**Project Title:** Development of a climate smart vaccine against camel mastitis for Improved camel productivity in the ASALs.

**Annual Report Period Covered:** Oct 2020 to Sept 2021

<table>
<thead>
<tr>
<th>KCSAP livestock Applied</th>
<th>Value chain: Camel</th>
<th>Duration: 18 Months</th>
<th>Start Date: Oct 2020</th>
</tr>
</thead>
</table>

**Lead Institution:** KALRO – Veterinary Research Institute

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**Background**
Camels are an important asset providing livelihoods to pastoralists in Kenyan ASALs. Diseases, which include mastitis, are a major constraint to camel productivity. Sub-clinical mastitis is difficult to treat and causes substantial loss in milk production. Bacteria are main causes of camel mastitis. This activity is addressing group B streptococcus (GBS - *Streptococcus agalactiae*) with a complex epidemiology since it is a common commensal and an important human pathogen. The anatomy of the camel udder makes it difficult to treat mastitis using local antibiotics. This makes it necessary to explore methods of control that exclude use of antibiotics.

This project will therefore sequence the whole genome and analyze for presence of immunogenic targets of *S. agalactiae* isolates (from camel milk) that can confer protection, and include a subunit portion for vaccine against GBS. It is envisaged that adoption of the vaccine will save the pastoralists KES3.7billion worth of milk annually and increase community resilience to climate extremes.

**Objectives:**
1. Characterisation, purification and expression of proteins identified from the AGRIFI activity.
2. Adjuvant optimization
3. Evaluate selected antigens for immune response in lab animals.

**Expected Outputs**
1. Proteins with maximum protective ability by eliciting antibody response will be identified and characterized
2. Immunogenic response of identified proteins determined.

### I ACHIEVEMENTS

**Objective 1:** Characterisation, purification and expression of proteins identified from the AGRIFI activity.

**Activity 1.1:** Training on sequencing protocols and protein production

**Achievement 1.1**
A 3-day Molecular Biology training was held at KALRO-VSRI, from 30th Nov to 2nd Dec 2021, with participants drawn from:
   a) KALRO-VSRI staff trainees & KCSAP Master’s scholar fellows
   b) University of Nairobi, Centre for Biotechnology and Bioinformatics (CEBIB) MSc students
   c) African Biosystems (ABI) Product technical specialist

The training content was designed to introduce, educate and update the trainees and staff of recent development in the molecular biology field and assist the postgraduate students to review and understand the techniques to apply to their Masters research projects.

II Other achievements
Q1 technical report was submitted

III Constraints and how they were overcome
It has been difficult to obtain whole genome sequencing (WGS) data since service providers declined accepting biological samples since the outbreak of covid-19 pandemic. A local company has set up and we sought authority to single source. Data is now available for analysis using bioinformatics.

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>4,852,000</td>
<td>2,371,200</td>
<td>2,355,250</td>
<td>1,960,400</td>
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</tbody>
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IV Way Forward
Activities Planned for the Period Oct 2021-June 2022
- Bioinformatics data analysis
- Characterization & purification of recombinant proteins