Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2024; 12(4): 215-223

Received: 13-06-2024
Accepted: 11-07-2024

Sharmin Nasrin
Department of Veterinary & Animal Sciences, University of Rajshahi, Rajshahi-6205, Bangladesh

Md. Parvez Hossain
Department of Veterinary & Animal Sciences, University of Rajshahi, Rajshahi-6205, Bangladesh

Md. Niamot Ali
Department of Veterinary & Animal Sciences, University of Rajshahi, Rajshahi-6205, Bangladesh

Shazid Rahman
Department of Veterinary & Animal Sciences, University of Rajshahi, Rajshahi-6205, Bangladesh

Jashim Uddin
Department of Veterinary & Animal Sciences, University of Rajshahi, Rajshahi-6205, Bangladesh

Abdulla Al Mamun Bhuyan
Department of Veterinary & Animal Sciences, University of Rajshahi, Rajshahi-6205, Bangladesh

Corresponding Author:
Abdulla Al Mamun Bhuyan
Department of Veterinary & Animal Sciences, University of Rajshahi, Rajshahi-6205, Bangladesh

Surgical affections of goats with their associated risk factors

Sharmin Nasrin, Md. Parvez Hossain, Md. Niamot Ali, Shazid Rahman, Jashim Uddin and Abdulla Al Mamun Bhuyan

DOI: https://doi.org/10.22271/j.ento.2024.v12.i4c.9371

Abstract
Goats are prolific domestic animals and are considered an indispensable component of rural livelihoods. However, surgical affections threaten their soundness and productivity, even leading to culling or death. This study has been demonstrated to observe and find out the occurrence of surgical affections among documented goats and their associated risk factors. A retrospective cohort study was conducted in ten upazilas in Rajshahi, Bangladesh, and looked for surgical affections in 1000 goats. SPSS-25 was used to analyze the documented data. The overall prevalence of common surgical affections was identified as castration (23.1%), abscesses (13.9%), wounds (10.6%), fractures (8.9%), myiasis (9%), and navel ill (6.6%) regardless of breeds, sex, age, body condition, season and demographic location. According to breeds, the prevalence of surgical affections was 81.6% and 18.4% in Black Bengal goats and Jamunapari or cross-breed goats, respectively. The prevalence of surgical affections in goats was 62.9% in males and 37.1% in females based on their sex, and according to the seasonal influence of different surgical affections in goats, it was 43.5%, 35.4%, and 21.1% in the summer, rainy, and winter seasons, respectively. In addition, body condition, age of goats and geographical location also have an effects on the prevalence of different surgical affections in goats. Compared to adults with young ones, the most frequent affections were abscess, urolithiasis, subcutaneous cyst, myiasis, gangrenous mastitis, scrotal hernia, and vaginal/uterine prolapse in adults and navel ill and castration in young ones. The findings of this study highlight the variable risk factors associated with surgical affection in goats. Our investigation suggests that we should take immediate care against surgical affections of goats to improve their wellness or health condition and prevent production losses of goats.

Keywords: Goat, welfare, surgical affections, risk factors

Introduction
Goats are highly prolific domestic animals (kidding multiple kids and maturing earlier than other livestock) and play an important role in Bangladesh's economic and cultural aspects [1, 2, 3]. Goat husbandry is a dynamic and sustainable livestock practice in developing countries like Bangladesh or underdeveloped [2]. Poverty is one of the main issues for underdeveloped or developing countries [4]. Thus, many rural people (poor, landless, marginal and small farmers, and rural women) depend on small ruminant rearing, especially goats in Bangladesh, to subside their daily crisis and poverty and increase earning opportunities [3, 4]. To meet the protein demand and solve the unforeseen economic crisis [2], a large number of marginal people and rural women of the society are dependent on goat rearing [5] to improve the socio-economic class of their families [6, 7, 8]. Both government and non-government organizations anticipate the necessary subsidy or small loan (under microfinance programs) for goat farming to subside rural poverty [4, 9]. Recently, goat farming in Bangladesh has faced several constraints, like high feed prices [10], shortage of veterinary supervision [5], lack of adequate transport systems, shortage of vaccines [5], disease outbreaks [5, 11, 12], limited research to develop breed value or on disease control [5], and high disease management costs. The estimated goat population in Bangladesh is still significant at about 1,94,44,136, and in Rajshahi district, it is about 7,08,868 [13]. Various diseases or conditions affect goats, resulting in considerable production losses that cause substantial financial loss for farmers and poor animal health. Like other livestock, surgical affections threaten their health and generation capacities [14, 15]. Surgical affections such as urolithiasis, vaginal and uterine prolapse, rectal prolapse, maggot infestation, wound, gid disease, abscess, tumor, gangrenous mastitis, bloat,

choke, fractures of bone, dog bite, subcutaneous cyst, fracture of horn and conjunctivitis can cause significant economic losses and suffering for animals if not treated in time or untreated.

Although various studies have been conducted on goat diseases in different countries and regions, demographic variations influence the need for research on this sector again because there is limited data available on the prevalence of surgical affections in goats in different geographical settings in Bangladesh. Thus, a comprehensive database is required to strengthen veterinary supervision and animal welfare [16], future studies on surgical affections in animals, and understanding the impact on animal behavior. Considering the importance of goats to the rural economy of Bangladesh and the negative effect of surgical affections on its production and welfare issue, this study aims to determine the prevalence of surgical affections and investigate the associated risk factors (breeds, sex, age, body condition, season and demographic location) with the occurrence of surgical affections in goats in Rajshahi, Bangladesh.

Materials and Methods

Research Population

This study used a total of 1000 goats. Goats brought to veterinary hospitals and finally diagnosed as surgically affectionate were evaluated for this research.

Research Area

This study was carried out at all of the Upazila Livestock Office and Veterinary Hospitals of Rajshahi district, Bangladesh [Bagha, Bagmara, Charghat, Durgapur, Godagari, Mohanpur, Paba, Puthia, Rajshahi Sadar (Veterinary Clinic and Artificial Insemination Centre, Narikelbaria and Metro Livestock Office) and Tanore].

Study Period

The study was one year, starting from 01 September 2022 and continuing to 31 August 2023.

Research Design

The research was designed as a quantitative and retrospective cohort study. The surgical diseases of the goats were categorized based on the breed (Black Bengal and Jamunapari or cross breed), sex (male and female), age (young; <1 year and adult; ≥1 year), and body condition (poor, moderate, good). Based on the climatic features of Bangladesh, the year was divided into three seasons: summer (March to June), rainy (July to October), and winter (November to February). Differentiating body condition in goats based on recognizing distinct physical characteristics [17, 18, 19].

Data Collection

A preformed data collection sheet recorded the complete history of each case and data regarding age, sex, breed of the goat, season, geographic location, body condition, and surgical disorders.

Arrangement and Statistical Analysis of Data

The collected data were coded, compiled, scored, tabulated, and analyzed by our research objectives. SPSS-25, a widely used statistical software, was used for statistical analysis of documented data. Descriptive statistics were computed and visually represented through tables and graphs. The average counts and percentages of surgical affections among goats across various parameters, including breed, body condition, sex, and seasons, were examined accordingly. To ascertain the prevalence of surgical affections, the number of specific cases was divided by the total number of infected animals and multiplied by 100.

Results

A comprehensive analysis of surgical affections of goats in all the upazilas of Rajshahi district in Bangladesh (Barind tract) revealed a diverse range of conditions affecting goat populations. The study encompassed 1000 cases, each presenting with distinct clinical manifestations requiring an immediate surgical intervention.

Overall Distribution of Surgical Affections in Goats

Figure 1 illustrates that the most prevalent surgical affections of goats were castration (23.1%), followed by abscess (13.9%) and wound (10.6%) regardless of breeds, sex, age, body condition, season and demographic location. Fracture was also noticeable (8.9%). In addition, myiasis and navel illness were moderate cases and recorded at 9% and 6.6%, respectively. Furthermore, gangrenous mastitis (2.8%), retained placenta (2.9%), and urolithiasis (5.7%) were less frequent disorders in goat populations. The scrotal hernia was relatively rare, comprising less than 1% of the documented data. However, some surgical disorders, such as atresia ani (1.3%), umbilical hernia (1.6%), vaginal prolapse (4%), and tumors (2.70%), were observed in varying frequencies, highlighting the prevalence of surgical affections within the studied population.

Influence of Age on the Occurrence of Surgical Affections in Goats

Table 1 reveals the variations in the prevalence of surgical affections between different age groups of goats. Young goats (less than 1 year) exhibited a higher prevalence, accounting for 55% of all surgical cases. In contrast, adult goats (greater than 1 year) comprised 45% of surgical cases.

The incidence of abscesses was higher in adult goats, about 55.4%, compared to young goats. Navel ill was significantly higher in young goats (87.9%) than in adult goats (12.1%). Wound (50.9%), subcutaneous cyst (65.3%), myiasis (66.7%), urolithiasis (94.7%), tumor (81.5%), and gid disease (86.7%) were frequent disorders in adult goats compared to young goats.

Effect of Sex on the Overall Distribution of Surgical Affections in Goats

The result revealed significant differences in surgical affection between male and female goats [Table 2]. Male goats accounted for the majority of surgical cases, representing 66.3% of the total cases. Conversely, female goats comprised 33.7% of the surgical cases.

Fracture was more prevalent in male goats (64.0%) than female goats (36.0%). Navel ill (69.7%) and gid disease (53.3%) exhibited higher prevalence rates in male goats, while myiasis (68.9%) was more prevalent in female goats. Furthermore, urolithiasis, scrotal hernia, and castration were observed only in male goats.

Incidence of Surgical Affections According to Breed of the Goats

Among the documented data, 81.6% were Black Bengal goats, and 18.4% were Jamunapari [Table 3]. Abscess

(84.2%), gangrenous mastitis (67.9%), fracture (86.5%), navel ill (84.8%), wound (82.1%), subcutaneous cyst (85.7%), myiasis (77.8%), retained placenta (86.2%), urolithiasis (82.5%), tumor (81.5%), gid disease (80%), and castration (77.5%) show significantly higher prevalence rates in the Black Bengal breed compared to Jamunapari. Interestingly, within the documented cases, the abscess was the most prevalent (84.2%) surgical affection in Black Bengal goats compared to 15.8% in Jamunapari.

Distribution of Surgical Affections in Goats According to Different Geographical Locations

Figure 2 illustrates the prevalence of surgical affections across different upazilas in Rajshahi district. Paba and Rajshahi Sadar (Metro Livestock Office and Veterinary Clinic and AI Center, Narikelbaria) emerged as the upazila with the highest prevalence, containing 157 surgical cases (15.70%) and 154 surgical cases (15.4%) consequently. Other notable Upazilas with relatively high prevalence rates of surgical disorders in goats were Bagha (12.4%), Charghat (10.8%), Puthia (10.7%), and Durgapur (10.1%).

Season-Wise Distribution of Surgical Affections in Goats

According to the data analysis [Figure 3], the highest prevalence of surgical affections was observed during the summer months (March 2023-June 2023), accounting for 40.3% of the total cases. In the rainy season (July 2022-October 2022), surgical affections were 30.6%. In the winter months (November 2022–February 2023), the prevalence of surgical affections further decreased to 29.1% of the total cases.

During the summer months, several conditions show elevated prevalence rates. Abscesses and myiasis were particularly notable, with 51.1% and 51.1% prevalence rates, respectively. Navel ill was documented with a high prevalence rate (57.6%). In the rainy season, the prevalence of gangrenous mastitis and wounds increased by 42.9% and 45.3%, respectively. Castration and urolithiasis, with a prevalence of 64.9% and 36.8%, respectively, were notably higher during winter season.

Effect of Body Condition Score on the Occurrence of Surgical Affections in Goats

The data analysis indicates that most surgical affections occurred in goats with a moderate body condition score, accounting for 48.6% of the total cases [Figure 4 and Table 5]. Goats with poor body condition scores represented 37.5% of the surgical cases. In contrast, goats with a good body condition score comprised 13.9% of the surgical cases.

Abscess was more prevalent in goats with poor body condition (53.2%) compared to those with moderate (40.3%) or good (6.5%) body conditions. The prevalence of gangrenous mastitis was the highest in goats with moderate body condition (60.7%), followed by poor (21.4%) and good (17.9%) body conditions. In addition, navel ill was predominantly observed in goats with poor body condition (53.0%), with a slightly lower prevalence in moderate body condition goats (47.0%). Interestingly, wounds were in a relatively equal distribution across poor (46.2%) and moderate (48.1%) body conditions, with a lower prevalence in goats with good body condition (5.7%). Consequently, subcutaneous cysts were more prevalent in goats with poor (38.8%) and moderate (44.9%) body conditions compared to those with good body condition (16.3%). Furthermore, retained placenta was overwhelmingly prevalent in goats with poor body condition (86.2%). Urolithiasis was higher in goats with moderate (49.1%) and good (42.1%) body conditions compared to poor-body condition goats (8.8%). Vaginal prolapse or uterine prolapse was more prevalent in goats with poor body condition (70%) compared to those with moderate (27.5%) or good (2.5%) body conditions. In addition, tumors show a higher prevalence in goats with moderate (48.1%) and good (29.6%) body conditions compared to those with poor body condition (22.2%). Gid disease was exclusively observed in goats with poor body condition (60.0%), with no reported cases in the documented rest of the goats.

Discussion

Overall Distribution of Surgical Affections in Goats

The animal husbandry practice and the farm's geo-climatic situation influence the disease's prevalence in animals [20, 21]. Our investigation observed castration, abscess, wound, myiasis, navel ill and urolithiasis as relatively more frequent surgical affections in goats. The higher castration rate indicates its importance in controlling herd dynamics, improving meat quality and disease incidence, and reducing aggressive behavior among bucks [1, 22].

In our study, the prevalence of wounds and abscesses collectively accounted for 24.5% of the documented cases. Thus, this report indicates the necessity of effective wound and abscess management and hygiene practices in goat farms. Proper wound care is crucial for minimizing goats' morbidity and mortality rates [2]. Fractures, while comprising a smaller proportion of cases (around 9%) [1, 15], represent significant challenges due to their potential to cause pain and immobility in the affected animals. Myiasis and Navel ill enlighten the importance of timely surgical intervention to address these debilitating conditions effectively and prevent further complications [23]. Less frequently encountered surgical affections such as gangrenous mastitis, retained placenta, and urolithiasis indicate the presence of more complex and potentially life-threatening conditions within the goat population. Similar findings were also reported in the previous study, but urolithiasis in goats was more frequent [24]. The relatively low incidence of scrotal hernia and gid disease [25] suggests effective preventive measures or a lower prevalence within the studied population.

Influence of the Age and Sex on the Distribution of Surgical Affections in Goats

These data illustrate the significant variations in surgical affections between goats of different ages and sexes. Young goats (less than 1 year) exhibited a higher prevalence of surgical conditions, particularly navel ill and castration. A higher prevalence of a disease indicates the vulnerability of an individual or a population to infectious diseases and environmental stressors [26]. The prevalence of castration exclusively in young (4–8 weeks of age) and male goats indicates the common management practice of early castration in male goats [1]. Conversely, the adult goats (greater than or equal to 1 year) showed higher rates of certain surgical affections, including abscesses (55.4%), gid disease (86.7%), tumors (81.5%), urolithiasis (94.7%), subcutaneous cysts (65.3%), myiasis (66.7%). Some diseases mainly occur in older animals because disease or etiological agents require more time to develop the disease, such as gid disease [27] and tumors [28]. However, the exact peak age for tumor incidence in sheep and goats remains unknown [29]. A parasitic infection primarily causes subcutaneous cysts and has a higher incidence in developing countries' sheep and goat populations [30]. Our findings are closely aligned with previous investigations [1, 31]. This study finds urolithiasis only occurs in male and older goats. Early castration causes underdevelopment or narrowing of the urethra and significantly contributes to predisposing stones in the urethra, resulting in urolithiasis [32, 33]. In addition, managemental factors like feeding (excess concentrate feed [33, 34], protein-rich diet [34], high phosphate in diet [33]) and medication (sulfa drugs [35]) also contribute to predisposing urolithiasis in animals. Wheat is a concentrate feed that is phosphorus-rich [36]. In addition, the higher prevalence of surgical affections in male goats (66.3%) compared to females (33.7%) raises questions about the potential role of anatomical differences, sex, behavioral traits, and management practices in influencing susceptibility to surgical conditions.

Incidence of Surgical Affections According to Breed of the Goats

The findings of this study reveal a notable difference in the occurrence of surgical affections between Black Bengal (81.6%) and Jamunapari or cross-breed goats (18.4%). Previous studies also report similar findings that Black Bengal goats are more susceptible to surgical affections [1, 31]. This disparity may be attributed to breed-specific susceptibilities to certain diseases, genetic predispositions, environmental adaptations, or breed availability in a selected geographical area. Black Bengal goats are more than 90% of the total goat population in Bangladesh [5, 37].

Distribution of Surgical Affections in Goats According to Different Geographical Locations

Geographical locations have been essential in distributing different diseases and surgical affections [20, 38]. This study emphasizes valuable information on the spatial distribution of surgical affections across different upazilas in the Rajshahi district. In particular, Paba (15.7%) and Rajshahi Sadar (15.4%) emerge as the upazilas with the highest prevalence. Such variations could stem from diverse environmental factors, agricultural practices, belief in veterinary services among the goat farming communities, communication gaps, and livestock management strategies prevailing in these regions.

Season-Wise Distribution of Surgical Affections in Goats

The seasonal variation in the manifestation of the surgical affections discloses the influence of environmental factors, climate, and management practices on goat health. The higher incidence of surgical conditions during the summer is due to heat stress and increased vector activity, which influence myiasis incidence [38]. Conversely, the prevalence of surgical affections decreases during the winter season because of improved environmental conditions, reduced exposure to heat-related stressors, and better management practices. This result also similarly aligns with previous studies [1, 38].

Effect of Body Condition Score on the Occurrence of Surgical Affections in Goats

The association between body condition score and surgical affections enumerates the importance of nutrition, health management, and disease control strategy in goat farming. Goats with moderate body condition scores are more susceptible to a range of surgical conditions such as castration (68.4%), tumor (48.1%), subcutaneous cyst (44.9%), and gangrenous mastitis (60.7%). It is suggested that goats with moderate body conditions are more prone to this type of surgical affection. In the rural goat farming system, most farmers supply green grass or leaves to the goats, and some farmers also supply additional concentrate feed [39]. Thus, most of the goat population in Bangladesh has a moderate body condition, which indicates why surgical affections are more in moderate body condition.

Some surgical affections, such as vaginal prolapse or uterine prolapse, navel ill, abscesses, and retained placenta, are more prevalent in goats with poor body conditions, emphasizing the necessity of targeted interventions to minimize these surgical affections in goats. Calcium deficiency in diet induces the incidence of vaginal or uterine prolapse and retained placenta [40]. Strategies aimed at optimizing body condition scores through proper nutrition, disease control, and management practices can help reduce the incidence of surgical affections in goats.

Table 1: Influence of the age on the occurrence of different surgical affections in goats

Name of Surgical Affection	Young (<1 year) (n)	Adult (≥1 year) (n)
Abscess	44.6% (62)	55.4% (77)
Gangrenous Mastitis	.0% (0)	100.0% (28)
Navel ill	87.9% (58)	12.1% (8)
Wound	49.1% (52)	50.9% (54)
Sub-cutaneous Cyst	34.7% (17)	65.3% (32)
Myiasis	33.3% (30)	66.7% (60)
Retained Placenta	.0% (0)	100.0% (29)
Urolithiasis	5.3% (3)	94.7% (54)
Scrotal Hernia	.0% (0)	100.0% (5)
Vaginal/Uterine Prolapse	.0% (0)	100.0% (40)
Tumor	18.5% (5)	81.5% (22)
Gid Disease	13.3% (2)	86.7% (13)
Castration	99.6% (230)	.4% (1)

Table 2: Effect of sex on the occurrence of different surgical affections in goats

Name of Surgical Affection	Male (n)	Female (n)
Abscess	51.1% (71)	48.9% (68)
Gangrenous Mastitis	.0% (0)	100.0% (28)
Fracture	64.0% (57)	36.0% (32)
Navel ill	69.7% (46)	30.3% (20)
Wound	50.9% (54)	49.1% (52)
Sub-cutaneous Cyst	63.3% (31)	36.7% (18)
Myiasis	31.1% (28)	68.9% (62)
Retained Placenta	.0% (0)	100.0% (29)
Urolithiasis	100.0% (57)	0% (0)
Scrotal Hernia	100.0% (5)	0% (0)
Vaginal/Uterine Prolapse	.0% (0)	100.0% (40)
Tumor	63.0% (17)	37.0% (10)
Gid Disease	53.3% (8)	46.7% (7)
Castration	100.0% (231)	0% (0)

Table 3: Occurrence of each surgical affections in different breed of the goat

Name of Surgical Affection	Black Bengal (n)	Jamunapari/Cross breed (n)
Abscess	84.2% (117)	15.8% (22)
Gangrenous Mastitis	67.9% (19)	32.1% (9)
Fracture	86.5% (77)	13.5% (12)
Navel ill	84.8% (56)	15.2% (10)
Wound	82.1% (87)	17.9% (19)
Sub-cutaneous Cyst	85.7% (42)	14.3% (7)
Myiasis	77.8% (70)	22.2% (20)
Retained Placenta	86.2% (25)	13.8% (4)
Urolithiasis	82.5% (47)	17.5% (10)
Scrotal Hernia	100.0% (5)	0% (0)
Vaginal/Uterine Prolapse	75.0% (30)	25.0% (10)
Tumor	81.5% (22)	18.5% (5)
Gid Disease	80.0% (12)	20.0% (3)
Castration	77.5% (179)	22.5% (52)

Table 4: Occurrence of different surgical affections in different seasons of the year

Name of Surgical Affection	Summer (March-June) (n)	Rainy (July-October) (n)	Winter (November-February) (n)
Abscess	51.1% (71)	33.8% (47)	15.1% (21)
Gangrenous Mastitis	35.7% (10)	42.9% (12)	21.4% (6)
Navel ill	57.6% (38)	28.8% (19)	13.6% (9)
Wound	34.9% (37)	45.3% (48)	19.8% (21)
Sub-cutaneous Cyst	49.0% (24)	32.7% (16)	18.4% (9)
Myiasis	51.1% (46)	47.8% (43)	1.1% (1)
Retained Placenta	44.8% (13)	37.9% (11)	17.2% (5)
Urolithiasis	33.3% (19)	29.8% (17)	36.8% (21)
Scrotal Hernia	80.0% (4)	20.0% (1)	0% (0)
Vaginal/Uterine Prolapse	37.5% (15)	37.5% (15)	25.0% (10)
Tumor	48.1% (13)	33.3% (9)	18.5% (5)
Gid Disease	26.7% (4)	20.0% (3)	53.3% (8)
Castration	22.5% (84)	12.6% (77)	64.9% (70)

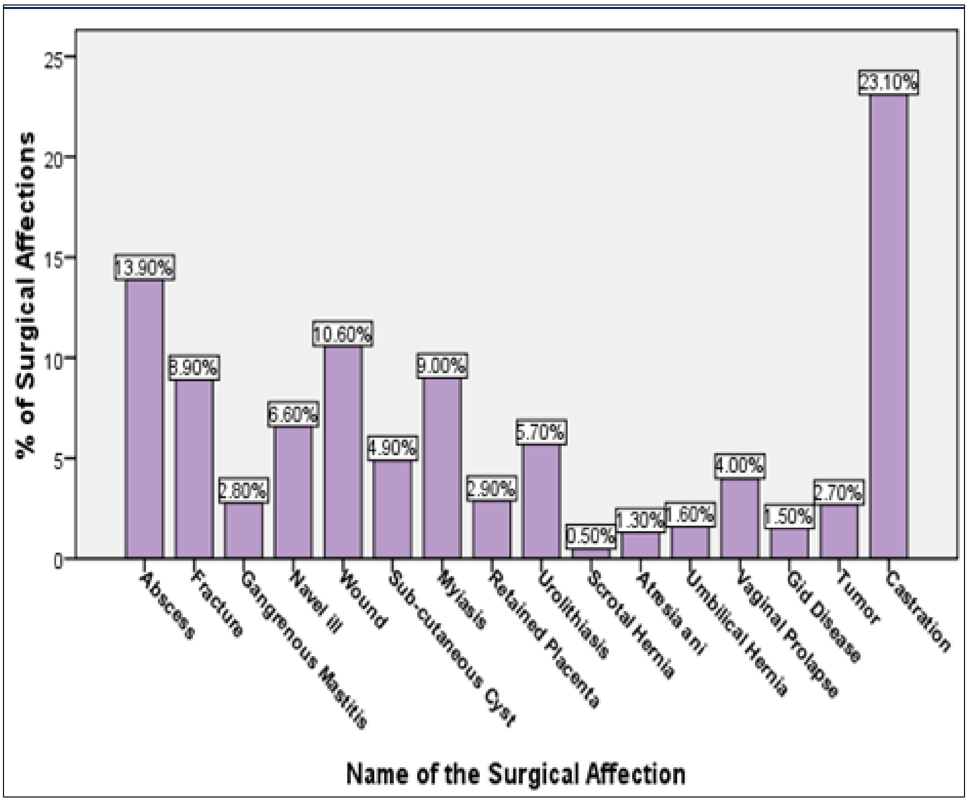

Fig 1: Illustrate the overall distribution of surgical affections in goats regardless of breeds, sex, age, body condition, season and demographic location.

Table 5: Effect of body condition on the distributions of different surgical affections in goats

Name of Surgical Affection	Poor (n)	Moderate (n)	Good (n)
Abscess	53.2% (74)	40.3% (56)	6.5% (9)
Gangrenous Mastitis	21.4% (6)	60.7% (17)	17.9% (5)
Navel ill	53.0% (35)	47.0% (31)	0% (0)
Wound	46.2% (49)	48.1% (51)	5.7% (6)
Sub-cutaneous Cyst	38.8% (19)	44.9% (22)	16.3% (8)
Retained Placenta	86.2% (25)	13.8% (4)	.0% (0)
Urolithiasis	8.8% (5)	49.1% (28)	42.1% (24)
Scrotal Hernia	40.0% (2)	60.0% (3)	0% (0)
Vaginal/Uterine Prolapse	70.0% (28)	27.5% (11)	2.5% (1)
Tumor	22.2% (6)	48.1% (13)	29.6% (8)
Gid Disease	60.0% (9)	40.0% (6)	0% (0)
Castration	8.7%	68.4%	22.9%

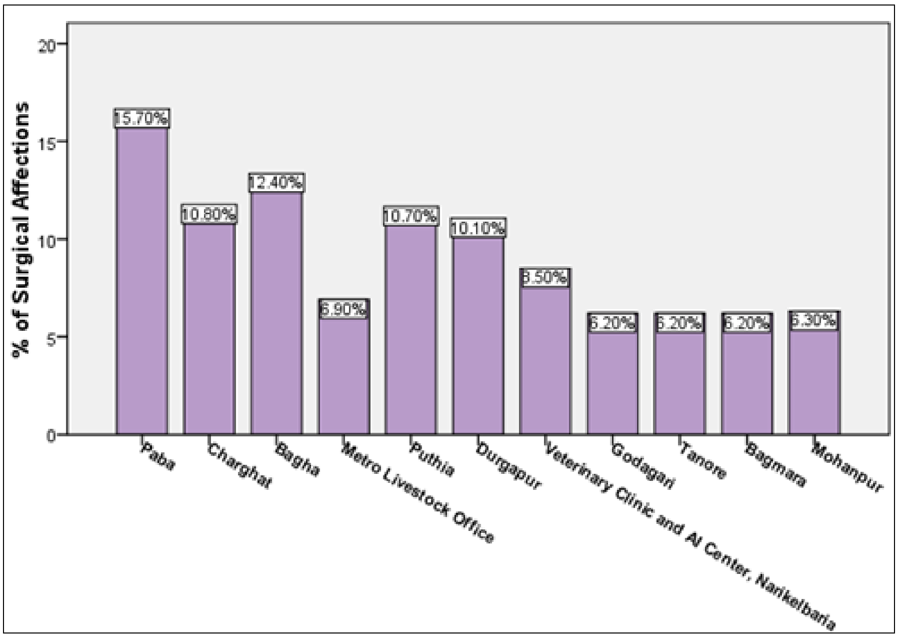

Fig 2: Illustrates the distribution of different surgical affections in goats in different geographical locations (mainly all the upazilas in Rajshahi district and where Metro Livestock Office and Veterinary Clinic and AI Center, Narikelbaria were under Rajshahi Sadar Upazila) in Rajshahi district.

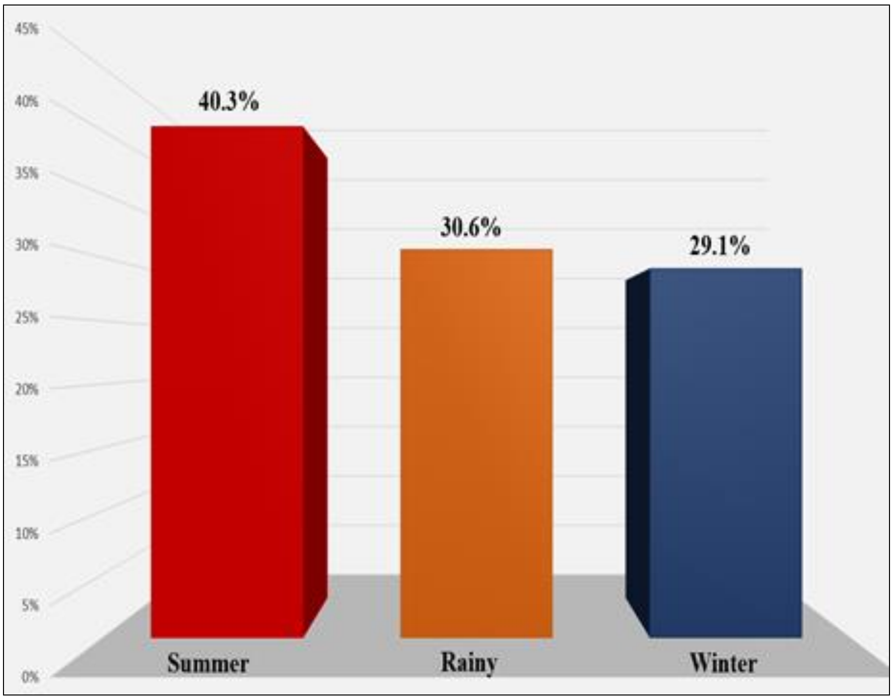

Fig 3: Illustrates the season-wise distribution of different surgical affections in goats regardless of breeds, sex, age, body condition and demographic location.

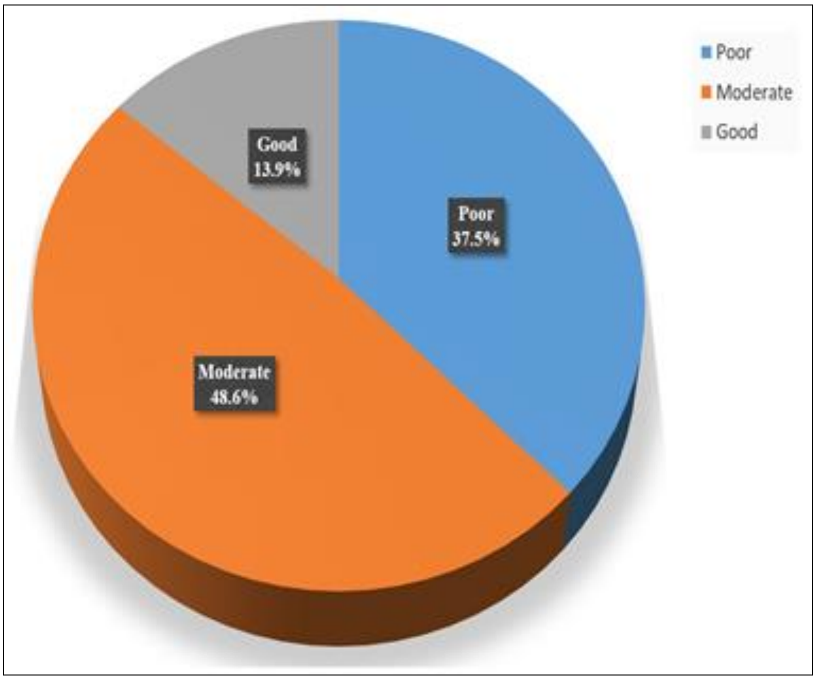

Fig 4: Illustrates the effect of body condition of goats on the distribution of different surgical affections.

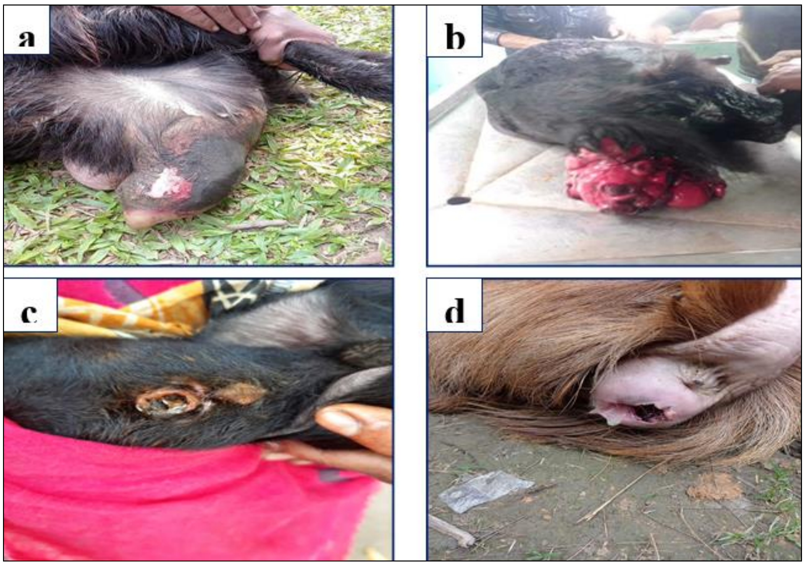

Fig 5: Illustrates the different surgical affections like gangrenous mastitis (a), uterine prolapse (b), navel ill (c), and myiasis (d).

Conclusion

This study provides valuable information on the prevalence, distribution, and risk factors of different surgical affections in goats in Rajshahi district in Bangladesh. These findings indicate the necessity of prompt surgical interventions to reduce animal suffering and improve animal health and welfare while decreasing production losses. To reduce the incidence of surgical affection, we should improve nutrition, good management practices, intensive veterinary supervision, and seasonal adjustments to enhance the goat's health and welfare.

Acknowledgments

The research group is grateful and would like to thank the Faculty of Veterinary and Animal Sciences, University of Rajshahi, and the Upazila Livestock Officers (ULO) and Veterinary Surgeons (VS) of all the Upazila Livestock Offices and Veterinary Hospitals in Rajshahi district for their kind support during this study's data collection.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Funding

This research had been supported by grants from the Ministry of Science and Technology as an NST Fellowship.

References

1. Salam A, Akter MA, Rahman MM, Runa RA. Prevalence of surgical affections and their risk factors in goats in selected Upazilas of Chuadanga District, Bangladesh. PSM Veterinary Research. 2022;7(1):1-10.
2. Paul DC, Haque MF, Alam MS. Goat production in the southwest region of Bangladesh. Livestock Research for Rural Development. 1991, 3(28). Available from: http://www.lrrd.org/lrrd3/3/dulal2.htm.
3. Kumar S, Rao CA, Kareemulla K, Venkateswarlu B. Role of goats in livelihood security of the rural poor in

the less favored environments. Indian Journal of Agricultural Economics. 2011;65(4):761-781.
4. Ali MN, Hasan N, Hossain MA, Bhuyan AAM. A case report: Management of gingival myiasis in a goat. The Pharma Innovation. 2024;13(7):190-192. https://dx.doi.org/10.22271/tpi.2024.v13.i7c.25779.
5. Siddiky NA, editor. Sustainable goat farming for livelihood improvement in South Asia. Dhaka: SAARC Agriculture Centre; c2017. p. 190. Available from: https://www.sac.org.bd/archives/publications/Goat%20Farming.pdf.
6. Nedumaran G, Muthuveni M. Women empowerment through goat farming. Emerging Trends in Business & Management. 2023;1:253-256.
7. Arce C, Díaz-Gaona C, Sánchez-Rodríguez M, Sanz-Fernández S, López-Fariña MD, Rodríguez-Estévez V. The role of women on dairy goat farms in southern Spain. Animals. 2022;12(13):1686. https://doi.org/10.3390/ani12131686.
8. Kumar A, Chae BJ, Bhuiyan AKFH, Sarker SC, Hossain MM. Goat production system in Mymensingh district, Bangladesh. Bangladesh Journal of Animal Science. 2018;47(1):13-20. http://dx.doi.org/10.3329/bjas.v47i1.39396.
9. Dossa LH, Wollny C, Gauly M. Smallholders' perceptions of goat farming in southern Benin and opportunities for improvement. Tropical Animal Health and Production. 2007;39(1):49-57. https://doi.org/10.1007/s11250-006-4440-2.
10. Opasina BA, Putt SNH. Outbreaks of peste des petits ruminants in village goat flocks in Nigeria. Tropical Animal Health and Production. 1985;17(4):219-224. https://doi.org/10.1007/BF02356980.
11. Agriculture Census 2019. Structure of agricultural holdings and livestock & fisheries: National report, Volume-1. Dhaka: Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning, Government of the People's Republic of Bangladesh; c2022. Available from: https://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/c645bd51_3cb5_4f53_86f9_7d29244caa4e/2022-12-26-08-36-394361bc904a7651ef763a4ff8033b67.pdf.
12. Islam MA, Akter MA, Alam MM. Prevalence and temporal distribution of surgical diseases in goats (Capra hircus) in Mymensingh district of Bangladesh. Journal of Advances in VetBio Science and Techniques. 2020;5(2):72-80. https://doi.org/10.31797/vetbio.753673.
13. Ghosh CP, Datta S, Mandal D, Das AK, Roy DC, Roy A, *et al*. Body condition scoring in goat: Impact and significance. Journal of Entomology and Zoology Studies. 2019;7:554-560.
14. Ali MN, Hasan M, Shanta IS, Choudhury MA, Rahman M, Bhuyan AAM. Myiasis in a backyard pig: A case report. Insights in Veterinary Science. 2024;8:015-017. https://doi.org/10.29328/journal.ivs.1001042.
15. Ahmed AF, Hassanein KMA. Ovine and caprine cutaneous and ocular neoplasms. Small Ruminant Research. 2012;106:189-200. http://dx.doi.org/10.1016/j.smallrumres.2012.03.007.
16. Samad MA. A five-decade systematic review of research progress on the production and management of small ruminants in Bangladesh. Journal of Veterinary Medical and One Health Research. 2021;3(1):1-91. DOI:10.36111/jvmohr.2021.3(1).0026.
17. Singh T, Amarpal, Kinjavdekar P, Aithal HP, Pawde AM, Pratap K, *et al*. Obstructive urolithiasis in domestic animals: A study on the pattern of occurrence and etiology. Indian Journal of Animal Sciences. 2008;78(6):599-603.
18. Makhdoomi DM, Gazi MA. Obstructive urolithiasis in ruminants – A review. Veterinary World. 2013;6(4):233-238. DOI:10.5455/vetworld.2013.233-238.
19. Alvi MA, Ohiolei JA, Saqib M, Tayyab MH, Khan MUZ, Li L, *et al*. First report on molecular characterization of Taenia multiceps isolates from sheep and goats in Faisalabad, Pakistan. Frontiers in Veterinary Science. 2020;7:594599. https://doi.org/10.3389/fvets.2020.594599.
20. Choudhury MP, Khatun A, Hossain MS, Islam F. Feeding and breeding management system of goats in the central and southern regions of Bangladesh. Asian Journal of Medical and Biological Research. 2016;2(1):9-12. http://dx.doi.org/10.3329/ajmbr.v2i1.27562.
21. Abbas MF, Abed FA. The most common risk factors of uterine prolapse in local goat breeds. Biochemical and Cellular Archives. 2021;21(1):1987-1990.
22. Lopez B. Urinary obstruction in sheep and goats; c2023. Available from: https://www.vetspecialists.com/vet-blog-landing/animal-health-articles/2023/02/02/urinary-obstruction-in-goats-and-sheep.
23. Farghali HAMA, Ali KK, Shamaa AAE. Incidence of the most common surgical affections among sheep and goats admitted to a referral hospital in the State of Kuwait. Advances in Animal and Veterinary Sciences. 2020;8(2):41-57. http://dx.doi.org/10.17582/journal.aavs/2020/8.s2.41.57
24. Arju MT, Samaddar K, Rahman MM, Haq MM, Rana MS, Juyena NS, *et al*. Surgical affections: A comparative scenario of Chittagong region. International Journal of Natural and Social Sciences. 2014;1(2):31-36.
25. Islam S, Hasan M, Bhattacharjee S, Alam MR, Hashim MA. Surgical affections of Black Bengal goats in selected areas of Sherpur district-A retrospective study. Bangladesh Veterinary Journal. 2019;53(1-4):35-42.
26. van Seventer JM, Hochberg NS. Principles of Infectious Diseases: Transmission, Diagnosis, Prevention, and Control. International Encyclopedia of Public Health; c2017 .p. 22-39. https://doi.org/10.1016%2FB978-0-12-803678-5.00516-6
27. Soulsby EJL. Helminths, Arthropods and Protozoa of Domesticated Animals. 7th ed. London: Bialliere Tindall; c1982.
28. Ahmed AF, Hassanein KMA. Ovine and caprine cutaneous and ocular neoplasms. Small Ruminant Research. 2012;106:189-200. http://dx.doi.org/10.1016/j.smallrumres.2012.03.007
29. Goldschmidt MH, Hendrick MJ. Tumors of the skin and soft tissues. In: Meuten DJ, editor. Tumors in Domestic Animals. 4th ed. Iowa: Iowa State Press, A Blackwell Publishing Co.; c2002 .p. 45-118.
30. Alvi MA, Ohiolei JA, Saqib M, Tayyab MH, Khan MUZ, Li L, *et al*. First report on molecular characterization of Taenia multiceps isolates from sheep and goats in Faisalabad, Pakistan. Frontiers in Veterinary Science. 2020;7:594599. https://doi.org/10.3389/fvets.2020.594599
31. Lopez B. Urinary obstruction in sheep and goats.

Veterinary Specialists; c2023 Feb 2. Available from: https://www.vetspecialists.com/vet-blog-landing/animal-health-articles/2023/02/02/urinary-obstruction-in-goats-and-sheep

32. Singh T, Amarpal, Kinjavdekar P, Aithal HP, Pawde AM, Pratap K, *et al*. Obstructive urolithiasis in domestic animals: A study on pattern of occurrence and etiology. Indian Journal of Animal Sciences. 2008;78(6):599-603.
33. Makhdoomi DM, Gazi MA. Obstructive urolithiasis in ruminants – A review. Veterinary World. 2013;6(4):233-238. DOI:10.5455/vetworld.2013.233-238
34. Matlaga BR, Shah OD, Assimos DG. Drug-induced urinary calculi. Reviews in Urology. 2003;5(4):227-31. PMCID: PMC1508366.
35. Julson E, Richter A. Top 12 foods that are high in phosphorus. Healthline; c2023. Available from: https://www.healthline.com/nutrition/foods-high-in-phosphorus
36. Samad MA. A five-decade systematic review of research progress on production and management of small ruminants in Bangladesh. Journal of Veterinary Medical and One Health Research. 2021;3(1):1-91. DOI:10.36111/jvmohr.2021.3(1).0026
37. Islam MA, Ashraf MB, Alam MM. Prevalence and associated risk factors of surgical affections in calves in Mymensingh District of Bangladesh. Veterinary Sciences: Research and Reviews. 2021;7(1):77-82. http://dx.doi.org/10.17582/journal.vsrr/2021.7.1.77.82
38. Choudhury MP, Khatun A, Hossain MS, Islam F. Feeding and breeding management system of goat at central and southern regions of Bangladesh. Asian Journal of Medical and Biological Research. 2016;2(1):9-12. http://dx.doi.org/10.3329/ajmbr.v2i1.27562
39. Abbas MF, Abed FA. The most common risk factors of uterine prolapse in local goat breeds. Biochemical and Cellular Archives. 2021;21(1):1987-1990.