



PRECISION LIVESTOCK FARMING

Technologies Evaluation in Africa

PROJECT OVERVIEW

The Precision Livestock Farming Technologies Evaluation in Africa is a 3-year project (2023 – 2025) funded by the Bill & Melinda Gates Foundation. This project aims to address important production constraints in smallholder dairy farms and pastoral production systems in northern Tanzania through the utilization of adaptive research.

Two leading PLF innovations will be used:

1. SmaXtec bolus:

The rumen bolus measures direct values in the reticulum that are transmitted to the smaXtec cloud where they can be always accessed through a phone app

2. Ceres tag:

These are satellite-linked ear tags attached to cattle that allow to track the animal's walking, grazing, resting, and ruminating. Real-time data can be accessed 24/7.

These technologies have the potential to allow monitoring and early detection of problems with factors affecting performance like livestock health, feed intake, heat detection as well as estimation of greenhouse gas emissions and optimal resource management through more targeted grazing.

PRINCIPAL INVESTIGATOR (PI) AND LEAD ORGANIZATION

DR. GEOFFREY DAHL

University of Florida
Feed the Future Innovation Lab
for Livestock Systems

COLLABORATOR INSTITUTIONS

Nelson Mandela African Institution of Science and Technology

(NM-AIST)

MAP Scientific Services

(Ceres Tag)

SmaXtec

(Bolus Monitoring Systems)

ADDITIONAL COLLABORATORS

- **Smallholder Dairy Farmers in Kilimanjaro region, Tanzania**
- **Members of Nronga Women Dairy Cooperative Society**
- **Kilimanjaro Fresh Members**
- **Pastoralists from Simanjiro and Handeni Districts**

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BACKGROUND

Livestock production provides a source of livelihood to more than 85% of the rural population in Tanzania and contributes > 7 % of Gross Domestic Product (GDP). Limited availability of livestock feed resources, caused by climate change (recurrent droughts), degradation of rangelands, encroachment of crop cultivation into communal rangelands, rampant disease and parasites, and underdeveloped livestock management have all contributed to low productivity of livestock in Tanzania. Precision livestock farming has the potential to contribute significantly to sustainably intensify livestock production in Africa, including Tanzania.



By employing various technologies, such as sensors, data analytics, and monitoring systems, these technologies can address several challenges faced by livestock farmers in the region.

PROJECT ACTIVITIES

Through an action-research approach, our goal is to generate the necessary data, and develop human capacity, knowledge, skills, and infrastructure that will lay the groundwork for the adoption of these and similar precision livestock farming technologies, for sustainable intensification of smallholder livestock production systems not only in Tanzania but also across sub-Saharan Africa. To achieve this goal, the project will undertake the following research and capacity building activities:

1. Determine the potential of smaXtec boluses

To improve feed utilization, reproductive management, and animal health across genetic influences in urban and peri-urban dairy farms in Tanzania.

2. Test the accuracy of smaXtec boluses

For the measurement of enteric methane emissions on dairy cows in Florida, to fully validate the approach in Tanzania.

3. Deploy Ceres ear tags

To evaluate the productivity of pastoral and ranch systems in Tanzania by gaining insights into animal movements and migratory patterns.

4. Establish a precision livestock farming Knowledge Hub

Through the creation of relationships with relevant stakeholders and evaluating the impact of different stakeholder engagements in promoting the adoption of precision farming technology.



TATHMINI YA UFANISI WA TEKNOLOJIA ZA KISASA ZA UFUGAJI

Wa Mifugo Barani Afrika

MUHTASARI WA MRADI

Mradi huu wa utafiti ni wa miaka mitatu (2023-2025) na unafadhiliwa na Bill & Melinda Gates Foundation. Mradi huu unalenga kutatua changamoto za ufugaji pamoja na kufanya tathimini ya matumizi ya teknolojia za kisasa za ufugaji wa mifugo barani Afrika. Lengo ni kuwasaidia wafugaji wa ng'ombe wa maziwa na wa nyama kutatua changamoto mbalimbali zinazowakabili kama vile; magojwa ya mifugo, ukosefu wa taarifa na kushindwa kufanya maamuzi sahihi na kwa wakati juu ya mifugo yao, hali inayochangia kushuka kwa uzalishaji.

Teknolojia mbili ambazo zimeonyesha kuwa na uwezo mkubwa na zinazotarajiwa kutumika katika utafiti huu ni pamoja na:

1. SmaXtec bolus:

Teknolojia hii itatumika kwa wafugaji wa ng'ombe wa maziwa. Mfugaji ataweza kufuatilia kwa ukaribu tabia za ng'ombe wake kupitia mfumo uliunganishwa na simu yake ya kiganjani, mfano: atapata kujua kama ng'ombe anatarajia kuingia joto au kuugua siku chache zijazo, kujua kiwango cha chakula au maji ambacho amekula/kunywa kwa siku, na atatarajia kutoa maziwa kiasi gani kulingana na ulishaji.

2. Ceres tag:

Teknolojia hii ambayo ni mfano wa hereni itatumika kwa kumvisha sikioni ng'ombe mmoja katika kila kundi la ng'ombe wafugwao katika jamii za kimasai na baadhi kutoka ranchi moja ya serikali ambapo itasaidia kufuatilia umbali wa ngombe waliotembea kwa siku, ulaji wa nyasi, kucheua na kutoa taarifa za awali kama mnyama atakuwa anaumwa.

MTAFITI KIONGOZI NA CHUO KIKUU KINACHOWAKILISHA MRADI:

DR. GEOFFREY DAHL

University of Florida
Feed the Future Innovation Lab
for Livestock Systems

TAASISI ZINAZOSHIRIKI

Taasisi ya Afrika ya Nelson Mandela ya Sayansi na Teknolojia

(NM-AIST)

MAP Scientific Services

(Ceres Tag)

SmaXtec

(Bolus Monitoring Systems)

WASHIRIKI WENGINE

- Wafugaji wadogo wa ng'ombe wa maziwa wa mkoa wa Kilimanjaro, Tanzania
- Wanachama wa ushirika wa wanawake wazalishaji maziwa ya ng'ombe wa Nronga
- Wanachama wa Kilimanjaro Fresh
- Wafugaji kutoka wilaya za Simanjiro na Handeni

INAYOFADHILIWA NA

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