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Occurrence of gastrointestinal parasitic infection in bovines of Haryana

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ABSTRACT

Gastrointestinal (GI) parasitic infections are the major constraint for livestock production causing huge economic losses to the livestock producers in terms of decreased milk production and reduced weight gain. Gastrointestinal disorders including diarrhoea may be caused by various etiological factors but parasitic infections play a significant role. A total of 1755 faecal samples from cattle (n = 594) and buffaloes (n = 1161) with the history of digestive disturbances/disorders were tested at four Disease Investigation Laboratories at Ambala, Bhiwani, Mahendergarh and Rohtak in Haryana during July 2020 to June 2021. All the faecal samples were processed by floatation and sedimentation methods. Coprological examination revealed 33.5% cattle and 37.3% buffalo as positive for GI parasites. The major parasitic infection of *Amphistomes* (6.3%), *Buxtonella sulcata* (14.8%) and *Strongyles* (11.05%) was observed in bovines. Highest infection of *Strongyles* (13.3%) and *Buxtonella sulcata* (17.4%) was found in cattle and buffaloes, respectively. Gastrointestinal parasitic infections in calves were in higher frequency than adult animals. Season-wise GI parasitic infections were recorded to be non-significantly higher in rainy season. Area-wise occurrence of parasitic infection was recorded highest in Rohtak followed by Bhiwani, Ambala and the least in Mahendergarh district of Haryana. This kind of study is found to be helpful in formulating effective control strategies against GI parasitic infections on regional basis.

Keywords: Amphistomes, *Buxtonella sulcata,* Gastrointestinal parasitic infection, Strongyles

Gastrointestinal (GI) parasitic infection hamper the growth and productivity of large ruminants such as cattle and buffalo. They are the major constraint for livestock production, causing huge economic losses to the livestock producers in terms of decreased milk production and reduced weight gain. Gastrointestinal disorders including diarrhoea may be caused by various etiological factors but parasitic infections play a significant role. Reduced feed intake and decreased efficiency in feed utilization due to subclinical or chronic infections may lead to productivity losses (Akanda *et al.* 2014). It is a worldwide problem for both small and large scale farmers and is a serious risk to livestock industry (Saddiqi *et al.* 2010).

Various epidemiological studies of GI parasitic infections in domesticated animals have been carried out in different parts of India (Samanta and Santra 2007, Jyoti *et al*. 2011, Singh *et al*. 2012, Rahman *et al*. 2012, Krishnamurthy and D'Souza 2014 and Maharana *et al*. 2016). The prevalence of GI parasites and its severity depends on various factors like local environmental conditions and management practices (Regassa *et al*. 2006). Therefore the present study was planned to investigate the occurrence of gastrointestinal parasitic infections in bovines (cattle and buffalo) of Haryana to acquire a baseline data which will help in preparation of control and prevention strategies in near future to minimize economic losses caused by gastrointestinal parasitic infections.

MATERIALS AND METHODS

Faecal samples from bovines with indications/history of digestive disorders such as diarrhoea, anorexia, and indigestion were brought for coprological examination at four Disease Investigation Labs, LUVAS, Ambala, Bhiwani, Mahendergarh and Rohtak in Haryana. Samples received from the period July 2020 to June 2021 were selected for this study. Haryana, one of the northern states of India, is located between 27°37' to 30°35' N latitude and between 74°28' and 77°36' E longitude. The seasons are broadly classified into winter (December, January, February), summer (April, May, June), rainy (July, August, September) and spring/autumn (October, November, March). Age-wise occurrence was recorded in two categories young (<6 months) and adult (>6 months). All the faecal samples were examined by floatation and sedimentation methods (Soulsby 1982). The data obtained from all four laboratories was compiled and analysed. The statistical analysis was carried out by IBM SPSS version 26 software. Chi-square test was used to compare occurrence of parasitic infections in cattle and buffalo with respect to various parameters such as age, month, season and species. Level of significance was considered at $p<0.05$.

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Table 1. Area-wise occurrence of GI parasitic infections in cattle and buffaloes

District	Cattle			Buffalo			Statistical significance		
	n	+*ve*	%	*n*	+*ve*	%	Chi square	*df*	*p value*
Ambala	418	114	27.27	363	102	28.10	0.018	1	0.893
Bhiwani	30	8	26.67	122	72	59.02	11.90	1	0.001*
Mahendergarh	50	1	2.00	379	24	6.33	2	1	0.157
Rohtak	96	76	79.17	297	235	79.12	0	1	1
Total	594	199	33.50	1161	433	37.30	0.127	1	0.722

*Level of significance: *p value* is significant at the 0.05 level or less.

RESULTS AND DISCUSSION

A total of 594 cattle and 1161 buffalo faecal samples were tested for coprological examination. Of them, 33.50 % cattle (n = 199) and 37.30% buffaloes (n = 433) were found positive for GI parasites (Table 1). Occurrence of GI parasitic infections in buffaloes was significantly higher ($p<0.05$) than cattle from Bhiwani district (Table 1). Remaining districts did not show any significant difference in parasitic infections among the species. However, statistically significant difference ($p<0.05$) was found while comparing occurrence of parasitic infections among cattle and buffaloes with respect to different districts, month and age (Table 4). Overall the highest occurrence was found in Rohtak (79.1%) followed by Bhiwani (52.6%), Ambala (27.6%) and the least in Mahendergarh (5.8%) district of Haryana. The reason for this variation might be due to variations in management and deworming practices of the respective study areas. Gupta *et al*. (2012) reported that prevalence was found to be higher in buffaloes (73%) than cattle (65%). This could be due to their wallowing habits and swampy habitat as it favours the development of many helminth species as well as snail vectors for trematodes (Bilal *et al*. 2009). Maharana *et al*. (2016) noted 42% faecal samples from cattle and 36% samples from buffaloes as positive for gastrointestinal parasites in and around Junagadh (Gujarat). Chaudhri *et al.* (2014) reported helminthic infections in 25.3% animals with significantly ($p<0.05$) higher infection in cows (38.1%) than buffaloes (20.3%) in eastern Haryana. Mir *et al.* (2013) reported 51.21% prevalence of GI parasitism in faecal samples of cattle and buffaloes, 38.7% in buffaloes and 67.15% in cattle of Jammu region. The variation in previous findings might be due to number of faecal samples examined, period of study and geoclimatic conditions (temperature and humidity, etc.) that favour the survival of infective stage of the parasites and of intermediate hosts, managemental conditions and deworming practices (Marskole *et al*. 2016).

The overall parasitic infection of Amphistomes (6.3%), *Buxtonella sulcata* (14.8%), *Strongyles* spp. (11.05%), mixed infection (2.2%) and other spp. (1.6%) was found in the present study (Supplementary Fig. 1). The other parasitic infection include *Toxocara* spp., *Moniezia* spp., *Coccidia* spp. and *Schistosoma* spp. Species wise prevalence of various parasites species are shown in Table 2. *Amphistome* infection was observed higher in cattle (7.07%) as compared to buffaloes (5.86%). Similarly *Strongyle* infection was also recorded higher in cattle (13.3%) than buffaloes (9.91%). However, differences were not statistically significant ($p>0.05$) between cattle and buffaloes. Chaudhri *et al*. (2014) reported that buffaloes had significantly higher infection of paramphistomes (14.2%) whereas crossbred cows had significantly higher infection of *Strongyles* (29.0%). *Buxtonella sulcata* was noted higher in buffaloes (17.4%) than cattle (9.76%). Our findings were similar to Maharana *et al.* (2016) who also reported the same. It is also in agreement with the study of Manoj and Singh (2019) in Haryana where faecal samples from cattle and buffaloes revealed a prevalence of 25.69% and 34.65%, respectively for *B. sulcata*. Though, *B. sulcata* is considered as non-pathogenic, in recent times its pathogenicity was recorded in the form of diarrhoea (AI-Saffar *et al*. 2010).

Season-wise highest parasitic infection in cattle and buffalo was observed during rainy season. In cattle the highest parasitic infection was observed during rainy (40.2%) followed by spring/autumn (39%), summer (27.9%) and the least in winter (22.7%). In buffaloes, highest parasitic infection was observed during rainy (44.1%) followed by spring /autumn (41.6%), winter (34.6%) and the least in summer (26.9%) (Table 3).

Table 2. Species-wise wise occurrence (%) of GI parasitic infections in cattle and buffaloes

Parasite	Cattle (n=594)		Buffalo (n=1161)		Statistical significance		
	n	%	*n*	%	Chi square	*df*	*p value*
Amphistomes	42	7.07	68	5.86	0.077	1	0.782
Buxtonella sulcata	58	9.76	202	17.40	1.815	1	0.178
Strongyles spp.	79	13.30	115	9.91	0.391	1	0.532
Others**	7	1.18	22	1.89	0.333	1	0.564
Mixed infection	13	2.19	26	2.24	0.000	1	1
Total	199	33.50	433	37.30	0.127	1	0.722

**Others: *Toxocara* spp., *Monezia* spp., *Coccidia* spp., *Schistosoma* spp.

Table 3. Month-wise and season-wise occurrence of GI parasitic infections in cattle and buffaloes (July 2020-June 21)

Month	Cattle (n=594)			Buffalo (n=1161)			Statistical significance		
	Total samples	Positive (n)	%	Total samples	Positive (n)	%	Chi square	*df*	*p value*
July	67	25	37.31	97	39	40.21	0.600	1	0.439
August	47	20	42.55	108	57	52.78	1.042	1	0.307
September	74	31	41.89	127	52	40.94	0.012	1	0.913
October	45	20	44.44	110	51	46.36	0.044	1	0.833
November	32	14	43.75	71	24	33.80	1.282	1	0.258
December	29	9	31.03	114	36	31.58	0.016	1	0.900
January	30	4	13.33	89	26	29.21	6.095	1	0.014*
February	40	7	17.50	111	46	41.44	8.966	1	0.003*
March	62	20	32.26	86	35	40.70	1.110	1	0.292
April	55	19	34.55	67	20	29.85	0.385	1	0.535
May	31	8	25.81	67	9	13.43	4.333	1	0.037*
June	82	22	26.83	114	38	33.33	0.600	1	0.439
Season									
Rainy	184	74	40.22	331	146	44.11	0.190	1	0.663
Spring/ Autumn	141	55	39.01	269	112	41.64	0.111	1	0.739
Winter	97	22	22.68	312	108	34.62	2.483	1	0.115
Summer	172	48	27.91	249	67	26.91	0.018	1	0.893

*Level of significance: *p value* is significant at the 0.05 level or less.

However, variation in the occurrence of parasitic infection among both species was not statistically significant ($p>0.05$) with respect to different seasons (Table 3 and 4). As per the study of Maharana *et al*. (2016), overall prevalence of GI parasites in cattle and buffaloes was highest in monsoon followed by summer and winter. Similarly, Laha *et al*. (2013) observed higher prevalence of GI parasites in rainy season (36.82%), followed by cool (26.16%), cold (22.42%) and hot (18.89%) seasons. Various researchers also observed in earlier studies that high moisture content along with temperature that prevailed during rainy season favoured the growth and development of larvae leading to increased prevalence of GI parasitic infections (Laha *et al*. 2013, Vanisri *et al*. 2016, Shit *et al*. 2017). The incidence and seasonal variation of gastrointestinal infection is affected by onset and advancement of monsoon rains (Wadhwa *et al*. 2011). Sodha *et al*. (2021) reported highest prevalence during rainy season (74.29%) which was in agreement to the reports of Singh *et al.* (2018), Gupta *et al*. (2012), Monika *et al*. (2017) and Choudhary *et al*. (2018). Biswas *et al*. (2013) in Bangladesh, Samanta and Santra (2009) in West Bengal and Mir *et al*. (2013) in Jammu reported high GI parasitic incidence in summer season.

Cattle had higher parasitic infections during August, September and October and least during January and February. Whereas, buffaloes harboured highest parasitic infection in August and least in May (Table 3). Buffalo had significantly higher rate ($p<0.05$) of parasitic infection than cattle in the month of January and February. Occurrence of parasitic infection in cattle had significantly higher rate ($p<0.05$) than buffalo in the month of May. Remaining months did not have significant variations of disease occurrence among both species (Table 3). On the other hand, comparison of parasitic infections among cattle with respect to all months showed statistically significant ($p<0.05$) variations. Similar results were obtained for samples from buffalo origin (Table 4). Marskole *et al*. (2016) recorded the monthly prevalence of GI parasites in cattle and buffaloes highest in September and least in December. According to Degefu *et al*. (2011) the overall prevalence of GI helminths infection was higher in October (wet month) and lower in February, reason for which could be favourable environment for the development of larvae. Significant difference ($p<0.05$) in the prevalence of parasitic infection among cattle and buffaloes was found only in the month of January, February and May (Table 3).

Table 4. Statistical variation in occurrence of GI parasitic infection between parameters

Species	Statistical significance		
	Chi square	*df*	*p value*
Area-wise (Ambala, Bhiwani, Mahendergarh, Rohtak)			
Cattle	93.237	3	0.000*
Buffalo	73.163	3	0.000*
Month-wise (January to December)			
Cattle	35.408	11	0.000*
Buffalo	31.120	11	0.001*
Season-wise (Rainy, Spring, Summer, Winter)			
Cattle	6.431	3	0.092*
Buffalo	4.811	3	0.186*
Age-wise (<6 month and > 6 months age)			
Cattle	10.894	1	0.001*
Buffalo	9.907	1	0.002*

*Level of significance: *p value* is significant at the 0.05 level or less.

Gastrointestinal parasitic infections in calves (<6 M) of cattle and buffalo showed no significant difference between them. Likewise results were obtained for adult (>6 M) cattle and buffalo (Supplementary Table 1). However, significant difference (p<0.05) in occurrence of GI parasites with age (between calves and adult) was observed in both cattle and buffalo (Table 4). Young animals had significantly higher rate of GI infections in both species. The present findings were in accordance with Haque *et al.* (2011) and Bilal *et al.* (2009) who reported higher prevalence of GI parasites in calves. Contrarily, the increase in prevalence of GI parasites with the age has been reported by Qureshi and Tanveer (2009) and Telila *et al*. (2014).

Gastrointestinal parasites produce detrimental effects on the health and productivity of the animals. The present study was designed to investigate the occurrence of gastrointestinal parasitic infections in bovines of Haryana with respect to species, age, season and month. Season wise GI parasitic infections were recorded to be non-significantly higher during rainy season. Significant difference in occurrence of parasitic infection was recorded area, age and month-wise. Area wise occurrence of parasitic infection was recorded highest in Rohtak and the least in Mahendergarh district of Haryana. Higher frequency of GI parasitic infections in calves than adult animals was observed. Highest parasitic infection was observed in October and August month in cattle and buffaloes, respectively. This study will be helpful in formulating effective control strategies against GI parasitic infections prevalent in cattle and buffaloes in any particular region.

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