

## TRENDS IN REPRODUCTIVE DISORDERS IN ANIMALS PRESENTED AT A VETERINARY HOSPITAL IN ENUGU STATE: A 10-YEAR RETROSPECTIVE STUDY

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### ABSTRACT

Reproductive disorders are one of the major causes of infertility, sterility and resultant economic loss in both companion and farm animals. They presented varied degrees of morbidity and mortality and were influenced by environmental conditions, reproductive history, and previous drug treatments. Reproductive disorders may have different consequences, ranging from absence of clinical signs to the impairment of fertility. The objective of this study was to report the different reproductive disorders presented at the Veterinary Teaching Hospital of the University of Nigeria Nsukka between 2013 and 2022 and to identify the most frequently occurring disorders. Information relative to the species, age and breed were obtained from a total of 96 reproductive disorders presented from 2,709 cases recorded in the hospital at the time. This represented 3.54%. The highest occurring reproductive disorder (irrespective of species) was dystocia (48.96%) while the least was orchitis (1.04%). Out of these 96 reproductive disorders, 49 were reported in dogs, representing 51.04 % while only 2 were reported in porcine, representing 2.08 %. Others were in caprine and ovine species. Nigerian indigenous breed of dogs were the most affected with transmissible venereal tumor (46.15%) while the boerboel and caucasian were least affected (7.69% each). In conclusion, the present study has bridged the knowledge gap in the report of epidemiology of reproductive diseases in dogs and other farm animals presented at the Veterinary Teaching Hospital in Enugu State.

Keywords: Dystocia, pyometra, reproductive disorders, transmissible venereal tumor

### INTRODUCTION

Reproduction ensures the continuity of the species such that they do not become extinct. Reproduction is key to evolution and it increases the number of species in the ecosystem. It is vital in both pet animals and livestock. Pets such as dogs and cats are important components of social relationships, and there is increasing demand for the maintenance of breeds appropriate for specific purposes, such as company, sport, hunting, and guarding, as well as aiding the disabled and the elderly (Hambolu *et al.*, 2014; Costa *et al.*, 2019). As human population shift demographically, the resulting increase in demand for meat and milk calls for improvements in the sustainability of livestock reproduction systems (Davis & White, 2020). However, the prevalence of several

reproduction-related diseases in animals are escalating, partly due to management, nutritional and genetic deficiencies. The effect of steroids on the ovary and uterus during the estrous cycle upturns a risk factor for endometrial change (Maya *et al.*, 2017). Similarly, male reproductive health is also under the influence of various endogenous and exogenous factors. Diseases involving the reproductive system are frequently seen in any veterinary practice, posing threat to veterinary surgeons and animal breeders (Fielding *et al.*, 2021). These diseases include vaginal disorders, uterine infections (endometritis, metritis, etc), pregnancy disorders (early embryonic death, foetal maceration), lactational disorders, disorders of the prostate and neoplasia of the genital system (Transmissible Venereal Tumor) and mammary glands

(Gupta *et al.*, 2020). Some common reproductive diseases of dogs that have been documented in Nigeria include Transmissible Veneral Tumor (T.V.T.) orchitis, scrotal dermatitis, dystochia, vaginitis, pyometra and metritis (Oyeyemi *et al.*, 2000). However, the documentation and report of these reproductive diseases in dogs and other animals, both in Enugu State and other states in Nigeria is limited. The only reports of reproductive disorders in available literature include those of Wosu and Anene (1990) in Enugu State, Waziri *et al.* (2006) in Borno State and Umaru *et al.* (2009) in Sokoto State. On the contrary, authors have documented the prevalence of other diseases, especially in dogs. Some of these include risk factors for canine parvovirus infection in Vom (Mohammed *et al.*, 2005), ascites (Ihedioha *et al.*, 2011), early bite wounds (Akinrinmade and Akinrinde, 2013), zoonotic and non-zoonotic gastrointestinal helminths of dogs (Odeniran and Ademola, 2014), and haemo- and gastrointestinal parasites (Pam *et al.*, 2013). Again, tick-transmitted pathogens of dogs (Adamu *et al.*, 2014) including canine babesiosis (Ogo *et al.*, 2011), common causes of poisoning and mortality in owned dogs (Shima *et al.*, 2015), and rabies (Adedeji *et al.*, 2010) among others have been studied.

There are several reproductive diseases which are encountered daily at the Veterinary Teaching Hospital of the University of Nigeria, Nsukka. In order to fill the knowledge gap in the report of epidemiology of reproductive diseases in dogs and other farm animals, this research was aimed at reporting the pattern of these recorded disorders in the Veterinary Teaching Hospital in Enugu State.

**MATERIAL AND METHODS**

A total of 2,709 animals were presented at the Veterinary Teaching Hospital, University of Nigeria, Nsukka, Nigeria, between 2013 and 2022. The records were evaluated and animals diagnosed with reproductive disorders were selected for the study. Nsukka is in Enugu State, (between 6.4483° N, 7.5139° - Figure I).



Figure I: Map of Nigeria showing the location of Enugu State

During the retrospective assessment of the clinical records of the animals, data relating to species, age, breed, and gender of each animal were obtained for those animals presented with reproductive disorders.

The diagnoses were based on the evaluation of anamneses, general physical examinations, specific physical examinations of the reproductive system, and complementary examinations such as ultrasonography, radiography, and histo-pathology.

The animals diagnosed were canine, caprine, ovine and porcine species of both sexes. Aside from these species variables, age and frequency of parturition were other variables adopted for the survey. Each species was grouped into three age groups viz: less than 2 years, 2 to 3 years and more than 3 years. With regard to the frequency of parturition, each species was grouped into primiparous and multiparous. Lastly, canine species were further separated into 10 breeds (Neapolitan mastiff, Bull mastiff, Rottweiler, Mixed breed, Nigerian indigenous breed, caucasian, boerboel, St. Bernard, German shepherd and Great Dane). Only one breed of caprine (West African Dwarf) and ovine (West African Dwarf) was presented for each of the species. The breed of the porcine species was not stated.

The data obtained were presented in Microsoft Excel 2013 and summarized using descriptive statistical analysis. Student’s t-test was used to compare prevalence, with P < 0.05 being significant. The results were presented on bars and tables.

**RESULTS**

**DISTRIBUTION OF REPRODUCTIVE DISORDERS IN ANIMALS PRESENTED AT THE VTH, UNN BETWEEN 2013 AND 2022**

The total number of reproductive disorders from the 2709 case files was 96, representing 3.54% of the total case files.

**TABLE I: DISTRIBUTION OF CASE FILES AT THE VTH, UNN BETWEEN 2013 AND 2022**

S/N	Year	Number of case files	Prevalence
1.	2013	306	11.30%
2.	2014	247	9.12%
3.	2015	257	9.49%
4.	2016	273	10.08%
5.	2017	293	10.82%
6.	2018	275	10.15%
7.	2019	328	12.11%
8.	2020	242	8.93%
9.	2021	286	10.56%
10.	2022	202	7.46%
<b>Total</b>		<b>2709</b>	

The bar chart below shows the distribution of the reproductive disorders in all species investigated. Dystocia (48.96%) was the most prevalent reproductive disorder. Orchitis, pyometritis and streptococcal infection were the least prevalent reproductive disorders, as each had a prevalence of 1.04%.

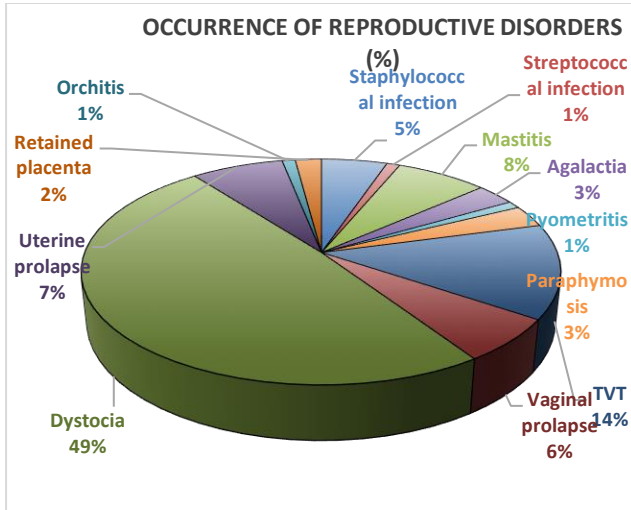


Figure II: Bar Chart of the Prevalence of Reproductive Disorders in Animals Presented at the VTH, UNN between 2013 and 2022.

**SPECIE VARIATIONS OF REPRODUCTIVE DISORDERS IN ANIMALS PRESENTED AT THE VTH, UNN BETWEEN 2013 AND 2022**

Figure III is a summary of the prevalence of reproductive disorders in different animals at the VTH, UNN between 2013 and 2022. The highest prevalence (51.04%) was in the canine species, while the lowest prevalence (2.08%) was in the porcine species. Caprine recorded a higher prevalence of reproductive disorders than ovine species.

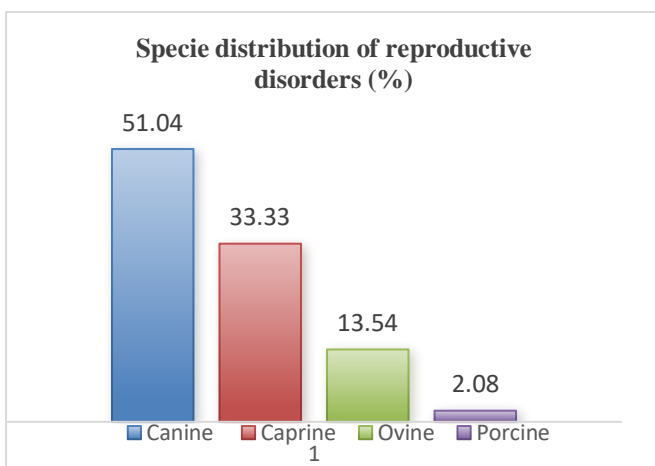


Figure III: Species Variation in the Prevalence of Reproductive Disorders in Animals presented at the VTH, UNN between 2013 and 2022

**DISTRIBUTION OF REPRODUCTIVE DISORDERS IN CANINE SPECIES PRESENTED AT THE VTH, UNN BETWEEN 2013 AND 2022**

The breed, age and frequency of parturition were adopted as variables in the study of reproductive disorders in the canine species.

**BREED DISPOSITION**

Table II is the prevalence of reproductive disorders in 10 breeds of dogs presented at the VTH, UNN between 2013 and 2022. Neapolitan Mastiff, St. Bernard and Great Dane were presented only for staphylococcal infection, dystocia and vaginal prolapse, respectively. The prevalence of staphylococcal infection was significantly higher in mixed breed compared to any of the infected exotic breeds ( $P < 0.05$ ); there was no statistical difference in the prevalence of agalactia in any of the three affected breeds ( $P > 0.05$ ).

The Nigerian indigenous breed was the most presented with reproductive disorders, having recorded cases of mastitis, paraphimosis, TVT, vaginal prolapse and dystocia. It showed the highest prevalence of TVT, vaginal prolapse and dystocia ( $P < 0.05$ ). Following the Nigerian indigenous breed are mixed breeds and bull mastiff; each of them were presented for four reproductive disorders.

The highest prevalence of mastitis was recorded in the boerboel breed (50%), with trauma at the teat ostium in most of the cases presented; also, most of the cases were presented with history of large litter size in the boerboel. The lowest prevalence (16.67%) was recorded in the German shepherd breed.

**AGE DISPOSITION**

Table III is a frequency distribution of the occurrence of reproductive disorders in dogs categorized according to three age groups: less than 2 years (<2 years), 2 to 3 years and more than 3 years old (>3 years), presented at the VTH, UNN between 2013 and 2022. Dogs <2 years were presented with higher prevalence of mastitis than those 2-3 years old, although the difference was not significant ( $P > 0.05$ ). Conversely, dogs >3 years old were presented with significantly higher ( $P < 0.05$ ) prevalence of dystocia than those 2-3 years old.

**PAROUS DISPOSITION**

Table VI is a frequency distribution of the occurrence of reproductive disorders in caprine and ovine species categorized according to the parous of the animals, divided into primiparous and multiparous. In each of the caprine and ovine species, the prevalence of dystocia was significantly higher ( $P < 0.05$ ) in primiparous than multiparous females.

**TABLE II: DISTRIBUTION OF REPRODUCTIVE DISORDERS IN DIFFERENT BREEDS OF DOGS PRESENTED AT THE VTH, UNN BETWEEN 2013 AND 2022**

Breed	Prevalence (%)										
	Staphylococcal infection	Streptococcal infection	Mastitis	Agalactia	Paraphimosis	TVT	Vaginal prolapse	Dystocia	Orchitis	Retained placenta	
Neapolitan Mastiff	20 <sup>a</sup>										
Bull Mastiff	20 <sup>a</sup>			33.33 <sup>a</sup>		30.77 <sup>a</sup>		11.11 <sup>a</sup>			
Rottweiler	20 <sup>a</sup>			33.33 <sup>a</sup>				22.22 <sup>b</sup>			
Mixed Breed	40 <sup>b</sup>			33.33 <sup>a</sup>				11.11 <sup>a</sup>		100	
Nigerian Indigenous Breed			33.33 <sup>a</sup>		100	46.15 <sup>a</sup>	66.67 <sup>a</sup>	44.44 <sup>c</sup>			
Caucasian Boerboel		100				7.69 <sup>b</sup>	16.67 <sup>b</sup>		100		
St Bernard			50 <sup>b</sup>			7.69 <sup>b</sup>					
German Shepherd			16.67 <sup>c</sup>			7.69		11.11			
Great Dane							16.67				

a,b,c Values in a column with different alphabet superscript are statistically significant (P < 0.05)

**TABLE III: DISTRIBUTION OF REPRODUCTIVE DISORDERS IN DIFFERENT AGE GROUPS OF DOGS PRESENTED AT THE VTH, UNN BETWEEN 2013 AND 2022**

Age	Prevalence of Reproductive Disorders (%)										
	Staphylococcal Infection	Streptococcal Infection	Mastitis	Agalactia	Pyometritis	Paraphimosis	TVT	Vaginal Prolapse	Dystocia	Orchitis	Retained Placenta
< 2 years			57.14 <sup>a</sup>	33.33 <sup>a</sup>		100	23.08 <sup>a</sup>	33.33 <sup>a</sup>	33.33 <sup>ab</sup>		100
2-3 years	100	100	42.86 <sup>a</sup>	66.67 <sup>b</sup>			23.08 <sup>a</sup>	16.67 <sup>b</sup>	22.22 <sup>a</sup>		
> 3 years					100		53.84 <sup>b</sup>	50.00 <sup>c</sup>	44.44 <sup>b</sup>	100	

a,b,c values in a column with different alphabet superscript are statistically significant (p< 0.05)

**TABLE IV: DISTRIBUTION OF REPRODUCTIVE DISORDERS ACCORDING TO PAROUS IN DOGS PRESENTED AT THE VTH, UNN, BETWEEN 2013 AND 2022**

Parous	Frequency of Reproductive Disorders (%)										
	Staphylococcal Infection	Streptococcal Infection	Mastitis	Agalactia	Pyometritis	Paraphimosis	TVT	Vaginal Prolapse	Dystocia	Orchitis	Retained Placenta
Primiparous	100	100	16.67 <sup>a</sup>	100	100	100	100	83.33 <sup>a</sup>	66.67 <sup>a</sup>	100	100
Multiparous			83.33 <sup>b</sup>					16.67 <sup>b</sup>	33.33 <sup>b</sup>		

a,b,c Values in a column with different alphabet superscript are statistically significant (P < 0.05)

**TABLE V: DISTRIBUTION OF REPRODUCTIVE DISORDERS IN DIFFERENT AGE GROUPS OF CAPRINE AND OVINE SPECIES PRESENTED AT THE VTH, UNN BETWEEN 2013 AND 2022**

Age (Caprine)	Prevalence of Reproductive Disorders (%)		
	Dystocia	Uterine prolapse	Retained placenta
< 2 years	48 <sup>a</sup>	33.33 <sup>a</sup>	
2-3 years	24 <sup>b</sup>	33.33 <sup>a</sup>	
> 3 years	28 <sup>b</sup>	33.33 <sup>a</sup>	100
<b>Age (Ovine)</b>			
< 2 years	41.67 <sup>b</sup>	100	
2-3 years	41.67 <sup>b</sup>		
> 3 years	16.67 <sup>a</sup>		

a,b,c Values in a column with different alphabet superscript are statistically significant ( $P < 0.05$ )

#### DISTRIBUTION OF REPRODUCTIVE DISORDERS IN CAPRINE AND OVINE SPECIES PRESENTED AT THE VTH, UNN BETWEEN 2013 AND 2022

##### AGE DISPOSITION

Table V is a frequency distribution of the occurrence of reproductive disorders in caprine and ovine species categorized according to three age groups: less than 2 years (<2 years), 2 to 3 years and more than 3 years old (>3 years), presented at the VTH, UNN between 2013 and 2022. In each of the two species, females less than 2 years of age had significantly higher ( $P < 0.05$ ) prevalence of dystocia than those of 2-3 or more than 3 years of age. There was no significant difference ( $P > 0.05$ ) in the prevalence of uterine prolapse in the does.

#### DISCUSSION

Owning pets, as well as livestock production, calls for a high sense of responsibility, including the provision of adequate housing, feeding and medical care, as well as protecting humans from associated zoonotic diseases (Craig and MacPherson, 2000). The prevalence of reproductive diseases is generally scaled down in a well managed animal husbandry system. In the present study, the pattern of these reproductive diseases was analyzed as presented to the VTH of UNN between 2013 and 2022.

In the present study, the highest prevalence of reproductive diseases was in the canine species. This may be attributed to the fact that dogs are the most important companion domestic species to man, thus, the increased demand for the maintenance of breeds appropriate for specific purposes, such as company, sport, hunting and/or guarding (Costa *et al.*, 2019), as well as aiding the disabled and the elderly persons. The demand of pet animal treatment is tremendously increasing in cities and the incidences of several reproduction related diseases are escalating due to the aforementioned

reasons. There was a higher prevalence of reproductive disorders in caprine than ovine species in this study, contrary to the report of studies conducted in Northern Nigeria (Sokoto and Borno States).

In Sokoto State, a fifteen-year retrospective study of reproductive diseases presented at the VTH of Usmanu danfodiyo University by Umaru *et al.* (2009) reported a higher prevalence of reproductive disorder in ovine than in caprine species. Similarly, a thirteen-year retrospective study of reproductive disorders in Borno State, by Waziri *et al.* (2006), reported a higher prevalence of reproductive disorder in ovine than in caprine species. This variation can be attributed to the varied demand of the two species of small ruminants in Southern and Northern Nigeria; while there is increased demand of sheep in Northern Nigeria for religious and socio-economic uses (such as naming ceremonies, wedding and Eid-el Kabir), there is higher acceptability of goats in Eastern Nigeria due to the perceived better palatability of chevron than mutton.

The lowest prevalence of reproductive disorders was in the porcine species. It has been documented that the pork is the most consumed meat in Nsukka and its environs. Thus, pig farmers will rather slaughter and sell apparently sick pigs than present them for clinical evaluation and management. This may explain the reason for the very low incidence of documented reproductive disorders in the porcine species.

Neapolitan Mastiff, St. Bernard and Great Dane were presented only for staphylococcal infection, dystocia and vaginal prolapse, respectively. This may be due to the low population of these priced breed of dogs in the locality. Conversely, the Nigerian indigenous breed was the most presented with reproductive disorders; this may be partly due to the increased population of this relatively less priced breed and partly due to their poor management conditions by the owners.

The low prevalence of orchitis recorded in the present study is comparable to the low prevalence in dogs presented in Veterinary clinics in Edo (Oyeyemi *et al.*, 2000) and Delta States (Shima *et al.*, 2015), as well as in ruminants in Borno (Waziri *et al.*, 2006) and Sokoto States (Umaru *et al.*, 2009). Furthermore, the prevalence of orchitis in the present study was in adult dogs only, similar to the report by Oyeyemi *et al.* (2000) in which the prevalence of orchitis in Delta State, Nigeria was significantly higher in adult dogs compared to puppies.

Dystocia (48.96%) was the most prevalent reproductive disorder in the present study. This validates earlier report in the same locality by Wosu and Anene (1990). Also, it is consistent with findings in Borno (Waziri *et al.*, 2006) and Sokoto States (Umaru *et al.*, 2009). In dogs, the incidence increased with age, a finding that is consistent with the findings of Cornelius *et al.* (2019) who observed that risk of

dystocia increased as the age of the dam increased. However, this was not the case in ruminants in the present study, as small ruminants less than 2 years recorded higher prevalence of dystocia than those more than 3 years.

Results of this study showed that older dogs had significantly higher prevalence of TVT than younger ones. Since sexual contact, licking, biting and sniffing the tumor affected areas are the most common causes of this cancer, it is expected that older animals that have been more exposed to sexual intercourse will record higher prevalence of TVT. With the exception of canine mastitis, the primiparous bitches recorded higher frequency of occurrence of all recorded reproductive disorders than the multiparous bitches. This is similar to the report of Cornelius *et al.* (2019) in dystocia and Kabuusu *et al.* (2010) in canine TVT.

### CONCLUSION

This study has reported the dynamics of reproductive disorders in some animals presented at the VTH of UNN in the last ten years (2013 to 2022). Canine species had the highest prevalence of reproductive disorders while caprine species had the highest prevalence of dystocia. The primiparous animals were more vulnerable to reproductive disorders than the multiparous animals. Breed disposition of ten breeds of dogs was expounded. It is expected that the results of this study will be handy for client advice and management of reproductive disorders by clinicians. Also, education of dog owners on preventive measures is key to ameliorating some of these health problems.

**CONFLICT OF INTEREST:** The authors hereby declare that there is no conflict of interest with regards to this publication.

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