

INCIDENCE OF *Buxtonella sulcata* INFECTION IN CATTLE FROM ORGANIZED AND UNORGANIZED DAIRY FARMS IN TAMIL NADU

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Abstract: The ciliates are present in the digestive tract of adult cattle as commensals helping for digesting plant fibres. *Buxtonellasulcata* is one of such ciliates identified in colon. In the recent past the occurrence of this ciliate in clinical cases of enteritis in calves and cows have been increasingly reported indicating its pathogenicity in pre-ruminant calves and adult cows. This study reports on the incidence of buxtonellosis in organised and unorganised dairy farms in Chennai, Tamil Nadu. The faecal samples collected from the calves and cows with the history of watery diarrhoea in two organized (n=62) and six unorganized dairy farms (n=76) in Chennai. The samples were subjected to coprological examination as per the standard laboratory methods. The incidence of *B. sulcata* infection in organized and unorganized dairy farms recorded in this study were 35.48% and 54.95% respectively based on the identification of cysts of *B.sulcata* in diarrhoeic faeces. The cyst per gram (CPG) of faeces was performed to investigate the intensity of infection.

Keywords: *Buxtonella sulcata*, cattle, diarrhoea, cysts per gram (CPG) of faeces.

Introduction

Protozoa occurring in the digestive system of ruminants are associated with the digestive processes taking place in the forstomach. Colon is often inhabited by the Ciliophora type of protozoa which are considered to be commensals in digestion of plant feed. *Buxtonellasulcata* had been considered to be one of these kind of ciliates (Jameson, 1926). Inside the host they are in vegetative forms living in colon of ruminants and outside the host these organisms form a cyst. It is an endosporic form but also invasive size of the cyst is variable depending upon the days after excretion. Some authors described these ciliates as parasitic protozoan (Urman and Kellky, 1964). The incidence of *B. sulcata* associated diarrhoea in adult cattle and calves have been reported in the past two decades from Iran (Hasheminasab *et al.*, 2015; Omeragic and Crnkic, 2015), Iraq (Aayiz, 2005; Al-Zubaid and Al-Mayah, 2011), Nepal (Adhikari *et. al.*, 2015), Serbia (Kocis *et al.*, 2015) and Korea (Hong and Youn, 1995). The incidence of *B. sulcata* in Indian subcontinent is sporadic from Karnataka (Mamatha and Placid, 2006) and Jammu and Kashmir state (Ganai *et al.*, 2015).

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This paper reports the incidence of *B. sulcata* infection in diarrhoeic cattle maintained in organized and unorganized dairy farms from Tamil Nadu.

Materials and Methods

The dung samples were collected from diarrhoeic calves and adult cows from two organised farms (n=62) and six unorganised dairy farms (n=76) and were examined for the presence of oocysts of coccidian parasites. During these screening *Buxtonellasulcata* cysts were identified based on morphological features. To determine the intensity of infection, cysts per gram (CPG) of faeces was performed using standard method. Briefly, two grams of dung sample was mixed with 28 ml of water and thoroughly homogenised. From the homogenized sample 0.3 ml was transferred on a slide and the number of cysts counted from 0.3 ml was multiplied by 50 to arrive CPG.

The clinical examination was done and the parameters like rectal temperature, heart rate, respiration rate, skin turgor test, capillary refilling time, faecal consistency score and health score were recorded. Health score was rated as per the level of alertness on 4 point scale; 1= normal (alert and responsive to feed or suckling milk from the dam, standing, walking and running), 2= mild depression (slow to respond to feed and suckling milk from the dam, standing from sternal recumbency during stimuli), 3 = severe depression (no response to feed, not suckling milk from dam, adopt sternal recumbency from lateral recumbency during stimuli) and 4 = dead or moribund (lateral recumbency and no response for stimuli). Faecal score was rated on a 5 points scale; 1 = normal (retains form/ does not flow across a surface), 2 = mild diarrhoea (flows slowly across a surface), 3 = moderate diarrhoea (fairly watery and flows easily across a surface leaving adherent material), 4 = severe diarrhoea (very watery and leaves no residue when flowing across a surface) and 5 = not observed. The data obtained from this study were analysed by students 't' test with a *p* value of less than 0.05 was considered significant.

Results and Discussion

B. sulcata cysts were identified based on the morphological features (Rees, 1930; Henriksen, 1977; Fox and Jacops, 1984; Aayiz, 2005; Krzysztof *et al.*, 2005). The cysts were round with a diameter ranging from 70-105 μ m (Fig. 1). This study recorded 35.48% and 54.95% of incidence in organized and unorganized dairy farms respectively (Table 1). Ganai *et al.* (2015) reported an incidence rate of 23.6 % in cattle in Jammu and Kashmir in India. The Nepal report indicated 27 % incidence in cattle Adhikari *et al.*(2013) whereas Iraqi report indicated 43.2% incidence in neonatal calves (Al-Zubaidi and Al-Mayah, 2011). The highest

incidence of 87.9% was reported from Poland in diarrheic cattle (Tomczuk *et al.*, 2005). These evidences indicate the increasing recognition of *B. sulcata* in clinical cases of diarrhoea in neonatal and young calves and adult cattle all over the world.

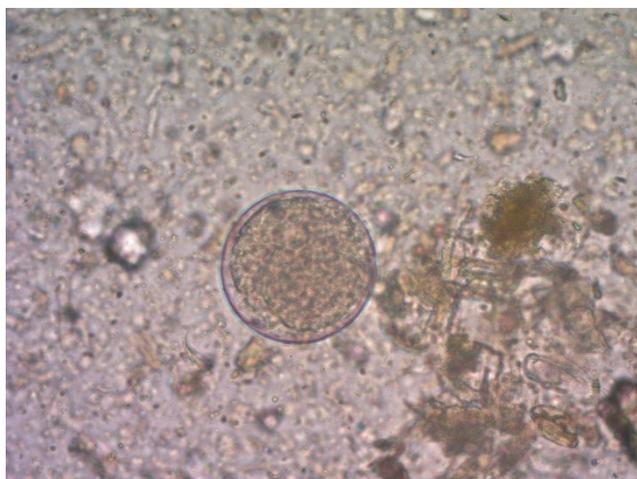


Fig. 1. *Buxtonella sulcata* oocyst

This study documented a high incidence rate of *B. sulcata* infection in unorganized dairy farms. The clinical examination also indicated some significant variation in the skin turgor test, capillary refilling time, heart rate, respiration rate, health score and faecal score in animals from unorganised dairy farm than organized dairy farms. This could be explained by various factors including the managemental and environmental hygiene between organized and unorganized dairy farms.

Table 1: Incidence and clinical manifestations in *Buxtonella sulcata* infected cattle

Parameter	Organised dairy farms (n=62)	Unorganised dairy farms (n=76)	F Value	P Value
Incidence (%)	35.48% (22/62)	54.95% (41/76)		
Mean rectal temperature (°C)	37.9 ± 0.02	37.9 ± 0.03	2.514	0.115
Capillary Refilling Time (sec)	1.27 ± 0.05	1.42 ± 0.06	12.49	0.001
Skin Turgor Test (sec.)	4.48 ± 0.30	5.30 ± 0.30	4.43	0.037
Mean heart rate (bpm)	65.7 ± 0.86	67.7 ± 0.88	4.83	0.03
Mean respiration rate (bpm)	25.6 ± 0.41	36.5 ± 0.42	6.66	0.011
Mean health score	1.47 ± 0.1	1.72 ± 0.1	6.28	0.013
Mean faecal score	1.74 ± 0.2	2.14 ± 0.2	9.01	0.003
Mean CPG of faeces	531 ± 110	806 ± 108	5.26	0.023

The significantly high mean CPG of faeces in animals from unorganized dairy farms than organized dairy farms also explained the increased infection rate of *B. sulcata* in poor hygiene and managerial practices.

The problem of buxtonellosis in ruminants has not been found as a great problem. This protozoan has generally considered as a commensal of alimentary tract of ruminants (Hong and Youn, 1995). But, later it was observed that the cysts are invasive and the increased invasion of the protozoan may result in the acceleration of the passage of alimentary contents in the digestive tract thus causing clinical disorders like diarrhoea and poor condition of animals (Tomczuk *et. al.*, 2005).

Diarrhoea continues to be a major cause death in neonatal and young calves. Many parasites have been reported to cause diarrhoea in calves, importantly *Cryptosporidium parvum*, *Eimeria* species, *Balantidium coli* and *Giardia* species. In the case of diarrhoea of unexplained aetiology in dairy cows and calves, the possibility of *B. sulcata* infection has to be ruled out. Primary infections, without bacterial involvement may be treated with normalization of feeding system and administering probiotics when the cases are further complicated with bacterial involvement, it has to be treated with selected antibiotics. It is concluded from this study that the incidence of *B. sulcata* was significantly altered by managerial conditions.

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