



## A retrospective study of disease prevalence in domestic animals of hill region

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### ABSTRACT

The present study was aimed at recording the prevalence and types of various disorders in the domestic animals of hill region. The retrospective data of three years (2014–16) was collected from outpatient case record of veterinary dispensary unit, Indian Veterinary Research Institute, Mukteswar. A total of 577 cases were recorded during the period, of which, majority of cases were of cattle followed by goats. The autumn observed highest percentage of cases with lowest % in winter. Ectoparasitic infestation, endoparasitism, diarrhea and weakness were noticed as major clinical problems in cattle. Among infectious diseases, mastitis prevailed most among all other diseases of cattle. Haematuria, injury/wound and repeat breeding were also recorded frequently in cattle. Highest prevalence (70.58%) of haematuria was observed in the age group of 5–10 years. Retrospective epidemiological data on goats revealed that ecto-endoparasitic infestation and stomatitis were major diseases/disorders observed among goats of the region. About 46.92% of goat patients were recorded in autumn while winter observed 10.05% cases only. The retrospective epidemiological data generated during the present study helps in better understanding of the animal disease pattern in temperate climatic conditions, which will further help in implementing control measures against infectious and non-infectious diseases.

**Key words:** Disease, Domestic animals, Haematuria, Hill region, Livestock, Temperate climate

India is endowed with the largest livestock population in the world. Livestock rearing is one of the critical economic activities in the hilly areas of the country, providing a source of supplementary income along with agriculture. In developing countries like India, livestock acts as a buffering system for the marginal farmers, sparing the overall dependency on agriculture. The contribution of livestock sector, including fisheries, to the national economy in terms of Gross Value Added (GVA) is 3.9%, both at current and constant prices for livestock sector during 2013–14 based on the revised base year 2011–12. The milk production has increased from 132.4 million tonnes in 2012–13 to 137.7 in 2013–14, registering a growth of 4% (Basic Animal Husbandry & Fisheries Statistics Report, Government of India, 2015). The state of Uttarakhand lies between 28° 43'–31° 27' N and 77° 34'–81° 02' E and occupies 17.3% of India's total land with an area of 53,483 sq km, mostly covered by mountains (about 46,035 sq km). Livestock has been a source of livelihood for more than 70% rural population of Uttarakhand and these rural household earn over a third of their total income from the livestock sector. Apart from providing a subsidiary income

to the families, rearing of livestock such as cattle, buffaloes, sheep, goats, pigs, poultry etc. is a source of protein supplement to the family members of the household in the form of milk, eggs, and meat. Most of the cattle in hills are desi or non-descriptive breed which survives on low level of nutrition and unconventional feed and fodder resources. Hill cattle are comparatively disease resistant and generally have low productivity. In Uttarakhand, marginal and small farmers including landless labourers own over and above 80% of livestock species. Major issues of livestock rearing in hills are the scarcity of feed and fodder, low production performance, repeat breeding and poor conception rate of the artificial insemination (Singh and Tulachan 2001, Meena *et al.* 2007, Paswan *et al.* 2008, Meena *et al.* 2008). Livestock health issues of the temperate climatic region vary from tropical or subtropical climates. The occurrence of disease among animal population in hilly region relies on several predisposing/risk factors. Temperate climate, high altitude, seasonal availability of feed and fodder, draught, housing conditions, animal movement, and management system are the main factors which influence the disease occurrence/conditions in animal population of hill region. The objective of the present study was to record the prevalence and document the types of disorders in domestic animals presented to the Veterinary Dispensary Unit, Indian Veterinary Research Institute (IVRI), Mukteswar, Nainital.

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MATERIALS AND METHODS

The study was conducted at Veterinary Dispensary Unit of Indian Veterinary Research Institute (IVRI), Mukteswar, Nainital, Uttarakhand. Mukteswar is situated at an altitude of 2,286 meters (7,500 feet) above sea level; having a subtropical highland climate (Koppen climate classification *Cwb*). Location of Mukteswar is 29.4722°N and 79.6479°E. The retrospective epidemiologic study of diseases was done using 3 years data at Veterinary Dispensary Unit of IVRI, Mukteswar. The retrospective data of 3 years from January 2014 to December 2016 was collected from outpatient case record of Veterinary Dispensary Unit, IVRI, Mukteswar. The data were analyzed retrospectively and interpreted according to age, sex, and season after calculating the percentage of distribution. In our study, we considered four seasons, viz. spring (March to May), rainy (June to August), autumn (September to November) and winter (December to February).

RESULTS AND DISCUSSION

Distribution of diseases/disorders in various domestic animals according to age, sex and season were recorded. According to age, animals were grouped between 0–6 month, 6 month–1 years, 1–2 years, 2–5 years, 5–10 years and above 10 year age group. During the study period of 3 years, a total of 577 cases were recorded from outpatient department register. Among 577 cases, majority of cases were of cattle (280 cases; 48.52%), followed by goats (179 cases; 31.02%) and dogs (61 cases; 10.57%). No case of sheep and pig was reported during the period. The number of cases presented to veterinary dispensary represents the population dynamics of the livestock in the area. In an earlier study, cattle population was recorded higher than any other livestock species in the same area (Meena *et al.* 2012). No case of sheep and pig was reported during the period which probably could be due to the lesser interest of regional farmers in sheep and pig farming. Out of the total 577 cases, 99 (17.15%) were male and 478 (82.84%) cases were female. Season and sex wise distribution of the cases of different livestock species is shown in Table 1. The highest % of cases (34.48%, 199 cases), were recorded during the autumn season while lowest % of cases (12.47%; 72 cases)

were recorded during winters.

Distribution of diseases/disorder in cattle according to age, sex and season is presented in Table 2. It was observed that ectoparasitic infestation (31.78%), endoparasitic infection (14.64%), diarrhea (8.21%) and weakness (7.85%) were major clinical problems in cattle of the sub-Himalayan temperate region. Among infectious diseases, mastitis (6.42%; 18 cases) was predominant among all other diseases of cattle. It had been reported previously that incidence and pattern of causative agents in mastitis vary from time to time, place to place and herd to herd. The prevalence of mastitis ranged from 29.34 to 78.54 in cows at different time intervals (Ebrahimi *et al.* 2007, Sharma and Maiti 2010). Haematuria (6.07%; 17 cases), injury/wound (4.64%; 13 cases) and repeat breeding (4.28%; 12 cases) were also recorded predominantly in cattle during our study. The incidence of haematuria varies considerably in different herds maintained under apparently similar conditions and even in the same herd from time to time. In some herds, only an occasional case may occur, but in others it is quite common to find 10–30% animals clinically affected at the same time. The highest incidence of haematuria (16.74%), followed by repeat breeding was recorded (14.97%) in an earlier study of the same area (Meena *et al.* 2012). The morbidity rate of 3.33% for haematuria had also been reported by the same researchers in another study in Kumoun region (Meena *et al.* 2007). The haematuria is a chronic disease of cattle fed on a bracken fern for a longer duration of a period. The presence of bracken fern in hill region is clearly evidenced by development of disease called as enzootic bovine hematuria (EBH) especially in adult cattle. In our study, approximately 52.94% (9/17) cases of EBH were reported in winter; however, it can be seen during any season of the year, as the disease generally requires a longer period to develop into clinical form after ingestion of bracken fern. Association between EBH and the level of pasture infestation with bracken fern had been demonstrated (Pinto *et al.* 2000). It is also well known fact that this fern contains toxic compounds like ptaquiloside (PT) and quercetin, which have mutagenic and carcinogenic effects, mainly in the urinary bladder of affected animals (Borzacchiello *et al.* 2003). Among reproductive disorders,

Table 1. Season and sex wise distribution of cases in different livestock species

Season/Species	Winter		Spring		Rainy		Autumn		Total
	M	F	M	F	M	F	M	F	
Cattle	1	30	6	67	9	81	1	85	280
Buffalo	1	7	0	6	0	5	0	13	32
Goat	2	16	10	47	6	14	24	60	179
Dog	8	4	12	13	4	6	10	4	61
Horse	0	1	3	1	2	0	2	0	9
Poultry	-	-	-	-	0	15	-	-	15
Cat	-	1	-	-	-	-	-	-	1
Sex-wise total	12	60	31	134	20	121	37	162	577
Total	72		165		141		199		

M, male; F, female.

Table 2. Distribution of diseases/disorder in cattle according to age, sex and season

Disease	Sex		Age groups						Season			
	M	F	0–6 m	6 m-1 yr	1–2 yr	2–5 yr	5–10 yr	>10 yr	Winter	Spring	Rainy	Autumn
Dog bite	-	1	-	-	-	-	1	-	-	-	1	-
Mastitis	-	18	-	-	-	2	15	1	1	3	7	7
Anorexia	-	2	-	-	-	-	2	-	-	1	-	1
Babesiosis	1	-	-	-	-	1	-	-	1	-	-	-
Bloat	-	5	-	-	-	-	4	1	-	1	1	3
Anaemia	-	2	-	-	-	-	2	-	-	2	-	-
Injury/wound	2	11	2	-	-	4	7	-	1	4	3	5
Debility/weakness	22	2	-	4	11	5	-	2	4	13	3	-
Otitis	-	2	-	-	-	2	-	-	2	-	-	-
Udder edema	1	-	-	-	-	1	-	1	-	-	-	-
Pyrexia	-	5	-	-	-	-	4	1	3	-	1	1
Anestrus	9	-	-	-	7	2	-	2	1	3	3	-
Tick infestation	4	85	4	5	10	32	38	-	3	16	27	43
Simple indigestion	8	-	-	-	3	5	-	1	1	6	-	-
Diarrhoea	3	20	2	-	-	12	9	-	6	11	1	5
Worm infestation	8	33	3	-	2	8	28	-	3	16	19	3
Nervous disorder	-	1	-	-	-	-	1	-	1	-	-	-
Haematuria	17	-	-	-	-	12	5	3	9	2	3	-
Bottle jaw	1	-	-	-	-	1	-	-	-	1	-	-
Retention of placenta	-	1	-	-	-	-	1	-	-	-	-	1
Pneumonia	2	-	-	-	2	-	-	-	-	-	2	-
Repeat breeding	-	12	-	-	-	3	9	-	2	3	2	5
Actinobacillosis	1	-	-	-	-	1	-	-	-	-	1	-
Oedema	-	2	-	-	-	-	2	-	-	-	2	-
Mange	-	1	-	-	-	-	1	-	-	-	1	-
Total	17	263	13	5	16	86	152	8	31	73	90	86

M, male; F, female; m, month; yr, year.

highest prevalence % of repeat breeding (4.28%; 12 cases), followed by anestrus (3.21%; 9 cases) and retention of placenta (0.35%; 1 case) were recorded in cattle. About 15% of morbidity rate for reproductive disorders had been reported in cattle of Kumoun region by Meena *et al.* (2007). Approximately 13 (4.64%) cases of injury/wound were recorded among the cattle during the study, which may be attributed to *kaccha* or uneven floor of an animal house which consequently leads to injury due to slip and fall. A rare occurrence or report of metabolic diseases during our study may be correlated to the low productivity of local hill cattle as metabolic diseases are mostly prevalent in high producing animals. Five cases of bloat/tympany (1.78%) were also observed during the period. Past study recorded the incidence of 11.45% of parasitic infestation, 8.37% of weakness, 7.48% of tick infestation, 6.60% of mastitis, 4.40% of bloat and 2.20% of diarrhea in cattle in the same area (Meena *et al.* 2012). The highest morbidity (28.71%) rate in cattle of Shivalik hills, Himachal Pradesh was evidenced due to specific diseases like foot and mouth disease, haemorrhagic septicemia (HS) and mastitis followed by digestive disorders (22.77%) like diarrhea and bloat and reproductive diseases (20.79%) such as repeat breeding, delayed estrus, dystocia and abortion (Kumar *et al.* 2015).

Season wise distribution of diseases in cattle showed

that mastitis was highly prevalent during rainy (38.88%; 7/18 cases) and autumn (38.88%; 7/18 cases) season of the year. This may be attributed to the unhygienic conditions prevailing during the rainy season which predisposes the animals to the disease condition. The ectoparasitic infestation was mostly observed during autumn season (48.31%; 43/89) while lowest occurrence was seen during the winter season (3.37%; 3/89). Diarrhea was recorded with its highest % of 47.82 (11/23 cases) in spring season while lowest % of 4.34 (1/23 cases) was recorded in the rainy season. Worm infestation was common during rainy season (46.34%; 19/41 cases). Age wise distribution revealed that highest % of cases were recorded between 5–10 years of age group (54.28%; 152/280 cases) in cattle; however, only a few number of cases were observed between age group of 0–6 months (2.14%; 6/280 cases). About 83.33% of mastitis was observed between the age group of 5–10 years; however, diarrhea (52.17%; 12/23 cases) was more prevalent in younger animals aged between 2–5 years. This age distribution of mastitis in animals corresponds to their productive life cycle. Seasonal variations in temperature, rainfall, and resource availability are ubiquitous and can exert strong pressures on disease dynamics. Seasonal change in the incidence of infectious diseases is a common phenomenon in both temperate and tropical climates in humans and animals. However, the

mechanisms responsible for seasonal disease incidence, and the epidemiological consequences of seasonality are poorly understood with rare exception (Nicholas *et al.* 2006). The disease dynamics during different seasons can be complicated by the interaction among pathogens, acting either to enhance the infectivity of one another through immune suppression (Lello *et al.* 2004) or antibody-dependent enhancement (Ferguson *et al.* 1999) or to inhibit one another through the removal of susceptible individuals by cross-immunity or mortality (Rohani *et al.* 2003, Lello *et al.* 2004). The reports on disease dynamics of animal diseases during different seasons and age of temperate region are scarce. Changing climate can exert the effect on pathogen, host, and vector which may bring about a change in the occurrence of diseases during different seasons (Thornton *et al.* 2009). The haematuria was observed in adult cattle with the highest % of 70.58% (12/17 case) in an age group of 5–10 years.

Distribution of diseases/disorder in goat according to age, sex and season are presented in Table 3. The highest number of goat cases were recorded in the autumn season (46.92%; 84/179 cases), while lowest (10.05%; 18/179) cases were recorded during winter. Age wise distribution showed highest % of 36.8 (66/179) cases in the age group of 1–2 years. Retrospective epidemiological data on goat revealed that ectoparasitic infestation (45.25%; 81/179 cases), endoparasitism (21.22%; 38/179 cases) and stomatitis (8.37%) were major health issues reported in region. Seven number of contagious ecthyma (orf) cases were also recorded during autumn season in goats. Highest numbers of cases of tick infestation (68) were observed during autumn season. Representative case of each disease/disorder like bloat, mastitis, pregnancy toxemia, nervous disorder, poisoning, and injury were also recorded. Reports

on seasonality of diseases in small ruminants of the temperate region are less. The earlier study on the incidence of diseases in goats in Nainital district revealed the 36.84% incidence of parasitic infestation, 31.57% incidence of diarrhea, 14.03% incidence of tick infestation, 7.01% incidence of mange and weakness (Meena *et al.* 2012), which was in harmony with the present study. The prevalence of 68.42% (26/38 cases) of worm infestation in goats was noticed during spring season. However, it is contrary to the earlier reports of the parasitic load in small ruminants which reported the higher load of worms during rainy and post rainy period (Jithendran 1998). Emaciation/weakness and abortion in goats were also observed during the study period. Epidemiological study from different part of the country reported high incidence of strongyle worm in small ruminants including 67.4% incidence in Jammu (Khajuria and Kapoor 2003), 58.8% in Kashmir (Nasreen *et al.* 2005), 94% in Himachal Pradesh (Jithenderan 1998), 77.3% in Sikkim (Pal and Bandyopadhyay 2004) and 58.5% in Tamil Nadu (Balasubramanian *et al.* 2001). Parasitic infestations were recorded as major constraints to profitable production among sheep and goats of Himachal Pradesh (Jithendran 2000). The morbidity rate due to the specific diseases like PPR, FMD, and HS as high as 42.11%, followed by parasitic diseases (35.90%) was recorded in goats of lower Himalayan region of Himachal Pradesh (Kumar *et al.* 2015).

The epidemiological study on disease dynamics during different seasons and age groups in temperate climatic condition are rare. Our study revealed the prevalence of diseases during different seasons among different species in the temperate climatic conditions of Uttarakhand. Ectoparasitic and endoparasitic infestation in cattle and goats, diarrhea (8.21%) and weakness (7.85%) in cattle were

Table 3. Distribution of diseases/disorder in goats according to age, sex and season

Disease	Sex		Age groups						Season			
	M	F	0–6 m	6 m -1 yr	1–2 yr	2–5 yr	5–10 yr	>10 yr	Winter	Spring	Rainy	Autumn
Bloat	-	1	-	1	-	-	-	-	1	-	-	-
Mastitis	-	1	-	-	-	1	-	-	1	-	-	-
Abscess	-	1	-	-	-	1	-	-	1	-	-	-
Worm infestation	5	33	-	-	21	17	-	-	6	26	-	6
Lice infestation	3	8	3	4	3	1	-	-	1	-	10	-
Pneumonia	2	7	3	3	2	1	-	-	8	1	-	-
Pregnancy toxemia	1	-	-	-	-	1	-	-	1	-	-	-
Poisoning	1	-	-	-	-	1	-	-	1	-	-	-
Mange	-	2	-	-	1	-	1	-	-	2	-	-
Nervous disorder	-	1	-	1	-	-	-	-	-	1	-	-
Pyrexia	-	3	-	-	3	-	-	-	-	1	2	-
Stomatitis	3	12	-	3	5	2	5	-	-	15	-	-
Debility/weakness	4	4	-	3	4	1	-	-	-	6	2	-
Diarrhoea/dysentery	2	7	-	2	7	-	-	-	-	3	4	2
Tick infestation	19	51	-	1	13	36	20	-	-	-	2	68
Contagious ecthyma	4	3	-	-	7	-	-	-	-	-	-	7
Injury/wound	-	1	-	-	-	1	-	-	-	-	-	1
Total	42	137	6	18	66	61	28	-	18	57	20	84

M, male; F, female; m, month; yr, year.

recorded as major clinical problems. The prevalence of haematuria was observed as 6.07% in adult cattle with the highest % of 70.58% (12 case out of 17) in the age group of 5–10 years. Among reproductive disorders, the highest prevalence of repeat breeding (4.28%; 12 cases), followed by anestrus (3.21%; 9 cases) and retention of placenta (0.35%; 1 case) were recorded in cattle. Prevalence of contagious ecthyma (3.91%; 7/79 cases) was also recorded during autumn season in goats. Conclusively, the data generated during the present study will facilitate a better understanding of the disease pattern among different species in the largely unexplored temperate climatic conditions, which will further help in implementing mitigation strategies against infectious and non-infectious diseases.

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