

INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student: Moushume Das

Roll Number: 136106033

Programme of study: Ph.D.

Thesis Title: Characterization of Newcastle disease virus from Northeast India and development of its alternate diagnostic and control measure.

Name of thesis Supervisor(s): Assoc. Prof. Sachin Kumar

Thesis Submitted to the Department/ Centre: Biosciences and Bioengineering

Date of completion of Thesis Viva-Voce Exam: 24-01-2020

Keywords for description of Thesis Work: RNA virus, Diagnostics, Antiviral

SHORT ABSTRACT

Livestock is an essential part of human society. The scarcity of livestock will result in food insecurity, malnutrition, diseases, economic losses and widespread poverty. Improving the availability of livestock, in particular, healthy livestock is a condition sine qua non for a policy aiming at the reduction of mass poverty. Reaching this goal is an uphill struggle. Poverty itself is the main stumbling block for poverty reduction. The poor are lacking the means to invest in an infrastructure that would enhance their capacity to increase the availability and quality of energy, food, water, sanitation, and health care. The poorest people often are destined to live in the environmentally worst areas, on the least fertile soils, the ecologically most vulnerable land, with the least economic perspective.

Poultry comprises the second largest share of the livestock industry after pork, throughout the world. According to world-leading organisations like the FAO and USDA, poultry meat production is expected to register a CAGR of 3.4% by 2023, which would supersede all other livestock productions. In such situations, it becomes invariably important to cater to the needs for sustainable development of this industry. The major obstacle for poultry producers comes from infectious diseases. Such diseases not only reduce trade and consumer confidence but result in implications of legal trade restrictions causing long term economic casualties.

Newcastle disease is one of the most devastating and contagious diseases of the poultry. Newcastle disease virus is a constantly evolving virus whose outbreaks have

been continuously modelling the economies of developed and developing countries alike. The havoc of this disease has been experienced throughout all continents of the world, since its first outbreak in 1926. However, only biosecurity measures and conventional live vaccines remain the only prevention or control against the disease. But these practices have not been completely adequate to prevent this disease or evolution of virulent genotypes, and therefore there lies imminent scope of research in this area.

The present work represents an overview of the neglected status of this disease in the Indian subcontinent, more particularly in the North Eastern part of the country. The study highlights the independent evolution of new sub-genotypes in the country thereby emphasizing on strict measures to be taken for controlling further epizootics. Proper diagnosis remains as one of the major steps for efficient handling of such disease situation. In our study, we have analysed the efficacy of NDV phosphoprotein as an immunogen and further designed a recombinant phosphoprotein based ELISA for NDV diagnosis. Since the invention of penicillin, antibiotics have revolutionised the world of therapeutics. Antiviral therapy stems out as a viable alternative in conjunction with conventional vaccination to curb viral disease outbreaks. In modern days, with ever-increasing technological advancements and a wide array of medicinal compounds being documented, drug repurposing emerges as a tempting alternative approach to speed up drug development. In this study, we proposed the repurposing of two small molecule drug targets for their efficient antiviral property against NDV. It has been shown that targeting various host factors and encouraging the immune system could diminish NDV replication by affecting its entry and progression. Such therapeutics being cost effective and low maintenance will have higher accessibility in under resourceful countries where infrastructure is lacking and professional administrators are few.

