

Report on potential areas of engagement of the L&F CRP in pig genetics / breeding in Uganda

Karen Marshall, June 2015.

Background

The pig value chain in Uganda is one of the value chains targeted under the Livestock and Fish CRP. In relation to this, a scoping trip was performed to identify areas of L&F engagement on pig genetic resource use in Uganda.

This scoping trip was performed by Karen Marshall (ILRI) in April 2014, with support of ILRI staff from the Uganda office. It comprised meetings with key research organisations and other actors involved in pig genetic resource use in Uganda, as well as travel to selected field sites. See Annex 1 for full details.

Current involvement of local institutes on pig AnGR use

Table 1 summarises the various national institutes visited, key persons met, and the involvement of the institute in relation to pig AnGR use. Key institutes working on pig ANGR use are: the National Animal Genetic Resource Centre and Databank, with a pig breeding unit of PIC pigs (Camborough sows and terminal sire line boars), and a mandate to implement the Animal Breeding Act; Makererre University, with a current project to upscale pig artificial insemination (AI); and Kampala City Council authority, with a pig breeding unit (Largewhite sows and Landrace boars) disseminated by AI via a private company). Further detailed notes on the visits are provided in Annex 2.

Databases on pig performance

Table 2 summarises the available databases on pig performance. This data is limited. NAGRC&DB and KCCA each have performance data on a limited number of exotic pigs over a relatively short time-frame (2-3 years), with these pigs kept under relatively good management condition. None of the organizations indicated they had any recorded data on local pig performance.

Table 1. Summary table on National institutions and involvement in pig AnGR use

Organisation	Contact	Activities on pig AnGR use
National Animal Genetic Resource Centre & Databank NAGRC&DB	<p>Esther Nakajubi – in charge of the piggery; magnakajubi@gmail.com</p> <p>Helen Nakimbugwe – livestock geneticist / technical manager breeding; nakimbugwe@yahoo.com</p> <p>Dr. Semambo – executive director; cattbrd@gmail.com</p>	<p>Have breeding population of 30-50 PIC sows of maternal line (Camborough 22) and 6 PIC boars of terminal sire line 337, 410, 401. Piglets from these are sold as ‘Camborough’ breeding sows and boars.</p> <p>Mandate includes implementation of the Animal Breeding Act; permission to import new breeds is given by the Commissioner of Livestock, Health and Entomology who consults with NAGRC&DB</p>
National Livestock Resources Research Institute (NaLIRRI)	Henry Mulindwa – Head Livestock Breeding Unit	Very limited to date. Currently have small pig unit (4 Camborough sows and 1 boar) on which they have initiated performance monitoring
Makerere Univeristy (MUK),	Donald Kugonza, Animal Breeder	Project on upscaling pig AI through creation of community boar studs (where a private person keeps boars and uses them as supply of semen for AI).
Bulindi Zonal Agricultural Research Division (BUZARDI)	<p>Gilbert Byenkya – Program leader, Livestock and Fisheries; byenkya@yahoo.com</p> <p>David Hafashimana – Director of Research (head of BUZARDI); davidhaf2000@yahoo.com</p>	<p>Small activity on pig multiplication and distribution in one year (2010). The pig unit remains from this (4 sows of Large White and Camborough and 1 Large White boar), and view is to commercialise this herd.</p>
Kampala Capital City Authority (KCCA)	<p>Esau Galukande – Deputy Director Production and Marketing, Directorate of Gender, Community Services and Production; egalukande@kcca.go.ug</p> <p>Robinson Kabanda – Animal production officer; rkabanda@kcca.go.ug</p>	<p>Has breeding unit of LW sows (20) x LR boars (4), producing LW x LR commercial progeny. Also producing own replacement LW sows and LR boars via use of imported semen from Spain. Promoting pig AI using the LR boars, currently using a private company as the AI service provider. AI is currently charged at 50,000 USh per pregnancy.</p>

Table 2. Summary table of databases on pig performance

Organisation	Type of data	Comments
NAGRC&DB	Data on Camborough herd for last 2-3 years. Herd comprises 30-40 sows (Camborough 22), 6 boars (PIC terminal sire line).	Maybe older records but these are not collated. Currently working on strengthening the recording system.
NaLIRRI	None	Planned a pig characterisation project but this was not funded. Currently has 4 Camborough sows that will be monitored
MUK	None	University farm had Large White herd (? number) but all animals were culled late 2014 due to ASF. Some records exist but these are in various 'farm books' and are not digitised.
BUZARDI	None	Distributed some LW piglets to farms, but these were not performance recorded
KCCA	Data on LW (20 sows) and LR (4 boars) producing LW x LR cross for last 2 years.	Applies to very high management system

Potential areas of engagement of the L&F CRP in pig genetics / breeding in Uganda.

The below summarises the identified potential areas of engagement of the L&F CRP in pig genetics / breeding in Uganda, resulting from the various discussions. Named potential partners are those who indicated they are interested in partnering on such an activity.

1. Genomics

- Selection signatures for ASF resistance, leading to identification of alleles that confer resistance to ASF.

2. Comparison of the performance and household benefit of keeping different pig breed-types

- Compare the performance and household benefit of keeping different pig breed-types via a longitudinal study, by monitoring of pigs on-farm or on a research station (potential partners MUK, KCCA, NaLIRRI)

- A station based study has the advantage of being able to test new breed-types, but apparently no single station with facilities to keep more than 15 sows, thus would need to use a private farm.

3. Availing breeds

- Identification of which commercially available breeds & breeding systems may suit different pig systems in Uganda, for potential importation of new breeds (e.g. terminal crossing-system for semi-intensive / market orientated smallholders; single breed for other smallholders). Possibly via the use of an expert panel inclusive of local stakeholders and international experts. (Potential partners MUK, KCCA)
- Breed registration system to improve quality control on breeds and ensure smallholders can access the breed-type they desire. Suggestion from MUK was to identify and certify private suppliers of the various breed-types (Potential partner MUK)
- Strengthening the small breeding unit established by KCAA (for example, by strengthening the nucleus recording system and linking this to a mobile platform for farmer recording; implementing EBV based index selection of nucleus animals (Potential partner: KCCA)

4. Conservation of the local pig

- Study on need for conservation actions re the local pig, and recommendations (if required) on appropriate approaches to this (potential partner NAGRC&DB)
- Creating a research resource of local pig DNA (potential partner NaLIRRI)

5. Support to development of pig artificial insemination

- Extending shelf life of boar semen (potential partner: MUK)

Concluding comment.

The scoping study resulted in a number of potential engagement areas in R4D on pig breeding / genetics in Uganda. Prioritization of resource mobilization to these issues is warranted.

Annex 1. Scoping trip itinerary (see Table 1 for people met at each institute)

- 27/4/15 National Animal Genetic Resource Centre & Databank (NAGRC&DB)
- 27/4/15 ILRI Value chain team
- 28/4/15 National Livestock Resources Research Institute
- 28/4/15 Makerere University
- 29/4/15 Devenish pig company
- 29/4/15 Bulindi Zonal Agricultural Research Division
- 29/4/15 Hoima District Local Government, District Veterinary Officer + local farm visits
- 30/4/15 Kampala Capital City Authority

Annex 2. Detailed notes from visits to the various local institutes

1. National Animal Genetic Resource Centre & Databank (NAGRC&DB)

- Under Ministry of Agriculture, Animal Industry and Fisheries
- Responsibilities are outlined in the 'Animal Breeding Act' 2001 (<http://www.agriculture.go.ug/userfiles/Animal%20Breeding%20Act%202001.pdf>), however the institute has insufficient resources to achieve all of these
- NAGRC & DB established 2003, prior to this was the 'Animal Breeding Centre'
- Current activities (in general):
 - Supply of breeding material
 - for dairy, beef, poultry, pigs: live animals + for cattle semen / embryos
 - in dairy (apparent main focus), have programs to upgrade indigenous breeds to e.g. 75% Friesian, also do artificial insemination, embryo transfer, sexed semen supply
 - breeding material sold at subsidised price
 - Databank
 - keep records on own breeding animals
 - design and avail record keeping material to farmers
- Funding mechanisms: government + self-generated from sale of breeding material
- NAGRC&DB has 13-14 farms located throughout Uganda
- NAGRC&DB specific activities on pigs:
 - Typically maintain about 50 Camborough-22 sows and 6 boars (PIC terminal sire lines 401, 410, 337) which are mated to produce piglets for sale at 2 to 4 months of age, as breeding animals. Piglets are sold for a subsidised price.

- *NB Checked PIC web-site and Camborough (now 29) listed as maternal, and 337 & 410 are listed as terminal sire lines. Note thus that NAGRC&DB are supplying a maternal PIC line x terminal PIC line cross for use as both sows and boars.*
 - Currently maintain less sows due to resources, and because of plan to source new Camborough sows
 - Pigs are located at Farmer Livestock Experimental Station, Entebbe and Njeru stock farm
 - Animals were sourced from PIC South Africa, imported by Ministry Agriculture, Animal Industries & Fisheries (MAAIF). The person who imported the animals is no longer alive, and thus criteria on which the actual animals were selected is not known
 - Demand for Camborough breeding animals cannot be met
 - If one producer is buying both female and male piglets, they will be given a male from a different family line to the female (to avoid inbreeding)
 - Have 2-3 years of records on the Camborough pigs (may be some older records but not collated into the main database)
 - Breeding: servicing, farrowing, weaning,
 - Health: treatment type, prophylactics
 - Feeding: type of feed, amount given to group of animals
 - Planning to include body measurements, weights
 - Pigs sold from NAGRC&DB are ear-tagged.
 - There are plans to monitor farm-level performance of sold animals in future
 - Typically 200-300 piglets sold per year (however currently less piglets are being sold due to the reduction in sow number)
 - Main constraint on their pig breeding operation: 1) too small income from pig sales to maintain the program; 2) continued postponment of brining in new pigs due to cost; 3) insufficient research activities at farm level
 - Plan to train staff in pig AI. Semen will be both from own sirs and purchased.
 - Were involved in collaborative project with Buzardi & NAROC on crossing local and exotic pigs, but this was discontinued due to lack of resoruces
- On pigs in general
- Common breeds (as named by Esther) are Landrace, Largewhite, Camborough, Pietran (though Helen said there are no Pietran), LargeBlance. Duroc uncommon
 - Camborough is synthetic of LW, LR and white Duroc; qualities include lean meat;
 - F is an issue at producer level, as if farmers are purchasing male and female breeding animals from the same litter
 - Aware of one person in Masaka crossing pigs with wild boar
 - Local pigs are rapidly reducing in number, and a conservation program is needed
 - Crossing of e.g. Camborough sow with LW or LR boar results in litter with piglets of many colours, which farmers do not like as black piglets don't sell

- AI beginning to be used in Uganda but farmers complain of small litter size, due to single insemination
- No national census on pigs. No breed registration system on pigs (though this is in NAGRC&DBs mandate to establish, they do not have resources)
- Animal breeding act specifies which breeds can be imported without special permission. These are LW, LR, Wessex Saddleback. Importation of other breeds is possible but requires permission from The Commissioner, Livestock, Health and Entomology, who should consult with NAGRC&DB
- Research ideas generating from discussion
 - Conservation of local pig (Helen) via keeping of breed & running breeding program on NAGRC&DB farm
 - Extending shelf life of boar semen (Dr Semambo); collaboration on pig AI in general
 - Disease resistance by breed-type (inclusive of the various exotic breeds), especially ASF (Karen)
 - Selection signatures for ASF resistance (Karen)
- Dr. Semambo is the National Co-ordinator for AnGR, responsible for the country reports
- Noted that Emma Naluyima is a private pig breeder importing Camborough; she is also the chairperson of the national pig multi-stakeholder platform

2. National Livestock Resources Research Institute (NaLIRRI)

- NaLIRRI is part of NARO (National Agriculture Research Organisation). NARO has 6 national institutes (one on livestock, NaLIRRI) and 9 zonal institutes doing adaptive research. NaLIRRI is located in Eastern Uganda – Tororo.
- NaLIRRI is mandated to do research on livestock nutrition (feeding), health and breeding. Breeding work has mainly been around dairy, goats, poultry, typically with indigenous breeds
- NaLIRRI has very good dissemination channels, and thus could be a potential dissemination partner
- NaLIRRI specific activities on pigs:
 - Very limited work on pigs to-date, partly because pigs are not prioritised in the Development Strategy for Investment Plan (DSIP) of the MAAIF. (NB can obtain copy of this plan from MAAIF website) and MAAIF funding calls are aligned to this plan
 - NaLIRRI had proposed a pig characterisation project for the local pig, but this was not funded.
 - They currently have seed money to keep a small pig unit - 4 sows, 1 boar, Camborough - on which they will do performance monitoring. These sows were sourced from farmers in Northern Uganda, and the boar from a farmer in East Uganda, the farmers having received animals via an NGO (thus the belief they are pure Camborough)

- NARO may soon start a specific program on pigs, covering all of breeding, feeding and health
- NaLIRRI / NARO facilities on pigs:
 - NaLIRRI has facilities to keep 8 sows in breeding unit, and 40-50 growers in grower unit, however these structures require some renovation
 - The NARO zonal livestock centres are distributed over the country, each has a livestock person, and most have small piggery units, most needing some renovation
- On pigs in general
 - Indicated some communities are interested in black pigs due to disease resistance and leanness
 - Named breeds present in Uganda as LW, LR, Camborough, Duroc, local, and crosses between these
 - Emma Naluyina has some Danish breeds of pigs which she sells onto semi-intensive farmers
 - Farmers would like a lean, disease resistant breed of pig
 - Indigenous micro-organism (IMO) technology is being used for waste management (pig floor of sawdust + IMO), but also belief this keeps pigs lean (maybe because of heat generation from IMOs pigs require less fat)
 - Contact for pig AI is Dr Kaule in Mukono 0752 974737
 - Local breed is declining, and mostly found in rural locations where NGOs haven't worked
 - On introduction of pig breeds: Camborough has come through the MAAIF, rest via NGOs
- Research ideas
 - Obtaining DNA samples from local pigs as research resource – NaLIRRI has capacity to assist in this (staff can take pig blood)
 - Pig breed characterisation

3. Makererre Univeristy (MUK)

- University farm
 - Kept 30-40 Large White sows. Some hand-written records on these animals would be available in the various farm books (but not collated into an electronic database). Records on reproduction, growth.
- MUK activities, led by Donald Kugonza, on pigs
 - NARO funded competitive grant scheme project on pigs (2 year project) with 2 objectives:
 - Upscaling pig AI through creation of community boar studs (where a private person keeps boars and uses them as supply of semen for AI). Based on previous project showing feasibility of pig AI, will initially train young people on pig AI and facilitate them to access boars at a zonal station (Rwebitaba), and

then evolve this into community boar stud model. Initially will source own boars for Rwebitaba (possibly one Camborough and one local)

- Trialling different milk replacers for use in cases where sows are not lactating
- Student in agricultural economics working on pig profitability for systems of different scales
- On pigs in general
 - Noted that there can be barriers to obtain the permit to import new breeds of pigs (some people have tried without success)
 - Interested in bringing in new breeds as semen for AI
 - ASF & semen – ASF can likely be spread via semen (ASF is a virus), thus stakeholders have asked for assurance that semen will be ASF free. At the moment there is no test for ASF in semen being applied (assurance is from the boar being healthy). Another MUK staff member, Dr Masembe, is working on a quick test for ASF
 - Stated pig breeds in Uganda as LW, LR, Camborough, 'Black with white band' (possibly Saddleback but is not sure, last Saddleback's introduced likely 60/70). Unsure on presence of Duroc.
 - Very interested to know which breeds were imported when, and indicated that Commissioner Livestock, Health and Entomology may refer us back to NAGRC&DB on this.
 - Noted that the local pig is more disease resistant and can handle tethering, whereas exotic pigs cannot handle tethering.
- Research ideas
 - System for quality control on breed e.g. breed registration. Suggestion was to establish 'reference points' for the various breeds, who are private people supplying the pure breeds (Donald)
 - Establish breeding system for lean pork (Donald) . Here the use of a specific terminal sire line should be considered.
 - On-station breed / cross-breed comparison, but would need to work with private farmer if considering keeping a high number of sows, due to lack of research station facilities (Donald)
 - Identification of which commercial available breeds may suit Uganda, for potential importation (Karen)

4. Devenish pig company

- Are a feed and animal nutrition company, but also running a project on pig production (breeds, feeds, markets).
- As part of the project, have initiated a farmers co-operative (with view of promoting commercialization. These are fees to join co-operative, also the farmer must have (or plan to have) 6 sows and 1 boar. There are currently 70 members.

- Are importing 'pure' Large White and Landrace from farmer's choice in Kenya, progeny of which will be availed (sold?) to their co-operative members. Discussed process of obtaining import permit, which seemed relatively straight forward
- Also establishing a demonstration pig farm
- Also interested in establishing AI

5. Bulindi Zonal Agricultural Research Division (BUZARDI)

- Small activity on pig multiplication and distribution in one year (2010) when funds were available. ~ 80 piglets from 5 sows (Large White) and one boar (Large White), given (free) to pig keepers within the districts that BUZARDI covers. Some farmer training on keeping exotic breed provided, plus limited monitoring of animals. Some farmers remain with these breeds, others could not maintain structure (housing) and and / or sold animals to meet emergency household expenses.
- BUZARDI currently have 4 breeding sows (Large White and Camborough) and one boar (Large White), and is planning to commercialise this herd
- Original pigs were sourced with help of NAGRC&DB (who sourced from private farm for LW)
- Breeds in area named as LW, LR, Camborough, local
- Hoping to have one staff member trained in pig AI, after which they will try to acquire equipment
- There are 2 other zonal centres also with small pig multiplication units: Mukono, Mbarara
- Noted that one trader from Congo preferred local pigs not due to breed-type per se, but because they are scavenging & fit, thus able to be trekked up a mountain
- Asked on collaborative research areas, but no definite answer
- At visit of pig unit, gave defining features of Camborough as: well curved back like LR, ears erect like LW, flat face, white or white with black spots, good feet

6. Kampala Capital City Authority (KCCA)

- Recent engagement in pigs under urban farming program, with a focus on genetics, management, cost of feeding
- Establish pig breeding centre on the 31 acre farm they have; also demonstration farm for IMO, plus hydroponics for pig fodder
- On breeding unit
 - 20 LW female (from 5 farms), 4 LR males, sourced 2 years ago from Kenya (farmers that supply farmers choice). Also 2 x LR females and 1 x LW male. None of these animals are likely entirely pure.
 - To date, 770 piglets (LW x LR), either sold as finishers or sold as piglets for fattening. Male piglets are castrated.
 - For own replacements:

- Producing own LW replacement sows, from best own LW sows and imported LW semen
- Producing own LR replacement boars, from own LR sows and imported LR semen
- Have imported frozen LW and LR semen from Spain, from the company Semen Cadona
 - Keeping records on reproduction and growth rates (currently in spreadsheet)
- Promoting use of AI, using VetLine as AI provider, both within and outside Kampala. Semen is from the LR boars. 128 farmers have registered for AI, done 471 inseminations (2 x 12 hrs apart), Cost is 50000 per AI, do not pay for repeats (as still experimental, later cost may increase including payment for repeat)
- Want to encourage urban pig producers to do wean to finish, obtaining piglets from outside the urban centre.
- May move to 3 breed cross LW x LR (maternal) x Duroc (terminal) with time
- Says unable to obtain list of breeds imported into country
- Note Esau indicated he had an internal report with some breed comparison data- he will forward
- Research questions
 - On-farm performance comparison
 - Alternate feeds (they are considering fermenting market waste, beans as protein source, fermented sawdust as supplementary CHO source)
- Named breeds as LW, LR, Camborough, Saddleback, No Duroc - only its descendants as crosses, NGO has introduced Pietran in Hoima, but now also only its descendants as crosses
- Vetline services
 - Private company doing pig PI, also IMO
 - Doing pilot project on pig AI since September 2014 with KCAA, 509 pigs inseminated to-date, 181 farmers, 644 piglets, 28% repeat rate, do double inseminations 12 hours apart, keeps farm-level records
 - Indicated that as new technology many farmers do not pay enough attention to heat detection (call e.g. on day 3 of heat), also some farmers / veterinarians (including DVOs) do not believe this can work in Uganda
 - Has trained a number of people who he employs in pig AI
 - Not aware of any other AI service providers in Uganda