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Comparison of different farm management system in relation to prevalence of *Eimeria* species in calves of Jammu region

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Abstract

Eimeriosis is caused by infestation of epithelial lining of alimentary canal by *Eimeria* sp. and is considered as important causative agent of diarrhoea in calves of young age. Epidemiological data helps in estimation of important risk factors that are responsible for pathogen transmission, viability, its virulence and immune interaction. In case of *Eimeria* infection, farm management plays important role in oocysts load and its intensity of infection. Therefore our study was designed to estimate the prevalence of *Eimeria* infection in young calves (<6 months age) in organized and unorganized dairy farms in and around Jammu region during period of January 2022- December 2023. Faecal collection and processing with saturated salt solution was done. The prevalence of eimeriosis in organized farms was significantly ($p<0.05$) low (30%) as compared to unorganized farms (63.3%). The Odds ratio observed at 95% confidence interval (CI) between organized vs unorganized farms is 4.03. Our study concludes higher percentage of positive cases of *Eimeria* in calves from unorganized areas, suggesting role of better farm management practices in prevention of eimeriosis.

Keywords: Farm management system, *Eimeria* species, calves

1. Introduction

Eimeriosis is caused by protozoan belongs to genus *Eimeria* spp. which parasitizes the epithelial lining of alimentary canal and is an important causative agent of diarrhea in livestock worldwide (Dubey *et al.*, 2018) [3]. They are considered to be host specific (Levine and Ivens, 1979) [8]. Out of numerous species of *Eimeria* in cattle; *Eimeria bovis*, *E. zuernii*, *E. bukidnonensis*, *E. subsphrica*, *E. auburnensis*, *E. ellipsodalis*, *E. Canadensis*, *E. alabamensis* and *E. cylindrica* are commonly found in northern region of India (Pandit, 2009) [5]. Out of these, *E. bovis* and *E. zuernii* are predominant ones, causing high morbidity and mortality with reduced intestinal functioning associated with diarrhoea containing blood, fibrin etc. Instead, *Eimeria bareillyi* has been considered as pathogenic species in buffaloes and no transmission to cattle has been documented yet (Dubey *et al.*, 2018) [3]. Economical impact caused by *Eimeriosis* is mainly due to reduced weight gain and deaths of young stock (Bahrami *et al.*, 2013) [1]. Epidemiological evidences of *Eimeria* infection in cattle showed higher prevalence of clinical cases in young calves (<6 months age) (Nain, 2017) due to lack of immunity (Graufner and Graubmann, 1979) [4], but prevalence has been documented in yearlings also (Cornelissen *et al.*, 1995) [2]. Chief cause of morbidity and mortality in calves is diarrhoea. Death rate in calves associated with diarrhoea ranges from 2 to 20% (Radostits, 2006) [6]. Estimation of *Eimeria* spp. infection has been documented on the basis of farm management by many authors. In Jammu region, the information related to the importance of epidemiological factors against eimeriosis is scarce. By keeping in view the importance of management system in prevention of eimeriosis in calves, therefore our study was designed to determine the Prevalence of *Eimeria* species in bovine calves reared in different farm management system in Jammu.

2. Materials and Methods

The study was carried out in farms of diverse management systems *viz.*, organized and unorganized dairy farms which were visited periodically in and around Jammu region during period of January 2022- December 2023. Fecal samples were collected from rectum of calves (<6 months) directly and labelled in polythene cover with full description of owner's name and management history.

Faecal samples were stored at 4 °C with appropriate amount of potassium dichromate (2.5%). The *Eimeria* oocysts were examined by floatation technique using saturated salt solution as per method described by Soulsby (1982) [7]. The positive samples found in floatation technique were quantified using modified Mc Master counting chamber as per method of Davis *et al.* (1963) [9]. In a mortar and pestle, 3 grams of faeces were triturated in 42 ml of purified water, sieved through a wire mesh and aliquots were made in 15 ml centrifuge tube. Centrifugation at 3000 rpm for 10 min was done thereafter, supernatants were discarded. The pellets were resuspended in saturated salt solution to their original volume of 15ml. The Mc master chamber was charged with saturated pellet (0.15ml in each) and number of oocysts per gram was obtained by multiplying the total oocysts in the two squares by 50.

3. Results and Discussion

The prevalence of eimeriosis in organized farms was significantly ($p < 0.05$) low (30%) as compared to unorganized farms (63.3%). The Odds ratio observed at 95% confidence interval (CI) between organized vs unorganized farms is 4.03 as shown in Table 1. It suggested that the chance of occurrence of eimeriosis in bovine calves of unorganized

farms is 4.03 times higher than organized ones. Our result was in accordance to findings of Cornelissen *et al.* (1995) [2] which states that in organized farms general hygienic standards are high, and manure is frequently removed. These measures reduce the intake of high numbers of infective oocysts by calves considerably. Also, as per findings of Tamrat *et al.* (2020) [10] prevalence of eimeriosis in separated and cleaned housing condition was significantly lesser than unorganized set up. The relative risk suggested that in cleaned separated house, risk of eimeriosis was 2.072 times lesser than unorganized set up. Whereas, Klockiewicz *et al.* (2008) [11] suggested that prevalence of eimeriosis was greater in big organized farms than small unorganized ones. These could be related with the fact that calves of the large herds are in overcrowded conditions during the day time when they are located in the management pen. These animals will be more likely to ingest large numbers of sporulated *Eimeria* oocysts over a short period of time. Also, animals in an overcrowded management pen will facilitate faecal contamination of water and feed troughs (Rodríguez *et al.*, 1988) [12]. The predominant species that were found in our study was *E. bovis* and *E. zuernii* (Figure 2). They are considered as pathogenic species of *Eimeria* genus.

Table 1: Farm management wise prevalence and risk of eimeriosis infecting calves of Jammu region

Farm management	No. of Farms examined	No. of Farms positive	Farms positive (%)	p value	Odds Ratio	95% CI
Organized farms	30	09	30%	$p < 0.05$	-	-
Unorganized farms	30	19	63.3%		4.03	0.87-7.39

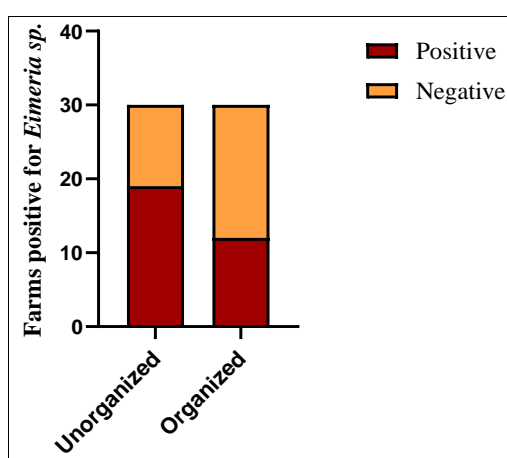


Fig 1: Graph depicting positive organized and unorganized farms of Jammu region infected with *Eimeria* species

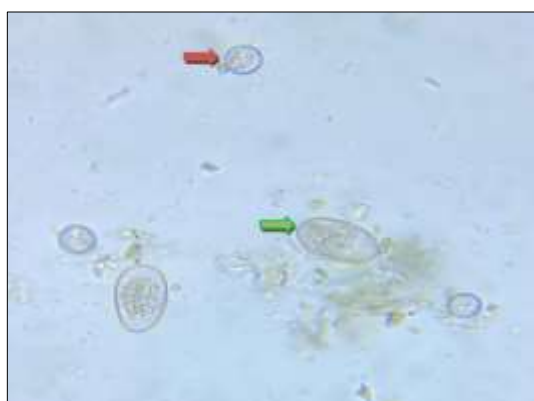


Fig 2: Oocysts of *Eimeria bovis* (Green arrow) and *E. zuernii* (red) (40X)

4. Conclusion

The present study revealed that there was a higher incidence of eimeriosis in calves of unorganized setup than organized one. The average level of oocysts per gram of faeces and the widespread presence of two highly pathogenic species (*E. bovis* and *E. zuernii*) is particularly alarming. Based on the finding of this study, due attention should be given to better implementation of calf management practices regarding housing, cleaning and sanitation.

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