Haryana Vet. (June, 2019) **58(1),** 60-65

Research Article

EPIDEMIOLOGY OF GASTROINTESTINAL NEMATODES OF CATTLE UNDER DIFFERENT MANAGEMENT SYSTEMS IN HARYANA

SUKHJEET SINGH, SATYAVIR SINGH and SUKHDEEP VOHRA*
Department of Veterinary Parasitology, College of Veterinary Sciences
Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar-125004, India

Received: 10.05.2018; Accepted: 21.01.2019

ABSTRACT

The epidemiology of gastrointestinal (GI) nematodes of cattle (>3 years) was studied for one year from June, 2016 to May, 2017 to know the prevalence of nematodes under different management systems i.e. small holder dairy unit, commercial dairy farm, large organised dairy farm and Gaushala in Hisar, Haryana. The strongyle eggs and *Strongyloides* spp. were found throughout the study period under different management systems. The strongyle eggs were significantly higher ($P< 0.05$) as compared to *Strongyloides* spp. However, the egg per gram of faeces was very low under all management systems, indicating very low grade of infection. Incidence and severity of GI nematodes was statistically higher ($P< 0.05$) in small holder dairy production system as compared to other three systems. Identification of infective larvae revealed *Haemonchus* spp. as the main contributor (> 87%) in all the four management systems around the year.

Key words: Epidemiology, Gastrointestinal nematodes, *Haemonchus*, Management systems

Among the various diseases affecting cattle, gastrointestinal parasites cause great economic losses. These losses are due to retarded growth, digestive disturbance, lowered production, impaired reproductive performance, and increased susceptibility of animals to other infections. Mortality may be there in severely infected young calves. Gastrointestinal nematode infections of cattle are one of the major constraints affecting efficient raising of cattle on pasture throughout the world (Gasbarre *et al.*, 2001).

Most studies on gastrointestinal nematode ecology in cattle have concluded that climatic conditions play an important role in the survival and transmission of parasite eggs and larvae. Therefore, to be effective, control measures depend on a sound understanding of the epidemiology of the disease in both the host and the environment. Various cattle production or management systems commonly practiced in Haryana state include small holder dairy units, commercial dairy farms, large organized dairy farms and Gaushalas. Cattle management systems are known to influence the prevalence of diseases as the cattle production approaches are different. The present study was formulated to study the epidemiology of gastrointestinal nematode infections in cattle under different management systems in Hisar, Haryana.

MATERIALS AND METHODS

The epidemiology of gastrointestinal nematodes of adult cattle (above 3 year of age) was studied under four separate production systems viz., small holder dairy units, commercial dairy farms, large organized dairy farms and Gaushalas at district Hisar from June, 2016 to May, 2107. Small holder dairy production system is a traditional farming system and consists of a few milking animals along with calves and heifers. With the increase in population, demand for milk has gone up and the traditional dairy farming has been revolutionized into modern dairy farming for commercial purpose. Mostly cross bred are being kept in the commercial dairy farms. Large organized dairy farms maintain large number of animals with better management practices with scientific approach. Gaushalas are charitable institutions run by trusts to house the unproductive cattle particularly indigenous, non-lactating, weak, aged and disabled stray cattle. However, healthy cattle, lactating cows and calves are also often sheltered. The animals of (Haryana breed) Ludas village, Hisar were selected for small holder dairy units, Krishna dairy and Chandan Nagar dairy at Hisar were taken as commercial (Cross bred) dairy farms, Cattle Breeding Farm, Lala Lajpat Rai University of Veterinary and Animal Sciences (LUVAS) (Haryana breed) was taken as large organized farm and Mangali Gaushala (Haryana breed) was chosen for Gaushalas management system. Thirty faecal samples per month from each management system were collected for one year. About 5 g per rectum faecal samples were collected from each animal. These were processed for flotation technique and faecal egg counts (FEC) by modified McMaster Technique for qualitative and quantitative examination of gastrointestinal nematodes.

The coproculture studies for all the four systems were also carried, every month separately to know the percent worm contribution to total population of gastrointestinal nematodes and identified as per standard technique. All the recorded data was statistically analyzed by one-way ANOVA test (SPSS software version 2.0).

*Corresponding author: sukhdeepvohra@gmail.com

RESULTS AND DISCUSSION

Epidemiology of gastrointestinal nematodes in cattle under small holder dairy units' system along with faecal egg count and coproculture during different months and seasons is given in table 1. The positivity of gastrointestinal nematodes was maximum during the month of August (43.3%) and minimum during the month of January (30.0%). The mean eggs per gram (epg) of these animals were maximum in the month of August (73.33±17.89) and minimum in January and June (53.33±17.11) with no statistical differences between different months (P>0.05) throughout the year. The epidemiological studies of gastrointestinal nematodes show maximum number of animals positive during the rainy season (40%) and minimum during winter season (33.33%). The mean epg of these animals were also maximum in rainy season (67.39±15.83) and minimum in summer season (59.17±16.33) (Table 1).

The positivity of gastrointestinal nematodes was maximum during the month of May (33.30%) and minimum during the month of June, September, October and December (16.60%) in commercial dairy farm (Table 2). History revealed that these animals were treated with fenbendazole @ 5mg/ kg body weight orally during the month of August. The mean epg of these animals were maximum with in July (54.84±18.46) and minimum with in October (20.69±9.12) with no significant difference between different months (P>0.05). The maximum number of animals were positive during summer season (25.83%) and minimum during rainy season (20%) (Table 2). The mean epg of these animals were also maximum in the summer season (40.00±14.24) and minimum in the rainy season (33.33±12.5) (Table 2).

The positivity of gastrointestinal nematodes was maximum during May (30%) and minimum during the months from June to November (13.30) in organized dairy farm, LUVAS (Table 3). Deworming history of the farm revealed that the animals were treated with fenbendazole @ 5 mg/kg body weight during the month of June. The mean epg of these animals were maximum in the month of May (40.00±12.32) and minimum in the month of June (13.33±6.31) with no significant difference in epg between the two months (P > 0.05). The gastrointestinal nematodes were maximum during the summer season (23.30%) and minimum during rainy season (13.33%). The mean epg of these animals was maximum in summer season (29.99±10.67) and minimum in rainy season (18.33±9.24) (Table 3).

The percent positivity of gastrointestinal nematodes was maximum during the month of May (33.30%) and minimum during the month of September (13.3%) in Gaushala (Table 4). Deworming history of Gaulshala revealed that cattle were dewormed with fenbendazole @ 5 mg/kg body weight orally during the month of May. The mean epg of these animals was maximum in March (53.33±17.11) and minimum in September (16.67±8.42)

Table 1
Epidemiology of gastro intestinal nematodes in cattle (> 3 year) under small holder dairy production system

Season and Month	Total positive (%)	Strogyles (%)	*Strongyloides* (%)	Faecal Egg Count (Mean±SE)	Coproculture (%)		
					H. spp.	*T.* spp.	*S.* spp.
Rainy	48 (40)	88.82	11.10	67.39±15.83			
July	12 (40.00)	94.70	5.20	70.97±19.78	92	2	6
Aug.	13(43.30)	90.50	9.50	73.33±17.89	95	2	3
Sep.	12 (40.00)	78.50	21.40	66.67±12.98	98	1	1
Oct.	11(36.67)	91.60	8.30	58.62±12.67	92	3	5
Winter	40(33.33)	84.60	15.37	60.00±17.80			
Nov.	10 (33.33)	76.40	23.50	56.67±17.08	90	4	6
Dec.	10 (33.33)	85.00	15.00	66.67±19.38	91	4	5
Jan.	9 (30.00)	87.50	12.50	53.33±17.11	89	5	6
Feb.	11 (36.67)	89.50	10.50	63.33±17.61	90	5	5
Summer	44 (36.67)	84.20	14.23	59.17±16.33			
Mar.	12 (40.00)	89.50	10.50	63.33±16.25	88	6	6
Apr.	10 (33.33)	83.40	16.60	60.00±17.02	92	4	4
May	12 (40.00)	88.90	11.10	60.00±15.61	90	4	6
June	10 (33.30)	75.00	18.70	53.33±16.42	94	1	5

H. - Haemonchus, T. - Trichostrongylus, S. - Strongyloides
*No. of animals examined= 30 per month

Table 2
Epidemiological pattern of GI nematodes in cattle in commercial dairy farm

Season and Month	Total positive (%)	Strogyles (%)	*Strongyloides* (%)	Faecal Egg Count (Mean±SE)	Coproculture (%)		
					H. spp.	*T.* spp.	*S.* spp.
Rainy	24 (20)	84.33	15.45	33.05±12.95			
July	8 (26.6)	82.30	17.60	54.84±18.46	90	4	6
Aug.	6 (20)	70.00	30.00	33.33±13.84	95	2	3
Sep.	5 (16.6)	85.00	14.20	23.33±10.38	92	2	6
Oct.	5 (16.6)	100	0.00	20.69±9.12	94	2	4
Winter	29 (24.17)	91.35	8.60	35.83±11.96			
Nov.	7 (23.3)	88.80	11.11	30.00±10.88	90	4	6
Dec.	5 (16.6)	90.90	9.09	36.67±12.21	88	4	8
Jan.	8 (26.6)	100	0.00	30.00±9.77	89	5	6
Feb.	9 (30)	85.70	14.20	46.67±14.96	94	1	5
Summer	31 (25.83)	76.3	23.65	40.00±14.24			
Mar.	8 (26.6)	90.90	9.09	36.67±12.21	88	6	6
Apr.	8 (26.6)	78.50	21.40	46.67±16.42	92	3	5
May	10 (33.3)	73.30	26.60	50.00±15.72	90	4	6
June	5 (16.6)	62.50	37.50	26.67±12.62	93	3	4

H. - Haemonchus, T. - Trichostrongylus, S. - Strongyloides
*No. of animals examined= 30 per month
**Animals were treated with fenbendazole @ 5mg/ kg b. wt. orally in August month

Table 3
Epidemiological pattern of GI nematodes in cattle in large organized dairy farm, LUVAS, Hisar

Season and Month	Total positive (%)	Strogyles (%)	*Strongyloides* (%)	Faecal Egg Count (Mean±SE)	Coproculture (%)		
					H. spp.	*T.* spp.	*S.* spp.
Rainy	16 (13.33)	77.48	22.48	18.33±9.24			
July	4 (13.3)	60.00	40.00	16.67±8.42	94	2	4
Aug.	4 (13.3)	100	0.00	16.67±8.42	90	3	7
Sep.	4 (13.3)	66.60	33.30	20.00±10.06	89	5	6
Oct.	4 (13.3)	83.30	16.60	20.00±10.06	90	4	6
Winter	23(19.16)	86.28	13.68	25.83±10.70			
Nov.	4 (13.3)	80.00	20.00	16.67±8.42	100	0	0
Dec.	5 (16.6)	87.50	12.50	26.67±12.62	90	4	6
Jan.	7 (23.3)	88.80	11.10	30.00±10.88	89	5	6
Feb.	7 (23.3)	88.80	11.10	30.00±10.88	87	5	8
Summer	28(23.30)	82.08	17.90	29.99±10.67			
Mar.	7 (23.3)	90.00	10.00	33.33±12.98	88	6	6
Apr.	8 (26.6)	80.00	20.00	33.33±11.07	90	4	6
May	9 (30.0)	83.30	16.60	40.00±12.32	90	4	6
June	4 (13.3)	75.00	25.00	13.33±6.31	98	1	1

H. - Haemonchus, T. - Trichostrongylus, S. - Strongyloides
*No. of animals examined= 30 per month
**Animals were treated with fenbendazole @ 5mg/ kg b. wt. orally in June month

with no significant difference between different months (P > 0.05). The gastrointestinal nematodes were maximum during the summer season (25.83%) and minimum during the rainy season (17.5%). The mean epg of these animals was maximum during summer season (37.55±12.83) and minimum during rainy season (27.41±11.65) (Table 4).

During the present investigation, it was found that 36.10% of cattle in small holder dairy production unit, 24.10% in commercial dairy farm, 18.61% in large organized dairy farm and 20.55% of cattle in Gaushala

Table 4
Epidemiological pattern of gastro intestinal nematodes infection in cattle in Gaushala

Season and Month	Total positive (%)	Strogyles (%)	*Strongyloides* (%)	Faecal Egg Count (Mean±SE)	Coproculture (%)		
					H. spp.	*T.* spp.	*S.* spp.
Rainy	21(17.50)	82.50	17.50	27.41±11.65			
July	7 (23.3)	75	25	38.71±14.43	94	2	4
Aug.	5 (16.6)	100	0	26.67±11.68	90	3	7
Sep.	4 (13.3)	80	20	16.67±8.42	89	5	6
Oct.	5 (16.6)	75	25	27.59±12.05	96	2	2
Winter	24(20)	86.68	13.25	30.83±12.72			
Nov.	5 (16.6)	85.8	14.2	23.33±10.38	98	1	1
Dec.	6 (20)	88.8	11.1	30.00±12.82	90	4	6
Jan.	7 (23.3)	83.3	16.6	40.00±14.86	88	5	7
Feb.	6 (20)	88.8	11.1	30.00±12.82	87	5	8
Summer	31(25.83)	82.18	17.78	37.55±12.83			
Mar.	9 (30)	87.5	12.5	53.33±17.11	88	6	6
Apr.	7 (23.3)	90	10	33.33±12.98	90	4	6
May	10 (33.3)	84.6	15.3	43.33±12.40	100	0	0
June	5 (16.6)	66.6	33.3	20.00±8.84	96	1	3

H. - Haemonchus, T. - Trichostrongylus, S. - Strongyloides
*No. of animals examined= 30 per month
**Animals were treated with fenbendazole @ 5mg/ kg b. wt. orally in May month

were carrying subclinical gastrointestinal parasitism. Singh and Kumar (1989) reported 26.2% cattle in Hisar, Haryana, Kumar *et al.* (1995) 52.90% cattle in Rajasthan, Chavhan *et al.* (2008) 32.18% in Nagpur, Maharashtra and Yadav *et al.* (2008) 17.79% cattle in Uttarakhand infected with gastrointestinal parasites.

In the present study, low prevalence (22.34%) of gastrointestinal parasites was found in the cattle more than 3 year of age, which might be due to low susceptibility of these animals to parasitic infections. Khan *et al.* (2010) observed higher infection rate among young animals as compared to adult cattle in Pakistan. Low infection rates in the present study may be attributed to their higher age (>3 years) and this observation is in concurrence with the above authors.

The prevalence of gastrointestinal parasites was higher in small holder dairy production unit (36.10%) in comparison of commercial dairy farm (24.10%), large organized farm (18.61%) and Gaushala (20.55%). The present finding is similar to the findings of Al-Dulaimi *et al.* (1986) in Iraq who also reported higher infection rate in cattle under traditional farming system than under intensive farming system.

The differences in incidence and severity were non-significant between seasons in all four management systems. The eggs of *Strongyle* spp. and *Strongyloides* spp. were found in faeces of naturally infected cattle in all the seasons throughout the year in all four management systems. However, the eggs of *Strongyle* spp. were significantly higher ($P<0.05$) as compared to *Strongyloides* spp. during all the three seasons. Incidence and severity of infection was significantly higher ($P< 0.05$) in small holder dairy production system during all the three seasons as compared to all other three systems. Further, incidence and severity did not differ significantly among commercial dairy farm, large organized farm and Gaushala among the seasons (Table 2, 3 and 4).

The infection rate of gastrointestinal nematodes was found to be statistically higher in cattle under small holder dairy units in comparison to that of commercial dairy farms, large organised dairy farm and Gaushala management system. This may be explained by the fact that the cattle under small holder dairy units were not administered any anthelmintic drug, which might have resulted into piling up of higher infection under this system. Apart from this, cattle under large organised, commercial dairy farming systems and Gaushala were always stall-fed. Further, in case of Gaushala, dry fodder is fed during most part of year, which cannot be the source of larvae for infection of cattle. In small holder dairy unit, cattle use to go for grazing on pastures contaminated with the faeces of infected animals and at times during scarcity of fodder, they were stall fed on these chaffed grasses which might have resulted into the higher infection rate under this system.

In the present study, subclinical infection with strongyles was maximum (85.02%) followed by *Strongyloides* spp. (14.98%). Almost similar observations for helminths have been recorded earlier by Rahman *et al.* (2012) in different agroclimatic zones of Sikkim and Singh *et al.* (2012) in Ludhiana, Punjab. The higher prevalence of strongyles (83.89%) was also recorded by Jimenez *et al.* (2010) from Costa Rican dairy calves, Wadhwa *et al.* (2011) in Bikaner and Vanisri *et al.* (2016) from Cheyyar Taluka of Tiruvannamalai district, Tamil Nadu.

The coproculture studies showed that only *Haemonchus* spp., *Trichostrongylus* spp. and *Strongyloides* spp. contributed to gastrointestinal nematode infection in all the management systems throughout the year in Hisar. The larvae of *Haemonchus* spp. were the main contributor throughout the year among all the three species identified in coproculture. The percent contribution of *Haemonchus* spp. was >87%. The remaining contribution was from *Trichostrongylus* spp. and *Strongyloides* spp. showing their less infection rate under different management systems (Table 1, 2, 3 and 4). These findings are similar with Gupta *et al.* (1985) who demonstrated that infective larvae of *Haemonchus* spp. were prevalent in Haryana throughout the year. Seasonal pattern with high incidence of *Haemonchus* spp. from July to November and of *Trichostrongylus* spp. from December to February has also been recorded earlier in Haryana (Gupta *et al.*, 1987).

The present investigation revealed that the overall severity of gastrointestinal parasites in cattle was low, epg was 60.28±16.65 in small holder dairy units, 36.25±13.04 in commercial dairy farm, 24.72±10.20 in large organized farm and 31.91±12.39 in Gaushala. Keyyu *et al.* (2006) recorded mean epg of 167±16 in cattle in Tanzania with maximum animals (89.8%) showing less than 500epg. Yadav et al. (2008) observed mean epg of 30.86 with a range of 0-7900 in cattle in Uttarakhand. Degefu *et al.* (2011) reported the mean count as 319.4±62.3 in cattle in Ethiopia. Sugama and Suyasa (2013) observed a low intensity of infection (epg below 500) in most of the cattle from Bali.

The infection of gastrointestinal nematodes in cattle was found similar throughout the year in all the three management systems studied in the experiment except small holder dairy units in which it was higher during rainy season. However, it has been earlier reported that during the rainy and post rainy seasons, the inhibited larvae of gastrointestinal nematodes perpetuate and develop on getting the congenial environment of moisture and humidity leading to higher infection rate and that is why infection rate was higher in small holder dairy production system during rainy season. But, in our study administration of anthelmintic drug in Gaushala, commercial dairy farm and large organised dairy farm resulted in reduced infection during rainy season. The prevalence of gastrointestinal nematodes was found to be significantly higher in small holder dairy units as compare to all other three systems. The findings were not found to be in concurrence, except small holder dairy units, with the findings of Jithendran and Bhat (1999) who reported higher rate of infection of gastrointestinal nematodes during the rainy period in comparison to the winter and summer periods. The possible reason may be anthelmintic intervention and zero grazing facilities in the three management systems.

On the basis of present investigation, it could be concluded that cattle of all four management systems were sub-clinically infected with gastrointestinal parasites. The prevalence and severity of infection varied from system to system. Strongylid nematodes were most prevalent with *Haemonchus* spp. being the main contributor.

REFERENCES

Al-Dulaimi, S.S., Jassini, B.A. and Molan, A.L. (1986). Survey of gastrointestinal helminths of cattle in Arbil. *J. Biol. Sci. Res.* **17**: 197-203.

Chavhan, P.B., Khan, L.A., Raut, P.A., Maske, D.K., Rahman, S., Podchalwar, K.S. and Siddiqui, M.F.M.F. (2008). Prevalence of nematode parasites of ruminants at Nagpur. *Vet. World.* **1**: 140.

Degefu, H., Abera, C., Yohannes, M. and Tolosa, T. (2011). Gastrointestinal helminth infections in small-scale dairy cattle farms of Jimma town, Ethiopia. Ethiop. *J. Appl. Sci. Technol.* **2**: 31-37.

Gasbarre, L.C., Leighton, E.A. and Sonstergard, T. (2001). Role of the bovine immune system and genome in resistance to gastrointestinal nematodes. *Vet. Parasitol.* **98**: 51-64.

Gupta, R.P., Yadav, C.L. and Ghosh, J.D. (1985). Epidemiology of helminths infections in calves of Haryana state. *Agri. Sci. Digest. India.* **5**: 53-56.

Gupta, R.P.; Yadav, C.L. and Chaudhri, S.S. (1987). Epidemiology of gastrointestinal nematodes of sheep and goats in Haryana, India. *Vet. Parasitol.* **24**: 117-127.

Jimenez, A.E., Fernandez, A., Alfaro, R., Dolz, G., Vargas, B., Epe, C. and Schnieder, T. (2010). A cross-sectional survey of gastrointestinal parasites with dispersal stages in feces from Costa Rican dairy calves. *J. Vet. Parasitol.* **173**: 236-246.

Jithendran, K.P. and Bhat, T.K. (1999). Epidemiology of parasites in dairy animals in northwest humid Himalayan region of India with particular reference to gastrointestinal nematodes. *Trop. Anim. Hlth. Prod.* **31**: 205-211.

Keyyu, J.D., Kassuku, A.A., Msalilwa, I.P., Monrad J. and Kyvsgaard, N.C. (2006). Cross sectional prevalence of helminth infection in cattle on traditional, small scale and large scale dairy farms in Iringa districts, Tanzania. *Vet. Res. Commun.* **30**: 45-55.

Khan, M.N., Sajid, M.S., Khan, M.K., Iqbal, Z. and Hussain, A. (2010). Gastrointestinal helminthiasis: prevalence and associated determinants in domestic ruminants of district Toba Tek Singh, Punjab, Pakistan. *J. Parasitol. Res.* **107**: 787-794.

Kumar, D., Manohar, G.S. and Kataria, A.K. (1995). Prevalence of gastrointestinal parasites in cattle in Rajasthan. VII National Congress of Veterinary Parasitology at Madras. pp: 101.

Rahman, H., Pal, P., Bandyopadhyan, S. and Chatlod, L.R. (2012). Epidemiology of gastrointestinal parasitism in cattle in Sikkim. *Indian J. Anim. Sci.* **82**: 355-358.

Singh, N.K., Singh, H., Haque, M. and Rath, S.S. (2012). Prevalence of parasitic infection in cattle of Ludhiana district, Punjab. *J. Parasit. Dis.* **36**: 256-259.

Singh, S. and Kumar, A. (1989). An epidemiological study on gastrointestinal parasitism in domestic large ruminants of Sirsa district (Haryana). *Haryana Vet.* **28**: 44-48.

Sugama, N. and Suyasa, N. (2013). Differences in the raising system to Bali cattle gastrointestinal parasitic infestations. *J. Ilmu Ternak dan Veteriner.* **18**: 289-294.

Vanisri, V., Subramanian, N. and Muthu, M. (2016). Prevalence of gastrointestinal parasites in cattle in and around Cheyyar taluk Thiruvannamalai district. *I.J.I.R.R.* **3**: 3282-3294.

Wadhwa, A., Tanwar, R.K., Singla, L.D., Eda, S., Kumar, N. and Kumar, Y. (2011). Prevalence of gastrointestinal helminths in cattle and buffaloes in Bikaner, Rajasthan. *J. Vet. Parasitol.* **25**: 46-49.

Yadav, C.L., Kumar, R.R., Vatsya, S., Garg, R. and Baneerjee, P.S. (2008). Epidemiological studies on gastrointestinal nematodosis in cattle and buffaloes. *J. Vet. Parasitol.* **22**: 49-52.