**Project Title:** Development and testing of a bivalent vaccine against Newcastle disease and Infectious bursal disease in Indigenous chicken

**Annual Report**

<table>
<thead>
<tr>
<th>KCSAP Livestock Applied</th>
<th>Value chain: Chicken</th>
<th>Duration: 18 Months</th>
<th>Start Date: 1st Oct 2020</th>
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</thead>
</table>

**Lead Institution:** KALRO-VSRI

**PI and contacts:** Dr. Irene Ogali

- inogali@yahoo.com; Irene.Ogali@kalro.org

**Collaborators and their contacts:**

1. Mr. Moses Orwe– Kenya Veterinary Vaccines Production Institute (KEVEVAPI)/UoN
2. Dr. Erick Mungube – KALRO-VSRI
3. Dr Harrison Lutta– KALRO-BioRI-Kabete
4. Dr Jane Githinji– DVS-Ministry of Agriculture Livestock, Fisheries and Cooperatives

**Background**

This project will develop and test a bivalent vaccine that combines Newcastle disease virus and Infectious bursal disease virus antigens based on local viral strains. The project will attempt to include potent plant extracts as adjuvants in the vaccine in order to enhance the immune response following vaccination. The vaccine formulations will be tested in experimental animal models to elucidate the immune responses and protectiveness. The project contributes towards development of technologies and innovations for the control of climate change induced infectious diseases. The developed technology targets poor rural farmers who are most negatively affected by climate shocks with an aim to reduce mortality of their indigenous chicken, increase productivity and improve their livelihoods. Ultimately, the project will contribute to enhanced indigenous chicken productivity for food, nutrition and income security and adaptation to climate change for rural livelihoods.

**Objectives**

1. To generate a bivalent vaccine based on local virus strains and plant derived adjuvant.
2. To evaluate the immunogenicity and protectiveness of the bivalent vaccine against NDV and IBDV.

**Expected Outputs**

1. At least one (1) bivalent vaccine based on local strains of NDV and IBDV developed
2. The efficacy and safety of the formulated bivalent vaccine determined
ACHIEVEMENTS

Objective 1: To generate a bivalent vaccine based on local viral strains and plant derived adjuvant

Activity 1.1: Hold project planning meetings with collaborators

Achievement 1.1: Four virtual planning meetings were held with project collaborators to discuss and agree on the project implementation plan and discuss project progress.

Activity 1.2: Hold inception workshop with stakeholders

Achievement 1.2: One inception and sensitization workshop was held on 27th November, 2020 at KALRO-Katumani, Machakos. The members present were sensitized on the project objectives and implementation plan.

Activity 1.3: Develop and optimize vaccine formulation protocol

Achievement 1.3: One vaccine formulation protocol was developed in January, 2021 and the optimization was completed in June 2021.

Activity 1.4: Identify, collect and prepare one suitable plant derived adjuvant and one conventional adjuvant

Achievement 1.4: Materials and reagents for extraction of plant adjuvants were procured ready for processing of plant extracts for adjuvant formulation which will be completed in the next project year Oct 2021 to Sept 2022.

Activity 1.5: Propagate and inactivate at least two virus strains each of NDV and IBDV.

Achievement 1.5: Two isolates each of Newcastle disease virus and Infectious bursal disease virus were propagated for use in the vaccine and their viral titres calculated. One of each virus was then selected and adapted to grow in cell cultures. Inactivation of the viral strains is ongoing and will be completed in the next project year Oct 2021 to Sept 2022.

Summary of achievements under objective 1
All activities planned for year 1 (Oct 2020 to Sept 2021) were achieved. These included:
1. Project planning meeting held
2. Inception workshops held
3. Vaccine formulation protocol developed and optimized
4. Materials and reagents for extraction of plant adjuvants and propagation of viral strains purchased
5. Two Newcastle disease virus isolates propagated.

Objective 2: To evaluate the immunogenicity and protectiveness of the formulated vaccine against NDV and IBDV.
Activity 2.1: Test the safety of the inactivated antigens
Achievement 2.1: This activity is planned for the next project year (Oct 2021 to Sept 2022).

Activity 2.2: Carry out experimental trials on the efficacy of the bivalent vaccine formulation
Achievement 2.2: This activity is planned for the next project year (Oct 2021 to Sept 2022)

Summary of achievements under objective 2:
The activities under objective 2 will be carried out in the next project year (Oct 2021 to Sept 2022) after successful inactivation and formulation of the bivalent vaccine.

II Other achievements: One technical progress report was submitted to the KCSAP secretariat on 28th July, 2021

III Constraints and how they were overcome
Global COVID-19 complicated and delayed importation and procurement of laboratory reagents. For this reason, laboratory activities had to be re-planned and requisition for laboratory reagents was started early taking into account their lengthy importation.

Sourcing specialized eggs for virus propagation was difficult when KEVEVAPI could not supply due to problems with their chicken and culture stocks. Protocols for virus propagation in cell cultures were developed and even though not as effective as eggs, cultures were used for propagation until eggs were available.

IV Summary of funds received, accounted for and balance

<table>
<thead>
<tr>
<th>Project Amount (KES)</th>
<th>Amount Received (KES)</th>
<th>Amount accounted for (KES)</th>
<th>Balance (KES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,999,650</td>
<td>4,276,750</td>
<td>2,469,600</td>
<td>1,807,150</td>
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IV Way Forward
Activities planned for the period Oct 2021-Sept 2022 include:
1. Hold project monitoring meetings with collaborators
2. Complete inactivation of viral antigens
3. Collect and prepare plant-based adjuvant for vaccine
4. Test inactivated viruses for safety response in embryonated eggs, cell cultures and experimental chicken
5. Formulate the bivalent vaccine
6. Carry out experimental trial to test the efficacy of the formulated vaccine in chicken.