

Seroprevalence and Risk Factors of Bovine Viral Diarrhea in Improved Cattle of Chitwan, Nawalpur and Rupandehi Districts of Nepal

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ABSTRACT

This study was aimed at assessing the prevalence of bovine viral diarrhoea (BVD) in improved dairy cattle of Chitwan, Nawalpur and Rupandehi Districts of Nepal. Altogether 92 blood samples were aseptically collected from jugular vein of cattle and transferred to clot activator tube and transported to National Cattle Research Program, Rampur, Chitwan. This cross sectional study was carried out from Mangsir to Magh of 2075 B.S using purposive sampling. Serum separation was done by centrifugation @3500 for 5 minutes. The serum was stored at -20°C till ELISA test was done. Serological analysis was done according to the protocol of ID.vet BVD Ab ELISA kit. Data were analyzed using Ms excel and SPSS version 20.0. The seroprevalence of BVD Virus was found to be 7.76%. Provided that no history of vaccination against BVD in cattle was done in the study area, seropositive was due to natural infection. Geographic location as well as sampling method might have contributed to this result. The result indicated lower prevalence along with no statistical significance to breed and age risk factors undertaken during the research. However significant association was observed between abortion history and seropositivity. Hence, there is a need of further research to identify the disease burden and its impact in the agricultural gross domestic products (AGDP).

Keywords: Bovine viral diarrhoea, Seroprevalence, ELISA, Dairy cattle

INTRODUCTION

Bovine viral diarrhoea (BVD) is an infectious and highly contagious viral disease of cattle. It is cosmopolitan in distribution and Office International des Epizootic (OIE) has listed it as notifiable disease. In Nepal, infertility problem in crossbreed and exotic cattle has been reported to be the most prioritized problem in pocket area in the country (Jha, 2000). It is caused by Pestivirus of family Flaviviridae which is characterized by alimentary, respiratory and reproductive disorder along with haemorrhagic syndrome and thrombocytopaenia (Baker, 1995). BVD virus (BVDV) is divided into two biotypes cytopathic (CP) and non-cytopathic (NCP) based on cytopathic effect on cell culture (Vanroose *et al.*, 1998). NCP can cross the placenta and is thus considered important. Noncytopathic crosses through the placenta to establish a persistent infection (PI). If the fetus is infected and survives after birth, BVD virus can severely affect the reproductive and nervous system (Saliki JT 2004). Reproductive problems like abortion and infertility are of major concerns in the dairy farming of Nepal. Very limited information is available regarding the causes of bovine reproductive problems in Nepal.

The prevalence of persistent BVDV infection in dairy cattle in two commercially important livestock districts i.e. Chitwan was 0.7% and Kavrepalanchowk was 3.4% as individual animal prevalence (Gaire T.N *et.al.*, 2016). Import of most of the BVDV infected cross-breed dairy cattle from India makes Tarai of Nepal more susceptible to BVDV. The BVDV is transmitted by direct contact to animals, by transplacental route, by discharges from reproductive tract of an infected cow (Meyling *et.al.*, 1990). The prevalence of persistent BVDV infections ranges from 0.5-2% in cattle populations from different countries of the world (Charleston B *et.al.*, 2001). In India, 15.3% cattle and 23.2% buffaloes were reported to be BVDV positive (Sudharshana K.J. *et.al.*, 1999).

MATERIALS AND METHODS

The study was carried out from December 2018 to February 2019 at National Cattle Research Program, Rampur, Chitwan. The 92 cattle serum samples were collected from eastern areas of Chitwan (Ratnanagar municipality), Nawalpur (Gaidakot and Kawasoti Municipality) and Rupandehi (Sunwaland Devdaha municipality). Animals were selected on the basis of the history in relation to their reproductive problems. The test was carried out in accordance to the manual of the ID Vet France @ BVD Ab ELISA for in vitro detection of antibodies. The ELISA used was of ID Vet-BVD P80 Antibody detection Lot/Ch.B: 693-008. The sample size necessary for detection of BVDV was calculated from EpiTools Epidemiological Calculators by Ausvet, in assumption of overall 2.2% of prevalence of BVDV infection in dairy cattle of Nepal (Manandhar S *et.al.*, 2018) computed with expected precision of 5% and 95% of confidence level. The data generated were stored in the MS excel 2010 and overall prevalence was calculated from MS excel. Questionnaire survey was also employed that included general description, herd history and individual animal history. Association between the categorical variables and outcomes variable was assessed by using IBM SPSS statistics 20.

RESULT AND DISCUSSION

Overall Seroprevalence of BVD

The study reveals overall seroprevalence of 7.76% from 92 samples tested, 7 samples being positive. Also, there is no any practice of vaccination against BVD in Nepal, the seropositivity must be attributed in response to natural infections. The samples detected positive by ELISA can be subjected to total RNA extraction and PCR amplified gene of BVDV for further confirmation with greater accuracy. Lower prevalence than this study was reported by Manandhar S (2018) in western Chitwan of Nepal (2.2%). This study is lower than the prevalence found 13.20% in Tamil, Nadu (Krishna K.S. *et.al.*, 2017). In contrast to this study, higher seroprevalence were found in different areas like in Europe, comprising more than around 50% of the isolates in North American 90% of the isolates (Ridpath J.F., 2005), 51.1% in Bangladesh (Uddin MA *et. al.*, 2017), 33.2% in cattle of Selangor, Malaysia (Daves L. *et.al.*, 2016), 15.29% in cattle of 16 states of India (Sudharshana K. J. *et.al.*, 1999). The higher seroprevalence in other countries might be due to vaccination against BVD.

Table 1: Seroprevalence of BVD determined by using ID.vet, France Ab ELISA

	No. of positive	No. of Negative	Prevalence	True prevalence
Total serum sample examined	7	85	7.76%	

There is no significant association between districts and occurrence of BVDV ($p > 0.05$). But Chitwan (9.37%) and Nawalpur (12.9%) have more prevalence percent than Rupandehi (0%). This might be affected by geographical location, sampling method and management practices. Sampling technique may have major role in missing out the positive samples.

Table 2: Districtwise seroprevalence of BVD

Districts	Total tested	Positive	Negative	Prevalence %	P-value
Chitwan	32	3	29	9.37	0.152
Nawalpur	31	4	27	12.90	
Rupandehi	29	0	29	0	

The study found no significant difference ($p > 0.05$) between age and prevalence. Statistically it is not significant which indicates that both age groups have equal probability of getting BVD. This result is in contrast with Daves L. *et.al.*, 2016 whose finding shows that the prevalence positivity increases with age.

Table 3: Age wise Seroprevalence of BVD

Age	Positive	Negative	Total	Prevalence	P-value
3 and less (young)	4	45	49	8.16	0.830
4 and more (adult)	3	40	43	6.97	

There is no significant difference ($P > 0.05$) between breed and prevalence. The present study indicates prevalence percent higher in Holstein, statistically it is not significant indicating that both breeds have equal chance to be infected with BVD. The prevalence percent was higher in Jersey cross (7.76%) than Holstein-Friesian cross (0%). This might be due to the higher number of Jersey crosses in tested sample.

The result is in agreement with S. Manandhar (2018) findings which shows prevalence of Jersey cross (2.4%) than Holstein-Friesian (1.7%) and with (Daves L. *et.al.*, 2016) which shows that higher prevalence is in Jersey breed of cattle than Holstein Friesian.

Table 4: Breed wise prevalence of BVDV

Breed	Positive	Negative	Total	Prevalence %	P-value
Jersey cross	7	65	72	9.72%	0.147
Holstein cross	0	20	20	0%	

Seroprevalence of BVDV with Abortion History

Seroprevalence of BVD between abortion history and result was found to be significant ($P=0.015$, i.e. $P < 0.05$) Odd Ratio: 6.333, The chance of BVD with history of abortion is 6.333 times more than the no history of abortion. This results is in agreement with S.Y. Derdour 2017 which findings shows that there was significant association between abortion and seropositivity (OR= 14.21).

Table 5: Abortion history wise seroprevalence

Abortion history	Positive	Negative	Total tested	Prevalence	P-value
Yes	3	9	12	25%	0.015
No	4	38	42	9.523%	

CONCLUSION

The result of the present study suggests that our dairy cattle have been infected with BVDV. This study found no significant association between seropositivity with district, age and breed with p-value 0.152, 0.830 and 0.147 respectively. However significant association was observed between abortion and seropositivity with p-value 0.015 and Odd ratio 6.333. Different tools like systematic control, culling PI animas, restriction of movement of infected herds should be used to contain this disease. There is a need of further research in molecular level to better understand the different factors causing the BVD.

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