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Prevalence of Nematode Larvae in Cattle and Buffalo of Guwahati, Assam

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ABSTRACT

To ascertain the larvae (L_3) of Strongyle species in cattle and buffalo present in and around Guwahati, Assam, a total of 3597 fecal samples of cattle (2339) and buffalo (1258) were screened for one calendar year from August 2012 to July 2013. The study period was divided into four seasons *viz.* pre-monsoon, monsoon, post-monsoon and winter. The selected animals were categorized according to age *viz.* calves (<1 year), heifer (1-3 years) and adult (>3 years). Fecal samples found positive for Strongyle group of parasites was subjected to coproculture for obtaining third stage infective larvae (L_3). The coproculture of cattle fecal samples revealed presence of *Haemonchus* (88.02%), *Cooperia* (3.52%), *Oesophagostomum* (3.15%), *Trichostrongylus* (2.94%) and *Mecistocirrus* (2.38%) larvae in calves; larvae of *Haemonchus* (58.27%), *Oesophagostomum* (17.48%), *Cooperia* (10.54%), *Trichostrongylus* (10.17%) and *Mecistocirrus* (3.54%) in heifer and larvae of *Haemonchus* (86.96%), *Trichostrongylus* (6.56%), *Oesophagostomum* (3.52%), *Cooperia* (2.04%), *Pelodera strongyloides* (0.75%) and *Mecistocirrus* (0.17%) in adult cattle. However, in buffalo calves percent larval composition of L_3 revealed highest prevalence of *Haemonchus* (98.5%) followed by *Cooperia* (0.92%) and *Oesophagostomum* (0.42%). In buffalo heifer, larvae of *Haemonchus* (90-98.5%), *Oesophagostomum* (2.25-2.5%), *Trichostrongylus* (1-1.75%) and *Cooperia* (1%) were observed while in adults buffalo, larvae of *Haemonchus* (>95%) was predominant followed by *Trichostrongylus* (1-2%), *Oesophagostomum* (1-1.33%) and *Cooperia* (1.25%). Seasonwise *Haemonchus* was the predominant L_3 in all the four seasons and in cattle the percentage of larvae ranges from 84.66-91.67% while in buffalo it was >98%.

1. Introduction

Livestock plays an important role in Indian economy and is an important subsector of Indian Agriculture. Among the livestock population, cattle (190.9 million) and buffalo (108.7 million) plays a major role in India's economy, accounting 37.28% and 21.23%, respectively of total livestock population (Livestock census, 2012). However, as per estimation record of State Animal Husbandry and Veterinary Department, Assam has 9,938,000 and 5,07,000 cattle and buffalo population, respectively (Economic Survey Assam, 2015-16). Gastrointestinal (G.I.) parasitic infections are common in both and responsible for causing considerable economic losses as a consequence of reduced weight gain in infected animals. It is a worldwide problem for both small and large scale farmers and is a great threat to livestock industry (Saddiqi *et al.*, 2010). Most common G.I. parasites are helminths and among them, Strongyle sp. is very common species. It comprises of several genera of nematodes within the abomasums, small and large intestines of infected animals. The genera that are producing the Strongyle type of eggs are *Haemonchus contortus*, *Oesophagostomum* sp., *Trichostrongylus* sp., *Bunostomum* sp., *Chabertia* sp., *Cooperia* sp. and *Ostertagia* sp. They have similar life cycle and produce oval, thin shelled eggs. Usually it is difficult to identify the genus and the species of eggs by fecal sample examination. Identification to genus and species is usually performed by coproculture and larval identification.

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Therefore, the present study was undertaken with the objectives of exploring the species of Strongyle parasites and other nematodes in cattle and buffalo present in and around Guwahati, Assam.

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.

2.2 Study design

A total of 3597 fecal samples of cattle (2339) and buffalo (1258) were screened to ascertain the Strongyle species present in them for one calendar year from August 2012 to July 2013. Fecal samples were collected from both Government and Private farms located in and around Guwahati, Kamrup district, Assam. 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). The selected animals were categorized according to age *viz.* calves (<1 year), heifer (1-3 years) and adult (>3 years). Fecal samples were collected directly from the rectum of the individual animal and kept in marked plastic pouch/vials. Samples not being examined on the same day were preserved and stored at refrigerated temperature (4°C) for next day examination. Fecal samples found positive for Strongyle group of parasites was subjected to coproculture for obtaining third stage infective larvae (L_3). The pooled fecal samples was finely broken and mixed with sufficient quantity of activated charcoal. The mixture was then packed loosely in glass culture dishes and incubated at 27°C for 7 days (MAFF, 1986). The L_3 was subsequently harvested and identified according to Borgsteede and Hendriks (1974) and Soulsby (1982).

3. Results and Discussion

Fecal samples found positive for Strongyle group of parasites was subjected to coproculture for obtaining third stage infective larvae (L_3). The L_3 was subsequently harvested, identified and percent larval composition of different genera of L_3 was counted.

3.1 Nematode larvae in coproculture of cattle

Monthwise and seasonwise percent larval composition of nematode larvae in coproculture of different age groups of cattle (calves, heifer, adult) revealed presence of *Haemonchus* sp., *Oesophagostomum* sp., *Cooperia* sp., *Trichostrongylus* sp., *Mecistocirrus* sp. and *Pelodera strongyloides* (Table 1, Figure 1-2). Similar reports on the prevalence of *Haemonchus*, *Oesophagostomum*, *Cooperia*, *Trichostrongylus*, *Mecistocirrus*, *Bunostomum* and *Nematodirus* larvae in coproculture of cattle was reported by Palampalle *et al.* (2002). In cattle calves, percent larval composition of L_3 revealed highest prevalence of *Haemonchus* (88.02%) followed by *Cooperia* (3.52%), *Oesophagostomum* (3.15%), *Trichostrongylus* (2.94%) and *Mecistocirrus* (2.38%). Seasonwise *Haemonchus* was the predominant L_3 in all the four seasons (84.66% to 91.67%). Coproculture showed the larval count of *Oesophagostomum*, *Cooperia*, *Trichostrongylus* and *Mecistocirrus* were low in different seasons and their prevalence ranged from 3-3.33%, 2.67-4.5%, 0.33-5.67% and 1-3.5%, respectively. Coproculture of heifer samples revealed that larvae of *Haemonchus* (58.27%) was predominant followed by *Oesophagostomum* (17.48%), *Cooperia* (10.54%), *Trichostrongylus* (10.17%) and *Mecistocirrus* (3.54%). Seasonwise the larvae of *Haemonchus, Oesophagostomum, Cooperia*, *Trichostrongylus* and *Mecistocirrus* were

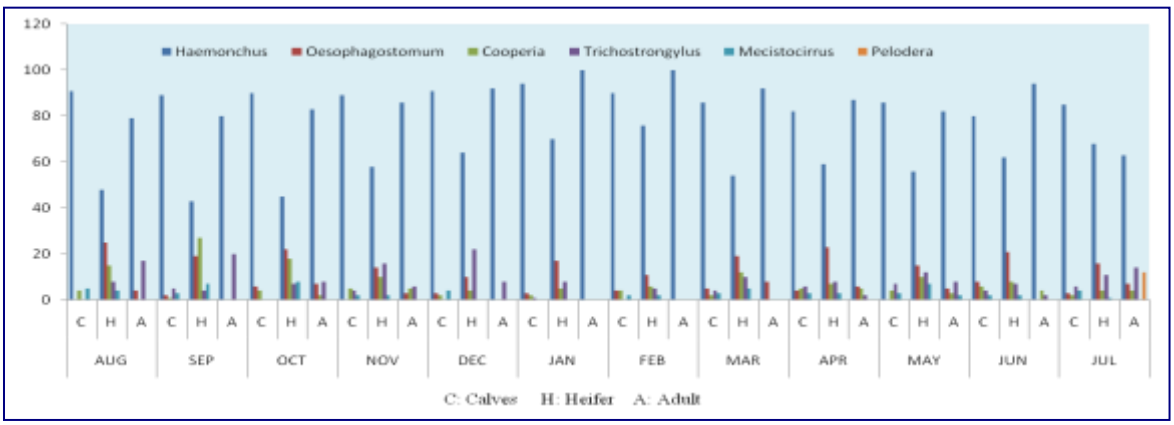


Figure 1. Percent prevalence of Nematode larvae (%) in coproculture of cattle

prevalent in all the four seasons and their proportion ranged from 51.5-70.0%, 12.67-20.25%, 5.0-14.0%, 7.5-11.67% and 0.66-5.0%, respectively. In adult cattle *Haemonchus* (86.96%) larvae was predominant followed by *Trichostrongylus* (6.56%), *Oesophagostomum* (3.52%), *Cooperia* (2.04%), *Pelodera strongyloides* (0.75%) and *Mecistocirrus* (0.17%). Seasonwise, larvae of *Haemonchus* and *Trichostrongylus* were prevalent in all the four seasons. However, larvae of *Oesophagostomum* and *Cooperia* were prevalent during pre-monsoon, monsoon and post-monsoon seasons. *Mecistocirrus* larvae were prevalent during pre-monsoon season only. *Pelodera strongyloides* was found in coproculture of adult cattle during monsoon season. The present study revealed that larvae of *Haemonchus* sp. was predominant than other nematode larvae. This finding was in agreement with the findings of Borthakur and Das (1998), Raman *et al.* (1999) and Godara *et al.*, (2003). Since, females of *Haemonchus* sp. are prolific egg layers (Urquhart, 1996) and infective stages of *Haemonchus* sp. survive for prolonged periods on pastures (Soulsby, 1982) being constantly picked up by animals while grazing in large numbers resulting in clinical haemonchosis. The larvae of *Oesophagostomum* sp. was also prevalent throughout the year which might be due to greater survivability of *Oesophagostomum* sp. in pasture (Durie, 1961). Moreover, according to Misra *et al.* (1974) variability in the species prevalence was largely dependent on local environmental conditions, particularly rainfall, temperature and humidity. This finding was in agreement with the findings of Borthakur and Das (1998), Raman *et al.* (1999) and Godara *et al.* (2003). Since, females of *Haemonchus* sp. are prolific egg layers (Urquhart, 1996) and infective stages of *Haemonchus* sp. survive for prolonged periods on pastures (Soulsby, 1982) being constantly picked up by animals while grazing in large numbers resulting in clinical haemonchosis. The larvae of *Oesophagostomum*sp. was also prevalent throughout the year which might be due to greater survivability of *Oesophagostomum* sp. in pasture (Durie,1961). Moreover, according to Misra *et al.* (1974) variability in the species prevalence was largely dependent on local environmental conditions, particularly rainfall, temperature and humidity.

3.2 Strongyle larvae (L_3) in coproculture of buffalo

The percent larval composition of nematode larvae in coproculture of different age groups of buffalo (calves, heifer, adult) revealed presence of *Haemonchus* sp., *Oesophagostomum* sp., *Cooperia* sp. and *Trichostrongylus* sp. (Table 2, Figure 4). In buffalo calves, percent larval composition of L_3 revealed highest prevalence of *Haemonchus* (98.5%) followed by *Cooperia* (0.92%) and *Oesophagostomum* (0.42%). *Trichostrongylus* larvae were not encountered in coproculture study. Seasonwise *Haemonchus* was the predominant L_3 in all the four seasons (>98%). *Oesophagostomum* and *Cooperia* larval count were lower ranging from a minimum of 0.67% to as high as 2% in the pre-monsoon, monsoon and post-monsoon seasons, respectively. The present finding revealed that larval concentration (L_3) of *Haemonchus* sp. was predominant and existing throughout the year in buffalo calves. Similar findings were reported by Gupta and Paul (1990) from Haryana. Moreover, the proficiency of the pre-parasitic stages of *Haemonchus* sp. to withstand adverse climatic conditions and as prolific egg producers as compared to other strongyle was reported earlier (Durie, 1961; Hunter and Heath, 1984). In coproculture of buffalo heifer, *Haemonchus* larvae (90-98.5%) and *Trichostrongylus* larvae (1-1.75%) existed in all the four seasons. However, *Oesophagostomum* larvae (2.25-2.5%) and *Cooperia* larvae (1%) were optimum only during monsoon and post-monsoon seasons. In adult buffalo, larvae of *Haemonchus* (>95%) was predominant followed by *Trichostrongylus* (1-2%), *Oesophagostomum* (1-1.33%) and *Cooperia* (1.25%). Seasonwise, *Haemonchus* larval output observed in pre-monsoon, monsoon and post-monsoon seasons followed by *Oesophagostomum* and *Trichostrongylus* in pre-monsoon and monsoon and *Cooperia* during monsoon season only. Similarly reports were made earlier by Thilekan and Sathianesan (1997) and Palampalle *et al.* (2002) on the highest incidence of *Haemonchus contortus* in coproculture.

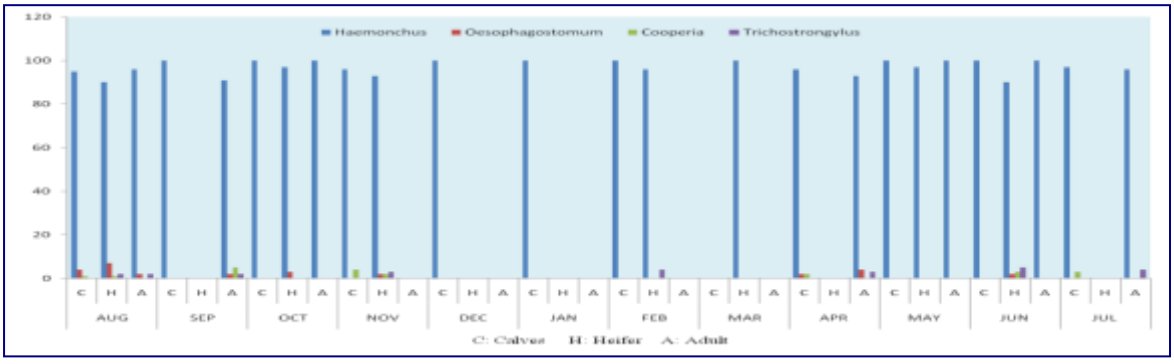
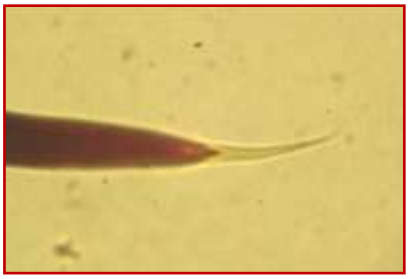


Figure 4. Percent prevalence of Strongyle larvae (%) in coproculture of buffalo

Anterior end of third stage *Haemonchus* larva (400X)

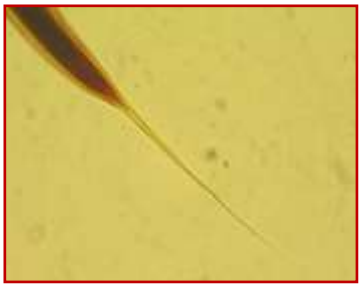
Posterior end of third stage *Haemonchus* larva (400X)

Anterior end of third stage *Trichostrongylus* larva (400X)



Posterior end of third stage *Trichostrongylus* larva (400X)

Anterior end of third stage *Cooperia* larva (400X)



Posterior end of third stage *Cooperia* larva (400X)

Anterior end of third stage *Mecistocirrus* larva (400X)

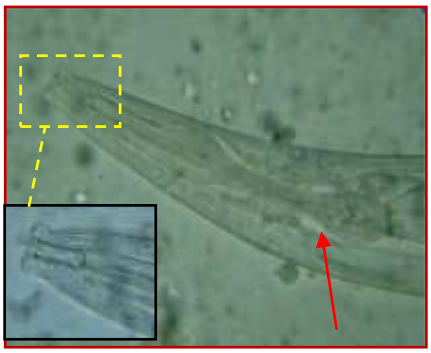
Posterior end of third stage *Mecistocirrus* larva (400X)

Anterior end of third stage *Oesophagostomum* larva (400X)

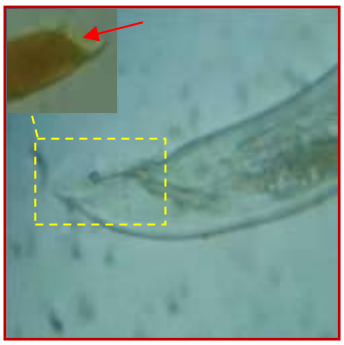
Posterior end of third stage *Oesophagostomum* larva (400X)

Figure 2. Third stage larvae (L_3) of Strongyle species

a.Male *Pelodera strongyloides* (100X)



b. Anterior end of *P. strongyloides* showing deep buccal capsule and rhabditiform oesophagus (400X)



c. Posterior end of male *P. strongyloides* showing elongated papillae (lateral view) (400X)

d.Female *Pelodera strongyloides* (100X)

e.Posterior end of female *P. Strongyloides* showing spine-like extension of tail (400X)

Figure 3. *Pelodera strongyloides* of cattle

Conclusions

The present study revealed that the nematode larvae (L_3) were prevalent in the fecal samples of the cattle and buffalo throughout the year in Guwahati, Assam and highly prevalent during monsoon season. Therefore, it is necessary to minimize the parasitic load in susceptible animals by management of the pastures and deworming the infected animals regularly.

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Table 1. Prevalence of nematode larvae in coproculture of cattle

Month/Season	Percent composition of infective larvae																	
	Haemonchus			***Oesophagostomum***			***Cooperia***			***Trichostrongylus***			***Mecistocirrus***			***Pelodera strongyloides***		
	Calves	Heifer	Adult	Calves	Heifer	Adult	Calves	Heifer	Adult	Calves	Heifer	Adult	Calves	Heifer	Adult	Calves	Heifer	Adult
MAR	86	54	92	5	19	8	2	12	-	4	10	-	3	5	-	-	-	-
APR	82	59	87	4	23	6	5	7	5	6	8	2	3	3	-	-	-	-
MAY	86	56	82	-	15	5	4	10	3	7	12	8	3	7	2	-	-	-
Pre-monsoon	**84.66**	**56.33**	**87.00**	**3.00**	**19.00**	**6.33**	**3.67**	**9.67**	**2.67**	**5.67**	**10.00**	**3.33**	**3.00**	**5.00**	**0.67**	-	-	**-**
JUNE	80	62	94	8	21	-	6	8	4	4	7	2	2	2	-	-	-	-
JULY	85	68	63	3	16	7	2	4	4	6	11	14	4	1	-	-	-	12
AUG	91	48	79	-	25	4	4	15	-	-	8	17	5	4	-	-	-	-
SEP	89	43	80	2	19	-	1	27	-	5	4	20	3	7	-	-	-	-
Monsoon	**86.25**	**55.25**	**79.00**	**3.25**	**20.25**	**2.75**	**3.25**	**13.50**	**2.00**	**3.75**	**7.50**	**13.25**	**3.50**	**3.50**	**-**	-	-	**3.00**
OCT	90	45	83	6	22	7	4	18	2	-	7	8	-	8	-	-	-	-
NOV	89	58	86	-	14	3	5	10	5	4	16	6	2	2	-	-	-	-
Post-monsoon	**89.50**	**51.50**	**84.50**	**3.00**	**18.00**	**5.00**	**4.50**	**14.00**	**3.50**	**2.00**	**11.50**	**7.00**	**1.00**	**5.00**	**-**	-	-	**-**
DEC	91	64	92	3	10	-	2	4	-	-	22	8	4	-	-	-	-	-
JAN	94	70	100	3	17	-	2	5	-	1	8	-	-	-	-	-	-	-
FEB	90	76	100	4	11	-	4	6	-	-	5	-	2	2	-	-	-	-
Winter	**91.67**	**70.00**	**97.33**	**3.33**	**12.67**	**-**	**2.67**	**5.00**	**-**	**0.33**	**11.67**	**2.67**	**2.00**	**0.66**	**-**	-	-	**-**
Overall	**88.02**	**58.27**	**86.96**	**3.15**	**17.48**	**3.52**	**3.52**	**10.54**	**2.04**	**2.94**	**10.17**	**6.56**	**2.38**	**3.54**	**0.17**	-	-	**0.75**

- (Negative)

Table 2. Prevalence of Strongyle larvae (L_3) in coproculture of buffalo

Month/Season	Percent composition of infective larvae											
	Haemonchus			***Oesophagostomum***			***Cooperia***			***Trichostrongylus***		
	Calves	Heifer	Adult	Calves	Heifer	Adult	Calves	Heifer	Adult	Calves	Heifer	Adult
MAR	-	100	-	-	-	-	-	-	-	-	-	-
APR	96	-	93	2	-	4	2	-	-	-	-	3
MAY	100	97	100	-	-	-	-	-	-	-	3	-
Pre-monsoon	**98.00**	**98.50**	**96.50**	**0.67**	**-**	**1.33**	**0.67**	**-**	**-**	**-**	**1.00**	**1.00**
JUNE	100	90	100	-	2	-	-	3	-	-	5	-
JULY	97	-	96	-	-	-	3	-	-	-	-	4
AUG	95	90	96	4	7	2	1	1	-	-	2	2
SEP	100	-	91	-	-	2	-	-	5	-	-	2
Monsoon	**98.00**	**90.00**	**95.75**	**1.00**	**2.25**	**1.00**	**1.00**	**1.00**	**1.25**	**-**	**1.75**	**2.00**
OCT	100	97	100	-	3	-	-	-	-	-	-	-
NOV	96	93	-	-	2	-	4	2	-	-	3	-
Post-monsoon	**98.00**	**95.00**	**100**	**-**	**2.50**	**-**	**2.00**	**1.00**	**-**	**-**	**1.50**	**-**
DEC	100	-	-	-	-	-	-	-	-	-	-	-
JAN	100	-	-	-	-	-	-	-	-	-	-	-
FEB	100	96	-	-	-	-	-	-	-	-	4	-
Winter	**100**	**96.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.33**	**-**
Overall	**98.5**	**94.87**	**97.42**	**0.42**	**1.19**	**0.58**	**0.92**	**0.50**	**0.31**	**-**	**1.40**	**0.75**

- (Negative)

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