

Low-cost Portable Molecular Diagnostic Platform for Rapid Detection of Select Poultry Pathogens (LMDP) in the Philippines

Abstract

It is recognized by experts within the Philippines that although the use of molecular methods for detection, identification, and characterization of infectious agents in poultry is gaining importance abroad, diagnosis using molecular techniques is still at its infancy in the country. The use of rapid field based molecular testing has the potential to greatly reduce diagnosis times and consequently reduce disease spread and may facilitate appropriate selection and more efficient management and treatment protocols. Hence, technologies that will be able to enable the rapid and accurate diagnosis of poultry diseases would ensure that money is not wasted on disease mortalities, culling and cost of treatment. Early diagnosis will also aid in the prevention of disease outbreaks and the spill-over of pathogens from broilers to other poultry sectors and avian species and vice-versa.

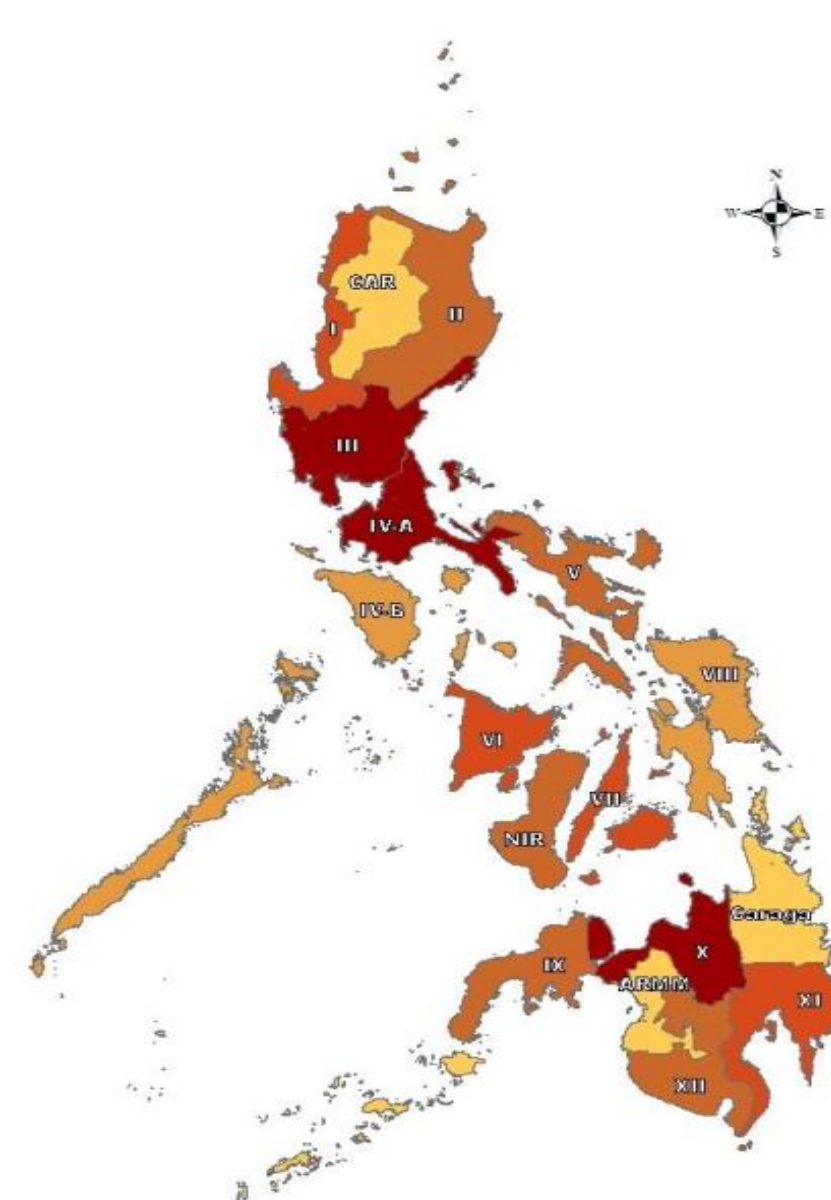
The multidisciplinary consortium from the UK and Philippines aims to develop and translate to the Philippines a rapid easy to use point of need molecular diagnostic test and complementary surveillance software that can be used at the site of infection and test for the key viral and bacterial pathogens which are of current concern.

Methodology

IDENTIFICATION AND CHARACTERIZATION OF SELECT VIRAL AND BACTERIAL PATHOGENS RELEVANT TO BROILER CHICKENS IN THE PHILIPPINES

Targeted Disease Surveillance

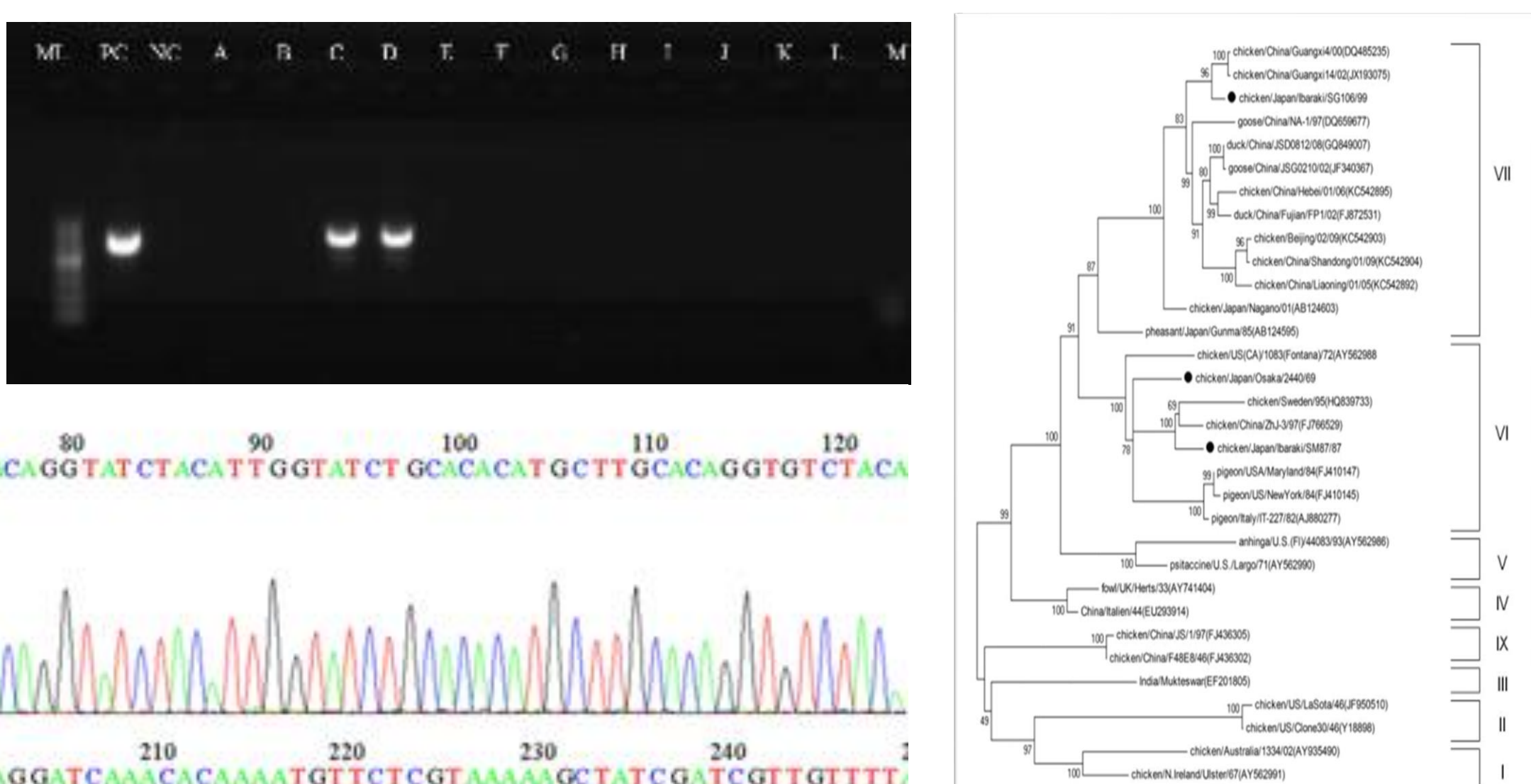
- Newcastle Disease Virus
- Infectious Bronchitis Virus
- Infectious Bursal Disease Virus
- Mycoplasma gallisepticum*
- Salmonella enterica*
- Avian Pathogenic *E. coli*



Diagnostic Sample Collection



Genetic Sequencing and Genotyping



Preliminary Results

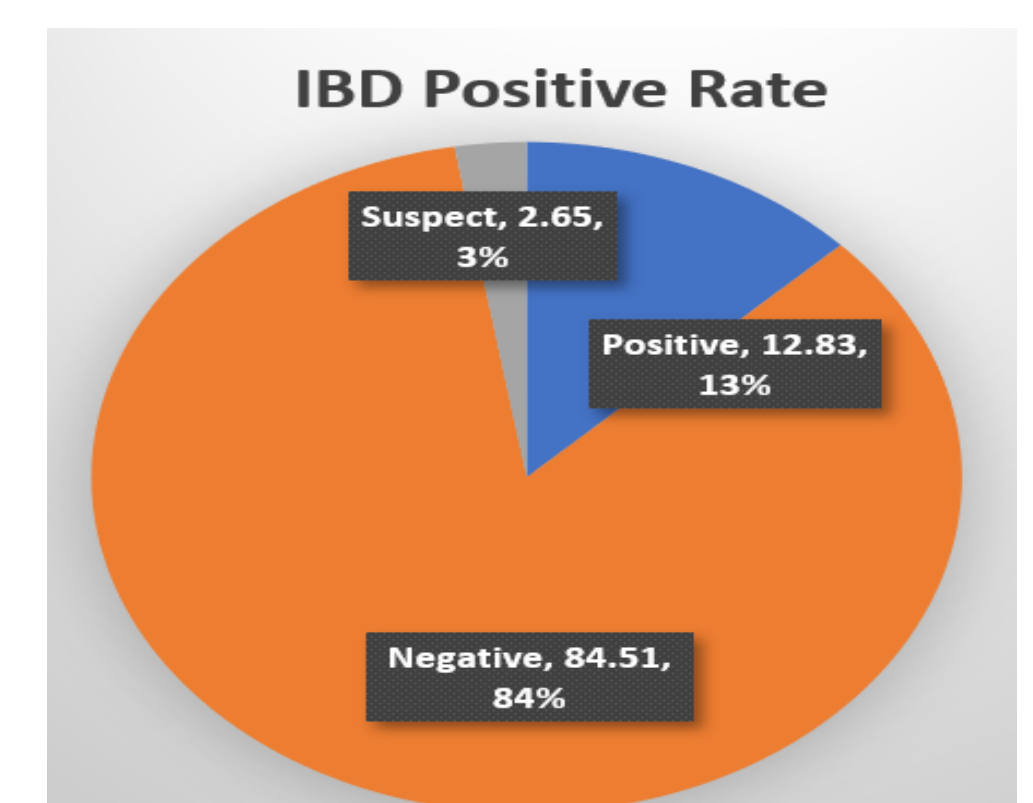
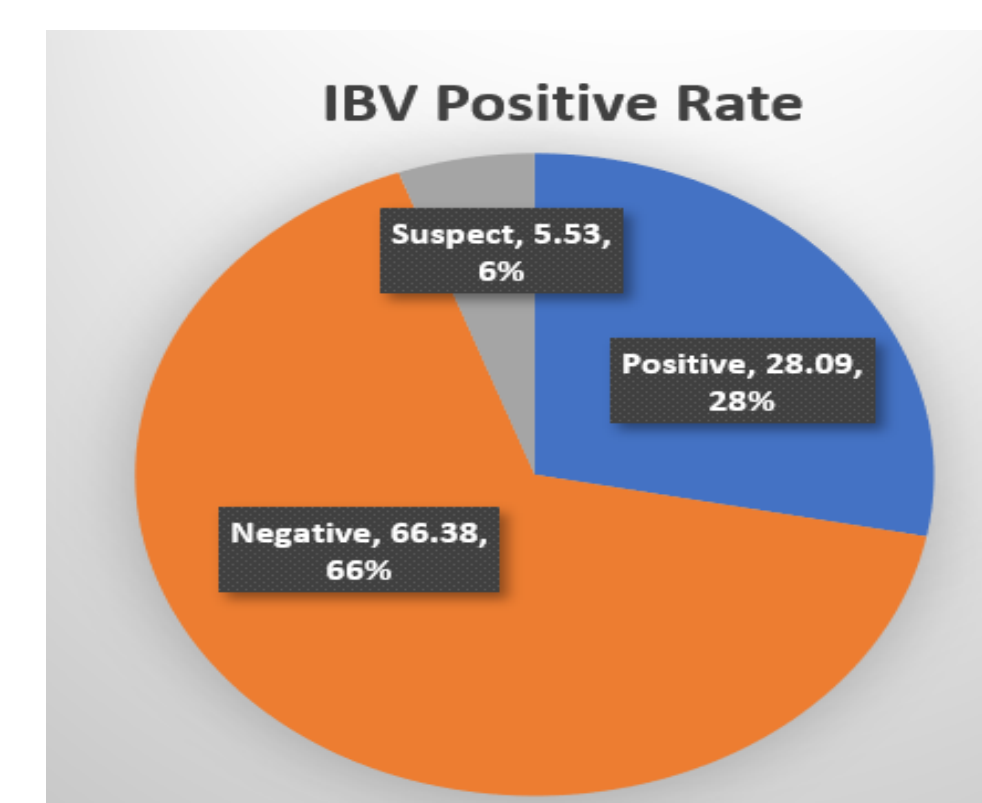
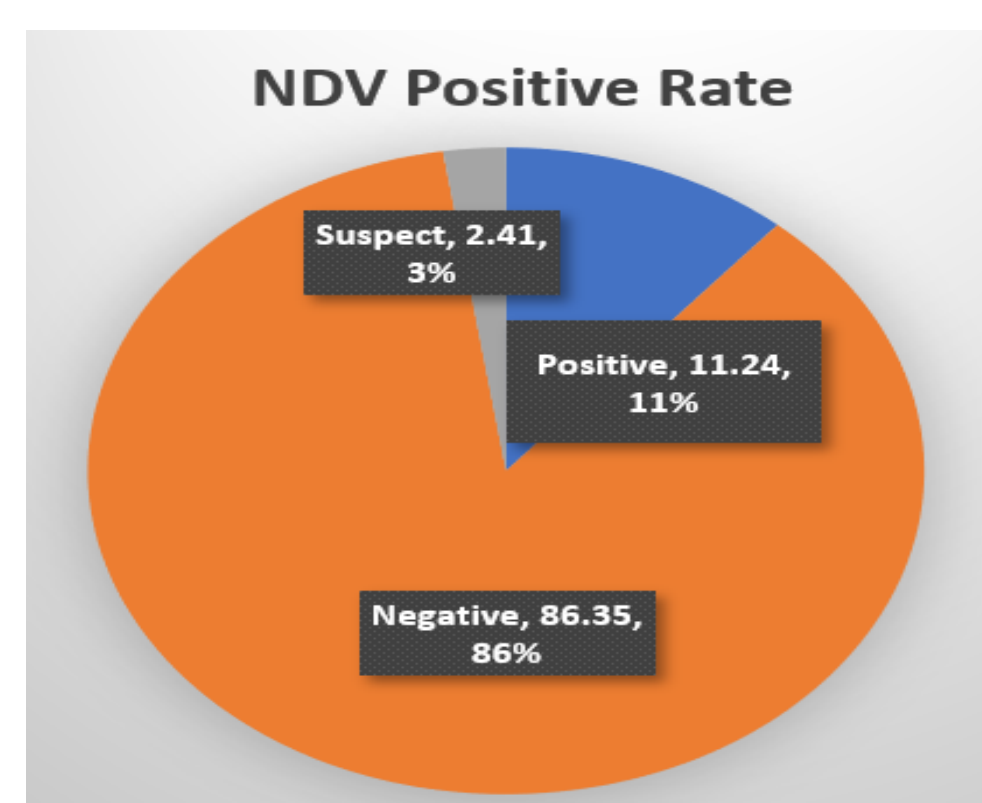
2019-2021 Field Sampling

Total Number of Poultry Flocks Investigated:
314 flocks

Approximate Population (Flock Level):
7,702,800.00 birds

Approximate Population (Farm Level):
25,676,000 birds

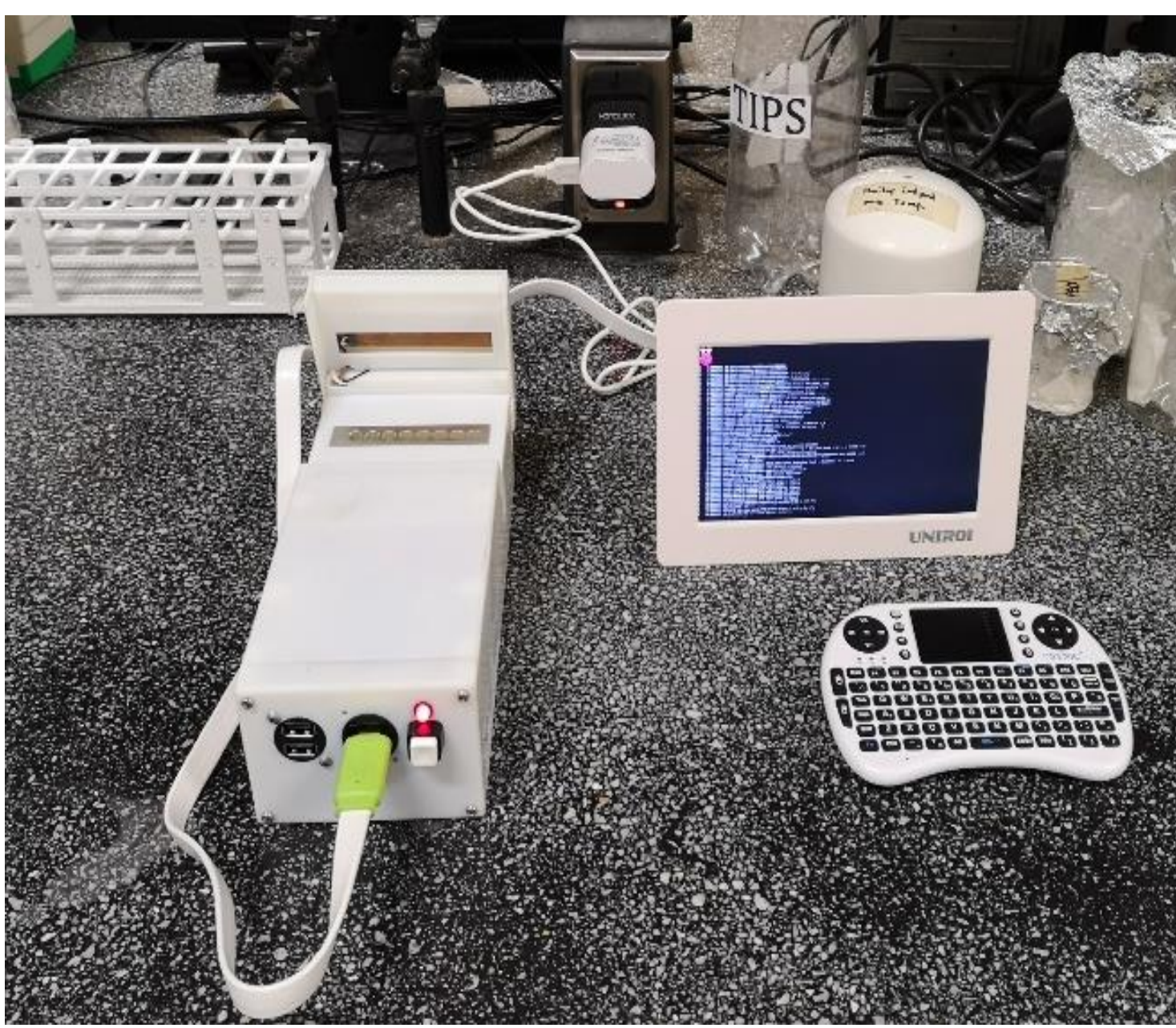
VIRAL PATHOGEN	IDENTIFIED GENOTYPES/SEROTYPE IN THIS STUDY	GENOTYPES FROM OTHER STUDIES
NDV	Genotype VIIa, VIIh, VIIi, VIc and II	Genotype VIId
IBV	G1-1 Mass (CK/CH/LHB/130573-like) G1-1 Mass (CK/CH/LJL/111054-like) G1-7 TW-like G1-15 Korean group I-like	QX Malaysian variant TW-1 TW-2
IBD	Genogroup 3 (VVIBD) Genogroup 2 (Antigenic variant) Variant E	No available reports



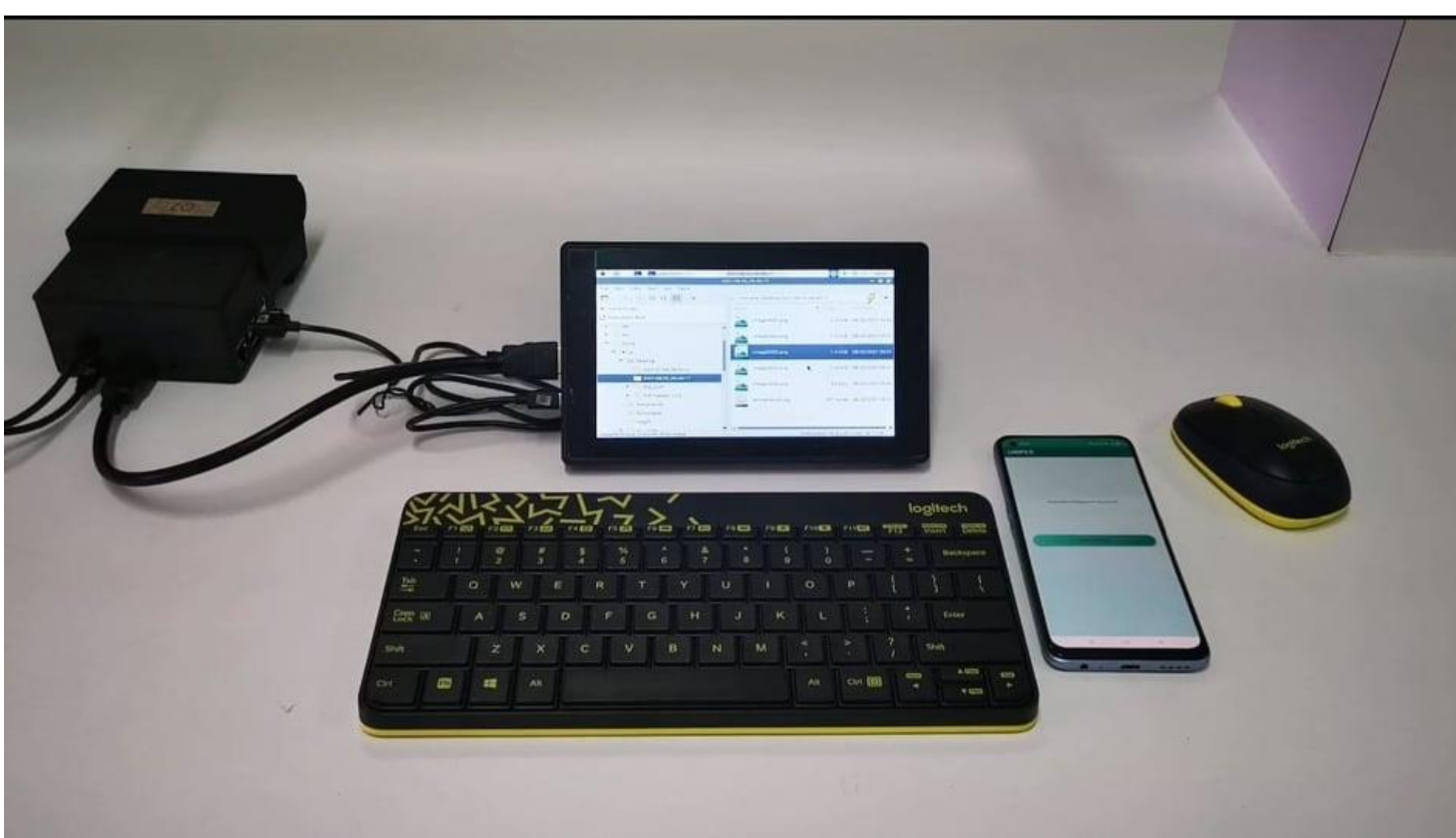
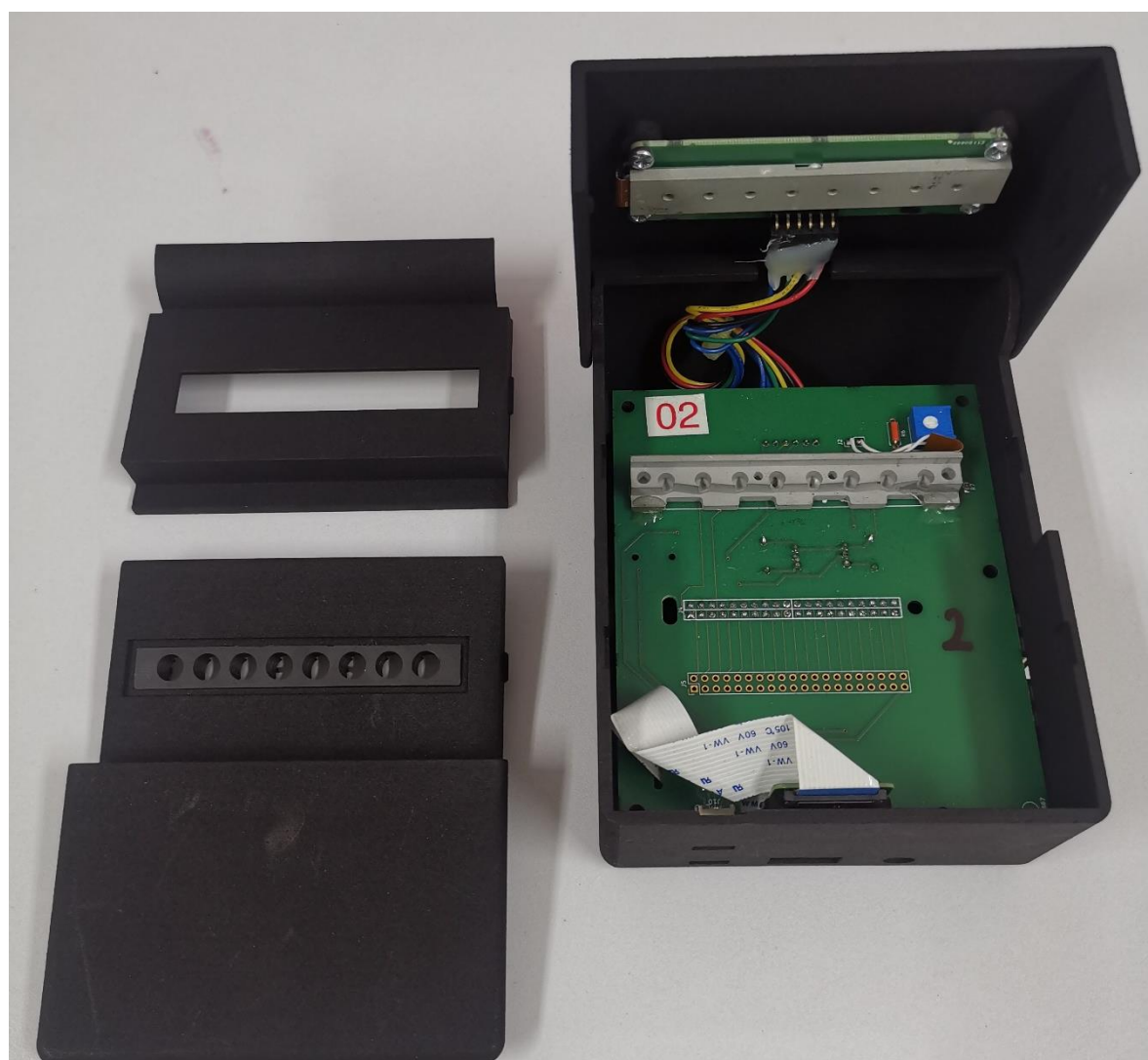
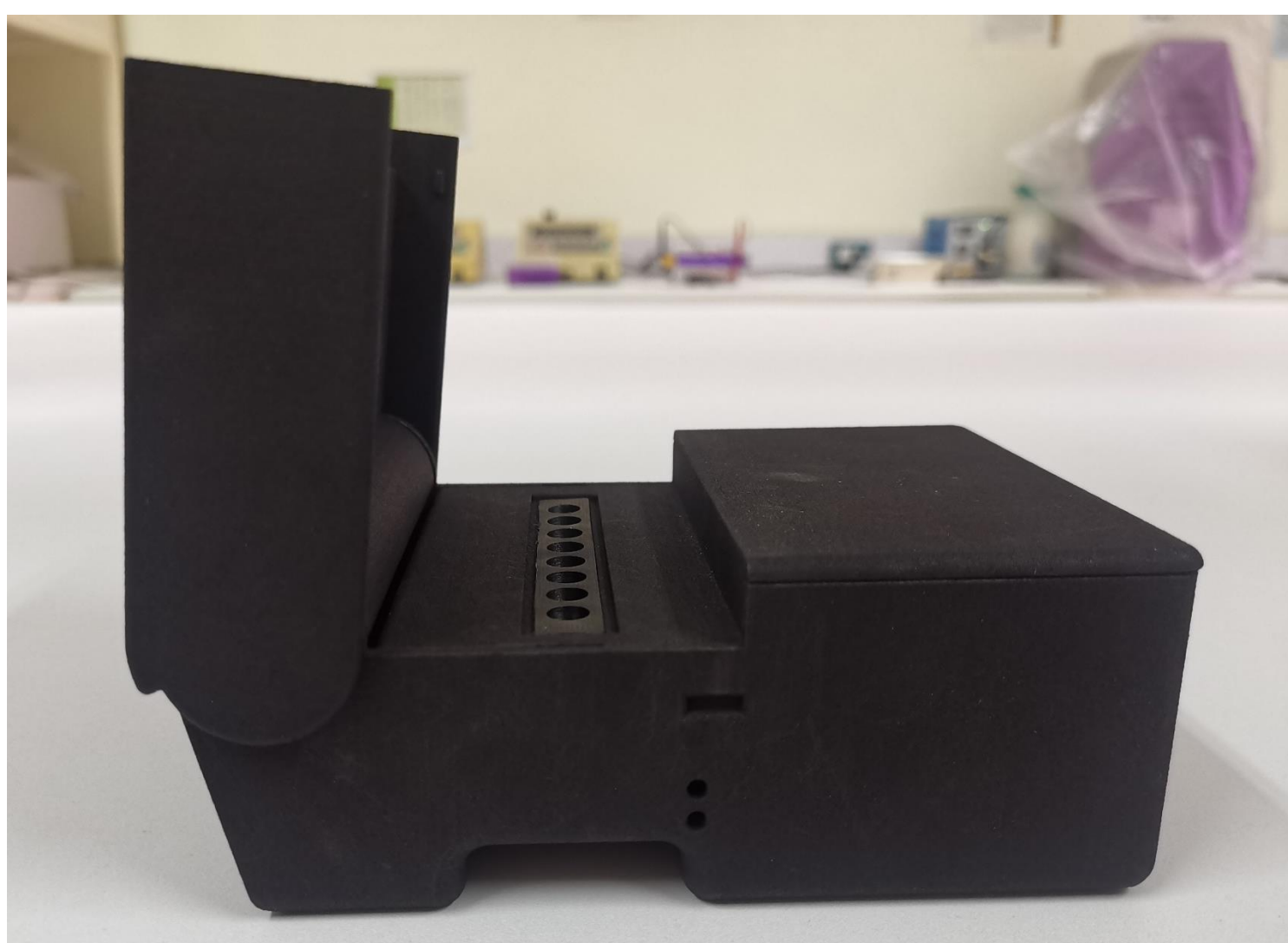
BACTERIAL PATHOGEN	IDENTIFIED GENOTYPES/SEROTYPE IN THIS STUDY	GENOTYPES FROM OTHER STUDIES
APEC	Ongoing	None
<i>Mycoplasma gallisepticum</i>	Ongoing	None
<i>Salmonella enterica</i>	Ongoing	None

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FIELD VALIDATION OF SYSTEM IN THE PHILIPPINES AND TECHNOLOGY TRANSFER

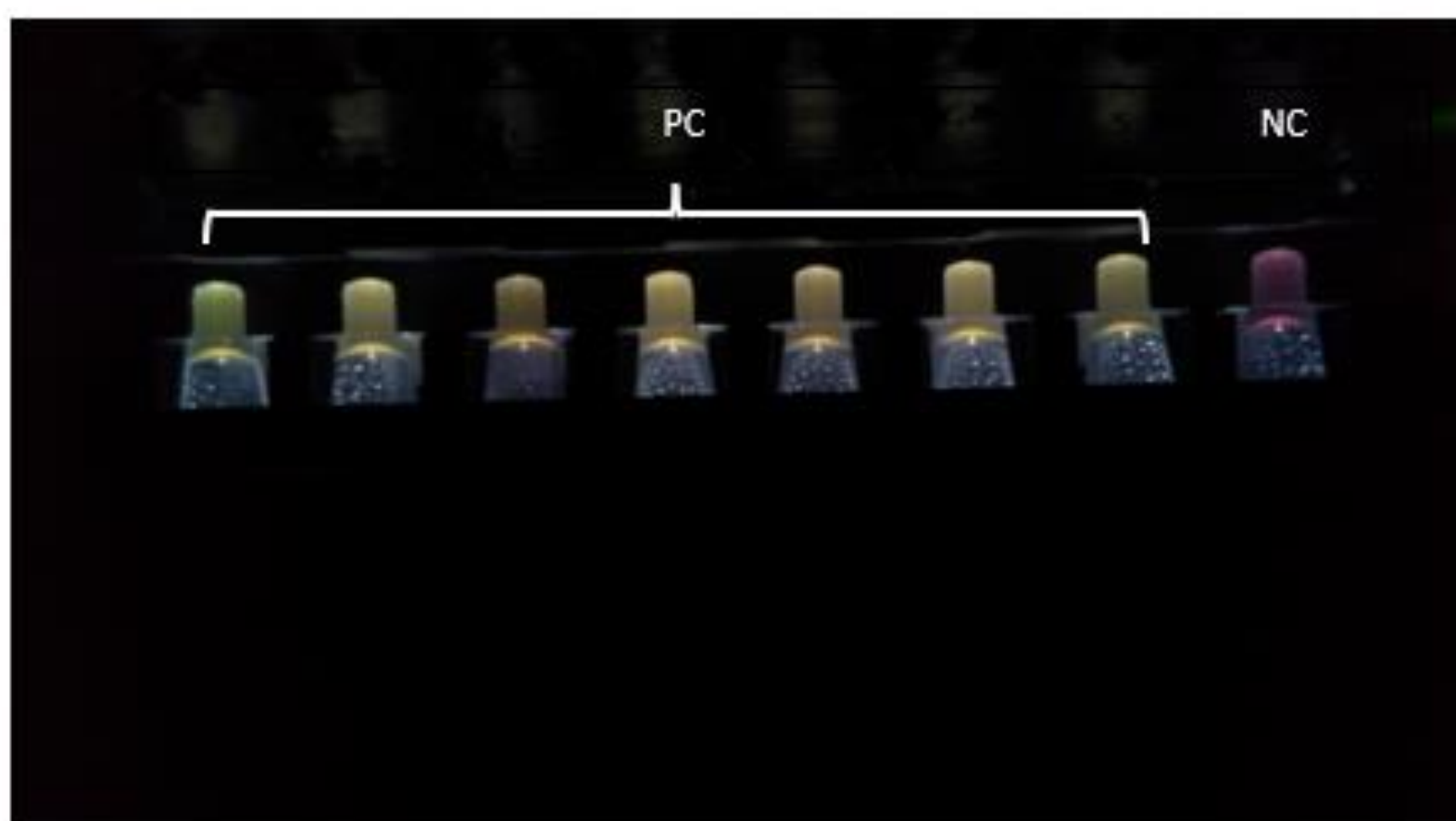
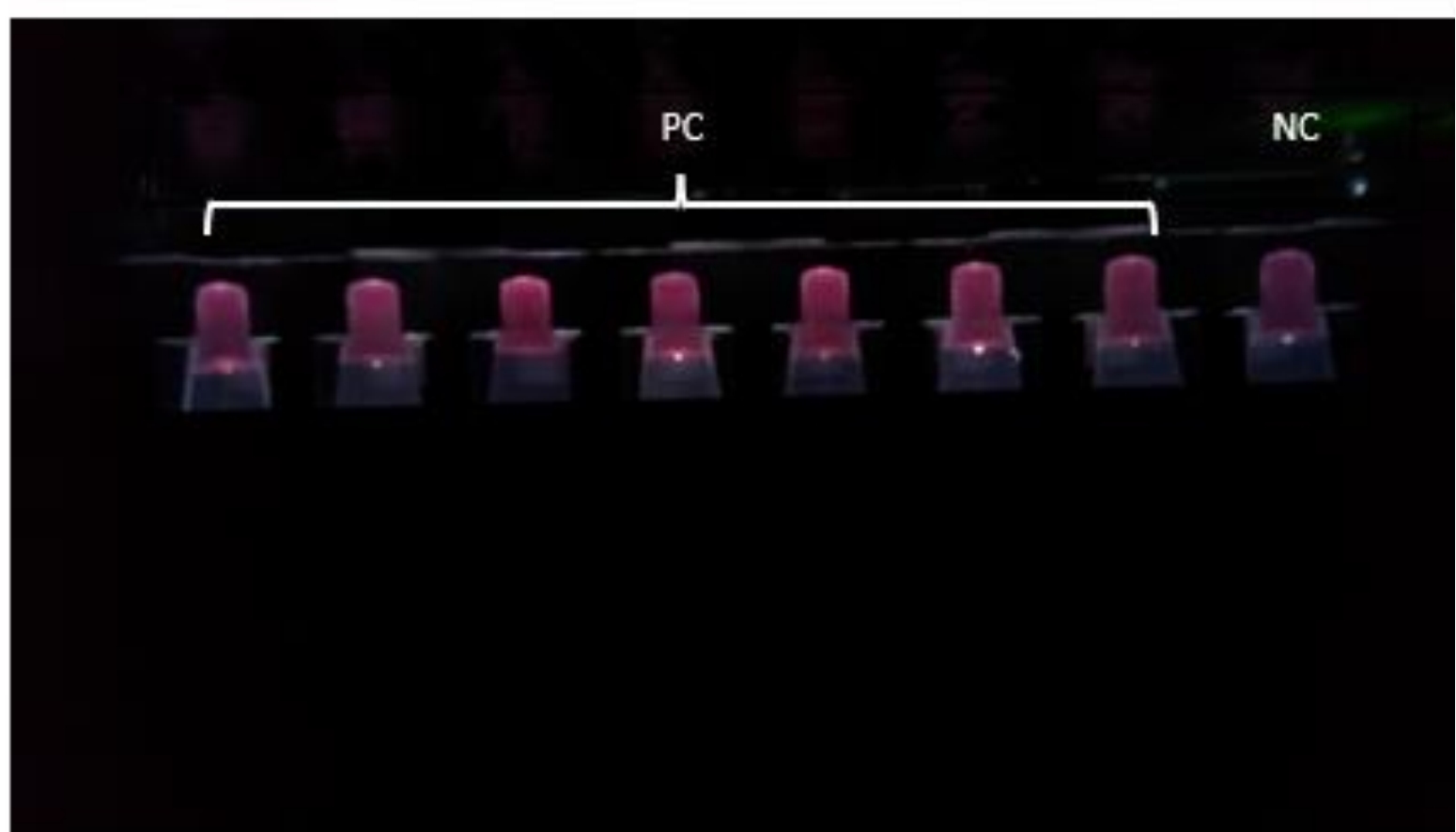


LMDP Device



A portable, battery-powered, stand-alone, molecular diagnostic prototype devices with associated control software

LAMP Assay



Colorimetric Loop-Mediated Isothermal Amplification (LAMP) assays that can be used on the LMDP device to achieve detection within 30 minutes

References

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Yamaguchi, T., Kasanga, C. J., Terasaki, K., Maw, M. T., Ohya, K., & Fukushi, H. (2007). Nucleotide sequence analysis of VP2 hypervariable domain of infectious bursal disease virus detected in Japan from 1993 to 2004. *Journal of Veterinary Medical Science*, 69(7), 733-738.

Research Consortium

 Prof. Roberto La Ragione Professor of Veterinary Microbiology and pathology	 Dr. Aureo Poirier Post Doctoral Research Fellow, LMDP	 Prof. Gerry Amor Camer Professor of Veterinary Pathology and Diagnostics	 Dave Bryan Pada-on University Research Associate
 Dr. Anil Fernando Reader in Video Communication	 Dr. Rajagopal Nilavelan Senior Lecturer in Electronic and Computer Engineering	 Dr. Ma. Cynthia Dela Cruz Assoc. Professor of Veterinary Microbiology	 Yves Roy Tibayan University Research Associate
 Prof. Wamadeva Balachandran Research Professor, Electronic and Computer Engineering	 Dr. Muhammad Munir Lecturer in Molecular Virology	 Dr. Ruth Mackay Lecturer in Mechanical Engineering	 PCC-Director Veterinary Epidemiology
 Dr. Manoharannehr Branavan Post Doctoral Research Fellow, LMDP	 David Brennan Engineering Technician, LMDP	 Engr. John Paolo Ramoso Assistant Professor Department of Electrical Engineering	 Erika Joyce Arellano, RMT University Research Associate
			 Dr. Dennis V Umali Asst. Professor of Veterinary Molecular Epidemiology
			 Gianna May Gagan University Researcher

Principal Investigator

Dr. Balachandran Wamadeva
Brunel University London
Tel (Mobile) 44 (0)7775914064
Email emstwwb@brunel.ac.uk

Dr. Dennis V. Umali
University of the Philippines Los Banos
Tel (Mobile) +63 917 596 3785
Email dvumali@up.edu.ph