

Prevalence and Risk Factors Associated with Bovine Viral Diarrhea Virus Infection in Dairy Cattle of North Western Zone of Tamilnadu

S. Krishna kumar^{1*}, K.M. Palanivel, K. Sukumar, Ponnudurai,
G. Selvaraju and Samuel Masilomoni Ronald

¹Assistant Professor, Department of Veterinary Preventive Medicine,
Veterinary College and Research Institute, Namakkal 637002, Tamil Nadu

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Abstract

A cross sectional study was carried out to identify the seroprevalence and risk factors associated with bovine viral diarrhoea (BVD) infection in non vaccinated dairy cattle herds of north western part of Tamil Nadu between September 2014 and August 2016. A total of 500 sera samples were collected from 62 dairy herds and indirect ELISA was carried out for BVD antibodies. A pre defined questionnaire which included variables related to herd size, frequency of purchase and pattern of purchase of new animals was collected from each herd. A herd with one animal positive for BVDV antibodies considered BVD sero positive to calculate herd sero positivity. The overall sero prevalence in the study population was 13.20%. The Chi square model showed that flock size, location and animal purchasing pattern were the potential risk factors associated with BVD infection in dairy cattle.

Key words: Bovine viral diarrhoea – Serology – i ELISA - Risk factors –Tamil Nadu

Introduction

Bovine viral diarrhoea (BVD) is considered one of the most devastating disease with pandemic in nature and high prevalence which causes negative economic impact on the production (Gates *et al.*, 2014).The objective of this study was to determine the risk factors in the

occurrence of BVD infection in dairy cattle, to formulate the prevention strategy at farm level.

Materials and methods

Sampling

A total of 500 sera samples were collected from 62 dairy farms located in north western zone of Tamil Nadu which includes Coimbatore, Erode, Tirupur and Karur districts. From each district, 125 sera samples were collected by simple random sampling method. Sample size was determined by assuming the herd level BVD expected prevalence was 20 % at 95 per cent confidence interval with an accepted error of 5 per cent. A pre structured questionnaire including open and close ended questions was designed to obtain the information's on location, animal purchasing pattern and herd size in the study population. Stocking density was less than 25 numbers, between 25 and 50 and more than 50 were categorized as small, medium and large herd respectively. Animals were not immunized for BVD and animals older than 6 months were selected to avoid maternal antibody interference.

*Email: subbiahkrishnakumar74@gmail.com

Serology

Blood samples were collected in BD colt activator tubes and transported in ice to the laboratory. Samples were centrifuged at 1500 rpm for 10 min and stored at – 200 C. The test sera were inactivated by keeping at 560 C for 30 min. IDEXX BVDV Total Ab Test kit (HerdChek* BVDV Ab IDEXX, Switzerland) was used for BVD serology. The sensitivity and specificity of the indirect ELISA test was 96.3% and 99.5% respectively.

Statistical Analysis

The sero prevalence of BVDV was estimated by using the ratio of positive

samples with the total number of animals screened. Epidemiological risk factors were analyzed with Chi square test at 0.05 % confidence interval.

Results

Prevalence

Out of 62 dairy herd screened, 15 herds from Tirupur, 14 herds at Coimbatore, 19 and 14 herd from from Erode and Karur respectively. Among the 62 herd, 17 herds were positive for BVD antibodies. Coimbatore district ranks first with nine herd for BVD antibodies followed by five herd in Tirupur, two herd in Erode and one herd in Karur. (Table 1)

Table 1: Zone wise seroprevalence of BVD in dairy cattle by i ELISA

District	Herd tested	Herd positive	Sero positive animals	% positive	Chi-square value	P value
Coimbatore	14	09	40	32.00	46.991^a	0.00
Erode	19	02	07	5.60		
Karur	14	01	03	2.40		
Tirupur	15	05	16	12.80		
Total	62	17	66	13.20		

The highest seroprevalence of BVD in Coimbatore with 32 per cent, 12.80% in Tirupur district, 5.6 per cent in Erode, and 2.4 per cent in Karur district. The influence of location, herd size and purchasing pattern on seroprevalence of BVD in cattle was statistically significant at 0.05 level ($p < 0.05$)

Risk factor

Out of 347 samples collected from small herds, 22 animals found positive for BVD. Whereas six and 38 animals were positive for BVD in medium and larger herds respectively (Table 2).

Table 2: Herd size variable with BVD antibody status of dairy cattle in north western zone of Tamil Nadu

Herd size	Samples screened	Samples positive	% Positive	Chi square value	P value
Small	347	22	6.3	61.718^a	0.000
Medium	47	06	12.8		
Large	106	38	35.8		

Percentage positivity of 35.8, 12.8 and 6.3 were noticed in larger, medium and smaller herd respectively and significantly associated with BVD sero prevalence at 0.05 level ($p < 0.05$).

Discussion

In the present study, animal level BVD seroprevalence rate was 32, 5.6, 2.4 and 12.80 per cent in Coimbatore, Erode, Karur and Tirupur districts respectively (Table 1). In contrast to this study, Sudharshana *et al.* (1999) and Selvaraj *et al.* (2007) found that 17.31 and 27.4 per cent BVD prevalence by i-ELISA in Tamil Nadu respectively. However Dighe *et al.* (2002) who reported that higher seroprevalence (40.66 %) of BVD in dairy cattle in Tamil Nadu.

The reasons for low level prevalence of BVD (13.20%) in dairy animals were, smaller sample size,

restricted regions, herd size and animals would pickup transient infection. (Table 2). The process of decrease in sero positivity might be due to self-clearance mechanism, is probably dependent on several factors such as herd size, extent of animal movements within and between herds, and degree of contact and smaller herd having higher degree of self clearance than larger herd as indicated by Mollema *et al.* (2005)

The prevalence of BVD was lower in Erode and Karur districts where smaller herds were more in these districts and frequency of replacement of animals were very rare (table 3) which is the main reason for rapid self-clearance process. The BVD infections were initially introduced to the herds by infected newly purchased animals afterwards only few animals were purchased after the establishment of the herd initially.

Table 3: Herd size distribution pattern in the study area

Herd size	Coimbatore	Erode	Karur	Tirupur
Small	03	18	08	07
medium	07	01	03	04
Large	04	00	03	04
Total	14	19	14	15

Moreover, replacement of animals with frequent spell of time will increase the risk of introduction of persistently infected animals and pregnant females gestating PI fetuses were assumed to get entered into the farm (Saa *et al.*, 2012). This study proved that few commercial dairy herds were having alarming seropositivity (66%) because of frequent replacement of stock to maintain the milk production to meet out the market demand. Similar findings were found by

Gates *et al.* (2014) and Graham *et al.* (2015) that dairy herds with higher replacement of stock having higher prevalence rate with every chance of inclusion of persistently or transiently infected animals in to the herd.

Conclusion

This study concluded that seroprevalence of BVD infection in dairy cattle of north western zone of Tamil Nadu was recorded and herd size, frequent

replacement of stock would impact for the occurrence of BVD in dairy cattle.

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