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Variation in the intensity of gastrointestinal parasitic infections in cattle of Guwahati, Assam

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ABSTRACT

The objective of the present study was to determine the intensity of gastrointestinal (G.I.) parasitic infections in cattle of Guwahati, Assam, India. A total of 2339 fecal samples of cattle were examined. In cattle, overall prevalence of infection was 58.35%. Strongyle sp. (18.76%) was predominant followed by *Eimeria* sp. (11.97%), Amphistome sp. (8.72%), *Strongyloides* sp. (3.76%), *Moniezia* sp. (2.65%), *Toxocara vitulorum* (1.32%), *Buxtonella sulcata* (0.81%), *Trichuris* sp. (0.72%), *Fasciola gigantica* (0.47%) and *Bunostomum* sp. (0.38%). Variation in the intensity of G.I. parasitic infections according to the breed and season was observed. Mean EPG in cross-bred and non-descript cattle was 617.60±11.81 and 550.44±11.05, respectively. Maximum EPG in cross-bred (842.00±32.90) and non-descript (740.79±34.48) cattle were recorded in the month of August, respectively. Independent sample test (t-test) revealed significant difference (P<0.01) in the equality of means in cross-bred and non-descript cattle with respect to EPG. Season-wise maximum EPG was recorded during monsoon (481.01±11.16) followed by post-monsoon (281.59±15.79), pre-monsoon (232.3±13.58) and winter (54.68±13.14).

1. Introduction

Livestock plays an important role in Indian economy and is an important subsector of Indian Agriculture. Among the livestock population, cattle (190.90 million) plays a major role in India's economy, accounting 37.28% of total livestock population (Livestock census, 2012). However, as per the estimation record of State Animal Husbandry and Veterinary Department, Assam has 8,938,760 cattle population (Economic Survey Assam, 2015-16). Gastrointestinal (G.I.) parasitic infections in cattle is a worldwide problem for both small and large scale farmers and is a great threat to dairy industry (Saddiqi *et al.*, 2010). The economic losses are mainly due to subclinical effects which go unnoticed to the owner's. Subclinical infections are responsible for high morbidity and mortality in young animals and enormous production losses in adults. The economic losses occurs in terms of lowered fertility, reduced work capacity, reduction in food efficiency and lower weight gain, lower milk production, increased treatment cost and mortality in heavily parasitized animals (Fikru *et al.*, 2006). Generally, low level of G.I. parasitic infection is present in animals without causing much damage to the susceptible animals. But when the intensity *i.e.* egg per gram (EPG) faeces in infected animal is high then it is harmful for the animals and require immediate treatment. Therefore, the present study was designed to know the variations in the intensity of gastrointestinal parasitic infections in cattle of Guwahati, Assam according to the breed and age of the animals.

2. Materials and Methods

2.1 Study area

The present study was conducted in Guwahati, the capital city of the state of Assam, which lies within the latitude of 26°11′0″N and longitude 91°44′0″E. The city is situated on an undulating plain with varying altitudes of 49.5-55.5 m above mean sea level. The southern and eastern sides of the city are surrounded by hillocks.

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2.2 Study design

A total of 2339 faecal samples of cattle were collected from both cross-bred and non-descript cattle present in the Government and Private dairy farms located in and around Guwahati, Assam for one calendar year from August 2012 to July 2013. The selected animals were categorized according to age *viz.* calves (<1 year), heifer (1-3 years) and adult (>3 years). The study period was divided into four seasons *viz.* Pre-monsoon (March, April, May), Monsoon (June, July, August, September), Post-monsoon (October, November) and Winter (December, January, February). Samples were examined to determine the intensity of G.I. parasitic infections according to the breed and season. At first samples were examined by flotation technique using saturated sodium chloride sp.gr. 1.20) and sucrose (sp.gr. 1.27) solutions (Soulsby, 1982). Positive samples were then quantified to estimate the egg per gram (EPG) of feces by modified McMaster technique (MAFF, 1986). Samples not being examined on the same day were preserved and stored at refrigerated temperature (4°C) for next day examination.

3. Statistical analysis

Data were statistically analyzed using Analysis of Variance (ANOVA) for significance using SAS 9.3 and SPSS 15 version.

4. Results and Discussion

Breed-wise intensity (EPG) of G.I. parasitic infection in cattle

Intensity serve as an index of the worm burdens and the counts are used as useful criteria for assessing the nature of the parasitism such as acute/chronic or sub-clinical parasitism. In the present study, the overall prevalence of G.I. parasitic infection in cattle was 58.35%. *Strongyle* sp. (18.76%) was predominant followed by *Eimeria* sp. (11.97%), *Amphistome* sp. (8.72%), *Strongyloides* sp. (3.76%), *Moniezia* sp. (2.65%), *Toxocara vitulorum* (1.32%), *Buxtonella sulcata* (0.81%), *Trichuris* sp. (0.72%), *Fasciola gigantica* (0.47%) and *Bunostomum* sp. (0.38%). Variation in the intensity *i.e.* egg per gram (EPG) of faeces was observed in different breeds of cattle. Mean EPG of 617.60±11.81 and 550.44±11.05 was recorded in the cross-bred and non-descript cattle, respectively (Table 1). In cross-bred cattle, minimum and maximum EPG of 200.00±17.84 and 842.00±32.90 was observed in the month of January and August, respectively. While in non-descript cattle, minimum and maximum EPG of 216.67±19.92 and 740.79±34.48 was recorded in the month of January and August, respectively. Independent sample test (t-test) revealed significant difference ($P<0.01$) in the equality of means in cross-bred and non-descript cattle with respect to EPG (Table 2).

In the present study, it was observed that in cross-bred cattle, the rate of infection was comparatively higher than non-descript animals which might be due to the susceptibility factor, restricted and confined stall feeding as reported earlier by Sanyal *et al.*, 1992. Similarly, Aktaruzzaman *et al.*, 2013 from Bangladesh reported more helminthic infections (76.93%) in crossbred cattle which were in compliance with the present findings. In non-descript cattle EPG count was recorded lower than crossbred which could be attributed to better resistance to infection and free-grazing practices. Sardar *et al.*, 2006 from Bangladesh also observed that prevalence of G.I. parasitic infection in crossbred cattle was higher than that of native breed. Ross *et al.*, 1959 also reported that *Bos indicus* are more resistant to the parasites than *Bos taurus*. About the levels of EPG to be considered as pathogenic, no firm limit has been fixed for lower or upper EPG limits. Roberts and Fernando 1990 estimated 13,000-25,100 EPG as pathogenic while Akhtar *et al.* (1982) considered 5,000-10,000 as moderate and above 10,000 as heavy infections. Baruah *et al.* (1980) assumed 2,700-16,000 as toxaemic infection. Lal and Canu (1979) noted 5,000 EPG as pathogenic and on the other hand, Srivastava and Sharma (1981) considered 500 as pathogenic. Such variation could possibly be due to estimation of EPG with no observation on the stage of infection and the decline in EPG output was perhaps not due to loss of parasites but due to low fecundity (Roberts and Fernando, 1990). However, EPG estimated in the present study indicated the levels of subclinical infections in the respective host species, but the impact of subclinical infections might be substantial in terms of impaired digestibility, suboptimal production and reproductive performance (Fabiyi, 1987; Garg *et al.*, 2004). It is well documented earlier that increase in the EPG count accounted for increase in worm burden of a particular host (Lyons *et al.*, 1987; Bryan and Kerr, 1989). It also helps in devising management strategies besides assessing the efficacy of control programmes and determining the interval of anthelmintic treatment.

Table 1. Intensity of G.I. parasitic infections in different breeds of cattle

Month	Egg Per Gram (EPG) (Mean±SE)	
	Cross-bred (CB)	Non-descript (ND)
Jan	200.00±17.84	216.67±19.92
Feb	364.29±40.06	390.00±34.52
Mar	404.35±28.27	303.95±19.63
Apr	374.39±20.07	349.12±17.81
May	629.46±18.14	583.33±21.46
June	746.62±26.85	643.88±31.79
July	737.91±28.08	735.48±29.74
Aug	842.00±32.90	740.79±34.48
Sept	677.19±33.63	653.92±30.96
Oct	565.91±33.22	637.50±25.04
Nov	491.03±33.81	423.96±30.50
Dec	291.18±32.44	293.33±22.06
Overall	**617.60±11.81**	**550.44±11.05**

Table 2. Independent sample test (T-test) for Equality of Means (CB vs ND) with EPG of Cattle

	Breed	N	Mean	±SE	Difference	±SE Difference	T	df	P_Value
EPG	CB	517	617.60	11.81	67.16	16.16	4.15	1083	<0.001**
	ND	568	550.44						

** Significant at P (<0.01) level (2-tailed), CB (Cross-bred), ND (Non-descript)

Season-wise intensity (EPG) of G.I. parasitic infection in cattle

Season-wise maximum EPG in cattle was recorded during monsoon (481.01±11.16) followed by post-monsoon (281.59±15.79), pre-monsoon (232.3±13.58) and winter (54.68±13.14) (Table 3). Statistical analysis revealed significant difference (P<0.05) in the intensity of G.I. parasitic infection according to season. It showed that in monsoon and winter all age groups behaved at par with, respect to the EPG. However, statistically according to age there was no difference in the EPG of calves (295.83±13.42) and heifer (265.14±12.25) but significant difference (P<0.05) was seen in adult (226.22±8.99). ANOVA revealed highly significant (P<0.01) effect of age, season and age x season interaction on EPG (Table 4).

In the present study, maximum EPG was recorded during monsoon followed by post- monsoon, pre-monsoon and winter in cattle which might be possibly due to heavy rainfall, temperature and relative humidity, congenial for growth and survival of non-sheathed infective larvae which was in agreement with Chauhan *et al.* (1973). Similarly, Borthakur and Das (1998) also recorded highest intensity of the Strongyle infection during the monsoon and post-monsoon seasons. Chavhan *et al.* (2008) from Nagpur, Sutar *et al.* (2010) from Maharastra, Khajuria *et al.* (2012) from Jammu also reported that the prevalence of G.I. parasitic infections in monsoon period was frequent and comparatively higher. High prevalence of infection during monsoon and post-monsoon seasons may be due to favourable environmental conditions such as optimal moisture, humidity and temperature for easy dispersion, development, propagation and transmission of G.I. parasitic eggs. Other factors which might be responsible are constant exposure to infections, continuous deposit of infections on the pastures by the adult animals as well as poor animal husbandry practices adopted by the farmers.

5. Conclusions

The present study revealed that the climate in this region is exclusively conducive for the development and propagation of gastrointestinal parasites in cattle throughout the year. Intensity of infection is high during monsoon season and it is therefore necessary to give strategic treatment during this season to minimize the parasitic load in susceptible animals.

Table 3. Season-wise EPG (Least Sq Mean±SE) of G.I. parasitic infections in cattle

Age group	Pre-monsoon (Least Sq Mean±SE)	Monsoon (Least Sq Mean±SE)	Post-monsoon (Least Sq Mean±SE)	Winter (Least Sq Mean±SE)	Total (Least Sq Mean±SE)
Calves	277.48^{bcd} ±28.42	490.3^{a} ±21.12	355.05^{b} ±30.1	60.48^{fg} ±26.89	295.83^{A} ±13.42
Heifer	195.68^{de} ±23.53	483.81^{a} ±20.66	331.68^{bc} ±29.8	49.4^{g} ±23.1	265.14^{A} ±12.25
Adult	223.75^{cde} ±17.26	468.92^{a} ±15.74	158.04^{ef} ±21.23	54.15^{g} ±17.26	226.22^{B} ±8.99
Total	232.3 B ±13.58	481.01A ±11.16	281.59 B ±15.79	54.68C ±13.14	270.18±7.09

Means with same superscripts are not significantly different (P>0.05)
Total means (season-wise) with same scripts are not significantly different (P>0.05)
Total means (age-wise) with same superscripts are not significantly different (P>0.05)

Table 4. Season-wise ANOVA of EPG in different age groups of cattle

Source	d.f.	Sum of Squares	Mean Square	F Ratio	Prob > F
Age	2	1795578.00	897789.00	10.0112	<.0001**
Season	3	56539510.00	18846503.00	210.1566	<.0001**
Season × Age	6	2816979.00	469496.50	5.2353	<.0001**
Error	2327	208681586.00	89678.00		
Total	2338	275142525.00			

**P (<0.01)

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7. References

Aktaruzzaman M, Rony SA, Islam MA, Yasin M and AKMA Rahman (2013) Concurrent infection and seasonal distribution of gastrointestinal parasites in cross-bred cattle of Sirajganj district in Bangladesh. Veterinary World 6(10): 720-724

Akhtar MS, Chatta MI and AH Chaudhary (1982) Comparative efficacy of santonin and piperizine against *Neoascaris vitulorum* in buffalo calves. Journal of Veterinary Pharmacology and Therapeutics 5: 71-76

Baruah PK, Singh RP and MK Bali (1980) Treatment trials and correction of electrolyte imbalance caused by *Neoascaris vitulorum* in buffalo calves. Journal of Veterinary Pharmacology and Therapeutics 5: 71-76

Bryan RP and JD Kerr (1989) The relation between the natural worm burden of steers and the faecal egg count differentiated to species. Veterinary Parasitology 30: 327-334

Borthakur SK, and MR Das (1998) Epidemiological studies on gastrointestinal helminths in dairy animals of Assam, India. Journal of Veterinary Parasitology 12: 85-88

Chauhan PPS, Bhatia BB and B Pande (1973) Incidence of gastrointestinal nematodes in buffalo and cow calves at State Livestock farms in Uttar Pradesh. Indian Journal of Animal Science 43: 216-219

Chavhan PB, Khan LA, Raut PA, Maske DK, Rahman S, Podchalwar KS and MFMF Siddiqui (2008) Prevalence of nematode parasites of ruminants at Nagpur. Veterinary World 1(5): 140

Economic Survey, Assam (2015-2016). Directorate of Economics and Statistics, Assam. Planning and Development Department, Government of Assam

Fabiyi JP (1987) Production losses and control of helminths in ruminants of tropical regions. International Journal for Parasitology 17: 435-442

Fikru R, Teshale S, Reta D and K Yosef (2006) Epidemiology of gastrointestinal parasites of ruminants in Western Oromia, Ethiopia. International Journal of Applied Research in Veterinary Medicine 4:51-57

Garg R, Banerjee PS, Yadav CL and A Garg (2004) Subclinical babesiosis and anaplasmosis in crossbred cattle in an organized farm. Journal of Veterinary Parasitology 18: 151-153

Khajuria JK, Katoch R, Yadav A, Godara R, Gupta SK and A Singh (2012) Seasonal prevalence of gastrointestinal helminths in sheep and goats of middle agro-climate zone of Jammu province. Journal of Parasitic Diseases doi. 10.1007/s12639-012-0122-3

Lal M and G Canu (1979) Rilieve sull ascaridiosidel vitello. Informatore Zooteonia 26: 38-40

Lyons ET, Drudge JH and SC Toiliver (1987) Epizotiology of internal parasite in lambs and ewes during the periparturient period in Kentucky in 1986. Proceedings of the Helminthological Society of Washington 54: 233-236

Livestock Census (2012) Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India

MAFF (1986) Ministry of Agriculture, Fisheries and Food. Manual of veterinary parasitological techniques, Her Majesty's Stationery Office, London

Srivastava A K and DN Sharma (1981) Studies on occurrence, clinical features and pathological aspects of ascariasis in buffalo calves. Journal of Veterinary Research 4: 160-162

Soulsby EJL (1982) Helminths, arthropod and protozoa of domestic animals, 7th edn. The English Language Book Soc., Bailliere Tindal, London

Sanyal PK, Singh DK and MR Knox (1992) The effect of peri-parturient anthelmintic treatment on the productivity of dairy cattle in subtropical western India. Veterinary Research Communications 16(6): 445-451

Sardar SA, Ehsan MA, Anower AKMM, Rahman MM and MA Islam (2006) Incidence of liver flukes and gastrointestinal parasites in cattle. Bangladesh Journal of Veterinary Medicine 4(1): 39-42

Saddiqi HA, Iqbal Z, Khan MN and G Muhammad (2010) Comparative resistance of sheep breeds to *Haemonchus contortus* in a natural pasture infection, International Journal of Agriculture and Biology 12: 739-743

Sutar AU, Kengar SB, Patil SS and MR Khan (2010) Prevalence of gastrointestinal parasites in goats of Ahmednagar district of Maharashtra. Veterinary World 3(10): 456-457

Ross JG, Lee RP and J Armour (1959) Haemonchosis in Nigerian Zebu cattle: The influence of genetic factors in resistance. Veterinary Record 71: 27-31

Roberts JA and ST Fernando (1990) The significance of the gastrointestinal parasites of Asian buffalo in Sri Lanka. Veterinary Research Communications 14: 481-488