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Abattoir-based Evaluation of Gross Reproductive Tract Abnormalities and Estrous Cycle Stages in Female Goats

Pradeep Kumar Manchiwal[1], Sandeep Dholpuria[1], Ashok Kumar[1], Abhay Kumar Meena[2] and Manisha Mehra[3]

[1]Dept. of Veterinary Gynaecology and Obstetrics, [3]Dept. of Veterinary Pathology, Rajasthan University of Veterinary and Animal Sciences, Bikaner, Rajasthan (334 001), India

[2]Dept. of Veterinary Clinical Complex, Post Graduate Institute of Veterinary Education and Research Jaipur, Rajasthan University of Veterinary and Animal Sciences, Bikaner, Rajasthan (334 001), India

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Corresponding abhaykumarmeena007@gmail.com

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ABSTRACT

The experiment was conducted during the months from August, 2024 to January, 2025 at the Department of Veterinary Gynaecology and Obstetrics CVAS, Bikaner, to identify gross genital abnormalities, evaluate the stage of the oestrus cycle Female goats at an abattoir. Out of 102 female goat genitalia, 16(15.7%) was pregnant, while 86(84.3%) was non-pregnant. Among the non-pregnant genitalia, 46(53.5%) were normal and 40(46.5%) exhibited significant abnormalities, with 57 gross abnormalities identified. The uterus (43.9%) and ovaries (22.8%) were the most commonly affected organs, followed by cervix (7.0%), fallopian tubes (5.3%) and miscellaneous (21.0%) etc. In terms of the stage of the estrus cycle, 28 (70%) of the abnormal genitalia were in the follicular stage and 12 (30%) in the luteal stage. For the normal genitalia, 41 (89.1%) were in the follicular stage and 5 (10.9%) were in the luteal stage. Overall, 55.88% of the genitalia exhibited gross abnormalities, with the uterus (24.52%) and ovaries (12.75%) being the most frequently affected, followed by cervix (3.92%), fallopian tubes (2.94%) and miscellaneous (11.76%) etc. Abnormalities were more prevalent in the follicular stage (67.6%) than in the luteal stage (32.4%). Endometritis (12.74%) was the most common uterine abnormality, while ovarian abnormalities included follicular cysts (4.9%), luteal cysts (3.93%) and par ovarian cysts (1.96%). Other conditions such as hydrometra (9.8%), cervicitis (1.96%), fallopian tube adhesions (1.96%) and cysts (11.76%) were also observed.

KEYWORDS: Oestrus cycle, ovarian abnormalities, endometritis, hydrometra

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1. INTRODUCTION

Small ruminants function as stepping stone to small farmers who find it difficult to own larger and higher-value animals such as cattle or buffalo and provide a more profitable and less-risky alternative in marginal or densely populated areas where access to feed resources are limited. Goats are versatile animals that provide meat, milk, skin and hair, making significant contributions to food Production, rural livelihoods and the overall economy (Beena et al., 2015). Despite limited reports on genital disorders in goats compared to cattle and ewes (Garba et al., 2020), understanding the prevalence of female genital abnormalities is crucial for improving reproductive performance and addressing limitations to goat production (Ibrahim et al., 2019). Uterine and ovarian lesions are common in animals and significantly contribute to infertility, sterility, and reduced reproductive efficiency (Beena, 2018). Goat uterine infections are producing significant financial losses for the animal breeding sector because of anomalies in their reproductive systems that range from 8.08 to 24.6% when derived from abattoirs (Agrawal et al., 2015; Talukdar et al., 2015). Beena et al. (2015) reported pathological lesions in 23.32% of abattoir-examined goat genitalia, with endometritis as the predominant uterine lesion. It is believed that bacterial germs are the main culprit behind endometritis and it is also important to include mycoplasma, viruses, parasites and mycotic agents. Uddin et al. (2019) reported reproductive tract pathology in 21.9% of 256 Black Bengal goat genitalia, with major lesions including luteal cysts (7.4%), endometritis (6.3%), and pyometra (7.0%). The prevalence of reproductive diseases increased with age, with the highest number of lesions (34) found in goats aged 19-24 months. The uterus had the most pathological lesions (44), followed by the ovary (31), fallopian tubes (5), cervix (2), and vagina (2). Doumtsop et al. (2021) examined 390 non-gravid small-ruminant uteri and diagnosed clinical endometritis, reporting an overall prevalence of 16.15%. The prevalences for clinical, subclinical, and pyometrial endometritis were 11.02%, 3.07%, and 2.05%, respectively. Oke et al. (2024) reported reproductive tract pathology in goats, with overall gross lesions in 18% of cases, including ovarian cysts (5%), metritis (3%), and pyometra (2%). Pooja et al. (2023) reported gross reproductive tract abnormalities in 19.13% (22/115) of abattoir-examined Marwari goats from Bikaner, India, comprising uterine infections (15.65%), ovarian cysts (2.61%), and parovarian cysts (0.87%). The estrous cycle in goats consists of follicular and luteal phases. The follicular phase involves FSH-mediated growth of antral follicles (typically 2–5 mm initially), followed by selection of dominant follicles (reaching 6–9 mm) under rising LH pulse frequency, increased estradiol-17β secretion, and an LH surge triggering ovulation within 20–36 hours; disturbances like follicular atresia, persistent follicles, or cystic ovaries (e.g., >10 mm without ovulation) often impair this process (Fatet et al., 2011). The luteal phase commences post-ovulation with corpus luteum formation and progesterone secretion (>1–2 ng ml^{-1} peak), sustaining ~14–17 days until PGF2α-mediated luteolysis; uterine pathologies (e.g., endometritis, pyometra) elevate cytokines or alter endometrial PGF2α release, prolonging the cycle (pseudopregnancy) or inducing anestrus and infertility (Greyling, 2000). Therefore, the present study was undertaken to systematically evaluate gross reproductive tract abnormalities and to determine the stages of the estrous cycle in female goats using an abattoir-based approach, to generate baseline data on reproductive pathology and cyclicity.

2. MATERIALS AND METHODS

The experiment was conducted during the months from August, 2024 to January, 2025 at the Department of Veterinary Gynaecology and Obstetrics CVAS, Bikaner. The objective of this study was to identify gross genital abnormalities and evaluate the stage of the oestrus cycle in Female goats at an abattoir. A total of 102 female goat genital tracts (ovary to cervix) were collected from a local abattoir in Bikaner and transported to the laboratory in an ice box within 1 hour in sterile plastic bags under chilled conditions. The age and breeding history of the animals were unknown. Each tract was initially examined for gross abnormalities and the stage of the oestrous cycle. The uterus was then aseptically incised, and pregnant samples were excluded from the study.

2.1. Gross genital abnormality

A descriptive survey of female reproductive tract abnormalities was carried out and both nulliparous and pluriparous goats were examined. Evaluation was done by visual appraisal, palpation and incision. Lesions were described by their size, colour, shape, consistency, or location as per the requirement. The malformation of different parts was observed and recorded. The organs were then incised along the mid dorsum from the superior vulvar commissure through the vestibule, vagina, cervix, corpus uteri and cornua uteri and gross genital lesions, if any, were recorded. The systemic examination of various parts of reproductive tract (N=102) was performed according to the techniques followed by McEntee (1990) and the observations were recorded.

2.1.1. Ovaries and oviduct

The ovaries were examined for the presence of any abnormal structures, viz., i) adhesion, ii) types of cysts, iii) follicles, iv) corpora lutea, v) tumour, etc. In brief, the detailed examination of the ovary and oviduct was done to detect

abnormalities or the presence or absence of follicle and/or corpus luteum (CL). Ovaries with follicles ≥10 mm diameter were considered cystic (Winter and Dobson, 1992). Based on appearance, the cysts were classified into follicular and luteinised cysts. The follicular cyst was tense, thin-walled. Follicles were distended with pale yellow fluid, while luteinised cysts were presented as thick-walled follicles lined with a connective tissue layer containing more amber or dark yellow fluid (Garcia, 1988). Then each tract was carefully examined for the presence of attachment between the ovaries and oviduct. Those adhesions involving about half the area of the ovary were considered moderate and over three-quarters of the ovary as complete ovarian-bursal adhesion. Those with minor adhesion in small areas were excluded because it was considered that ovulation could normally proceed in these cases (Regassa et al., 2009). The oviduct was examined for evidence of salpingitis, hydrosalpinx, pyosalpinx, or any other abnormality. The mesovarium and surrounding structures were also examined for miscellaneous abnormalities.

2.1.2. Uterine tubes

Uterine tubes were examined for the presence of i) adhesion, ii) cyst, iii) any contents, e.g. water, exudates, or pus, iv) other lesions like inflammation, obstruction.

2.1.3. Uterus

The uterine horns were incised to record any pathological abnormality. The uterus was examined for evidence of accumulation of fluid in one or both horns. Depending upon the colour, consistency and viscosity of the uterine contents, viz. watery, mucoid, or pus mixed, the condition was classified as hydrometra, mucometra or pyometra, respectively.

2.1.4. Cervix and vagina

Examined the cervix and vagina after giving an incision throughout its length. The examination was made for the following parameters, viz. i) colour, ii) contents e.g., pus, exudates) iii: Prolapse of the cervical ring, iv) other lesions e.g., inflammation or any developmental abnormality etc.

2.2. Stage of estrus cycle

The stage of the estrus cycle (follicular and luteal stages) of the animal was estimated by careful observation of the left and right ovaries and based on the presence of growing/large antral follicles or corpus luteum (Salemi et al., 2020).

3. RESULTS AND DISCUSSION

3.1. Gross genital abnormality and stage of estrus cycle in abattoir female goat

The present study was aimed to investigate various types of abnormalities of the reproductive tract of the goat. Out of a total of 102 female genitalia of goats collected and examined, 16(15.7%) were found to be pregnant, which was similar to the result of Talukdar et al. (2015) who reported 15.3% pregnancy in goats. The highest percentage reported were 41.12% and 26.7% in goats and ewes, respectively (Kumar, 2018 and Dawood, 2010) and a lower percentage (12.3%) was reported in goats (Khodakaram-Tafti and Davari, 2013).

A total of 86(84.3%) goats were non-pregnant in the present study. Out of 86 non- pregnant goat genitalia, were further examined and found, 46(53.5%) were normal genitalia, and rest 40(46.5%) showed genital abnormalities, in this some revealed multiple abnormalities involving various parts of the same genital tract.

A total of 40 genitalia were found, and 57 gross genital abnormalities. According to gross genital abnormalities, maximum abnormality was observed in the uterus (25), then ovaries (13), cervix (4), fallopian tubes (3), and miscellaneous (12), etc. Total presence of abnormality in percentage (%) was found in the uterus, ovaries, cervix, fallopian tube, and miscellaneous condition was 43.9%, 22.80%, 7.0%, 5.3%, and 21.0%, respectively (Table 1). According to stage of estrus cycle, in 40 abnormal genitalia, 28(70%) were in the follicular stage and 12(30%) were in luteal stage while in 46 normal genitalia, 41(89.1%) were in follicular stage and 5(10.9%) were in luteal stage (Table 2). In a previous study by Salemi et al. (2020), ovarian inspection revealed that 51 buffaloes were in estrus cycles, with 34 in the luteal phase and 17 in the follicular phase.

Table 1: Occurrence of gross genital abnormality in the reproductive tract of abattoir female goats

Sl. No.	Organs of reproductive tract	No. of abnormalities (no of genitalia=40)	No. of abnormalities (%)	Overall occurrence of abnormality (%) (n=102)
1.	Uterus	25	43.9	24.51
2.	Ovary	13	22.80	12.75
3.	Fallopian tube	3	5.3	2.94
4.	Cervix	4	7.0	3.92
5.	Miscellaneous condition	12	21.0	11.76
	Total	57	100	55.88

(2 genitalia showed three types of abnormality, and 11 genitalia showed two types of abnormality)

The Overall occurrence of gross genital abnormality was 55.88% (Table 1). Approximately a similar finding of 52.77% was reported in ewes by Adams (1975). Other researchers found lower percentages, ranging from 7.8% to 45.79% in goats, as reported by Beena et al. (2016),

Mushonga et al. (2017), Kumar (2020) and Uddin et al. (2019). The variation in the occurrence of gross genital abnormality in the present study compared to that of other workers from India or abroad might be due to differences in the breed of the animal, managemental practices, and climatic/geographical conditions (Beena et al., 2015). According to the stage of the estrus cycle, the overall percentage in the Follicular and luteal stages was 67.6% and 32.4%, respectively (Table 2). This result was approximately the reverse of the findings of Salemi et al. (2020), who reported 29.31% follicular stage and 58.62% luteal stage.

3.2. Gross genital abnormality and stage of estrus cycle in abattoir female goat

3.1.1. In the uterus

Among the whole genitalia studied, the uterus exhibited the highest abnormality of all. Out of 57 abnormalities, 25 (43.9%) were found to be gross uterine abnormalities (Table 1). Mainly three abnormalities were found in the present study: Endometritis, Hydrometra and Retention of placenta (Table 3).

Approximately similar findings were reported, 41.34% in goat genitalia (Archana et al., 2013). The present result was higher compared to the studies of Beena et al. (2015), Kumar (2020) and Uddin et al. (2019), who reported 12.42%, 8.08% and 17.18% in goats, respectively. Similarly, the present result exceeded the findings of Sharma et al. (2014) and Abdulazeez et al. (2022), who reported 10.53% and 25.75% in ewes, respectively.

Table 2: Stage of the estrus cycle (follicular and luteal stages) in the reproductive tract of abattoir female goats

Sl. No.	Female reproductive tract	Follicular stage	Luteal stage	Overall follicular stage (%) (n=102)	Overall luteal stage (%) (n=102)
1.	Normal reproductive tract (n=46)	41	5	41/102=40.19	5/102=4.9
2.	Abnormal reproductive tract (n=40)	28	12	28/102=27.45	12/102=11.8
3.	Pregnant (n=16)	-	16	-	16/102=15.7
	Total (n=102)	69	33	67.6	32.4

Table 3: Gross abnormality in the uterus

Sl. No.	Gross abnormality	No. of cases (%)	Overall occurrence of abnormalities in (%) (n=102)
1.	Endometritis	13(52)	12.74
2.	Hydrometra	10(40)	9.8
3.	Retention of placenta	2(8)	1.96
	Total	25	24.5

However, the present finding was lower than the results reported by Beena et al. (2016) in goats and Dawood (2010) in ewes, which were 53.24% and 70%, respectively.

3.2.1.1. Endometritis

Among all uterine abnormalities, endometritis is the most frequent gross genital abnormal condition. Out of total 25 uterine abnormalities, 13 (12.74%) have endometritis (Table 3). The findings of the current study align closely with those reported by Abdulfatah et al. (2021) in goats and Dzhurova et al. (1985) in ewes, who documented prevalence rates of 12.5% and 13.7%, respectively. However, the results of this study were higher than those reported by Talukdar et al. (2015), Kumar (2020) and Uddin et al. (2019), who observed prevalence rates of 6.8%, 7.11% and 6.3% in goats, respectively. Conversely, the findings were lower compared to those of Beena et al. (2015) and Mushonga et al. (2017), who reported higher prevalence rates of 24.02% and 15% in goats, respectively. Similarly, the present result exceeded the findings of Dawood (2010) and Abdulazeez et al. (2022), who documented prevalence rates of 24.8% and 19.69% in ewes, respectively. These variations in the prevalence of endometritis could likely be attributed to differences in the management systems used to rear the animals (Beena et al., 2015). In the present study, most cases of endometritis were observed during the luteal phase, which aligns with earlier research indicating that uterine immune function is suppressed during this phase in ewes and cattle (Jana et al., 2004). Even a slight increase in progesterone, typically associated with the luteal phase, can trigger uterine infections by inhibiting pro-inflammatory molecules and eicosanoid synthesis (Mitchell et al., 2003). Conversely, previous studies have reported that uterine immune function is enhanced during the follicular phase in ewes and cattle (Mink et al., 2002). These findings suggest that hormonal fluctuations, particularly progesterone levels, play a critical role in modulating uterine immunity and susceptibility to infections. Endometritis is considered an important cause of embryonic loss by disruption of uterine tissue or by direct cytolysis of the embryo. Absorption of bacterial components from the uterus can prevent Graafian follicle growth and ovulation (Sheldon et al., 2004).

3.2.1.2. Hydrometra

Pseudopregnancy or hydrometra condition was detected in 10 (9.8%) goats (Table 3). The uterine lumen, including both the horns, was distended with clear water fluid, and the uterine wall became thin and translucent due to distension pressure (Figure 1). There was no evidence of a fetus or foetal membranes.

Figure 1: Image showing hydrometra (fluid-filled uterus with distended wall) in goat

The results of the present study align with those of Hesselink and Elving (1996) and Moraes (2007), who reported hydrometra conditions of 10.4% and 9% in goats, respectively. However, the findings were lower than those of Lopes et al. (2004), who found a 33.3% occurrence of hydrometra in goats. Conversely, the current study revealed a higher percentage compared to the research conducted by Beena et al. (2015), Kumar (2020), and Uddin et al. (2019), who reported hydrometra percentages of 0.15%, 2.54% and 2.3% in goats, respectively. Additionally, the findings of this study exceed those of Dawood (2010), Khodakaram-Tafti and Davari (2013) and Sharma et al. (2014), who reported hydrometra percentages of 3.1%, 0.15% and 4.74% in ewes, respectively. Hydrometra or pseudo-pregnant doe's exhibit clinical changes in their behaviour like a pregnant doe. Since the pseudo-pregnant animal in the study was an abattoir animal, clinical history was unknown (Beena et al., 2015).

3.2.1.3. Retention of placenta

There were 2(1.96%) cases of placental retention identified during the study (Table 3). These uteri were externally swollen, having a purplish tinge and wrinkled on the surface. On dissecting the uteri brown coloured necrosed placental fragments were seen. The caruncles also revealed hemorrhagic and necrotic centers (Figure 2).

Figure 2: Image showing Retention of Placenta (Showing wrinkled surface of uterus and necrosed placental fragments inside the uterus) in a goat

The current study observed an overall percentage of 1.96% for retained placenta; this percentage is notably lower than the 16.9% reported by Sayeed et al. (2020) in goats. The present study was approximately higher than the rates reported by Beena et al. (2015) in goats (1.36%). The occurrence of retained placenta in farm animals has been attributed to various factors, including hormonal dysfunction, mechanical issues, nutritional deficiencies, impaired maternal immune responses and infections (Hanafi et al., 2011). Additionally, in herds with a higher incidence of the condition, subclinical hypocalcemia and deficiencies in selenium or vitamin E have been identified as contributing factors (Guard, 1999).

3.1.2. In the ovary

Ovaries were the second most affected part of the female reproductive tract of goats, next to the uterus. The proportion of ovarian abnormalities amongst the total abnormalities was 22.80% (Table 1). Mainly four types of abnormality were found in the present study: follicular cyst, luteal cyst, oophoritis, par ovarian cyst (Table 4).

The results of the present study are consistent with the findings of Karim et al. (2017), Dharani et al. (2019), and Kouamo and Asonagafec (2020), who reported ovarian abnormalities in goats at rates of 21.64%, 22% and 22.5%, respectively. However, the current study found a higher percentage compared to the studies of Rahman et al. (2006)

and Uddin et al. (2019) in goats, as well as Moghaddam and Gooraninejad (2007) and Agrawal (2012) in ewes, where ovarian abnormalities were observed at rates of 15.58%, 10.24%, 20.1% and 12.11%, respectively. On the other hand, the present study reported a lower percentage than the findings of Beena et al. (2015) in goats and Dawood (2010) in ewes, who documented rates of 25.97% and 24%, respectively.

Table 4: Gross abnormality in the ovaries

Sl. No.	Gross abnormality	No. of cases (%)	Overall occurrence of Abnormalities in (%) (n=102)
1.	Follicular cyst	5(38.5)	4.90
2.	Luteal cyst	4(30.8)	3.93
3.	Oophoritis	2(15.4)	1.96
4.	Parovarian cyst	2(15.4)	1.96
	Total	13	12.75

Roukbi (2013) found that cystic ovaries, caused by hormonal imbalance, were the most common ovarian disorder in goats. While ovarian cysts are known to be a major cause of infertility in cattle, their significance in small ruminants is not as well established, as noted by Palmieri et al. (2011).

3.2.2.1. Follicular and luteal cysts

A total of 5 (4.90%) follicular cysts and 4(3.93%) luteal cysts were observed among ovarian abnormalities (Table 4). Grossly, they occurred as milky white single cysts measuring 14 mm to 20 mm in diameter and were found unilaterally (Figures 3 and 4). The cyst wall was thicker in the luteal cyst compared to that of the follicular cyst. One of the ovaries has multiple follicular cysts (polycystic ovary) with yellowish and brownish discharge (Figure 5).

Figure 3: Image showing a follicular cyst on the right ovary in a goat (arrow)

Figure 4: Image showing a luteal cyst on the left ovary in a goat (arrow)

Figure 5: Image showing multiple follicular cysts on the surface of both ovaries (polycystic ovary) in goat (arrow)

Cystic ovarian disease is an important cause of reproductive failure. The findings of this study are consistent with those reported by Rahman et al. (2006) and Kouamo and Asonagafec (2020), who documented follicular cyst prevalence rates of 3.9%, 4%, and 4% in goats, respectively. The percentage of follicular and luteal cysts has been shown to vary significantly, with reported ranges of 0.19% to 2% (Dawood, 2010) and 0.01% to 2.4% (Moghaddam and Gooraninejad, 2007) in ewes, respectively. In the present study, the frequency of follicular and luteal cysts (cystic Graafian follicles) was higher when compared to the

findings of Timurkaan and Karadas (2000), and Beena et al. (2015), who reported occurrences of 1.1%, and 0.90%, respectively, in goats. These variations in cyst prevalence may be attributed to differences in study populations, management practices, or diagnostic criteria. Animals with polycystic ovaries should be infertile or sterile. Polycystic ovary causes disturbances in the hypothalamo-hypophyso-gonadal system that result in irregular oestrous cycle due to high level of oestrogen and ends in reproductive failure (Salvetti et al., 2004).

3.2.2.2. Par ovarian cyst

Par ovarian cysts were (2; 1.96%) among 13 grossly abnormal ovaries (Table 4). The cysts were mostly as small pea-sized (measuring about 2–8 mm in diameter) structures, appearing as bright pearl white and containing clear fluid inside. The majority of these cysts were attached to the anterior poles of the ovary or to the fimbriae of the oviducts.

The findings of this study are consistent with those reported by Dharani et al. (2019), who reported a 1.5% incidence of par-ovarian cysts in goats. However, the results of the current study showed a lower incidence compared to those of Virmani (1993), who identified 3 par ovarian cysts out of 900 goats and Shringi et al. (2013), who found 133 par ovarian cysts in 1024 sampled goats. These variations in incidence rates may be attributed to differences in sample size, geographical location, or diagnostic methodologies (Beena et al., 2015). Par ovarian cysts do not impair the fertility of animals until causing pressure on the fallopian tube (Smith et al., 1999). In humans, the par-ovarian cysts were sometimes neoplastic in origin (Smorgick et al., 2009).

3.2.2.3. Oophoritis

Two cases (1.96%) of oophoritis were observed (Table 4). Grossly, the involved ovaries were large in size compared to the contralateral ovary and, on sectioning, yielded milky white pus-like discharge (Figure 6).

The results of this study align with the findings of Rahman et al. (2006) and Rahman et al. (2008), who reported oophoritis prevalence rates of 1.9% and 2.0% in goats, respectively. However, the current findings were higher compared to those of Beena et al. (2015), who documented lower prevalence rates of 0.45% in goats.

3.1.3. In the fallopian tube

The proportion of fallopian tube abnormalities amongst the total abnormalities was 3(5.3%) (Table 1). The gross abnormality conditions noticed in the fallopian tube were Fallopian tube adhesion and Inflamed FT (Salpingitis) (Table 5).

In this study, the findings were similar to those of Beena et al. (2015), who reported a 5.19% incidence of fallopian tube abnormalities in goats. However, the result was lower

Figure 6: Image showing enlarged left ovary compared to the contralateral ovary (oophoritis) in goat (arrow)

Table 5: Gross abnormality in the fallopian tubes

Sl. No.	Gross abnormality	No. of cases (%)	Overall occurrence of abnormalities in (%) (n=102)
1.	Fallopian tube adhesion	2(66.66)	1.96
2.	Salpingitis	1(33.33)	0.98
	Total	3	2.94

than the findings of Uddin et al. (2019) in goats, and Dawood (2010) and Abdulazeez et al. (2022) in ewes, who reported incidences of 5.95%, 6%, and 10.60%, respectively. Conversely, the result was higher compared to the study by Moghaddam and Gooraninejad (2007), who reported 4.6% in ewes.

3.2.3.1. Fallopian tube adhesion and inflamed FT (Salpingitis)

Two cases of fallopian tube adhesion were found with an overall occurrence of 1.96% (Table 5). The fallopian tubes were swollen, edematous, and showed adhesion with themselves and the uterine body (Figure 7). It was overlapping on itself, thus making an irregular mass. No associated structural deformity was found in either case, and one case (0.98%) of salpingitis was also found (Figure 8).

In this study, the overall incidence of 1.96% for fallopian tube abnormalities and 0.98% for salpingitis was significantly lower than the 3.9% reported by Rahman et al. (2008) and the 5% reported by Mushonga et al. (2017) in goats, as well as the 6.06% reported by Abdulazeez et al. (2022) in ewes. However, the incidence was higher than the 0.27%

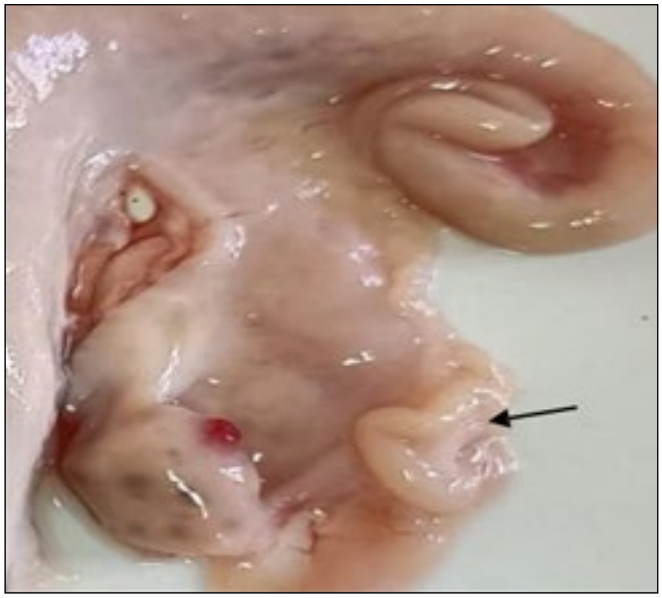

Figure 7: Image showing adhesion of fallopian tube in goat (arrow)

Figure 8: Image showing salpingitis in a goat (arrow)

reported by Agrawal (2012) and the 1.2% reported by Uddin et al. (2019) in goats. The result was similar to the 0.93% incidence of salpingitis reported by Kassim et al. (2007).

The fallopian tube revealed mild salpingitis and desquamation of mucosal folds. Various defects in the fallopian tube have been associated with infertility in sheep and goats. Even mild cases of salpingitis can cause infertility (Acland, 2001). The loss of lumen patency is associated with both congenital lesions and acquired chronic salpingitis with extensive interstitial fibrosis, external pressure, or obstruction (Dawood, 2010). Hydrosalpinx can arise in several ways: as a sequel to salpingitis, as a result of external pressure from cysts, or possibly as a result of congenital abnormalities. Hydrosalpinx is a significant lesion leading to infertility and subfertility, since intraluminal fluid interferes with embryo attachment (Chien et al., 2002).

3.1.4. In cervix

Two cases of Anatomical deformity (bent cervix) and two cases of cervicitis were found. The Occurrence of cervical abnormality out of the total 57 gross abnormality conditions was 4(7.0%) (Table 1). Gross abnormality conditions in the cervix in this study included an anatomical deformity (bent cervix) or cervicitis (Table 6). The result was higher than the 2.38% reported by Uddin et al. (2019) in goats. However, it was lower than the 11.03% reported by Beena et al. (2015) in goats.

3.2.4.1. Bent cervix or cervicitis

Two cases (1.96%) had a lateral deviation of the cervix (bent cervix) (Figure 9), and two (1.96%) had purulent discharge (cervicitis) (Table 6) (Figure 10). Grossly, the cervix appeared thickened and oedematous, and the lumen was partly obliterated in some cases. In one case, other than cervicitis, there is the presence of a foetal remnant in the cervix.

Figure 9: Image showing lateral deviation of cervix (bent cervix) in goat (arrow)

In the current study, the result was lower than the 3.9% and 3.8% reported by Rahman et al. (2008) and Archana et al. (2013) in goats. However, the incidence was higher than the 1.5% and 0.8% reported by Beena et al. (2015) and Uddin et al. (2019) in goats. In cases of bent cervix (1.96%), the result was significantly lower compared to the findings of Khatun et al. (2007) in goats which were 27%. According to Roberts (1986), conception can still occur even in severe cases of cervicitis

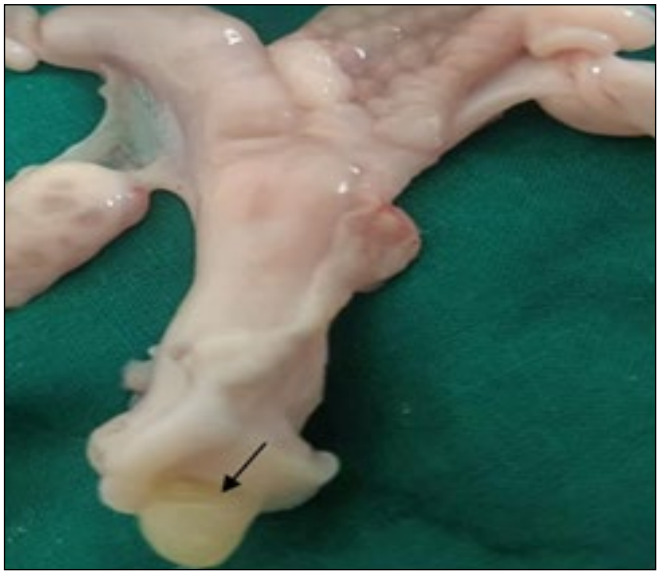

Figure 10: Image showing mucopurulent discharge (cervicitis) in a goat (arrow)

4. CONCLUSION

The present findings demonstrate a notably high prevalence (>50%) of gross genital abnormalities in the female reproductive tract of goats, indicating a substantial burden of reproductive pathology. The uterus emerged as the most frequently affected organ, followed sequentially by the ovaries, cervix, and fallopian tubes, suggesting a greater susceptibility of uterine tissue to pathological alterations. Furthermore, a higher incidence of abnormalities during the follicular phase of the oestrous cycle indicates a potential association between endocrine dynamics and the manifestation of reproductive disorders.

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