

## Editorial

Molecular Virology and Control of *Peste des Petits Ruminants Virus*

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**Abstract** | Peste des Petits ruminants (PPR) is a highly contagious and economically devastating viral disease of small ruminants and camels, and thus is negatively affecting the livelihoods of poor people in many developing countries. Efforts are being made to advance our understandings on different aspects of molecular biology of the virus and to consolidate national and international strengths to eradicate the disease from the planet. This Editorial highlights recent research articles and reviews that have provided up-to-date and current research trends in the field to further facilitate disease eradication campaigns.

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**Citation** | Atmaca, H.T. 2016. Molecular virology and control of *Peste des Petits Ruminants virus*. *British Journal of Virology*, 3(4): 130-132.

**P**este des Petits Ruminants Virus (PPRV) belongs to the genus Morbillivirus in the family of Paramyxoviridae. It is known to cause enormous economic losses in small ruminants and camels. The virus is commonly found in developing countries, especially in tropical countries where the diseases is widespread. After the eradication of the rinderpest virus, which closely relate to PPRV, researchers and practitioners have resumed their interest to understand the biology, pathogenesis and various ways to improve the diagnosis and vaccines against the PPRV. The successful eradication of rinderpest has motivated OIE to target the global elimination of PPRV. As a result, Food and Agriculture Organization (FAO) of the United Nations and World Organization for Animal Health (OIE) have initiated a Global Campaign, which has received positive remarks and appreciation from academic policy makers and funding bodies. According to the campaign, two groups targeted to eradicate the virus by 2030. However, although they have high morals and motivation to eliminate the disease, there are important facts they need to address before claiming any success.

Since there are immense efforts ongoing in many countries where disease is endemic, a special issue was planned to attach latest research on all aspect of the disease and virus. The current Editorial summarizes published scientific studies on PPR virus biology, pathogenesis and improvement of diagnoses and vaccines, and experimental immunology to offer and explain the current scenario, as well as new developments in PPR situation in the world.

The inaugural article by Govindaraj and colleagues have highlighted the estimated economic losses of PPRV in developing countries and have estimating the economic impact of the disease using annual incidence parameters including morbidity, mortality and treatment expenses. They then compared these findings with previously reported economic constraints derived from the literature, expert discussions and scientific facts. While using the various mathematical models, the authors evaluated different parameters of young and adult sheep/goats such as mortality rate, body weight loss, milk loss, increased inter-lambing period and rate of abortion.

The study also investigated the cost related to high feeding and increased rearing inputs in both young and adult sheep/goats. In summary, it was proposed that it is essential to evaluate the true economic impact of the disease to attract research and funding from both national and international funding bodies.

A critical analysis by Banyard and Parida helped to understand the current PPR situation by describing research areas where knowledge improvement is necessary in understanding the diseases, and the geographical regions where the virus is endemic. It was proposed that some considerations are critical in any program focusing on viral elimination campaign and these concerns need to be addressed for disease eradication. While the disease eradication is a challenge in 2030, the corporation on a global scale to follow the same process used in the elimination of rinderpest virus globally renders the process achievable.

In another paper written by Balamurugan et al., authors provided an analytical study with valid statistics about the incidences of the disease and socioeconomic burden, which are crucial to elicit increased interest by providing additional information essential to support or control policy decisions. They also argued that the sharing of experiences, plans, and techniques used in vaccination and monitoring of the disease in sheep and goats in India may motivate other states in the country and other nations in the world to adopt similar strategies, which eventually may lead to mass vaccination and control of PPR.

While using information from reports, available research and data from international organizational databases Kardjadj and Luka reviewed factors that have encouraged the spread of PPR in Africa and some of the possible solutions that not only can help to control but also to eradicate the virus. However, they also listed and discussed some of the challenges that hinder successful eradication of the infection. These factors include, uncontrolled movement of animals through porous borders, lack of financial capacity to expand and improve the existing systems and lack of quality vaccines. Additionally, the farmers also face challenges in the delivery of vaccines and lack of regional coordination to efficiently and sustainably control the PPR in the region.

Gomes et al., have approached the problem from a different perspective, which is the use of recombinant

technology based vaccines and diagnosis, virus-like particles (VLPs) and reversed genetics to eradicate the virus. Authors first comprehended these technologies and then focused on their application in the control and eradication of the disease. After understanding the techniques, the authors found that vaccines that allow differentiation of infected from vaccinated animal (DIVA) can be effective in PPR eradication program especially in the later stage of the program. As a result, they concluded that for the program to be effective, there is a need to develop a marker vaccine, which is multivariate or thermostable or recombinant-based. Such vaccines combined with the serological tests are critical in the development of future control programs.

Mahmoud et al., (2016), Abubakar et al., (2016) and Rahman et al., (2016) have described the current situation of PPRV in Middle East and sub-continent. These finding highlight several areas of research that currently are lacking in developing countries. These studies also emphasised on the active involvement of research laboratories that are currently working on PPRV in these countries in any effort for disease control.

Finally, Fischer et al., (2016) have discussed an interesting and yet ignored aspect of disease control and proposed to enhance the cooperation between different disease monitoring stakeholders including participatory epidemiologists, social science activists, farmers and different funding agencies. The concluded that these close associations are fundamental for achieving the goal of control and eradication of PPR by 2030 and poverty alleviation.

In these special issues, efforts were made to comprehensively cover areas of active research and those aspects that are crucial for disease control and eradication from the planet. Since the task is mighty, aiming to cover all aspects of research is not feasible and efforts will continuously be made to present future research in coming issues of the journal.

**List of all articles published in two issues** and dedicatedly addressing this important disease of the livestock:

Gurrappa Naidu Govindaraj, Vinayagamurthy Balamurugan, Habibur Rahman. **Estimation of Economic Loss of PPR in Sheep and Goats in India: An Annual Incidence Based Analysis.** British Journal of Virology, Vol. 3, Iss. 3s, Pages 77-85. <http://dx.doi.org/10.17582/journal.bjv/2016.3.3s.77.85>

Ashley C. Banyard and Satya Parida. **Eradicating Peste des Petits Ruminants - The Challenges Ahead.** British Journal of Virology, Vol. 3, Iss. 3s, Pages 47-52. <http://dx.doi.org/10.17582/journal.bjv/2016.3.3s.47.52>

Vinayagamurthy Balamurugan, Gurrappa Naidu Govindaraj and Habibur Rahman. **Planning, Implementation of Peste des Petits Ruminants Control Programme and Strategies Adopted for Disease Control in India.** British Journal of Virology, Vol. 3, Iss. 3s, Pages 53-62. <http://dx.doi.org/10.17582/journal.bjv/2016.3.3s.53.62>

Moustafa Kardjadj, Pam Dachung Luka. **Factors Affecting PPRV in African Countries and their Countermeasures.** British Journal of Virology, Vol. 3, Iss. 3s, Pages 63-76. <http://dx.doi.org/10.17582/journal.bjv/2016.3.3s.63.76>

Amitha Reena Gomes, Belamaranahally Muniveerappa Veeregowda, Sonnahallipura Munivenkatappa Byregowda, Vinayagamurthy Balamurugan. **Comprehensive Review on Recent Developments in the Diagnostics and Vaccines**

**against Peste des Petits Ruminants.** British Journal of Virology, Vol. 3, Iss. 3s, Pages 90-104. <http://dx.doi.org/10.17582/journal.bjv/2016.3.3s.90.104>

Ahmed Zein Mahmoud, Muaz Abdellatif, Luai Shazali. **Prevalence of PPR-virus Antibodies in Sheep, Goats and Camels in Hail, Saudi Arabia.** British Journal of Virology, Vol. 3, Iss. 3s, Pages 86-89. <http://dx.doi.org/10.17582/journal.bjv/2016.3.3s.86.89>

Mohammad Mushfiquur Rahman, Rokshana Parvin, Ataur Rahman Bhuiyan, Mohammad Giasuddin, Shah Md. Ziqrul Haq Chowdhury, Mohammad Rafiqul Islam, Emdadul Haque Chowdhury. **Genetic Characterization of Peste des Petits Ruminants Virus Circulating in Bangladesh.** British Journal of Virology, Vol. 3, Iss. 4, Pages 115-122. <http://dx.doi.org/10.17582/journal.bjv/2016.3.4.115.122>

Muhammad Abubakar, Shumaila Manzoor, Jonas Johansson Wensman, Emeli Torsson, Qurban Ali, Muhammad Munir. **Molecular and Epidemiological Features of Peste des Petits Ruminants Outbreak during Endemic Situation.** British Journal of Virology, Vol. 3, Iss. 4, Pages 123-129. <http://dx.doi.org/10.17582/journal.bjv/2016.3.4.123.129>

Klara Fischer, Erika Chenais, Emeli Torsson, Jonas Johansson Wensman. **Where is the Participation in Participatory Epidemiology? How Engagement with Social Science could lead to Improved Understanding and Control of Peste des Petits Ruminants.** British Journal of Virology, Vol. 3, Iss. 4, Pages 105-114. <http://dx.doi.org/10.17582/journal.bjv/2016.3.4.105.114>