



Detection of Antibodies against Bovine Respiratory Syncytial Virus in Ruminants of Grenada, West Indies

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ABSTRACT

Bovine Respiratory Syncytial virus (BRSV) is associated with respiratory disease complex in ruminants. The aim of this study was to estimate the seroprevalence of antibodies for BRSV in non vaccinated cattle, sheep and goats in Grenada, West Indies. Sera were collected randomly from 60 cattle, 60 sheep and 60 goats from all six parishes of Grenada. Sera were tested for antibodies using an indirect Enzyme Linked Immunosorbant Assay (ELISA) Kit. An overall seroprevalence of BRSV antibodies was 7.8% (95% CI: 0.043 to 0.127). Seroprevalence was highest in sheep 15.0% (95% CI 0.0787 to 0.2634) followed by cattle 5% (95% CI 0.0117 to 0.1425) and goat 3.3% (95% CI 0.0025 to 0.1203). There was no significant difference in prevalence ($p > .05$) of antibodies to BRSV in cattle, sheep and goats. This is the first report of Seroprevalence of BRSV antibodies in ruminants in Grenada, West Indies.

Keywords: Bovine respiratory syncytial virus, Grenada, ruminants, seroprevalence

Bovine respiratory syncytial virus (BRSV), human respiratory syncytial virus (HRSV) and pneumonia virus of mice are an enveloped RNA viruses which belong to the genus Pneumovirus of the family Paramyxovirus (Mahmoud and Allan, 2013).

Respiratory disease complex in ruminants is a major cause of economic losses in the dairy (Sakhae *et al.*, 2009) and small ruminant industry (Yesilbag and Gungor, 2009). Many respiratory viruses and bacteria coupled with stress are cause of respiratory disease complex in ruminants. Bovine respiratory syncytial virus (BRSV) is the most important virus affecting the respiratory tract of ruminants (Wellems, 1990; Giangaspero *et al.*, 2013). Clinical signs of BRSV in experimental as well as natural infection include fever, coughing, and nasal discharge. Gross lesions of the disease confined mostly to cranioventral part of the lungs are seen as red, depressed and firm areas. Microscopic lesions consist of inflammation and of necrosis of epithelial cells in bronchi and bronchioles.

Multinucleated syncytial cells and occasional presence of intranuclear eosinophilic inclusions are seen in areas of inflammation (Broderson, 2010).

BRSV was first identified in Switzerland in 1970 (Paccaud and Jacquier, 1970). Subsequently BRSV has been reported in ruminants in many countries of the world including Europe and USA (Van der Poel *et al.*, 1994; Valarcher and Hagghund, 2006; Klem *et al.*, 2013). Reports of BRSV from other countries include Japan (Giangaspero *et al.*, 2013), Soudi Arabia (Mahmoud and Allan, 2013); Turkey (Yavru *et al.*, 2005, Yesilbag and Gungor, 2008); Syria (Giangaspero *et al.*, 1992), India (Mahajan *et al.* 2015). In Canada, Durham and Hassard (1990) found BRSV component in respiratory disease complex in bovines and Lomontagne *et al.* (1985) in sheep and goats. Countries of South America, neighbors of Caribbean region, have reported BRSV in cattle and small ruminants in Brazil (Arns *et al.*, 2003; Goncalves *et al.*, 2011), in Peru (Rodasio *et al.*, 1984), and in Venezuela

(Obando *et al.*, 1999). As far as authors are aware there is no published report on BRSV from the Caribbean region. The aim of this study was to estimate the prevalence of antibodies to BRSV in cattle, sheep and goats in Grenada, West Indies, and to serve as a prototype for future analyses of this disease.

MATERIALS AND METHODS

Ethical Approval

The project was approved by Institutional Animal Care and Use committee (IACUC) of St George's University Grenada.

Study Area

Grenada is the southern most island country in the Caribbean Sea, with an area of 348.5 Km². The country consists of 6 parishes. Country with low hills, small trees and shrubs and tropical climate is most suitable for small ruminant production. Estimated population size is 3000 sheep, 2500 goats and 1500 cattle.

Sample preparation and detection of antibodies

Blood samples from the jugular vein were collected randomly from 60 cattle, 60 sheep and 60 goats from all six parishes of the country in 2014. Sera were separated by centrifugation of blood at 1500g for 15 minutes at room temperature (27-28°C) and stored at -80°C until testing.

Commercial ELISA kit to detect antibodies for BRSV was obtained from IDEXX Laboratories, Inc. Westbrook, Maine, USA. Test was performed following the manufacturer's instruction.

Statistical analysis

The data was analyzed by the statistical methods: Fisher's exact test, using graphical statistical software (<http://www.graphpad.com/quickcalcs/contingency2>).

RESULTS AND DISCUSSION

The over- all Seroprevalence of BRSV virus antibodies in ruminants in Grenada is 14/180, 7.8% (95% confidence

interval: 0.043 to 0.127). Sheep (ovine) showed highest seroprevalence 9/60, 15.0% (95% confidence interval: 0.0787 to 0.2634), followed by bovine 3/60, 5%: (95% confidence interval 0.0117 to 0.1425), and goats (caprine) 2/60, 3.3%: (95% confidence interval 0.0025 to 0.1203). There was no significant difference in seropositivity among these species of ruminants. The results are presented in Table 1.

Table 1: Seroprevalence of antibodies to Bovine Respiratory Syncytial Virus (BRSV) in ruminants from Grenada

Species	Number of animals tested	Number positive	Percent positive
Caprine	60	2	3.3%
Ovine	60	9	15.0%
Bovine	60	3	5.0%
Total	180	14	7.8%

Fisher's exact test: The association between rows (groups) and columns (outcomes) is considered non-significant (p>.05).

BRSV is most important virus in the respiratory disease complex of ruminants. It is capable of causing disease as a single entity or along with other respiratory viruses. Previous researchers have reported simultaneous presence of antibodies for BoHV-1, bPI-3V, BRSV in the same herd of cattle (Mahajan *et al.*, 2015; Kristina *et al.*, 2009; Yavre *et al.*, 2005) and in same flock of sheep/goat (Lamontagne *et al.*, 1985; Yesilbag and Gungor, 2009; Goncalves *et al.*, 2011). We also found the antibodies for BoHV-1 (Tiwari *et al.*, 2016) and bPI-3V (Tiwari *et al.*, 2016) along with BRSV in the same herd of cattle and sheep/goats in Grenada.

In the present study, presence of serum antibodies to BRSV in cattle was 5%. Comparable to our result, a low grade seroprevalence (13.3%) was found in cattle of Punjab state of India (Mahajan *et al.*, 2015) and 14.6% in turkey (yavru *et al.*, 2005). Kristina *et al.* 2009 reported low (7.7%) to very high (100%) seroprevalence of BRSV in Lithuanian cattle. A great variation in seroprevalence of antibodies for BRSV in cattle has been reported from various countries of the world: In Syria, 83% (Giangspero *et al.*, 1992); in Egypt 75% (Mahmoud and Allan, 2013); Venezuela 85% (Obando *et al.*, 1999); Iran 100% (Sakhaee *et al.*, 2009); Canada 78.5% (Durham and Hassard, 1990). A moderate seropositivity 43% to 46% was found in Turkey (Yasilbag and Gungor, 2008).

Our survey in Grenada showed seroprevalence of BRSV antibodies in sheep (15%) and goats (3.3%). Reports from previous researchers varied from our results. Lamantagne *et al.* 1985 found antibodies to BRSV in sheep (35%) and in goats (36%) in Canada. Yesilbag and Gungor 2009 reported 72% sheep and goats with antibodies for BRSV in Turkey. Recently Goncalves *et al.* (2011) reported very low (0.5%) seroprevalence of BRSV antibodies in sheep in Brazil.

The difference observed by various researchers on the seroprevalence of antibodies to BRSV in ruminants in different countries may be due to rate of exposure of the animal to virus, agro-climatic conditions and management practices (Mahajan *et al.*, 2015). Grenada has a tropical climate without much climate variation from month to month. Livestock husbandry in Grenada is different from the intensive system management practiced in the developed countries. Cattle population is very small and mostly kept in door. Sheep and goats are managed together in small flock mostly semi intensive. Hence chances of interspecies transmission of BRSV are minimum.

Conclusion and recommendation

This is the first report of Seroprevalence of BRSV antibodies in cattle, sheep and goats in Grenada. Further research with larger sample size is suggested.

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