

Study of *Eimeria canadensis* in *Bos indicus* from Marathwada Region

V. K. Bansode¹, S. V. Nikam², S. R. Sable³

Dept. of Zoology Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S.)

Abstract: The objective of this study is first time describe *Eimeria canadensis* in cow. *Bos indicus* from Marathwada region. The described *Eimeria canadensis*, common to cattle have not been reported previously from *Bos indicus* in this region.

Keywords: *Bos indicus*, Coccidiosis, *Eimeria*, Sporulated oocyst and Unsporulated oocyst

1. Introduction

Coccidiosis in cattle is one of the five most economically important diseases of the cattle industries. *Eimeria* are known to infect cow. Several eimeria species are pathogenic in cattle causing several clinical symptoms (Samson Himmelstjerna et al 2006, Sanchez, Romero, Foundroge 2008). Most pathogenic species in cow is *Eimeria zurnii* and *Eimeria bovis*.

In severe infection deaths occur within 7 to 10 days. In united state 2 to 3 millions cattles are treated annually, for clinical coccidiosis. It is reported that up to one in five of these animals dies. *Eimeria Canadensis* are studied and identified in different countries (Kasim, Al Shawa 1985, Munyua, Ngotho 1990 Chivonda et al 1997, Matjila, Penzhorn 2002, sanchez, romero, Founroge 2008).

Several species of coccidia cause extensive pathological damage and mortality in poultry, cattle, sheep, goat, pig and other domestic animals. For this reason coccidia have attracted the attention of many workers. Here author is describing only one species i.e. *Eimeria Canadensis*

2. Materials and Methods

The material for the study of species *Eimeria canadensis* in cow (*B. indicus*) was obtained from different localities in Marathwada region in the form of fecal matter. Fecal matter of each cow was collected in separate plastic vials. These samples were examined and processed within five to six days after collection. Used salt flotation tech. for the presence of oocyst after sieving and centrifugation. The oocysts collected were spread out in shallow petridishes in 2.5 % potassium dichromate solution for sporulation. The character included ware oocyst shape, presence or absence of micropile, polar granules and oocystic residuum. Similarly for sporosysts its shape, steida body, residuum and sporulation time was taken to consideration.

3. Description of the oocyst

The oocysts of this species are ovoid. Micropyle is inconspicuous and micropylar cap is absent. The wall of

oocyst is two layered 1 to 1.5 μm thick. Outer layer is thicker than inner layer. Inner layer is light red and outer one is reddish brown. The unsporulated oocyst has spherical to ovoidal, sporoblast at the centre in the form of compact mass. The sporulated oocyst shows four sporocysts. No oocystic residuum is seen. Sporocystic residuum is in the form of loose granules in linear masses. Sporozoites are elongated, banana shaped and lie head to tail in the sporocyst and have two to three clear refractile globules each. Steida body is very clear.

4. Dimension of sporulated oocysts are as follows:-

(All measurements are in μm) {Phase contrast at 100x X 10x}

Particulars	Oocyst from cow feces	
Length of oocyst	29-33	31
Width of oocyst	23-26	24.5
L/W ratio of oocyst	1.26	
Length of sporocyst	16-18	17
Width of sporocyst	05-07	06
L/W ratio of sporocyst	2.83	

Sporulation time:

Sporulation time of the oocyst was 4-5 days.



Unsporulated



Sporulated

Showing the Comparative Dimension of Oocysts of *Eimeria canadensis* from Cow (Based on Various Authors)

Sr. No.	Author	Oocyst (µm)		average	length / width ratio	micropyle	Sporocyst (µm)		average	length / width ratio	Oocyst wall thickness	Oocysticresidium	Sporocysticresidium	Shape of sporozoite	Steid a body	Refractil e globule	Sporula tion time
		Leng th	Wid th				Leng th	Width									
1	Nigeria research report 2004 parts of Plateau State	29.1 -36.2	21.0 -26.2	32.65x23.6	1.38	P	18.3	7.6	18.3x7.6	2.40	0.6	Ab	Ab	Elongate	-	2 - 3	3 - 5
2	M.A.Taylor,R.L. Coop,R. L.Wall (E.book : Vaterinary Parasitology)	28 - 37	20 - 22	32.5x21.0	1.54	P	12 - 22	6 - 10	17.0x8.0	2.12	-	P	P	-	P	2 - 3	3 - 4
3	Brian Lassen 2009 Estonian University of Life Sciences	28 - 37	20 - 27	32.5x23.5	1.38	P	15 - 22	6 - 10	18.5x8.0	2.31	-	-	P	-	P	-	-
4	Institute of Parasitology Univerait y of Leipzig	28 - 37	20 - 27	32.5x23.5	1.38	P	-	-	-	-	-	Ab	P	-	-	-	-
5	Zoologic al Survey of India 1980 by A.K.Mandal	25 - 37	18 - 28	31.0x23.0	1.34	P	13 - 17	6.6- 8.9	--	1.93	1.2	Ab	P	Elongated	p	1	3 - 4
6	Vasant Jadhav 2002	25 - 38	17 - 25	31.5x21.0	1.5	P	13 - 18	6 - 9	15.5x7.5	2.06	1.2	Ab	P	Banana shape	P	2 - 3	3 - 4
7	Bhatia et.al 1968	25- 37	18- 28	31.0x23.0	1.34	-	-	-	-	-	-	-	P	-	-	-	-
8	Levine and Ivens 1970	28- 38	20- 29	33.0x24.5	1.32	-	-	-	-	-	-	-	-	-	-	-	-
9	Pellerdy 1974	28- 37	20- 27	32.5x23.5	1.38	-	-	-	-	-	-	-	-	-	-	-	-
10	Present author	29- 33	23- 26	31.0x24.5	1.26	P	16- 18	05-07	17.0x6.0	2.83	1.5	Ab	P	Elongated	P	2 - 3	4 - 5

5. Results and Discussion

This species was first described by Bruce 1921 in united state. Later described by several workers as Christensen 1941, Levine and Ivens 1967. Kennedy and Kralka 1987, worked on eimeria in Alberta,Canada. Lin et al.1993 worked in China.

In Turkey Dumanli et al. 1993 worked on incidence of coccidia species. Card 1993 and Grommes 1996 worked on epidemiological study of *Eimeria* infecting among grazing calves.

In India various workers reported this species from different parts of India like Gill 1960, Patnaik1963, Patnaik and Pande 1965 and Bhatia et.al 1968.

Present author compared the species with earlier workers is shown in above table. After observation it is seen that approximately all the oocyst are similar including the present species except slight morphometric differences.

In Levine the oocysts are slightly larger than present one. V.D.Jadhav observed small polar granule which is not observed here. Sporocystic residium is absent in Plateau State which is seen in the present species though some minor variations are seen in the earlier species and the present species.

Micropyle is noted by all the workers including present author except Bhatia et al 1968, Levine and Ivens 1970, Pellerdy 1974.

Sporocystic residium is in all the earlier species except Nigeria research report which is present in present species. Oocystic residium absence in all species including present one except M.A.Taylor, R.L Coop and R.L.Wall.

Sporulation time is approximately similar in all including present species. It is concluded that the present species is *Eimeria Canadensis* as most of the characters are similar and redescribed here by present author.

6. Conclusion

Present author compared the present species with the species *Eimeria Canadensis* described by earlier workers as in above comparative chart. It is concluded that though there are minor morphometric differences the species is *Eimeria Canadensis* and redescribe here.

7. Acknowledgment

The authors are grateful to the Head, Dept. of Zoology Dr. Babasaheb Ambedkar Marathwada University, Aurangabad for his kind cooperation encouragement and facilities extended.

References

- [1] Abebe, R., Wossene, A., Kumsa, B. (2008). Epidemiology of *Eimeria* infections in calves in Addis-Ababa and Debre-Zeit dairy farms, Ethiopia. *International Journal of Applied Research in Veterinary Medicine* 6, 24–30.
- [2] Abisola Titilayo, Oluwadare. (2004). Studies on Bovine coccidia [Apicomplexa: eimeriidae] in parts of Plateau State, Nigeria. (<http://dspace.unijos.edu.ng/jspui/handle/123456789/129>).
- [3] Arslan, M., Tuzer, E. (1998). Prevalence of bovine eimeriosis in Thracia, Turkey. *Turkish Journal of Veterinary and Animal Sciences* 22, 161–164.
- [4] B. A. Pandit. (2009). Prevalence of Coccidiosis in Cattle in Kashmir valley. *Vet Scan* 2009 Vol 4 No 1.
- [5] B.L.Penzhom, S.E.Knapp and C.A.Speer. (1994). Enteric Coccidia in Free-ranging American Bison (*Bison bison*) in Montana. *Journal of Wild life Diseases*, 30 (2), 1994, pp.267-269.
- [6] Brian Lassen (2009). Diagnosis, Epidemiology and Control of Bovine coccidiosis in Estonia.
- [7] Brian Lassen, Leena Seppa-Lassila. 2014. Recovery and Sporulation of Bovine *Eimeria* oocysts after Exposure to Sub-Zero Temperature. ISSN 1392-2130. *Veterinarija Ir Zootechnika (Vet Med Zoot)*. T. 66 (88). 2014
- [8] Cicek, H., Sevimi, F., Kozan, E., Kose, M., Eser, M., Dogan, N. 2007. Prevalence of coccidia in beef cattle in western Turkey. *Parasitology Research* 101, 1239–1243.
- [9] Cornelissen, AWCA., Versteegen, R., Vanden-Brand, H., Peri, NM, Eysker, M., Lam, TJGM., Pijpers, A. 1995. An observational study of *Eimeria* species in housed cattle on Dutch dairy farms. *Veterinary Parasitology* 56, 7–16.
- [10] Dausgschies, A., Najdrowski, M. 2005. Eimeriosis in cattle: current understanding. *Journal of Veterinary Medicine B* 52, 417–427.
- [11] Dawid, F., Amede, Y., Bekele, M. 2012. Calf coccidiosis in selected dairy farms of Dire Dawa, Eastern Ethiopia. *Global Veterinaria* 9, 460–464.
- [12] Dong, H., Zhao, Q., Han, H., Jiang, L., Zhu, S., Li, T., Kong, C., Huang, B. 2012. Prevalence of coccidial infection in dairy cattle in Shanghai, China. *Journal of Parasitology* 98, 963–966.
- [13] Gill, B.S. (1960): *The coccidian oocysts of Indian cattle*. pp. Proc. 47 th session Ind. Sci. Cong. Section VII: 430.
- [14] Heidari, H., Sadeghi-Dehkordi, Z., Moayedi, R., Gharekhani, J. 2014. Occurrence and diversity of *Eimeria* species in cattle in Hamedan province, Iran. *Veterinarija Ir Zootechnika*, 59, 2014 (6): 271–275.
- [15] Heidar Heidari, Jamal Gharekhani. 2014. Detection of *Eimeria* species in Iranian native cattle. *International Journal of Advanced Research* (2014), Volume 2, Issue 7, 731-734.
- [16] Kasiman, A.A., Al-Shawa, Y.R. 1985. Prevalence of *Eimeria* in faeces of cattle in Saudi Arabia. *Veterinary Parasitology* 7, 95–99.
- [17] Kennedy, M.J., Kralka, A. 1987. A survey of *Eimeria* spp. in cattle of Central Alberta. *The Canadian Veterinary Journal* 3, 124–125.
- [18] Klockiewicz, M., Kaba, J., Tomczuk, K., Janecka, E., Sadzikowski, A.B., Rypula, K., Studzinska, M., Malecki-Tepicht, J. 2007. The epidemiology of calf coccidiosis (*Eimeria* spp.) in Poland. *Parasitology Research* 101, 121–128.
- [19] Nikam, S.V. 2011. Protozoology. Oxford book company, Jaipur, New Delhi.
- [20] Nikam, S.V. and Borde, S.N. 2013. A textbook of Practical Zoology Protozoa and Helminths, Dama international publication Solapur Maharashtra India.
- [21] Paul Tshepo Matjila. 2000. Occurrence and diversity of Bovine coccidia at three localities in South Africa. Department of Veterinary Tropical Diseases Faculty of Veterinary Science University of Pretoria Pretoria
- [22] Pilarczyk, B., Balicka-Ramisz, A., Ramisz, A. 2000. Studies in coccidiosis in cattle in Northwest Poland. *Electronic Journal of Polish Agricultural Universities* 3, 101–103.
- [23] Rahmeto, Abebe, Abebe, Wossene., Bersissa, Kumsa., 2008. Epidemiology of *Eimeria* Infections in Calves in Addis Ababa and DebreZeit Dairy Farms, Ethiopia. *Intern J Appl Res Vet Med*, Vol. 6, No. 1, 2008.
- [24] Nalbantoglu, S., Sari, B., Cicek, H., Karaer, Z. 2008. Prevalence of Coccidian Species in the Water Buffalo (*Bubalus Bubalis*) in the Province of Afyon, Turkey. *ACTA VET. BRNO* 2008, 77: 111–116; doi:10.2754/avb200877010111.
- [25] Yakhchali, M., Zarei, M.R. 2008. A survey of frequency and diversity of *Eimeria* species in cattle and

buffalo in Tabriz region (in Persian). *Iranian Veterinary Journal* 4, 94–102.

Author Profile

Vikas K. Bansode is Ph.D Scholar, Dept. of Zoology Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. 431001 (M.S) India. Working under the guidance of Dr. Nikam S.V. from last 3 years.

S. V. Nikam is professor (Retired) in Dept. of zoology Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. 431001 (M.S) India. She is specialized in parasitology and has 100 research papers to her credit in national and international journals and also two books prescribed for UG/PG Student.

S. R. Sable is Ph.D Scholar, Dept. of Zoology Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. 431001 (M.S) India. Working under the guidance of Dr. Nikam S.V. from last 3 years.