of cattle uterus showing atrophy with hard, pale serosal wall;

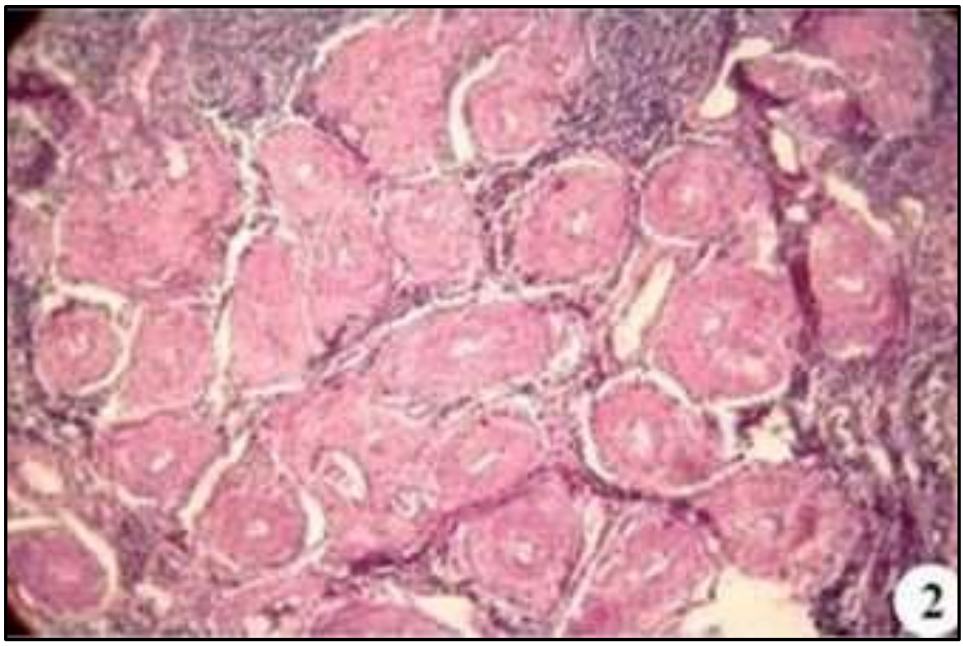

Figure 4.2: Cattle uterus showing thick walled sclerotic vessels in the endometrium. H&E, 100X;

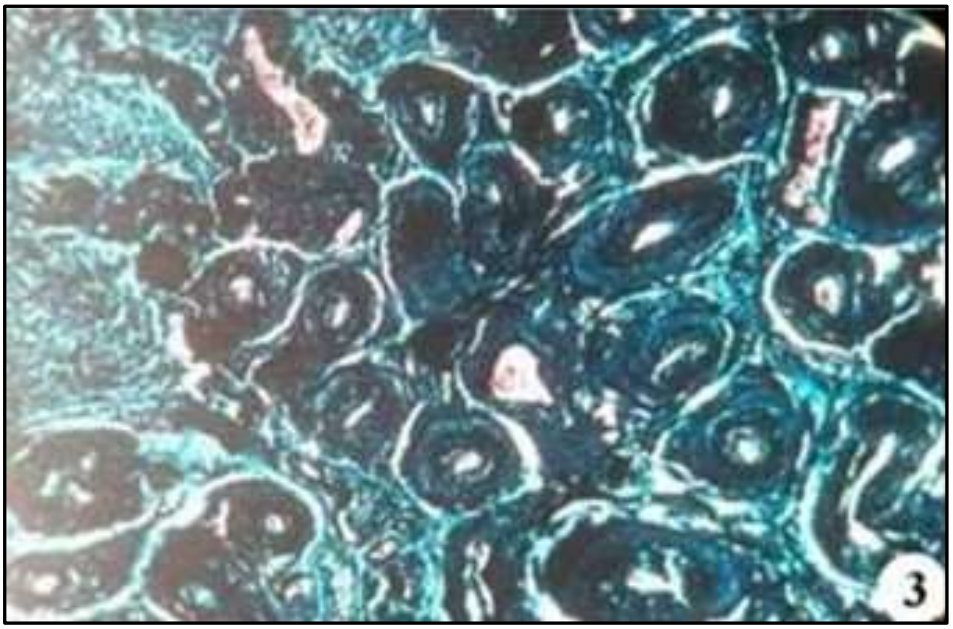

Figure 4.3: Cattle uterus showing greenish stained fibrous tissue in sclerotic vessels. Masson's Trichrome 100X.

Dwivedi and Singh[4] studied the histopathology of the uterus of Indian buffalo and concluded that histological structures of the senile endometrium of buffaloes had traditional atrophic changes with changes in the blood vessels in the form of pseudo-angiomatosis. Nair and Raja[5] reported that 2.16% cases revealed senile atrophic changes in the uterus. The uterus appeared hard and fibrotic and serous surface of the organs presented a slight brownish lusterless appearance. The mucosa was pale and showed numerous small, hard, closely arranged cotyledons. The surface was lined by a single layer of low columnar or cuboidal cells. The uterine glands, which were only a few in numbers, showed atrophic changes. Jubb *et al.*[6] observed that the loss of trophic function of the ovaries had been attributed to be the major cause for senile atrophic changes of the uterus. It is concluded that in the present study pathological condition of atrophy occurred in 3.2% cases.

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5. Occurrence of Foetal Mummification in Cattle

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Abstract:

The present investigation was carried out from May 2009 to October 2009. During this period a total number of 390 samples of female genital tract were examined from cattle of different age and breeds. 156 specimens suspected for abnormalities were further processed for histopathological examination.

Out of these 64 samples showing gross lesions were collected and tissue sections from these were subjected to histopathological examination. In the present study the overall occurrence of Mummified foetus in genital tract of cattle is found to be 0.64% (1 case).

Keywords:

Cattle, pathological conditions, female genital tract, Mummified foetus.

5.1 Introduction:

Cattles are prone to various infectious and non-infectious diseases which lead to drop in production and economy. Study of pathological conditions of genital tract in cattle gives guideline to proper diagnosis of genital diseases.

In Rajasthan, so far very little efforts have been made to study the etiology, occurrence and pathology of various lesions in genital tract of cattle. Therefore, the present study was under taken to study the genital tract affections in cattle.

5.2 Materials and Methods:

The specimens of the female genital tract of cattle for the proposed investigation were collected from the carcasses of cattle, irrespective of age and breed.

The samples were collected from various municipal areas of Bikaner, Jodhpur and Kota districts. The samples were also collected from the carcasses submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Science, Bikaner for routine post-mortem examination.

During the post mortem examination, the samples were thoroughly examined for various pathological abnormalities.

The study was conducted from May 2009 to October 2009. For histopathology, the fixed tissues were processed and sections were stained with routine Hematoxylin and Eosin staining method.

5.3 Results and Discussion:

For the present investigation, 390 specimens of the female genital tract of cattle were collected from various municipal areas of Bikaner, Jodhpur, Kota districts irrespective of age and breeds.

Out of these 390 specimens, 156 specimens suspected for abnormalities were further processed for histopathological examination.

Out of these 64 samples showing gross lesions were collected and tissue sections from these were subjected to histopathological examination. This condition was observed in 0.64 per cent case.

Lower incidence recorded by Nair and Raja (1976) as 0.08 per cent cases in left uterine horn.

The endometrial surface was completely eroded and was light brownish in colour. Foetal fluids were absent and there was no interplacental haemorrhage.

Figure 5.1: Photograph of genital tract showing contorted mass of mummified foetus in uterine horn.

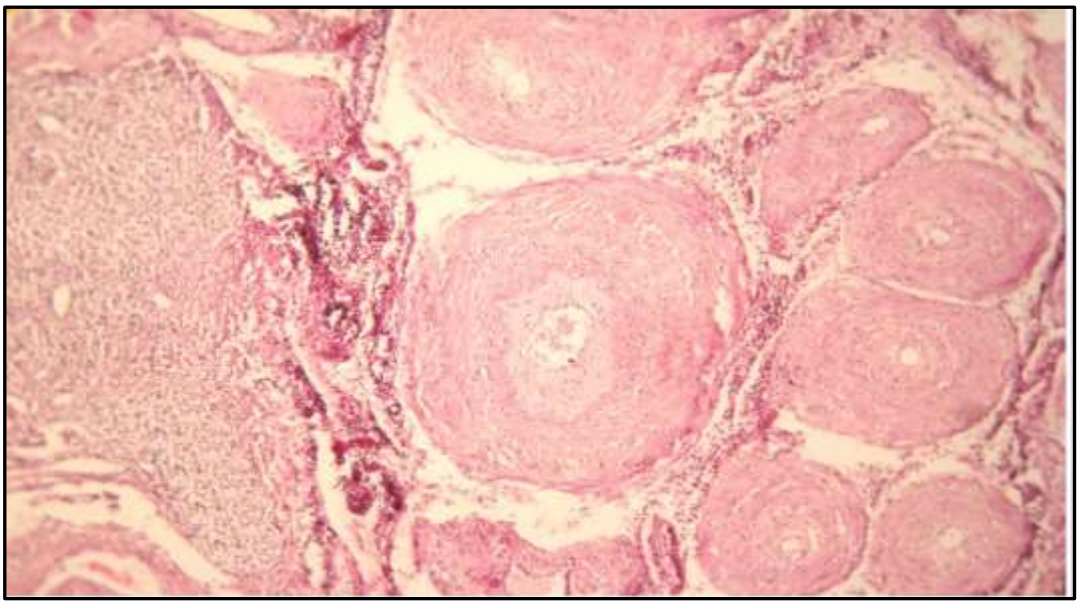

Figure 5.2: Photomicrograph of uterus showing few atrophic glands and numerous sclerosed blood vessels in endometrium. H&E, 100X.

Roberts (1986) stated that hematic mummification was more frequent in occurrence than papyraceous mummification in cattle.

Ghora *et al.* (1996) observed old macerated foetus with small pieces of bones, necrotic tissues and sloughed off endometrial mucosa with metaplasia of uterine mucosal epithelium. Gadakh and Akhare (2008) observed papyraceous mummified foetus in a crossbred cow, in which, the foetal membranes get shriveled, dried and become parchment like. The fluids were observed and uterus contracts on the foetus and moulds on to a dry contorted mass.

Grossly, the entire genitalia appeared hard and enlarged. The left horn was larger than the right horn and contained a mummified foetus. The foetal fluids were absent and hard uterine wall was firmly adherent to the foetus. The foetal membranes get shriveled, dried and contorted mass present. (Figure 5.1) Microscopically, endometrium revealed few atrophied glands and numerous sclerosed blood vessels. (Figure 5.2)

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6. Gross and Histopathological Features of the Lesion in the Female Genital Tract of Cattle

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Abstract:

The present investigation was carried out from May 2009 to October 2009. During this period 390samples of female genital tract were examined from cows/cattle of different age and breeds. Outof these 129 samples showing gross lesions werecollected and tissue sections from these were subjected to histopathological examination. Oophoritis (3.20%), Acute salpingitis (0.64%), Chronic salpingitis (2.56%), Acute endometritis (0.64%), Subacute endometritis (1.92%), Chronicendometritis (18.58%) and Metritis (3.84%) wasobserved.

Keywords:

Cattle, oophoritis, salpingitis,endometritis, metritis.

6.1 Introduction:

In Rajasthan, very little efforts have been made to study the etiology and occurrenceof various lesions in the genital tract of cattle. Therefore, the present study was under taken to study the genital tract affections in cattle.

6.2 Materials and Methods:

The specimens of the female genital tract ofcattle for the proposed investigation were collected from the carcasses of cattle, irrespective of age and breed. The samples were collected fromvarious municipal areas of Bikaner, Jodhpur and Kota districts.

The samples were also collected from the carcasses submitted to the Department of Veterinary Pathology, Collegeof Veterinary and Animal Science, Bikaner for routine post-mortem examination. During the post mortem examination, the samples werethoroughly examined for various pathological abnormalities.

The study was conducted from May 2009 to October 2009. For histopathology, the fixed tissues were processed and sections were stained with routine Hematoxylin and Eosin staining method.

6.3 Results and Discussion:

For the present investigation, 390 specimens of the female genital tract of cattle/cows were collected from various municipal areas of Bikaner, Jodhpur, Kota districts irrespective of age and breeds.

Out of these 390 specimens, 129 specimens suspected for abnormalities were further processed for histopathological examination which revealed several overlapping conditions.

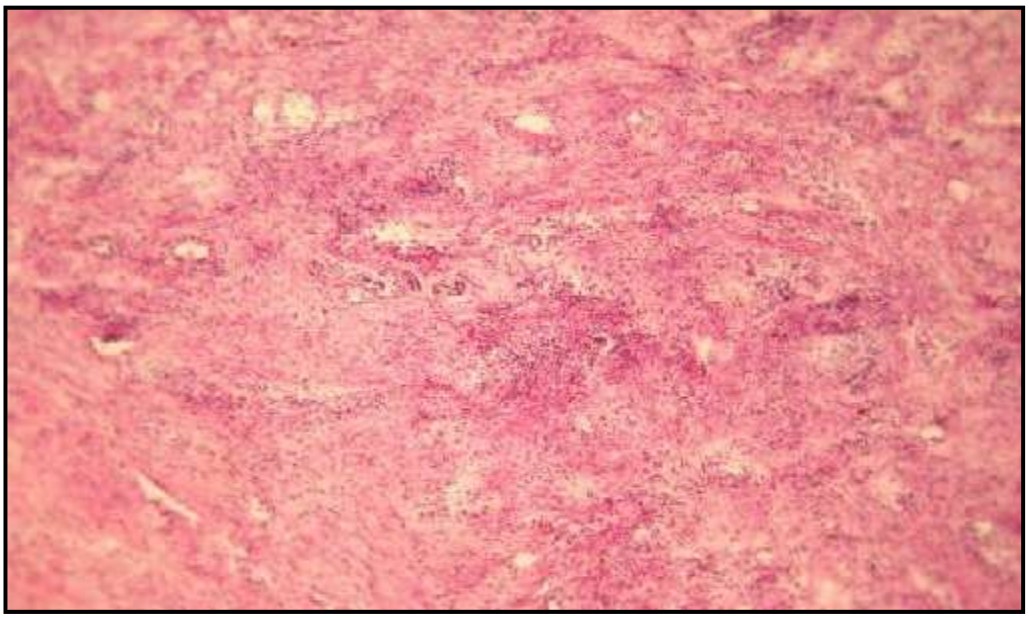

Figure 6.1: Ovary: lymphocytic infiltration in the medullary part. H&E, 100X.

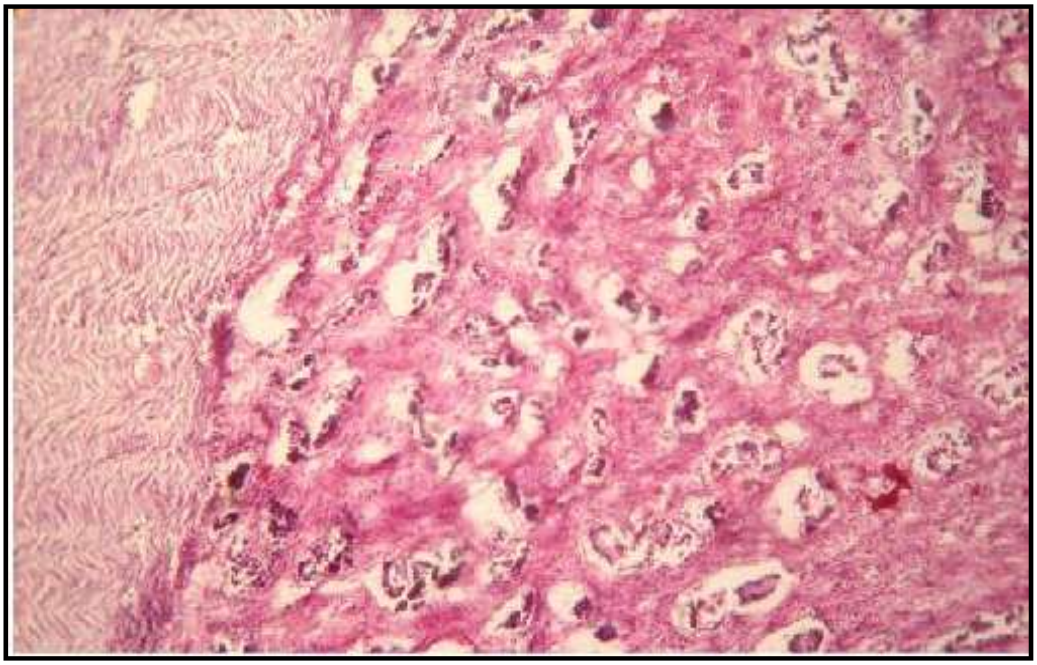

Figure 6.2: Endometrium: thick fibrous stroma & atrophed glands. H&E, 100X.

In 3.20 per cent cases of oophoritis was recorded, while Mukherjee (1980) reported 3.80 per cent cases of necrotic oophoritis and Sharma*et al.* (1993) reported 3.33% oophoritis. Oophoritis was identified histologically, as diffuse infiltration of lymphocytes in the medulla and perivascular lymphocytic infiltration in the hilar region. (Figure 6.1). Salpingitis was recorded in 3.20 per cent cases. Slightly higher incidence ofsalpingitis was recorded by Cuevas *et al.* (1981)as 4.7 per cent cases. Acute salpingitis was observed in 0.64 per cent cases.

Grossly, both tubes were affected and were soft in consistencywith moderate distension of the ampullary part. Microscopically, neutrophilic and mononuclear cell infiltration, Congestion of the mucosal vessels and loss of epithelium of the mucosal folds were present. The infections of the oviductwas found associated with acute endometritis. Itmight be ascending in nature. Chronic salpingitis was reported in 2.56 per cent cases. Grossly,in most of these cases, fallopian tubes revealed adhesions with ovary and bursa and in all casestubes were comparatively hard. Microscopically,the mucosal folds were thickened and denuded. Loss of epithelium occured first in the free edgesof the mucosal folds and these denuded areas fused and adhered to produce intramucosal cysts.

The chronic inflammation of oviductis associated with chronic endometritis and metritis. Infection might have reached in the oviduct by ascending mode (Jubb *et al.,* 2007). Cases of endometritis observed were dividedinto acute, subacute and chronic endometritis. Acute endometritis was observed in 0.64 per cent cases, which is higher than 0.34 per cent recorded by Dwivedi and Singh (1975). Higher incidence (5.7%) was recorded by Mukherjee (*loccit.*). Subacute endometritis was seen in 1.92 percent cases, while Mukherjee (*loc. cit*) recorded 1.90 per cent. Chronic endometritis was recordedin 18.58 per cent cases, while Dwivedi and Singh (*loc cit.*) recorded 12% (Figure 6.2) Similar incidence was observed by Mukherjee (*loc cit.*) (19.20%.) Metritis was observed in 3.84% cases. Higher incidence was recorded by Mukherjee (*loc cit.*) (9.60%). However, in available literature theincidence of metritis varied from 1.58 per cent Farooq *et al.* (2000) to 9.60 per cent Mukherjee (*loc cit.*). Present observations revealed that in the case of metritis, all layers of the uterus wereaffected.

6.4 Summary:

In the present study Oophoritis (3.20%), Acute salpingitis (0.64%), Chronic salpingitis (2.56%),Acute endometritis (0.64%), Subacute endometritis (1.92%), Chronic endometritis (18.58%) and Metritis (3.84%) was observed of the lesion in the female genital tract of cattle

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7. Pathology of Adenomyosis in the Female Genital Tract of Cattle

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Abstract:

A total of 390 samples of female genital tract were examined from cattle of different age and breeds, of which 156 were found to have various abnormalities. Out of these, 64 samples revealed pathological lesions in the uterus, of which 1 case (0.64%) was of adenomyosis. Microscopically, foci of displaced endometrial glands were noticed either in single or numerous groups, superficial or deep extending into the myometrium and endometrial glands were present in myometrium.

Keywords:

Female genital tract, cattle, uterus, histopathology, adenomyosis.

7.1 Introduction:

Animals are the back bone of agriculture economyof our country. Cattle are prone to various infectious and non-infectious diseases which lead to drop in production and economy. Study of pathological conditions of genital tract in cattle gives guideline to proper diagnosis of genitaldiseases (Nair and Raja, 1976; Rathore *et al*, 2015).

In Rajasthan, very little efforts have been made to studythe etiology and occurrence of various lesions in thegenital tract of cattle. Therefore, the present study was under taken to study the spontaneous genital tract affections in cattle.

7.2 Materials and Methods:

The specimens of the female genital tract of cattle for the proposed investigation were collected from the carcasses of cattle, irrespective of age and breed. The samples were collected from various municipal areas of Bikaner, Jodhpur and Kota districts. The samples were also collected from the carcasses submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Science, Bikaner for routine post- mortem examination. During the post mortem examination, the samples were thoroughly examined for various pathological abnormalities. For histopathology, the fixed tissues were processed and sections were stained with routine Hematoxylin and Eosin staining method.

7.3 Results and Discussion:

For the present investigation, 390 specimens of the female genital tract of cattle were collected from various municipal areas of Bikaner, Jodhpur, Kota districts irrespective of age and breeds. Out of these 390 specimens, 156 specimens suspected for abnormalities were further processed for histopathological examination.

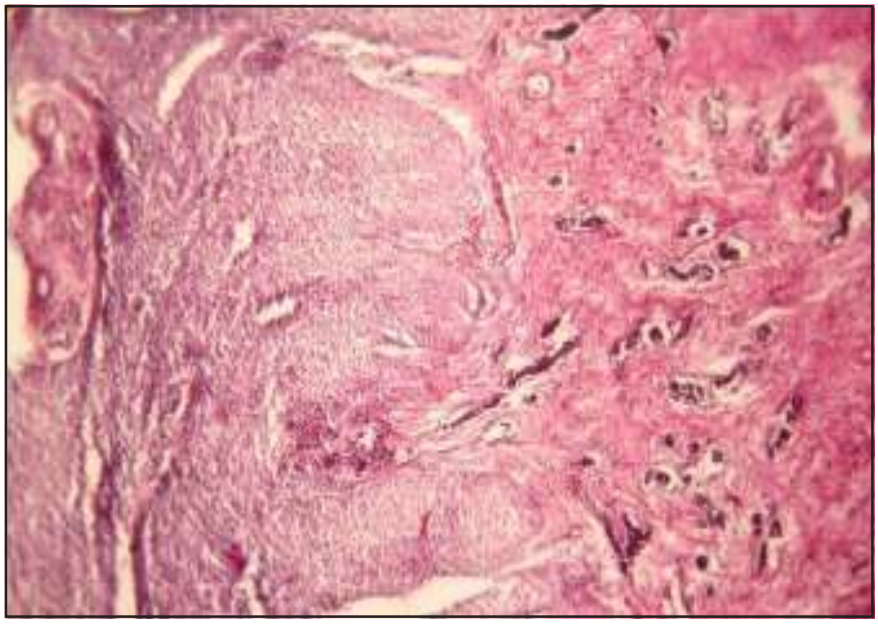

Figure 7.1: Photomicrograph of uterus showing endometrial glands extended into myometrium. H&E, 100X.

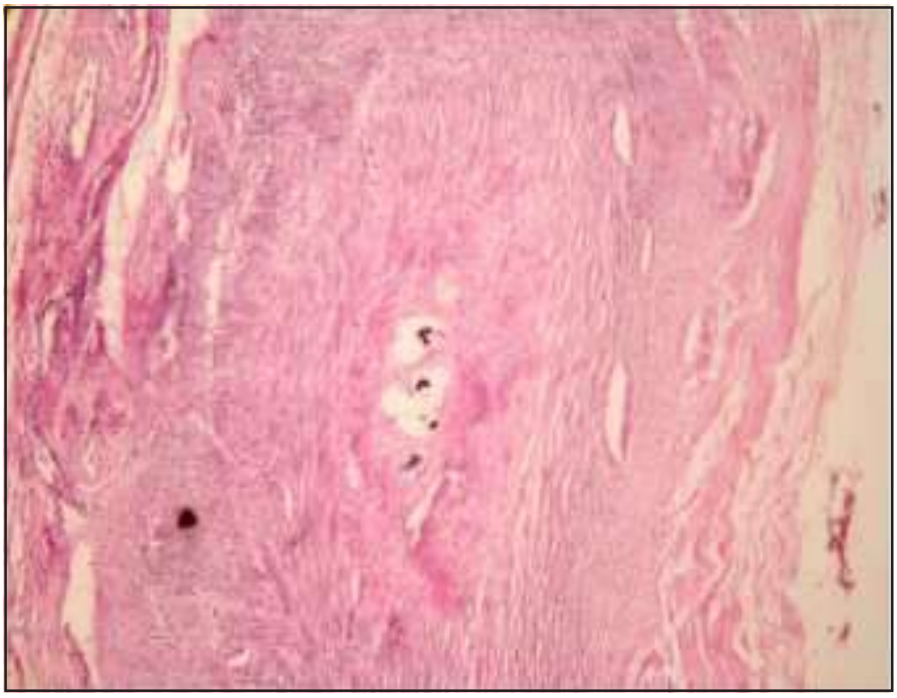

Figure 7.2: Photomicrograph of myometrium showingpresence of endometrial gland. H&E, 100X.

Out of these, 64 samples revealed pathological lesions in the uterus. This condition was observed in 0.64 per cent case. Lower incidence recorded by Nair and Raja (1976) as 0.16 per cent cases. Microscopically, foci of displacedendometrial glands were noticed either in single or numerous groups, superficial or deep extended into the myometrium (Figure 7.1) and endometrial glands were present in myometrium (Figure 7.2). Similar observations were recorded by Rao and Rajya (1976) in buffaloes. In some cases, it is a malformation and in other it arises by hyperplastic overgrowth of the endometrium (Jubb *et al*, 2007).

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8. Pathological Study on Persistent Corpus Luteum in Cattle

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Abstract:

The present investigation was carried out from May 2009 to October 2009. During this period a total number of 390 samples of female genital tract were examined from cattle of different age and breeds, of which 156 were found to have various abnormalities.

Out of these, 55 samples revealed pathological lesions in the ovary, of which 6 cases (3.84%) were of persistent corpus luteum. Grossly, on incision, no central cavity was seen and colour of persistent corpus luteum varied from dark brown to faint yellow.

Microscopically, thick fibrous connective tissue capsule with its invagination into the lutein tissue subdividing it into small lobules. In some cases, lutein cells were normal with vacuolated cytoplasm and lightly stained nuclei.

Keywords:

Persistent corpus luteum, cattle, pathological lesions, ovary.

8.1 Introduction:

In Rajasthan, very little efforts have been made to study the etiology and occurrence of various lesions in the genital tract of cattle. Therefore, the present study was under taken to study the genital tract affections in cattle.

8.2 Materials and Methods:

The specimens of the female genital tract of cattle for the proposed investigation were collected from the carcasses of cattle, irrespective of age and breed. The samples were collected from various municipal areas of Bikaner, Jodhpur and Kota districts.

The samples were also collected from the carcasses submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Science, Bikaner for routine post-mortem examination.

During the post mortem examination, the samples were thoroughly examined for various pathological abnormalities. The study was conducted from May 2009 to October 2009. For histopathology, the fixed tissues were processed and sections were stained with routine Hematoxylin and Eosin staining method.

8.3 Results and Discussion:

For the present investigation, 390 specimens of the female genital tract of cattle/cows were collected from various municipal areas of Bikaner, Jodhpur, Kota districts irrespective of age and breeds.

Out of these 390 specimens, 156 specimens suspected for abnormalities were further processed for histopathological examination. Out of these, 55 samples revealed pathological lesions in the ovary.

This condition was observed in 3.84 per cent cases, which was slightly lower than the incidence reported by Sujata (2000) in 4.00 per cent cases. Lower incidence was reported by Rao and Rajya (1976) in 0.16 per cent.

Figure 8.1: Photograph of cut section of ovary showing pale yellow colored persistent corpus luteum without central cavity.

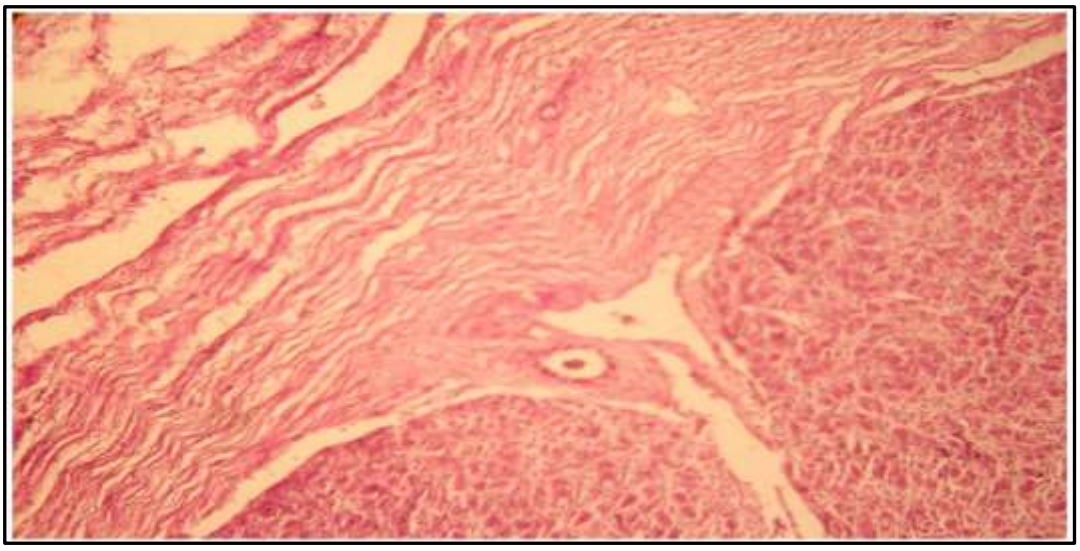

Figure 8.2: Photomicrograph of persistent corpus luteum showing connective tissue capsule with lobules. H&E, 100X.

Grossly, colour of persistent corpus luteum varied from dark brown to faint yellow without central cavity (Figure 8.1). Microscopically, thick fibrous connective tissue capsule with its invagination into the lutein tissue subdividing it into small lobules (Figure 8.2). Most of the lutein cells in these corpora lutea were apparently functioinal and resembled the lutein cells present in large cyclic corpus luteum with mild regressing changes. In some cases, lutein cells were normal with vacuolated cytoplasm and lightly stained nuclei. These findings are same as described by Dwivedi and Singh (1971). Present findings indicated that persistence of corpora lutea in these cases might be due to lack of diminished secretion of luteolytic substance by the uterus as suggested by McDonald (1975).

8.4 References:

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9. Occurrence and Pathology of Various Conditions of Fallopian Tube in Female Genital Tract of Cattle

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Abstract:

In the present investigation a total number of 390 samples of female genital tract were examined from cattle of different age and breeds. One hundred and fifty-six specimens suspected for abnormalities were further processed for histopathological examination. Out of these 10 samples showing gross lesions were collected and tissue sections from these were subjected to histopathological examination. Fallopian tube revealed pathological conditions in 6.41% cases as: acute salpingitis 0.64%, chronic salpingitis 2.56%, hydrosalpinx 1.28% and epithelial hyperplasia in 1.92% cases.

Keywords:

Cattle, fallopian tube, hyperplasia, pathological conditions, salpingitis.

9.1 Introduction:

India is an agriculture dependent country and rearing of livestock is subsidiary to agriculture. Animals are the back bone of Agriculture economy of our country. The cattle husbandry and dairying is an important thrush to rural economy in this arid region of Rajasthan.

The population of cattle in Rajasthan is 12.41 million according to 18th Indian livestock census, 2007. Cattle are prone to various infectious and non-infectious diseases which lead to drop in production and economy.

Histomorphological lesions in genital organs with or without apparent gross lesions lead to disturbances in reproductive cycle and disturbed cycle results in a large proportion of failure of conception and are an important cause of sterility. Female genital tract has many diseases, which are very important clinically as well as pathologically also.

The disorders of genital tract in female cattle are multietiological in origin and there are many predisposing factors, which may be genetic, anatomical, physiological and infectious agents. The most frequently encountered pathological conditions of fallopian tube in bovine practice are salpingitis and hyperplasia. Hydrosalpinx is the sequel of salpingitis. In Rajasthan, so far very little efforts have been made to study the etiology, occurrence and pathology of various lesions in genital tract of cattle. Therefore, it becomes pertinent to study the genital tract affections in cattle.

9.2 Materials and Methods:

The specimens of organs of female genital tract of cattle for the proposed investigation were collected from the carcasses of cattle irrespective of age and breeds. The samples were collected from various municipal areas of Bikaner, Jodhpur and Kota districts. The samples were also collected from the carcasses submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Science, Bikaner for routine post-mortem examination.

During post- mortem examination, the samples were thoroughly examined visually and manually for various pathological abnormalities such as colour, consistency, shape and size, presence of tumours and ulcers etc. For histopathology the fixed tissues were processed mechanically for paraffin embedding by acetone and benzene technique (Lillie, 1965). The sections of 4-6 micron thickness were cut and stained with routine hematoxylin and eosin staining method. As far as possible, results were recorded by gross observations and photomicrographs.

9.3 Results and Discussion:

For the present investigation, a total number of 390 specimens of female genital tract of cattle were collected from various municipal areas of Bikaner, Jodhpur, Kota districts irrespective of age and breeds.

One hundred and fifty six specimens suspected for abnormalities were further processed for histopathological examination. Out of these 10 samples showing gross lesions were collected and tissue sections from these were subjected to histopathological examination.

These genital tracts were examined grossly and 10 selected organs were preserved in 10% formalin and finely submitted to histopathology. All organs revealed several overlapping conditions, may be of hormonal as well as infectious origin.

In the present study various kinds of affections, recorded in fallopian tube to the extent of 6.41 per cent. Higher incidence was recorded by Ansari *et al.* (2009) as 23.94 per cent. Lower incidence was recorded by Fathalla *et al.* (2000) as 3.5 per cent. This difference may be due to different climatic conditions or may be due to different management conditions of animal rearing.

Salpingitis was recorded in 3.20 per cent cases. Slightly higher incidence of salpingitis was recorded by Cuevas *et al.* (1981) as 4.7 per cent cases and considerable lower incidence was recorded by Sharma *et al.* (1968) as 2 per cent cases.

Acute salpingitis: Acute salpingitis was observed in 0.64 per cent case. Grossly, both tubes were affected and were soft in consistency with moderate distension of the ampullary part.

Microscopically, neutrophilic and mononuclear cell infiltration in the blood vessels of uterine tube, congestion of the mucosal vessels and loss of epithelium of mucosal folds were present. Similar observations were described by Jubb et al. (2007). The infections of oviduct were found associated with infectious conditions of the uterus like acute endometritis. It might be ascending in nature.

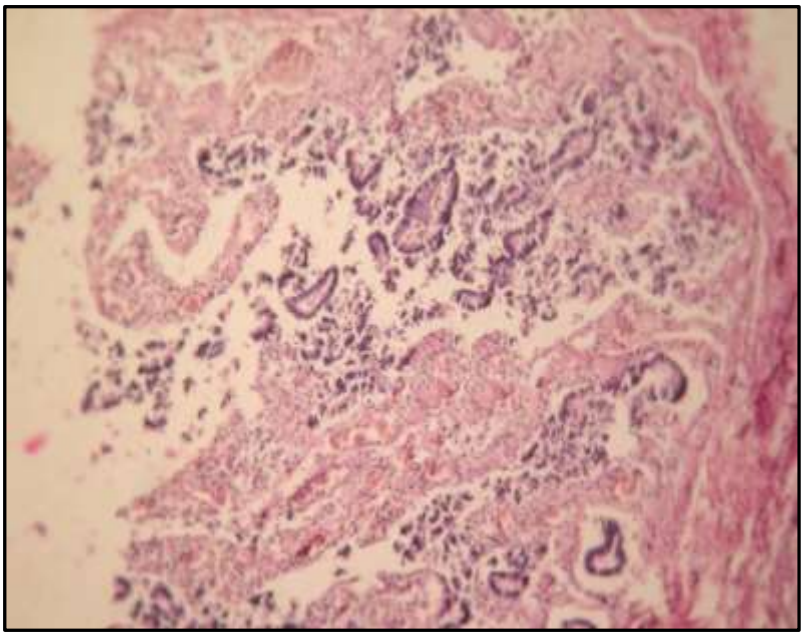

Figure 9.1: Photomicrograph of fallopian tube shows loss of epitheliumof mucosal fold (H&E, 100X).

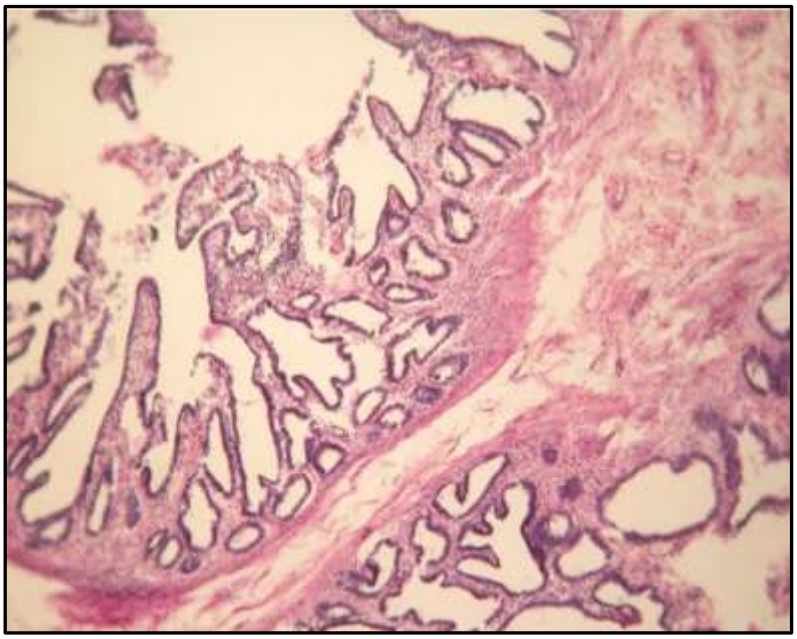

Figure 9.2: Photomicrograph of fallopian tube shows intramucosal cystformation (H&E, 100X).

Figure 9.3: Photomicrograph of fallopian tube shows thin wall withcomplete loss of mucosal fold (H&E, 100X).

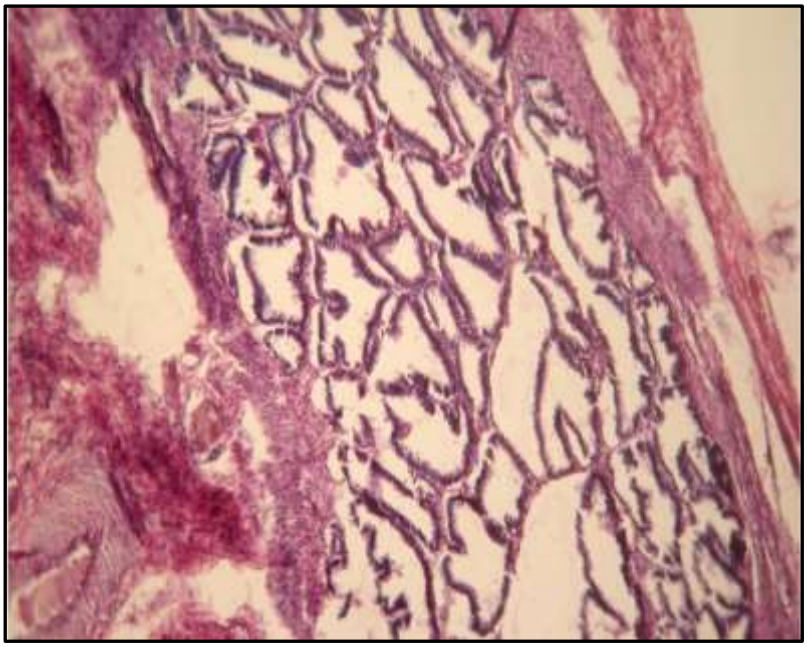

Figure 9.4: Photomicrograph of fallopian tube shows mucosal epithelialhyperplasia in the form of multiloccular structure (H&E, 100X).

Table 9.1: Incidence of various pathological conditions of fallopian tube in female genital tract in cattle

Sr. No.	Name of Condition	No. of Cases	Percentage
1.	Fallopian tube	10	6.41
1.1	Inflammatory conditions	5	3.20
1.1.1	Acute salpingitis	1	0.64
1.1.2	Chronic salpingitis	4	2.56
1.2	Miscellaneous conditions	5	3.20
1.2.1	Hydrosalpinx	2	1.28
1.2.2	Epithelial hyperplasia	3	1.92

- **Chronic salpingitis:**

Chronic salpingitis was reported in 2.56 per cent cases. Grossly, in most of these cases, fallopian tubes revealed adhesions with ovary and bursa and in all cases tubes were comparatively hard. Microscopically, the mucosal folds were thickened and denuded. Loss of epithelium occurs first in the free edges of the mucosal folds and these denuded areas tend to fuse and adhere to produce intramucosal cysts. Similar observations were described by Jubb *et al.* (2007). The chronic inflammation of oviduct is associated with chronic endometritis and metritis. Infection might be reached in the oviduct by ascending mode (Jubb *et al.*, 2007).

- **Hydrosalpinx:**

This condition was recorded in 1.28 per cent cases. Slightly lower incidence was recorded by Sharma *et al.* (1968) as 1 per cent cases. Although in available literature, incidence of hydrosalpinx varied from 0.91 per cent (Seitaridis and Metaxopoulos, 1971) to 3.50 per cent (Sujata, 2000). Grossly, in all cases fallopian tubes were distended, elongated and tortuous. The wall of the distended tubes was very thin and cavity contained clear fluid. These findings were accordance with the reports of Al-Dahash and David (1977). Microscopically, the mucosal folds were completely

atrophied. The lumen were larger, lamina propria and muscular coat were very thin. Similar observations were described by Sastry and Rao (2005). The microscopical changes suggested that hydrosalpinx cases under report might have been the sequelae of salpingitis as suggested by Roberts (1986) and Jubb *et al.* (2007).

- **Epithelial hyperplasia:**

This condition was observed microscopically in 1.92 per cent cases. Larger proliferating epithelial cells of mucosal folds were rested on a very thin connective tissue core and fused with the epithelial cells of adjacent folds giving rise to multilocular structures. The epithelial lining of these structures also revealed similar proliferating and anastomosing changes resulting in further mutiloculation between mucosal folds. Similar observations were recorded by Kumar and Singh (1985).

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10. Occurrence and Pathology of Various Conditions of Ovary in Female Genital Tract of Cattle

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Abstract:

The present investigation was carried out from May 2009 to October 2009. During this period a total number of 390 samples of female genital tract were examined from cattle of different age and breeds. Out of these 55 samples showing gross lesions were collected and tissue sections from these were subjected to histopathological examination. The overall occurrence of various pathological conditions affecting the female genital tract of cattle was observed as 40 per cent. Ovary revealed pathological conditions in 35.25% cases as: oophoritis 3.20%, follicular cyst 9.61%, cystic corpus luteum 0.64%, granulosa cell tumour 1.92%, persistent corpus luteum 3.84%, parovarian cyst 1.28%, hypoplasia 0.64%, ovarobursal adhesion 3.20%, subactive ovary 2.56%, sclerosed ovary 3.20%, follicular atresia 2.56%, anovular cords 1.28%, folliculoids 0.64%, haemorrhage 0.64% cases.

Keywords: *Cattle, ovary, cyst, pathological conditions.*

10.1 Introduction:

India is an agriculture dependent country and rearing of livestock is subsidiary to agriculture. Animals are the back bone of agriculture economy of our country. The cattle husbandry and dairying is an important thrush to rural economy in this arid region of Rajasthan. The population of cattle in Rajasthanis 12.41 million according to 18th Indian Livestock census, 2007. Cattle are prone to various infectious and non-infectious diseases which leads to drop in production and economy. Histomorphological lesions in genital organs with or without apparent gross lesions lead to disturbances in reproductive cycle and disturbed cycle results in a large proportion of failure of conception and are an important cause of sterility. The conditions of ovary include oophoritis, cystic ovarian disease, neoplasm and other conditions like atretic follicles, hypoplasia, folliculoids, granulosa cell tumour etc. Cystic ovarian disease is the most important reproductive disorder responsible for abnormal oestrus behaviour and infertility. In Rajasthan, so farvery little efforts have been made to study the etiology, occurrence and pathology of various lesions in genital tract of cattle. Therefore, it becomes pertinent to study the genital tractaffections in cattle.

10.2 Materials and Methods:

The specimens of organs of female genital tract of cattle for the proposed investigation were collected from the carcasses of cattle irrespective of age and breeds. For the present investigation, a total number of 390 specimens of femalegenital tract of cattle were collected from various municipal areas of Bikaner, Jodhpur, Kota districts irrespective of age and breeds. The samples were also collected from the carcasses submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Science, Bikaner for routinepost-mortem examination. During post-mortem examination,

the samples were thoroughly examined visually and manually for various pathological abnormalities such as colour, consistency, shape and size, presence of tumours etc. The study was conducted from May to October 2009. For histopathology the fixed tissues were processed mechanically for paraffin embedding by acetone and benzene technique (Lillie, 1965).

The sections of 4-6 micron thickness were cut and stained with routine hematoxylin and eosin staining method. As far as possible, results were recorded by gross observations and photomicrographs.

10.3 Results and Discussion:

Out of these 390 specimens, 55 specimens suspected for abnormalities were further processed for histopathological examination which revealed several overlapping conditions. These genital tracts were examined grossly and 55 selected organs were preserved in 10% formalin and finely submitted to histopathology. All organs revealed several overlapping conditions, may be of hormonal as well as infectious origin.

In the present study, various kinds of affections were recorded in ovary to the extent of 35.25 per cent. The presentincidence was slightly higher than the observations of Mukherjee (1980) as 30.50 per cent. However, in available literature this incidence varied from 4.41 per cent (Rao and Rajya, 1976b) to 41 per cent (Narnaware *et al.*, 2009).

The percentage incidence of ovarian abnormalities was towards the higher due to diseases, poor nutrition, inadequate herd management, anatomical deformity of the genital tract, hereditary, hormonal disturbances or environmental changes,makes the animal infertile.

In present study 3.20 per cent cases of oophoritis were recorded, while Mukherjee (1980) reported 3.80 per cent cases of necrotic oophoritis and Sharma *et al.* (1993) reported 3.33 per cent incidence of oophoritis. Oophoritis was identified histologically, as diffuse infiltration of lymphocytes in the medulla and perivascular lymphocytic infiltration in the hilar region. Similar observations were described by Summer andCampbell (1974) and Azab *et al.* (2006).

Cystic ovaries might be due to substances, such as phytoestrogens, that may reduce fertility. Feeding of cows forprolonged periods on clover, lucerne (alfalfa) or other plants rich in phytoestrogens may lead to cystic ovaries.

A follicular cyst was recorded in 9.61 per cent cases. Similar observations were recorded by Mukherjee (1980) as 9.60 per cent. The most widely accepted theory of the origin of cystic ovarian disease is that, there is aberration of the preovulatory surge of luteinizing hormone, either the absence of the surge or mistiming of the surge, which cause the disease. There is clearly a genetic predisposition also to the disease in certain families (Jubb *et al.*, 2007).

Cystic corpus luteum was observed in 0.64 per cent cases. Slightly higher incidence of 0.80 per cent was recorded by Nair and Raja (1974). However in available literature this incidence varied from 0.17 per cent (Shalash, 1958) to 11.11 per cent (Wahid *et al.*, 1991). These cysts represent an abnormal accumulation of fluid at the centre of corpus luteum, where a small fluid containing cavity is normal. Nothing can be said about their cause although this could be conceivably being some accidental insufficiency of blood supply (Jones *et al.*, 1997).

Granulosa cell tumor was recorded in 1.92 per cent cases. Higher incidence was recorded by Mukherjee (1980) as 5.70 per cent. Two cases of granulosa cell tumor was reported by Wahid *et al.* (1991). A small spherical eosinophilic mass, so called call-exner body, lies in the center of the rosette. Tumor was lined by granulosa cells, which were surrounded by thecal cells. Similar findings were recorded by Jones *et al.* (1997) and Jubb *et al.* (2007).

Persistent corpus luteum was observed in 3.84 per cent cases, which was slightly lower than the incidence reported by Sujata (2000) in 4.00 per cent cases. Lower incidence was reported by Rao and Rajya (1976b) in 0.16 per cent. These findings are same as described by Dwivedi and Singh (1971). Present findings indicated that persistence of corpora lutea in these cases might be due to lack of diminished secretion of luteolytic substance by the uterus as suggested by McDonald (1975).

Parovarian cyst was recorded in 1.28 per cent cases, almost same incidence was reported by Rao and Rajya (1976b) as 1.09 per cent cases. However, in available literature incidence of parovarian cyst varied from 1.09 per cent (Rao and Rajya, 1976b) to 6.5 per cent (Narnaware *et al.*, 2009).

Hypoplasia was seen in 0.64 per cent case, which was closely related to the incidence reported by Khan (1970) as 0.66 per cent cases. However, reported literature about incidence of hypoplasia of ovary varied from 0.08 per cent (Rao and Rajya, 1976b) to 1.50 per cent (Sujata, 2000).

Ovarobursal adhesion was seen in 3.20 per cent cases. Higher incidence recorded by Fathalla *et al.* (2000) as 8 per cent. Ovarobursal adhesions were probably due to breeding and postpartum complications. Many factors contribute to the predisposition of the reproductive tracts to infections during these periods (Fathalla *et al.*, 2000).

Subactive ovary was seen in 2.56 per cent cases which was similar to Shalash (1958) as 2.64 per cent cases. Higher incidence was recorded by Khan (1970) as 12.34 per cent. The subactive ovaries were due to the low level of thyrotropic hormone in blood, diminished release of gonadotrophin and malnutrition specially the deficiency of vitamin A, mineral and trace elements in the ration (Dwivedi and Singh, 1971).

Sclerosed ovary was recorded in 3.20 per cent cases, which was slightly lower than those reported by Mukherjee (1980) as 3.80 per cent cases. This condition could be due to hypofunction of thyroid by low blood levels of thyrotropic hormone. Nutritional error might have a significant role in production of disease (Sastry and Rao, 2005).

Follicular atresia was observed in 2.56 per cent cases, which was closely related to the incidence reported by Sujata (2000) as 2.50 per cent cases. Formation of atretic follicles may be due to malnutrition and possibly iodine deficiency were the causes of follicular atresia in an estrous animals (Rahman *et al.*, 1977).

Anovular cords was recorded in 1.28 per cent cases, which was slightly higher than the incidence reported by Rao and Rajya (1976b) as 1.05 per cent cases. These anovular cords and follicles were associated with hypoplastic ovaries.

Similar correlation was suggested by Sastry and Rao (2005). Folliculoids was observed in 0.64 percent case, which was slightly higher than those reported by Rao and Rajya (1976b) as 0.15 per cent cases. These folliculoids were associated with anovular cords.

Haemorrhage was recorded in 0.64 per cent case, whichwas higher than those reported by Rao and Rajya (1976b) as 0.09 per cent cases. It may be due to bacterial infection, suchas *Salmonella pullorum*, mechanical and toxic conditions (Cohrs, 1967).

Table 10.1: Incidence of various pathological conditions of ovary in female genital tract in cattle

Sr. No.	Name of condition	No. of cases	Percentage
1.	OVARY	55	35.25
1.1	Inflammatory condition	5	3.20
1.1.1	Oophoritis	5	3.20
1.2	Cystic ovaries	16	10.25
1.2.1	Follicular cyst	15	9.61
1.2.2	Cystic corpus luteum	1	0.64
1.3	Neoplasm	3	1.92
1.3.1	Granulosa cell tumour	3	1.92
1.4	Miscellaneous conditions	31	19.87
1.4.1	Persistent corpus luteum	6	3.84
1.4.2	Parovarian cyst	2	1.28
1.4.3	Hypoplasia	1	0.64
1.4.4	Ovarobursal adhesion	5	3.20
1.4.5	Subactive ovary	4	2.56
1.4.6	Sclerosed ovary	5	3.20
1.4.7	Follicular atresia	4	2.56
1.4.8	Anovular cords	2	1.28
1.4.9	Folliculoids	1	0.64
1.4.10	Haemorrhage	1	0.64

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11. Occurrence and Pathomorphology of Follicular Cyst in the Female Genital Tract of Cattle

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Abstract:

The present investigation was carried out from May 2009 to October 2009. During this period a total number of 390 samples of female genital tract were examined from cattle of different age and breeds, of which 156 were found to have various abnormalities. Out of these, 55 samples revealed pathological lesions in the ovary, of which 15 cases (9.61%) were of follicular cyst. Grossly the affected ovaries were enlarged due to presence of follicular cysts in the cortex and even extending deep into the medulla. These cysts were either single or multiple. Their size varied and cavity contained serous fluid. Microscopically, cyst wall was divided into three categories: cyst wall in which granulosa layer was absent and lutenized thick theca layer present, both granulosa layer and theca layer were present and cysts in which granulosa layer was absent and theca was present without luteinization.

Keywords:

Cattle, female genital tract, follicular cyst, histopathology, ovary.

11.1 Introduction:

Female genital tract has many diseases, which are very important clinically as well as pathologically also. The disorders of genital tract in female cattle are multietiological in origin and there are many predisposing factors, which may be genetic, anatomical,

physiological and infectious agents. Study of pathological conditions of genital tract in cattle gives guideline to proper diagnosis of genital diseases. (Mukherjee, 1980; Rathore *et al*, 2016).

In Rajasthan, very little efforts have been made to study the etiology and occurrence of various lesions in the genital tract of cattle. Therefore, the present study was under taken to study the genital tract affections in cattle.

11.2 Materials and Methods:

The specimens of the female genital tract of cattle for the proposed investigation were collected from the carcasses of cattle, irrespective of age and breed. The samples were collected from various municipal areas of Bikaner, Jodhpur and Kota districts.

The samples were also collected from the carcasses submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Science, Bikaner for routine post-mortem examination. During the post mortem examination, the samples were thoroughly examined for various pathological abnormalities.

The study was conducted from May 2009 to October 2009. For histopathology, the fixed tissues were processed and sections were stained with routine Hematoxylin and Eosin staining method.

11.3 Results and Discussion:

For the present investigation, 390 specimens of the female genital tract of cattle were collected from various municipal areas of Bikaner, Jodhpur, Kota districts irrespective of age and breeds.

Out of these 390 specimens, 156 specimens suspected for abnormalities were further processed for histopathological examination. Out of these, 55 samples revealed pathological lesions in the ovary.

Figure 11.1: Photograph of cut surface of ovary showing follicular cysts.

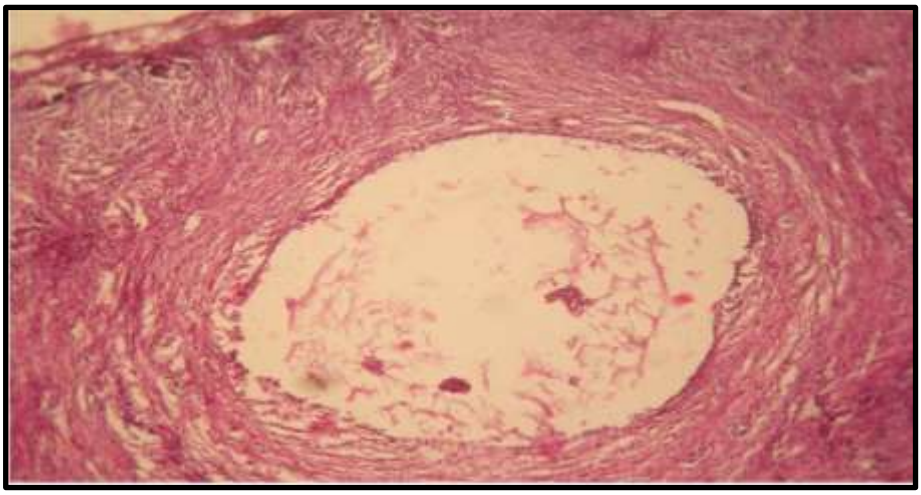

Figure 11.2: Photomicrograph showing wall of follicular cyst in which granulose layer absent and theca revealed luteinization. H&E, 100 X.

Follicular cysts are usually defined as follicles having diameter greater than 1 cm and which have been failed to ovulate. This condition was recorded in 9.61 per cent cases. Similar observations were recorded by Mukherjee (1980) as 9.60 per cent. The affected ovaries were enlarged due to presence of follicular cysts in the cortex and even extending deep into the medulla (Figure 11.1). These cysts were either single or multiple. Their size varied and cavity contained serous fluid.

Histologically, cyst wall was divided into three categories: cyst wall in which granulosa layer was absent and lutenized thick theca layer present (Figure 11.2), both granulosa layer and theca layer were present and cysts in which granulosa layer was absent and theca was present without luteinization. These follicular cysts were associated with endometrial glandular hyperplasia. Similar observations were described by Al-Dahash and David (1977) and Garm (1949).

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12. Pathohaemorrhagic Lesions of Ovary and Uterus in Cattle

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Abstract:

The present investigation was carried out on 390 samples of the female genital tract of cow belonging to different age and breeds, of which 156 (40%) were found to have various abnormalities. Out of these, 119 (30.5%) samples revealed pathological lesions in the ovary and uterus, of which 6 cases (3.84%) were of haemorrhages. Grossly, the blackish-red coloured spots were seen on the surface of the ovary, the uterine mucosa revealed hyperaemic and closure to the cervix, there was a large accumulation of blood and mucous in the uterine cavity. Microscopically, the ovarian stroma was diffusely filled with RBC's and massive area of haemorrhage seen in the uterine cavity.

Keywords:

Cattle, Pathology, Uterus, Ovary.

12.1 Introductions:

The cattle husbandry and dairying is an important thrush to the rural economy in the arid region of Rajasthan, so it is regarded as "Goumata". The cattle practices continue to be the source of livelihood of rural masses and have registered their significant contribution on to the Gross Domestic Product in the form of milk, milk by-products and hide as a source of export leather.

Histology and ultra structural details of ovaries and endometrium of uterine horn have significant role in diagnostic evaluation of reproductive system (Al- Ramadan, 2014; Qureshi *et al*, 2015; Rathore *et al*, 2016; Kumar *et al*, 2018). In Rajasthan, so far very little efforts have been made to study the aetiology, occurrence and pathology of various lesions in the genitaltract of cattle. Therefore, it becomes pertinent to study the genital tract affections in cattle.

12.2 Materials and Methods:

The specimens of organs of the female genital tractof the cow for the proposed investigation were collected from the carcasses irrespective of age and breeds. The samples were collected from various municipal areas of Bikaner, Jodhpur and Kota districts. The samples were also collected from the carcasses submitted for routine post-mortem examination.

During the post-mortemexamination, the samples were thoroughly examined for various pathological abnormalities such as colour, consistency, shape and size, presence of tumours andulcers etc. For histopathology, the fixed tissues were processed mechanically for paraffin embedding by acetoneand benzene technique (Lillie, 1965). The sections of 4-6 micron thickness were cut and stained with routine Hematoxylin and Eosin staining method. As far as possible, results were recorded by gross observations and photomicrographs.

12.3 Results and Discussion:

For the present investigation, 390 specimens ofthe female genital tract of cows were collected from various municipal areas of Bikaner, Jodhpur, Kota districts irrespective of age and breeds. Out of these 390 specimens,156 (40%) were found to have various abnormalities.

Out of these, 55 samples of ovary and 64 samples of uterus(total 119 samples) revealed pathological lesions in the ovary and uterus, of which 1 (one) case of ovary (0.64%) and 5 (five) cases of uterus (3.20%) total 6 cases (3.84%) were of haemorrhages. This condition was observed in the ovary as 0.64 per cent case, which was higher than those reported by Rao and Rajya (1976) as 0.09 per cent cases. Grossly,the blackish-red coloured spots were seen on the surface of the ovary (Figure 12.1).

Microscopically, the ovarian stroma was diffusely filled with RBC's (Figure 12.2). These findings are in perfect agreement with the reports of Cohrs (1967). Slight haemorrhage occurs in every ovulation. In certain pathological conditions, it may occur to a large extent. It may be due to bacterial infection, such as *Salmonella pullorum*, mechanical and toxic conditions (Cohrs, 1967). In the uterus, haemorrhage was recorded in 3.20 per cent cases.

Similar observation recorded by Khan *et al* (1992) as 3.33 per cent cases. Grossly, the uterine mucosa revealed hyperaemic and closure to the cervix, there was a large accumulation of clotted blood and mucous in the uterine cavity (Figure 12.3).

Microscopically, a massive area of haemorrhage in the uterine cavity was observed (Figure 12.4). Similar observation recorded by Cohrs (1967). Haemorrhage might be due to torsion, inversion, during difficult parturition by the tearing of blood vessels, inflammatory processes in the endometrium and when inflammation has led to the closure of the cervix, there may be a large accumulation of blood in the uterine cavity (Cohrs, 1967).

Figure 12.1: Ovary showing dark-coloured multifocal areas of haemorrhages.

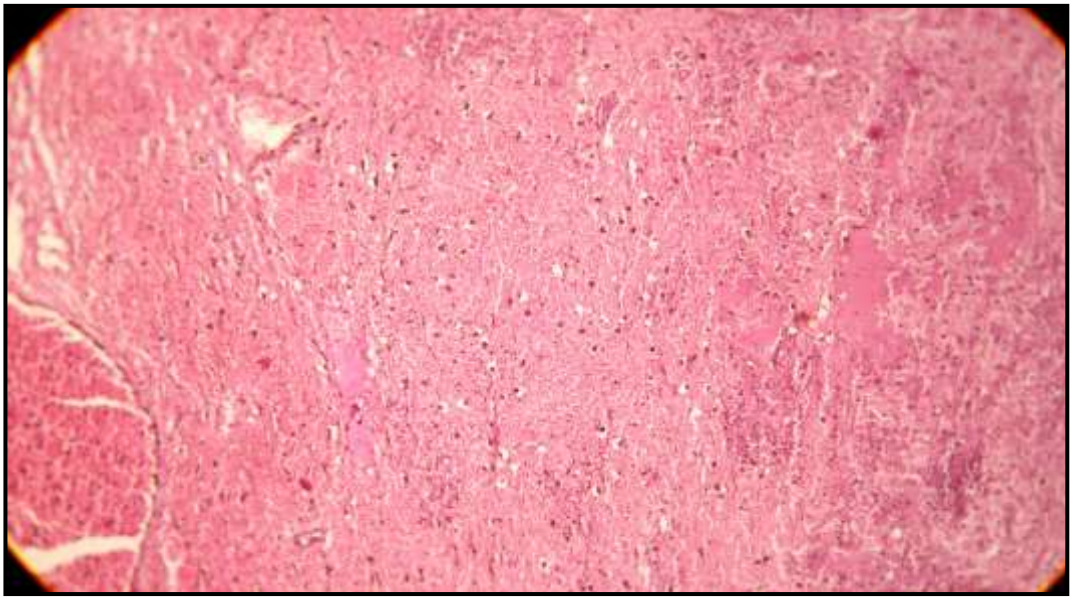

Figure 12.2: Ovary showing area of haemorrhage into the stroma. H&E, 10X.

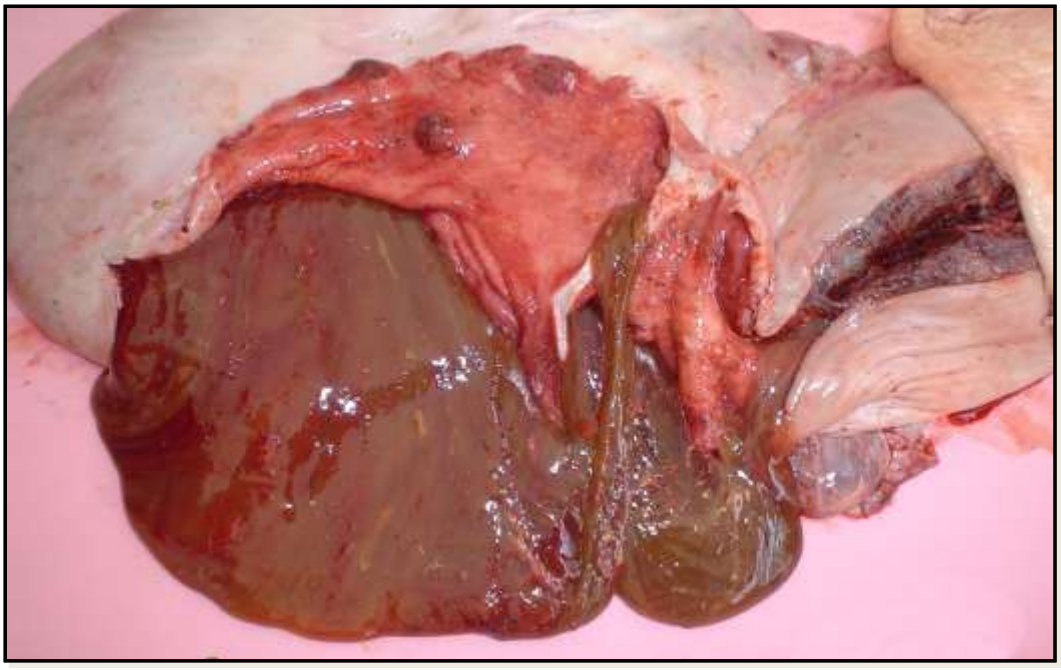

Figure 12.3: Uterus showing blood clot admixed with mucus in the cavity.

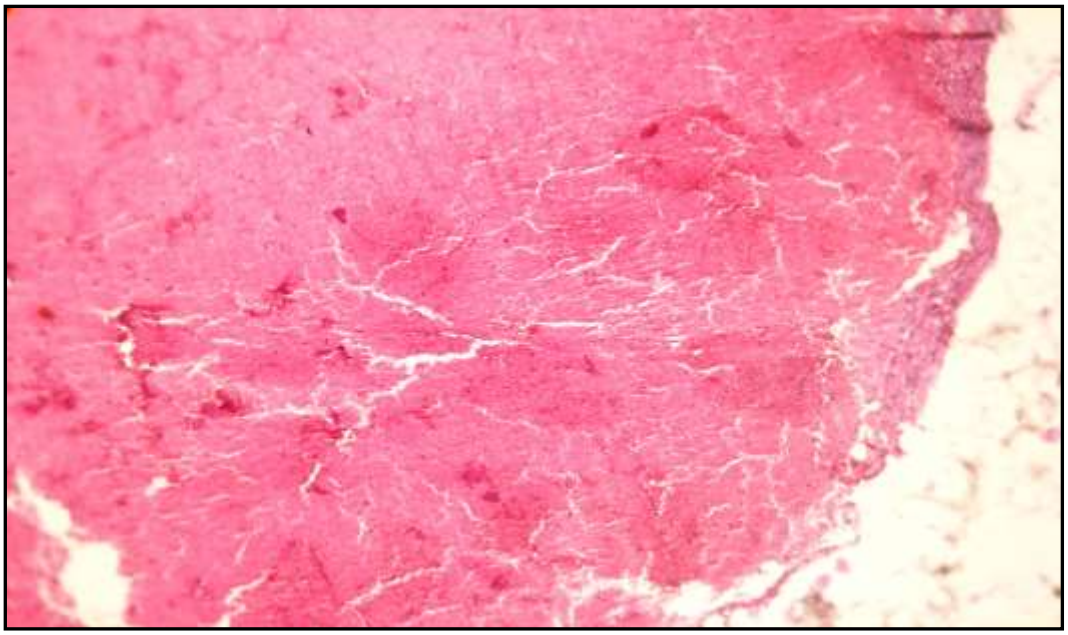

Figure 12.4: Uterus showing a massive area of haemorrhage inside the cavity. H&E, 10X.

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