

PATHOLOGICAL CONDITIONS OF THE OVARY AND BURSA IN CROSSBRED CATTLE

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Crossbred cattle with higher production potential, reared in the hot humid climate of the state under suboptimal levels of feeding and management are prone to a higher incidence of infertility and culling rate due to functional ovarian disorders. This finding has also been confirmed by gross morphological and microscopical examination of the ovaries of infertile cows from abattoirs. Though there are exhaustive studies reported on the pathology of ovaries of exotic cattle from different parts of the world (Erickson *et al.* 1976, Al. Dahash and David 1977, Takushi *et al.* 1981), there are only a few reports on the pathology of ovary and bursa of crossbred cattle from India probably on account of ban on cow slaughter in most of the states (Nair and Raja 1974 a,b Kavani *et al.*, 1986, Thakur *et al.*, 1989).

Materials and Methods

Two hundred and sixty five genital organs of crossbred cows slaughtered at Municipal slaughter house, Trichur and Meat Plant, Kerala Agricultural University, Mannuthy formed the material for the study. Of these 252 were non-gravid and the remaining 13 were gravid. Within half an hour of slaughter and evisceration of the organs, the genitalia including the ovaries, bursa and broad ligament were excised and transported to the laboratory in polythene bags for detailed morphological and

histopathological studies. While the breeding history and clinical history of the animals slaughtered at University Meat Plant were known, those of animals slaughtered at Municipal slaughter house were not traceable. The ovaries and bursae which on gross examination revealed evidence of pathological lesions were subjected to detailed morphological and histopathological studies. The salpinx and uterus from the genitalia in which ovaries and bursa were affected, were also subjected to detailed gross and histopathological studies. The ovaries were incised at different planes for deeply situated lesions. Tissue slices of 5 mm size were preserved in buffered formalin (Humason, 1979). Thin slices of tissue 1-2 mm thick were taken out after 72 hours and were processed for detailed histopathological studies by standard procedures (Luna, 1967). Thin paraffin sections of 5 microns thickness were taken, processed and stained by Harris Haemotoxylin and eosin method. Special staining by Van-Giessan method was done whenever there was indication.

Results and Discussion

Among the 252 non-gravid genitalia studied, 139 (55.16 per cent) showed one or more lesions in the ovary and bursa. While 103 genitalia showed only a single lesion, the remaining 36 showed 2 or more lesions in the ovary, bursa and ligaments.

Out of the 252 non-gravid genitalia 99 (39.28 per cent) showed one or more lesions in the ovaries (Table 1). The incidence of various pathological lesions were inactive ovaries (23.41%) cystic ovaries (2.78%), cystic corpus luteum (2.78%) ovarian haemorrhage (5.56%) abscess of ovary (0.40%) senile atrophy (5.56%), persistent corpus luteum associated with hydrometra (0.79%), retention cyst in tunica albuginea (0.79%) parovarian cyst (3.17%) and parovarian abscess (0.40%).

Inactive ovaries were small, flat and pale yellow in colour. The length, breadth and thickness of the ovaries were 1.96 ± 0.077 cm, 1.317 ± 0.064 and 0.977 ± 0.058 cm

respectively. Numerous pin head sized follicles and luteal scars were seen on the surface of ovaries from parous cows. In contrast the ovaries of heifers were much smaller, paler and smoother with pinhead sized follicles but there was no luteal scar (Fig. 1). The ovarian cortex was thin, firm in consistency and showed only small follicles and a few dark brick red coloured corpora albicans. Absence of follicles above 5 mm diameter and corpus luteum in any stage of cyclic growth and early regression confirmed the condition as inactive ovary. On histological examination, the cortex was found to show predominance of stromal tissue with only a few antral follicles, atretic follicles and luteal scars.

Table 1 Pathological conditions in the ovaries of cross-bred cattle

Sl. No.	Condition	Unilateral		Bilateral		Total	
		No.	Percent	No.	Percent	No.	Percent
1	Inactive ovaries	-	-	59	23.41	59	23.41
2	Cystic ovary	5	1.99	2	0.79	7	2.78
3	Cystic corpus luteum	7	2.78	-	-	7	2.78
4	Haemorrhage	14	5.56	-	-	14	5.56
5	Ovarian abscess	1	0.40	-	-	1	0.40
6	Senile atrophy	-	-	14	5.56	14	5.56
7	Persistent CL Associated with hydrometera	2	0.79	-	-	2	0.79
8	Retention cysts on surface of ovary	2	0.79	-	-	2	0.79
9	Par ovarian cyst	8	3.17	-	-	8	3.17
10	Par ovarian abscess	1	0.40	-	-	1	0.40
Total		40	15.88	75	29.76	115	45.64

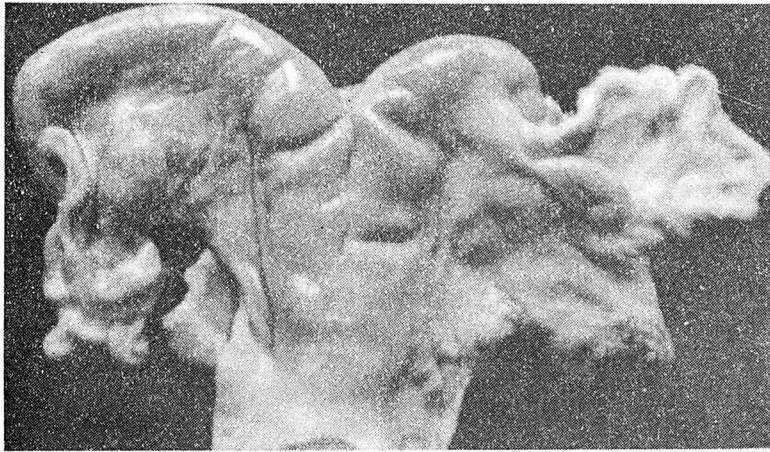


Fig. 1. Inactive ovary. Small, pale and smooth with pin head sized follicles

The incidence of cystic ovary with one or both ovaries showing one or more follicles larger than 1.6 cm was recorded to be 2.78 per cent (Table 2). The size of the cystic graafian follicles ranged from 1.2 to 3.3 cm, with single cysts always larger than 1.7 cm in diameter. However multiple cysts as small as 1.2 cm were also seen (Fig. 2). The right ovary was found to be more frequently affected (57.14 per cent) than the left ovary (14.29 per cent) with bilateral involvement in 28.57 per cent cases. The follicular cysts were predominant (85.7%) than the luteal cysts (14.29 per cent) (Fig.3). Multiple follicular cysts showed evidence of

luteinisation both on gross morphological and histological examination in one of the cysts. There was a single case of hydrometra associated with a large single cyst. In one case of multiple follicular cyst partial luteinisation of one of the cyst as evidenced by a very thin patch of luteal tissue was noticed on microscopic examination. Yet another case of multiple follicular cyst (5 cysts) in the right ovary was found associated with hydrops bursa, and encapsulation of ovary. One of these cysts which was deeply situated was found to be luteinised with a thick rim of luteal tissue while the remaining four were thin follicular cysts.

Table 2. Incidence of cystic ovarian degeneration in cross-bred cattle

Sl. No.	Type of cyst	Unilateral				Bilateral		Total	
		Left		Right					
		No.	Percent	No.	Percent	No.	Percent	No.	Percent
1.	Luteal	1	14.29	-	-	-	-	1	14.29
2.	Follicular								
	a) Multiple	-	-	2	28.57	1	14.29	3	42.86
	b) Single	-	-	2	28.57	1	14.29	3	42.86



Fig. 2. Multiple follicular cyst. Both the ovaries showing multiple thin walled follicular cysts with partial luteinisation of one of the cysts

On microscopic examination, the wall of the luteal cyst was found to consist of an inner connective tissue layer lining the cyst cavity, a fairly thick middle luteinised theca interna containing both the luteal cell types I and II showing hydropic degeneration and the outer theca externa (Fig. 4). In the case of follicular cyst the membrana granulosa was 2 to 3 layer thick at places while there

was only a single layer of flattened epithelium in the rest of the lining membrane (Fig. 5). The lumen contained desquamated granulosa cells. There was extensive degenerative changes in the theca interna and externa. In one case of a large follicular cyst with a thin cyst wall, a patch of luteal tissue was seen in the theca interna (Fig. 6).

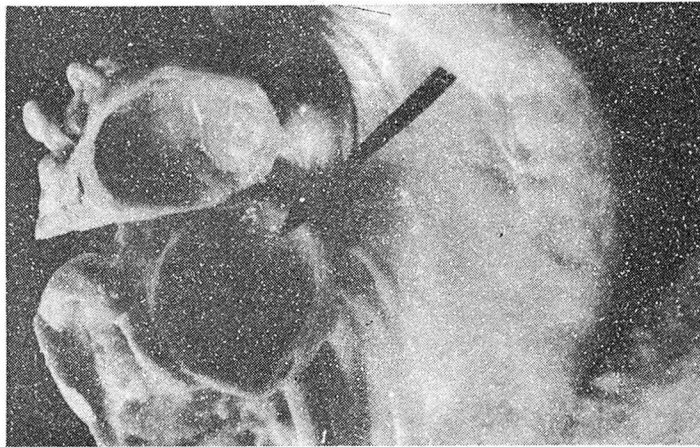


Fig. 3. Luteal cyst. Large cyst with thick patch of yellowish luteal tissue

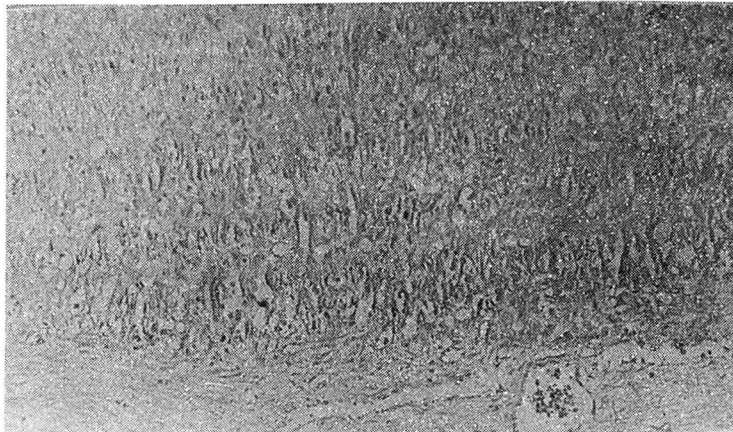


Fig.4. Luteal cyst. The cyst wall showing the luteinised theca interna with vacuolated luteal cells (H&E x 150)

The incidence of cystic corpus luteum was 2.78 per cent (7 nos.) of which 5 were in the right ovary and the remaining 2 in the left ovary (Fig.7). The cystic C.L. were larger than normal with a central cavity of 0.6 to 1.3 cm in diameter containing a light straw coloured fluid. In two cases the cyst

cavity was found filled with semisolid blood clot.

Histologically there was evidence of regressive changes in the luteal tissue such as reduced vascularity, vacuolation of luteal cells and proliferation of fibroblasts.



Fig. 5. Follicular cyst. Thin cyst with an inner flattened membrana granulosa lining the connective tissue

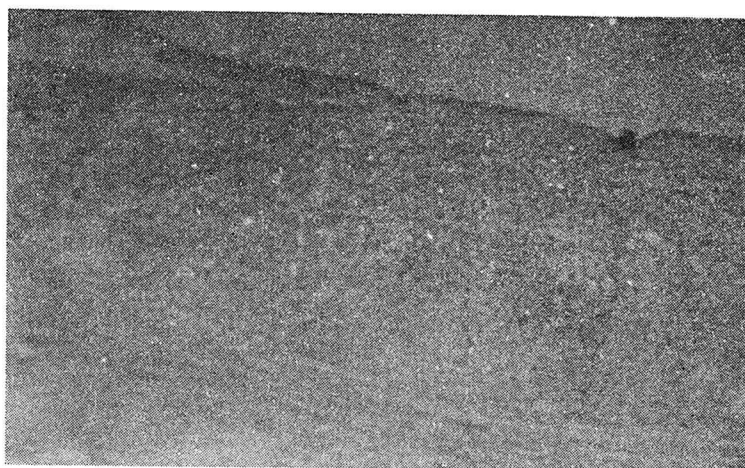


Fig. 6. Follicular cyst. Thin cyst wall showing a small patch of luteal tissue. (H&E x 150)

The incidence of ovarian haemorrhage was 5.56 per cent which included haemorrhagic follicles (14.29%), haemorrhage into central cavity of C.L. (14.29%), haemorrhage into central cavity of corpus albicans (7.14%) haematoma of the cortex (7.14%), haemorrhage of C.L. between parenchyma and capsule (14.29%) diffuse haemorrhage of cortex (28.57%) haematoma

of tunica albuginea (7.14%) and a large haematoma in the mesovarium (9.14%). Out of the 14 cases of ovarian haemorrhage 12 (85.17%) were in the ovarian cortex involving both the germinal and stromal elements. Except in the case of haemorrhagic follicles, in which the ovary appeared bluish in colour, there was no external evidence of ovarian haemorrhage. Only when the ovaries were

incised focal and diffuse areas of haemorrhage were noticed in the cortex. The haemorrhage in the tunica albuginea appeared as soft dark bluish miliary structures and that in the mesovarium was a large thick brownish red mass close to the right ovary (Fig.8).

On microscopic examination, focal or diffuse areas of haemorrhage (Fig.9) were noticed in the ovarian cortex. The haemorrhage was into the follicles, corpus luteum, corpus albicans (Fig.10) or between the C.L. and its capsule. There was varying degree of organisation of the haemorrhage.

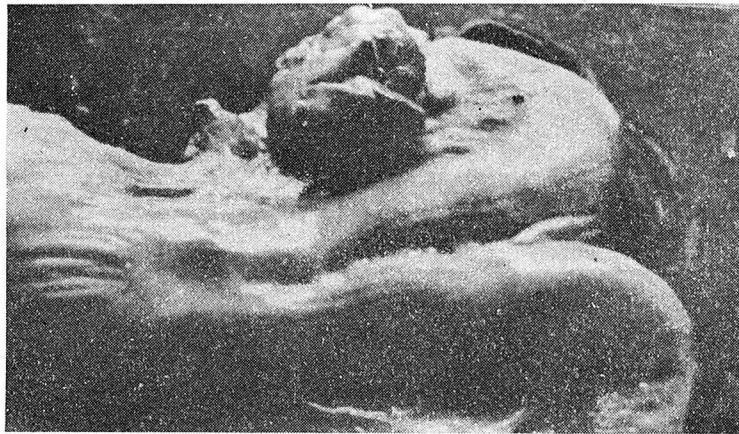


Fig. 7. Cystic corpus luteum. The cyst cavity showing a long white thread like worm - *Setaria cervi*

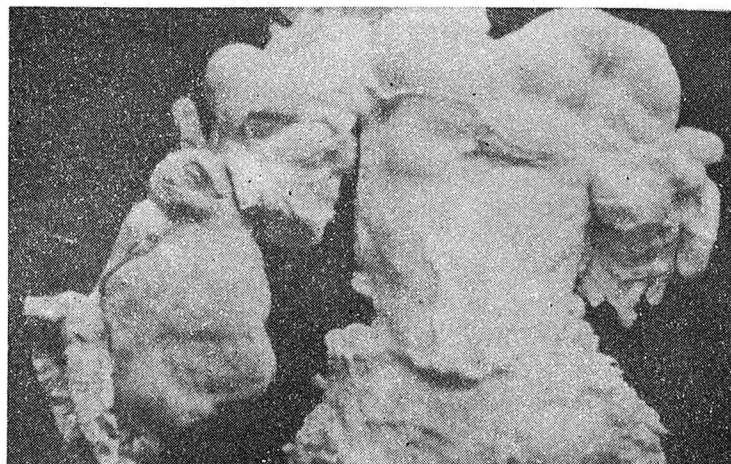


Fig. 8. Haemorrhagic mesovarium. A large organised haematoma in the mesovarium close to the right ovary

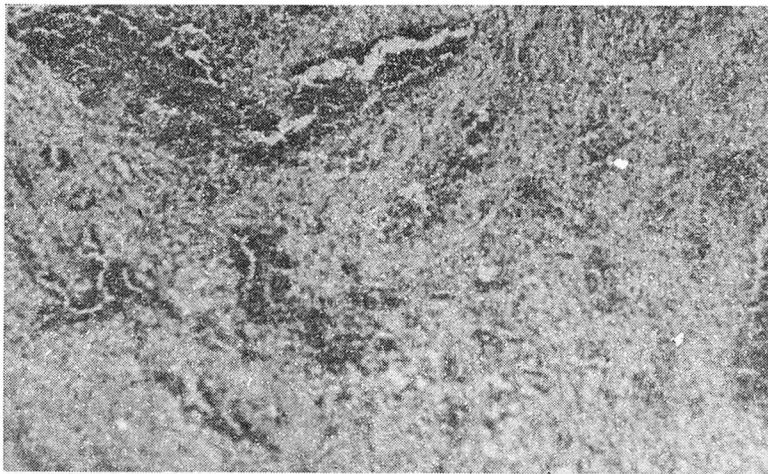


Fig. 9. Diffuse haemorrhage in the ovarian cortex (H&E x 400)

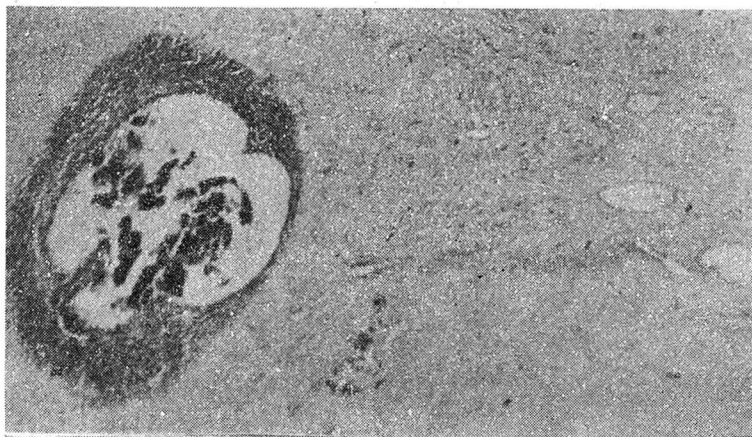


Fig. 10. Haemorrhagic corpus albicans. The cavity of corpus albicans showing haemorrhage (H&E x 250)

A single miliary abscess of 2 mm diameter containing thick creamy pus was found projecting on the surface of an inactive ovary. On microscopic examination, the

abscess wall was found composed of thick fibrous connective tissue which was frayed at places. There was cellular infiltration around the wall of the abscess.

Fourteen pairs of ovaries (5.56 per cent) were affected with senile atrophy. The ovaries affected with senile atrophy were pale and waxy with a rough pitted surface having the typical "pock mark" appearance (Fig.11). The ovaries were considerably larger than both normal functional and inactive ovaries with rubbery consistency. The mean length, breadth and thickness in cm and weight in grams were 2.953 ± 0.139 , 2.262 ± 0.109 and 1.416 ± 0.085 and 6.659 ± 0.579 . The thin ovarian cortex was found studded with

a few antral follicles below 3 mm diameter and numerous pin head sized follicles, red bodies and luteal scars. On microscopic examination, the germ-inal epithelium was found extremely flattened and missing at places. The tunica albuginea was thickened and denser and extremely thin cortex showed predominance of stromal elements than germinal elements. Majority of the follicles were atretic and luteal scars were found arranged in clusters (Fig.12).



Fig. 11. Ovary - senile atrophy. Ovarian surface showing 'Pock marking' appearance

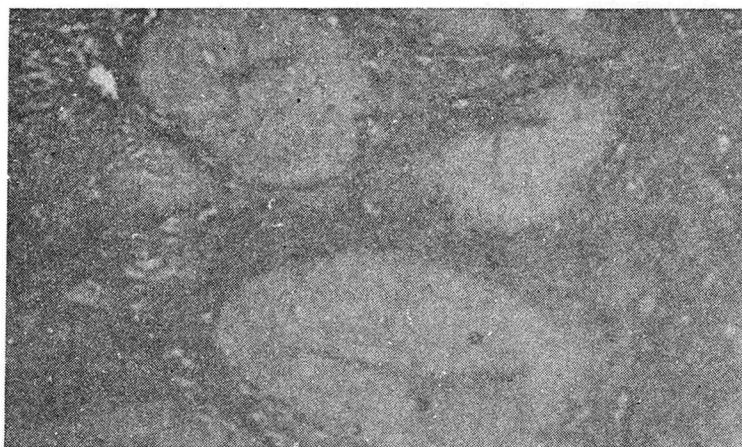


Fig. 12. Ovary - senile atrophy. The cortex showing clusters of luteal scars with a few atretic follicles. (H&E x 400)

There was 2 cases (0.79%) of persistent corpus luteum, which were found associated with hydrometra of the uterus. The CL was slightly larger than normal, pale and harder with no central cavity. Microscopic examination showed the presence of considerable amount of fibrous connective tissue breaking up the luteal tissue into irregular cell masses. Both luteal cell types, types-I and II, showed vacuolation. Fibroblasts were actively proliferating.

A total of 68 (26.98 per cent) genitalia showed bursal involvement, which included ovaro bursal adhesion (25.79%) Hydrops

bursa (0.40%) and haemorrhagic bursitis (0.79 per cent) (Table 3). Three grades of bursitis were noticed of which the most predominant type was the strandular type (50.77%) followed by fibrinous type (44.62%) and ovarobursal adhesion and encapsulation (4.62%). The fibrinous type, characterised by the presence of one or more fibrinous strands from the surface of the ovary across the bursa, was the mildest type. The strandular bursitis had thicker connecting strands which reduced the depth of the bursa and limited its movement. There was total ovaro bursal adhesion and encapsulation in 3 cases.

Table 3 Pathological conditions involving bursa in cross-bred cattle

Sl. No.	Pathological condition	Unilateral		Bilateral		Total	
		No	Percent	No	Percent	No.	Percent
1	Ovaro bursal adhesion	53	21.03	12	4.76	65	25.79
2	Hydrops bursa	1	0.40	-	-	1	0.40
3	Haemorrhagic bursitis	2	0.79	-	-	2	0.79
	Total	56	22.22	12	4.76	68	26.98

There was a single case (0.4%) of hydrops bursa (Fig.13) and two cases of haemorrhagic bursitis (0.79%). While the bursa was impatent in hydrops bursa, it was patent in haemorrhagic bursitis. But there was an area of haemorrhage in the bursa nearer to the mesovarial attachment.

The higher incidence of 55.16 per cent ovarian and bursal lesions recorded in the present study might be on account of the fact that most of the slaughtered cows were culled because of infertility.

The incidence of 39.28% ovarian lesions included inactive ovaries (23.41%) senile atrophy (5.56%), ovarian haemorrhage (5.56

per cent), cystic ovary (2.78%) and cystic corpus luteum (2.78%). Small ovaries which were pale and tough in consistency with graafian follicles of 5 mm or less diameter and no corpus luteum in any stage of cyclic growth and regression were considered as inactive ovaries. The clinical manifestation of the condition will be anoestrus. As such this observation of high incidence of inactive ovary is in confirmity with the reported higher incidence of anoestrus in heifers and post-partum cows. Senile atrophy (5.56%), characterised by an extremely large sized ovary having rubbery consistency with rough pitted surface showed sharp reduction in the primordial and growing follicle with corresponding increase in solid stromal

tissue. The higher incidence might be on account of a larger proportion of older cows going into slaughter. There was a considerably higher incidence of ovarian haemorrhage (5.56%) which involved the germinal and stromal elements in all cases except two. Unlike the commonly reported ovarian haemorrhage due to trauma, all the cases presently encountered point to internal haemorrhage of the ovary possibly on account of toxic - infectious causes (Neberlie and Cohrs, 1966). Ovaries were found to be affected with cystic graafian follicle in 2.78% of which the follicular cyst (85.71%) was more common than the luteal

cyst (14.29%). The right ovary was more frequently affected than the left which could possibly be accounted to by a greater functional activity of the right ovary. The presence of a small patch of luteal tissue in the wall of a follicular cyst and the coexistence of luteal cyst with follicular cysts in the same ovary point to the existence transitional stages. It is not possible to make any deduction as to what will be the clinical manifestation in transitional cases. With increase in productivity of the crossbred cattle of the state, trend of increased incidence of cystic ovarian disease is recorded.



Fig. 13. Hydrops bursa. The right bursa showing multiple cysts of varying size

The incidence of pathological conditions of bursa were recorded to be 26.98%, which included bursitis and ovaro bursal adhesion (25.79%) hydrops bursa (0.40%) and haemorrhagic bursitis (0.79 per cent). The fibrinous bursitis, was the mildest and of no significance as far as the fertility of the cow was concerned. The strandular type reduced the depth of bursa and limited the

movement of the fimbriated end of fallopian tube. Thus this type could lead to infertility due to inefficient egg pick up mechanism. Bursitis, ovaro bursasl adhesion and encapsulation, and hydrops bursa would certainly lead to infertility. The haemorrhagic bursitis might possibly be on account of trauma during per rectal examination.

Summary

Gross morphological and histopathological studies of the common pathological conditions affecting the ovaries and bursa of crossbred cattle were conducted using abattoir specimens. Out of 252 non gravid genitalia examined, 139 (55.16%) had one or more lesions in the ovary and bursa. Of these, 36 genitalia had two or more lesions affecting the ovary, bursa and ligaments. 99 non-gravid genitalia (30.28%) showed one or more lesions in the ovaries. The pathological conditions encountered were inactive ovaries (23.41%) cystic ovaries (2.78% per cent), cystic CL (2.78%) ovarian haemorrhage (5.56%) ovarian abscess (0.40%) senile atrophy (5.56%) PCL associated with hydrometra (0.79%) parovarian cyst (3.17%) and parovarian abscess (0.40%). The incidence of pathological conditions of bursa was 26.98% which included bursitis and overbursal Adhesion (25.79%) hydrops bursa (0.4%) and haemorrhagic bursitis (0.79%). Three distinct types of bursitis viz. fibrinous (44.62%) strandular (50.77%) and complete ovarobursal adhesion (4.62%), were encountered. The strandular and complete ovarobursal adhesion are of functional significance from fertility point of view.

Acknowledgement

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