Integrating Assisted Reproductive Technologies & Elite Pig Genetics to Transform the Pig Value Chain in Uganda (MAK RIF1/CAES/009)

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Project Team Inception

Feb. 14, 2020

Research team/Collaboration

Names & Address	Research Roles/Level of Participation
Dr. Donald R. Kugonza, PhD College of Agricultural and Environmental Sciences, Makerere University, Uganda	**Animal breeding & production** Principal investigator, Project Coordinator, Study Designs and Set up, Reporting and Accounting
Dr. Catherine Pauline Anena, PhD School of Gender & Women Studies (SWGS), College of Humanities & Social Sciences, Makerere University	**Gender Specialist & Mainstreaming** Gender analysis, Design gender-responsive project actions, Gender-mainstreaming, Project design & Implementation for women integration
Dr. Gideon Nadiope, MSc. Iowa State University – Uganda Program (ISU-UP), Kamuli district, Uganda	**Veterinary Medicine and Animal Production** Mobilisation, Selection and Training of pig farmers; Training AI technicians; Animal Health
Mr. Robert Natumanya, MSc. Dept. of Agricultural Production (DAP), Makerere University, Kampala, Uganda	**Animal Reproduction** Boar training, Semen collection and evaluation, Training of pig AI technicians/farmers & Actors.
Ms. Lydia Mugala, MSc. Ministry of Agriculture, Animal Industry & Fisheries (MAAIF), Entebbe, Uganda	**Agribusiness Management & Agricultural Extension** Farmer training, documentation & profiling; Monitoring & Evaluation; Business dev.

Introduction

- Poor access to good quality pig genetics is a serious challenge limiting productivity to meet high pork dd

- 52% of SH farmers in central Uganda esp. women don't keep a breeding boar (Bamundaga et al. 2017)

- SH farmers keep just a couple of sows make over 75% of all farms and rely on communal boars.

- 20 years ago, Pork cost half the price of Beef in Kampala, today they are at par.

The Problem

- Low sow productivity –**small litter sizes, inbreeding, low growth rates, rampant diseases - ASF**;

- Small litter sizes may result from boar factors – over working, insufficient service, mis-timed service, inbreeding, low genetic potential, **poor fertility**;

- MUARIK boar stud needs replacement & expansion to meet demand.

- Stud is housed in a converted store needs refurbishment to basic standards.

- A mini-lab for semen processing needs revitalization

Where our Previous efforts have reached

Lira

Buikwe

Gulu

Hoima

Jinja

Kamuli

Kiryandongo

Luweero

Lwengo

Masaka

Masindi

Mbale

Mityana

Mpigi
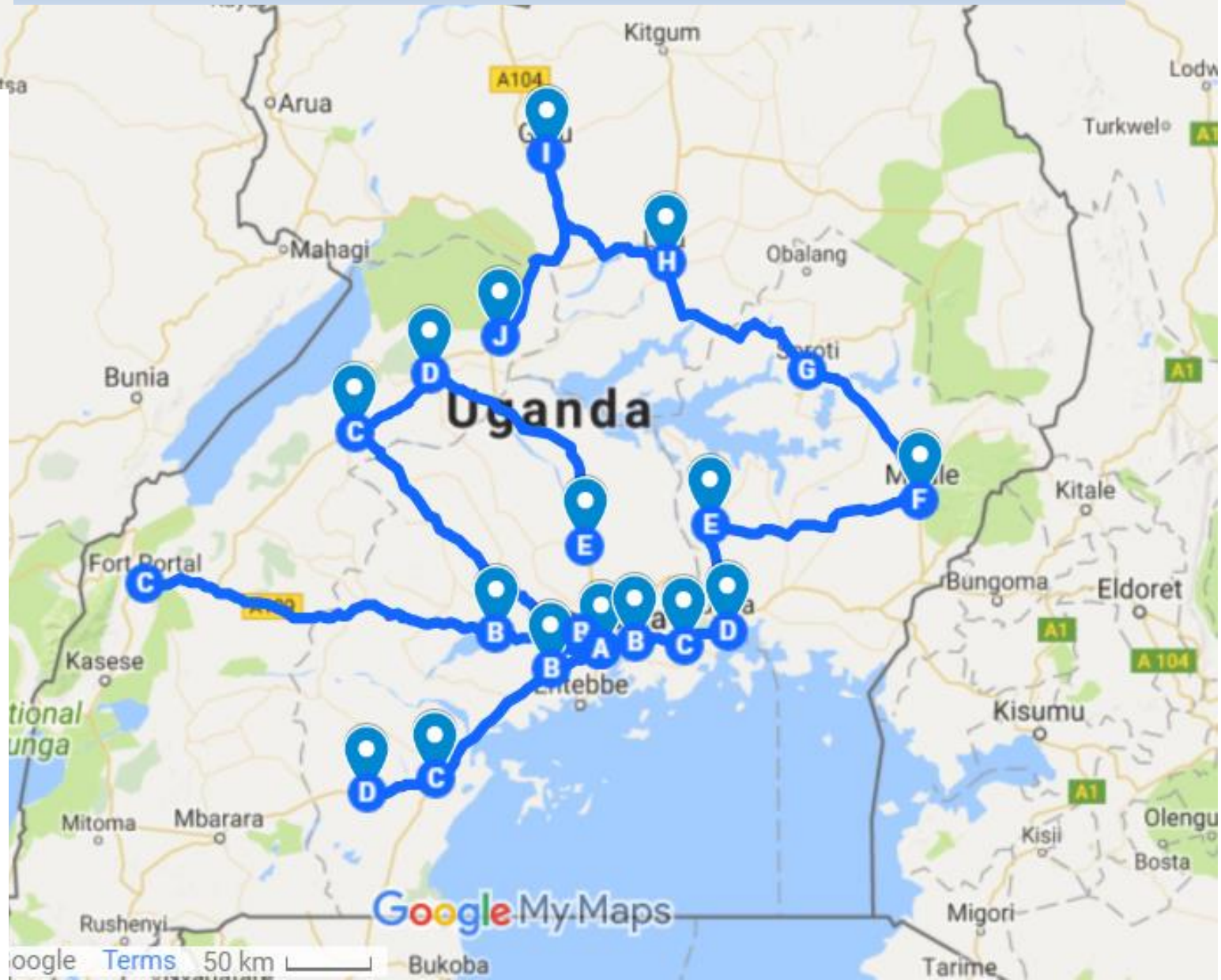
Proposed Solution

- Pilot testing a community-based pig AI model that uses estrus synch – Luweero, Kamuli, Wakiso;

- Acquire grade Duroc, Cambrough & Large White boars to produce, process & distribute semen.

- Determine the best model of distribution of semen to far areas.

- Develop a boar-based product for detecting estrus in gilts and stimulating sows for service.

- Develop a next-generation extender to preserve semen beyond 4 days.

Proposed Solution…….

Build capacity of women and youth pig farmers

One cohort of 21 pig inseminators will be trained.

Relevance of the project

- **Breeding**, **Research** & Dev., **Capacity** building in R&D, Specific **Input** supply, Providing **Extension** services - 5 of 10 activities in Uganda vision 2040 to enhance agric. production; are focus of this project.

- This action aligns with NDPII strategy of increasing local meat consumption per capita (NPA, 2015)

- Enhancing production & productivity of pork, beef cattle, goat, poultry, prod. entomology is a core of the Agricultural Sector Strategic Plan (MAAIF, 2016)

- Strong alignment to SDG2- Ending hunger, achieve food security & improved nutrition, promote sustainable agriculture.

Specific Objectives

- Promote elite boar semen through artificial insemination in 3 districts through community engagement;

- Assess the effectiveness of different AI technology delivery models fo scaling up elite pig genotypes;

- Evaluate the composition and effects of various body discharges of boars on sow reproductive behaviour;

- Develop, pilot test and promote a new long term boar semen extender to increase sperm life;

- Refurbish the boar unit infrastructure at MUARIK to basic standards.

Materials & Methods

- **Stakeholder Population**: 1000 pig farmers in Kamuli, Luweero and Wakiso – will be trained, will participate in trait preference study; will have their pigs inseminated

- **Stage of Solution**: Project is piloting/transitioning to scale. Proof of concept, refining collection and insemination protocol, determining acceptability by farmers;

- **Utility of Solution**: We will work with 1000 farmers; at least 80 Ugandans are qualified to provide the service;

- **Approach to develop solution**:

Materials & Methods

Approach to develop solution:

1. Selection and promotion of elite boar semen:

5 boars will be selected based on records

Farmer training to determine criteria for beneficiary farmers

Survey on breeds, production systems, selection criteria, pig performance traits of choice for various gender categories.

Materials & Methods……

- Identify breeding goals thru own herd ranking based on farmer choice, ranking of groups of animals and choice experiments

- Selected boars [Duroc/Cambrough/Large White??] aged 6-8 months will be procured, identified, stocked and quarantined at MUARIK.

- Boars will be trained for semen collection, that will be processed & distributed [To catch time, we shd start with available semen to meet the 1000 planned inseminations]

Materials & Methods………

- **2. Assessing effectiveness of different technology delivery models for scaling up superior genotypes:**

- We shall test 3 models: AI based on out-sourced semen; Use of communal boars; AI based on-farm semen production

- Semen quality control attributes will be checked at critical points namely: at boar stud, during storage, at user farm

- Data based on the semen will be collected and analysed for model evaluation to determine best-bet model for production, processing and distribution of boar semen.

Materials & Methods………

3. Evaluating composition & effects of various body discharges of boars on sow reproductive behaviour:

Boar fluids – semen, urine, saliva and pre-putial fluids will be collected, purified and tested for behaviour responses on a set of gilts.

Twelve gilts in Four pens will be treated with stimuli for behaviour responses. [Each gilt will be a replicate.]

Materials & Methods………

4. Developing next generation extenders for boar semen to increase sperm life:

Raw materials will be selected based on cost and function, then procured, stocked, mixed to get recipes based on the period of storage (control, 1-7 days, 1-14 days) and cost.

Test recipes will be formulated and tested in the laboratory and in field for fertility performance --------

Semen attributes of extended semen will be assessed per extender.

Field inseminations to evaluate extender performance – repeat heats, conception, farrowing rate, litter size.

Outcomes, Impact, Outreach

- Primary beneficiaries are smallholder women and youth pig farmers in Kamuli, Luweero and Wakiso

- Secondary beneficiaries: Extension agents, NGOs, other knowledge management workers.

- Anticipated outputs:

- A renovated boar stud house at MUARIK

- Restocked stud at MUARIK

- A community-based AI distribution model developed

- One boar-based sow stimulant developed

- One long-term boar semen extender developed

Outcomes, Impact, Outreach…….

- At least 900 pig farmers trained
- At least 3 social media platforms created for knowledge sharing
- At least 2 publications generated
- Post Project expected outcomes:
- 25,000 pigs produced
- Reduced incidence and devastation of Swine Fever
- Reduced inbreeding in pigs and increased number of marketable pigs per year
- Enhanced food security, increased incomes and improved protein nutrition

Capacity Building

- One PhD student will be supported

- One MSc student will be trained

- 3 BSc students will undertake their research and internship under the project

- Interactions of team members who are from varying disciplines will build their respective capacities.

- At least 10 members of Makerere Univ community will be capacitated

- 21 Field AI technicians will be capacitated

- Over 900 farmers will be capacitated

Key Milestones

- Conduct an Inception meeting for research team Nov '19

- Engage of leaders of key stakeholder groups – Dec 2019

- Rehabilitate Boar stud unit at MUARIK – Dec 2019

- Procure five boars, - Dec 2019

- Procure Field AI Kits, - Dec 2019

- Procure/Fabricate Portable Weigh Crate – Dec 2019

- Procure Semen storage Cabinet – Dec 2019

- Select target farmers, conduct trainings in best practices for profitable pig production – Feb 2020

- Conduct training of one cohort of 21 pig inseminators drawn from the 3 target districts – Jan 2020

- Produce, distribute semen for AI – Jun 2020

Key Milestones…….

- Identify approaches to ensure quality AI service, pilot test the community-based AI model – Jun 2020

- Collect purify, evaluate candidate boar-based sow stimulants for estrus management – May 2020

- Select and characterise candidate materials for formulating next generation long-term boar semen extenders – May '20

- Conduct lab and field evaluation of candidate semen extenders – Jun 2020

- Disseminate project outputs – policy briefs, farmer workshops, Mak-news articles, multi-media documentary, journal papers, Social media posts – Jun 2020

- Reports – Feb, April, June 2020

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