



RESEARCH
PROGRAM ON
Livestock

More meat, milk and eggs by and for the poor

Smallholder pig value chains transformation in Uganda: Results, lessons and insights

Emily Ouma, Michel Dione, Kristina Roesel, Peter Lule, Brian Kawuma, Rosemirta Birungi, Grace Asimwe, Felix Opio, and Ben Lukuyu

Uganda Livestock Sector Consultative Meeting, Kampala, 14 March 2017





Background on pig sector in Uganda

- Not a priority enterprise in Development Strategy Investment Plan - MAAIF (2010/11-2014/15)
 - Prioritised in some district plans, e.g. Hoima and Masaka
- MAAIF Agriculture Sector Strategic Plan (2015/16 – 2019/20) - draft
 - Piggery: *not chosen among the 12 priority strategic commodities but recognised as very important for food and nutrition security of the population.*
 - Budget allocation of UGX 15bn for control of ASF



Background of pig value chain – L&F program

- Smallholder pig value chains in Uganda identified as a high-potential target to translate research into major interventions:
 - Stimulate pro-poor transformation and generate benefits at scale.
- High potentials for growth due to rising demand for pork
 - Highest per capita consumption in Eastern Africa at 3.4Kg
 - 4% increase in pig population from 2010 – 2014 (3.4 – 3.5 Mn)



Background.....

- Smallholder pig value chain activities – commenced in 2011
- Funding support
 - EC-IFAD funded project: Catalysing emerging smallholder pig value chains (2011-2014)
 - Irish Aid funded project: More Pork by and for the poor: Catalysing emerging pig value chains for food security and poverty reduction (Apr 2014 – Mar 2017)
- Complementary projects
 - GIZ funded: Safe Food Fair Food (A4NH CRP) (2011 – 2015)
 - GIZ funded: mPig Mobile SMS learning for pigs – An innovative information sharing platform for smallholder pig value chain actors (A4NH CRP) (2015-2017)

Stakeholder vision and expected outcomes

- **Value chain stakeholder vision** - “development of an efficient, all-inclusive and sustainable pig value chain for safe and affordable products by 2023”
 - Participatory visioning process
- **Target outcomes**
 - Improved pig productivity
 - Better quality of pork supplied in marketing systems
 - Better performance of the value chain
 - Improved income from piggery
 - Better waste management practices along the chain (environment)

Team

- Multidisciplinary –fuller understanding of value chain issues
 - Animal Nutritionist
 - Animal health/epidemiologist
 - Agricultural Economist
 - Public health – food safety aspects
 - Communications staff
 - Livestock geneticist (HQ-based)
 - Gender support (remotely by Royal Tropical Institute (KIT), The Netherlands)

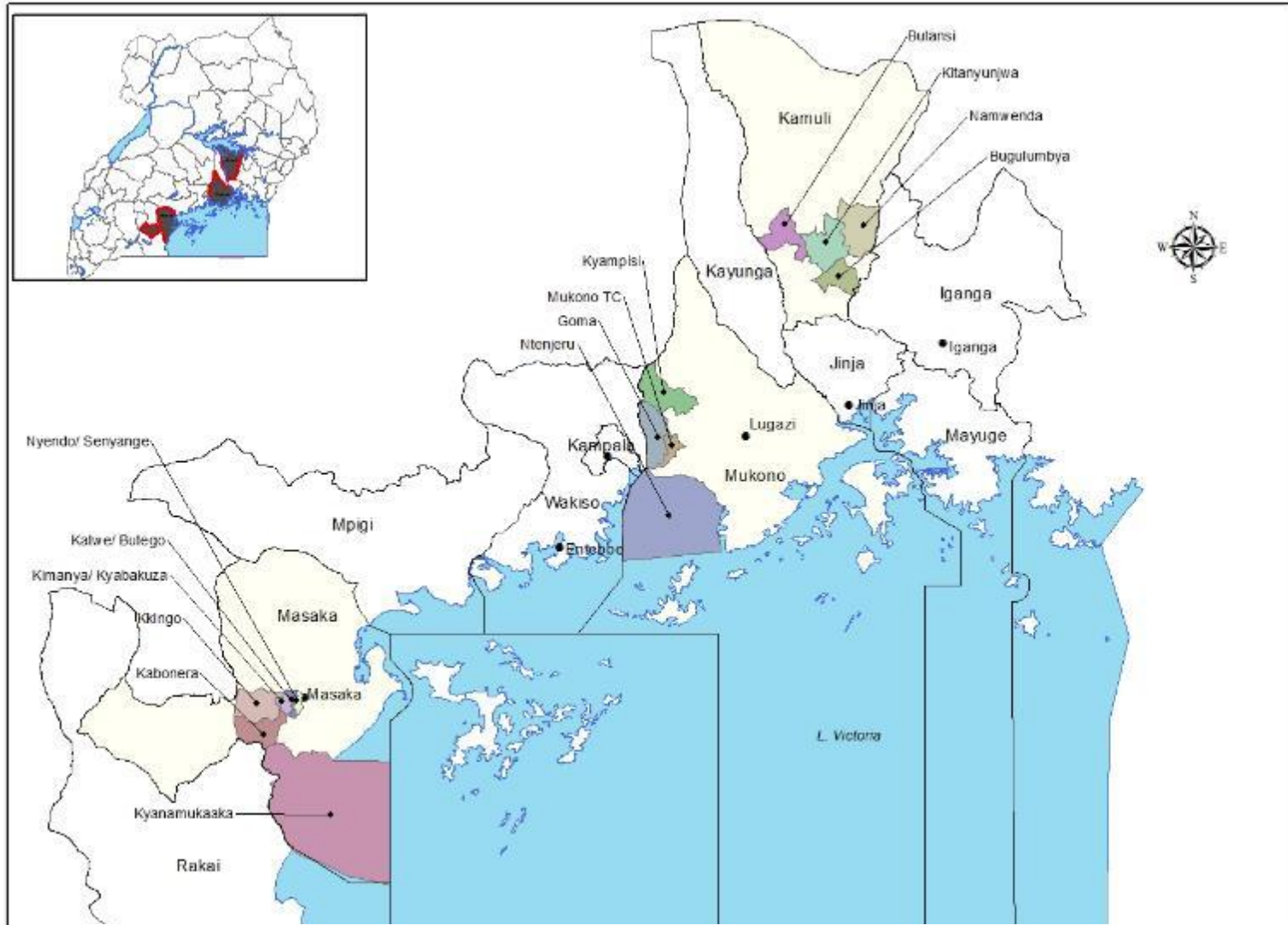


Partnerships

- *Public sector:* MAAIF, local governments of Kamuli, Masaka, Mukono, Hoima & Lira, KCCA
- *Research/education institutions:* NARO, NaLIRRI, Makerere University (COVAB, CAES, CNS), SLU, Iowa State University – Uganda Program
- *NGOs:* VEDCO, SNV, Veterinaries Without Borders
- *Private sector:* PPM, Union of Pig Coops of Greater Masaka, Wambizzi Coop., Green Heat (U) Ltd., OrgaFarms (on IMOs)



Site selection



Site selection criteria (Van der Steeg, 2012 – GIS study targeting smallholder Uganda pig value chains)

Pig density; Poverty level; Human population; Market access; Potential partners/stakeholders; Accessibility; severity of constraints

Value chain assessments

- **Key objective:** Identify constraints and opportunities in the value chain
 - entry points for testing best bet interventions
- **Methodology**
 - Situation analysis: macro-level assessment of the pig sector
 - Value chain assessments: Micro-level assessments



Value chain assessments: methodology

Inputs and service providers

- Questionnaire surveys:
 - Feed stockists (*n*=59)
 - Village veterinarians (*n*=112)
 - Agrovets stockists (*n*=56)
 - Village boar owners (*n*=90)

Pig farmers

- Focus group discussions (*n*=2519)
- Disease prevalence surveys (*n*=1200)
- Pig sampling (sera, blood and faeces from 1200 pigs)
- Feed samples for nutritional analysis (*n*=43)
- Multipathogen surveys (*n*=630 pig samples, *n*=326 hh)

Post-production nodes

- Questionnaire surveys:
 - Live pig traders (*n*=168)
 - Butchers (*n*=25)
 - Pork retailers (*n*=56)
- Descriptive survey: Kampala pig slaughterhouse
- Pork samples (Brucella suis, Salmonella spp, total aerobic counts)
- Consumer household surveys (*n*=1800)

Value chain assessment results and interventions

Inputs and services



- Low efficacy of drugs (dewormers and antibiotics)
 - Expired drugs
 - Poor storage and improper handling (cold chain)
 - Inappropriate administration (under/over dosage) due to inaccurate body-weight estimation of pigs
- High cost and seasonal availability of raw materials for compounding feeds
- Weak implementation of quality assurance systems
- Poor quality commercial feeds in the market

Partnership intervention

- Sensitisation of drug stockists by National Drug Authority on application of best practices involving drug use, handling and storage (ILRI in collaboration with Mukono DLG)

2: Pig Health

Results and interventions

African swine fever and biosecurity

- Evidence of healthy pigs carrying ASF virus.
- Risk factors are prompt disposal of dead pigs on farms, presence of wild animals and sourcing of drugs from stockists by farmers.
- Transportation, slaughter and collection/bulking nodes are highest risk nodes in the spread of ASF
- Farmers aware about ASF but lack knowledge on application of good biosecurity practices
- Lack of compensation for ASF-related pig losses, prompting panic sales.



Impact of parasitic infections and other pig diseases

- High burden of gastrointestinal parasites: 61.4% of pigs positive for one or more gastrointestinal helminths (*Strongyle*; *Metastrongylus* spp., *Ascaris suum*, *Strongyloides ransomi* and *Trichuris suis*, *Coccidia* oocysts)
- High prevalence of pathogens of production and public health importance (*Streptococcus suis*, *Leptospira* spp., PCV2, APP, *M. hyo.*, Influenza A, PPV, PRRVS)
- Routine management factors (*routine removal of manure and litter from pig pens*) had a greater impact on the parasite prevalence of infection than regular treatment or the level of confinement
- Impact of multi-morbidity on pig health and productivity (vs. losses due to acute illness for instance ASF)



Gender, pig diseases and husbandry

- Women play an important role in disease control.
- It is important to involve the whole household in disease control interventions.
- Need to build capacity of women to enable them participate in markets and access financial resources for investment in biosecurity.



Capacity building of farmers on improved husbandry and biosecurity practices (RCT trials)

- 960 farmers involved in the study
- Improved knowledge of pig farmers on biosecurity
- Reduced outbreaks in some areas following training
- Farmers are willing to take preventive action as they have observed the positive outcomes.



**Improvement of farmer's
business performance and
enforcement of disease
control regulations**

Ex-ante assessment of pig biosecurity interventions

- Application of System Dynamics model to assess the impact of biosecurity interventions on margins to value chain actors
- Average annual % change of value chain actors' cumulative profit relative to baseline

Scenario	Pig value chain actors				
	Producers	Butchers	Traders	Collectors	Wholesalers
ASF biosecurity Vs baseline	-6.2	8.1	10.3	8.6	8.0
Pig business hub Vs baseline	11.3	5.3	8.8	7.3	4.0
Combined ASF biosecurity and pig business hub	6.5	13.1	21.2	17.4	10.4

Capacity building of butchers on appropriate pork slaughter and pork handling

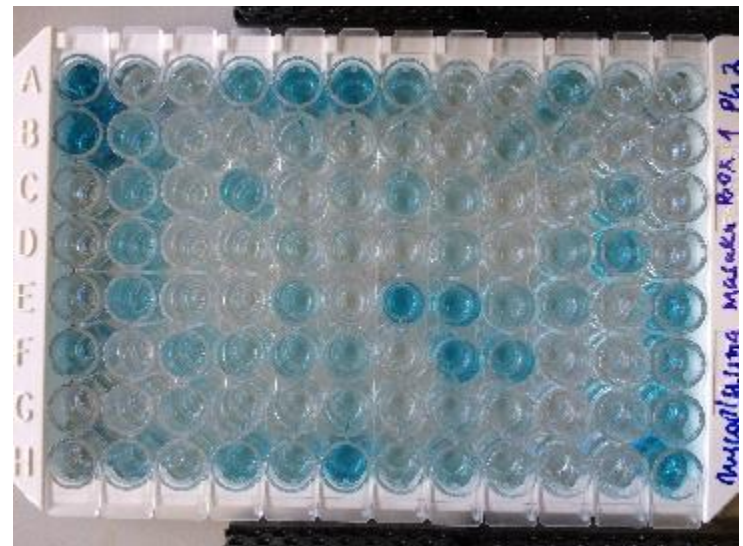
- Participatory training for butchers (47) in collaboration with **Veterinarians Without Borders** has enhanced hygiene, carcass handling and biosecurity practices in Mukono Municipality.
- Improved knowledge on good hygiene and sanitation, personal hygiene, and management of sick pigs and “abnormal pork”
- Some butchers have reported an increase in sales of pork as a result of adoption of best practices



Meat inspection and hygiene regulations are instrumental to sustain outcomes

USAID CGIAR Linkage Funds: Point of Care Diagnostic Technologies

- Implemented in collaboration with VWB, Makerere, MAAIF, NALIRRI
- Systematic cell count for mastitis in milk
- Use of mobile phone for ELISA picture interpretation
- Fluorescent Polarisation Assay for Brucella



Rose Bengal test

3. Food Safety and Zoonoses

Results and interventions

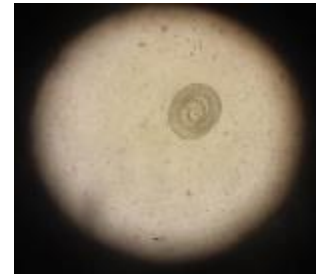
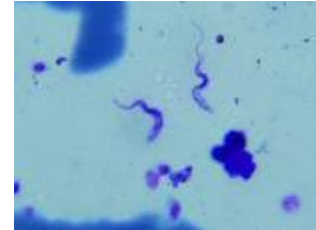
Levels of risk to consumers

- High burden of disease at farm but risk to consumers for pork-borne disease low-moderate due to good practice of long heating (less common in the cities)
- Risk of contamination of pork increases when supply chains become longer (i.e. due to poor slaughter and other post-harvest handling practices)
- Health risks likely to be associated with “relishes” such as salt and alcohol, not necessarily the pork itself (not quantified) or vegetables which were contaminated at lower levels but will not be cooked for eating
- More frequent consumption of pork (and animal sourced foods) in more urban areas



Disease prevalence and risk factors

- No *Brucella suis* in Masaka, Mukono and Kamuli
- Multi-resistant *Salmonella enterica* in pork in Kampala: Wambizzi and KLA pork joints; flies as vectors
- Diamond skin disease in Kamuli pigs and people: high occupational risk for raw pork handlers
- High prevalence of pigs infected with *Toxoplasma gondii*, high risk for immunocompromised urban population
- Preparedness:
 - ebola risk assessment in the pig value chain in Uganda;
 - pigs carrying Trypanozoon in Mukono (Ntenjeru)
 - Strong evidence for infection of pigs with *Trichinella* spp., but risk still low



ILRI/A4NH DISCUSSION PAPER

1

Fit for human consumption?
A descriptive study of Wambizzi
pig abattoir, Kampala, Uganda



Taenia solium cysticercosis

Sero-Prevalence

- Masaka (11.7%); Mukono(11.2%); Kamuli (13.5%)

Risk factors

- Improved breed;
- Poor farmer knowledge about *T. solium* cysticercosis transmission cycle;
- Dirty sources of water and
- Absence of latrines;
- Lack of capacities of farmers to combat the disease in pigs and humans

Recommendations

- Improve pig management and husbandry practices
- Sensitize and educate farmers and other value chain actors on the control of *T. solium* cysticercosis
- “One health Approach” is needed to achieve efficient and sustainable control of *T. solium* cysticercosis



Tukutule Olujegere Lw'enfaana Y'omu Nnyama Y'embizzi n'emitemdera gino 6 emyangu



Technology and training interventions



Research feedback
 Butcher trainings on GHP
 Insecticide-treated nets for fly control
 sms for knowledge dissemination



4. Feeds and feeding Results and interventions

Major constraints

- Feed availability (quantity)
- Poor feed quality
- High cost of commercial feeds
- Extreme seasonal variations
- Knowledge gaps amongst farmers to use local resources



What we aimed to do

- Better utilization of local feed resources in pig feeding
- Integration of high quality forages in pig diets



What we did (I)

Documented current feeding practices

- Household surveys
 - In Mukono, Masaka, Kamuli, Hoima and Lira
- Feed analysis
 - Analyzed nutritive value of 43 local feed ingredients
 - Used knowledge to formulate and test rations on-station and on-farm



What we did (II)

Carried trials to test pig performance on feed rations

- Feed rations based on local ingredients
 - Three diets tested on-station at Kamuzinda farm
- Sweetpotato silage trials
 - Three sweetpotato silage based diets tested on-station
 - Best performing SPS diet validated on-farm
 - Determined the cost benefit for the SPS diet.



What we did (III)

Capacity development

- Developed training materials
 - A training manual (English & Luganda) and a brochure on how to make silage
 - Brochure on feeding pigs on supplemented silage
 - Extension brief on local formulated rations
- Trainings on sweetpotato silage making and feed rations
 - Extension staff of local governments (Masaka & Kamuli), MUZARDI, NALIRRI
 - Smallholder farmers (280 youth, 1,458 female and 402 male) trained
 - Two silage open days held in Kamuli and Masaka
 - Two sweetpotato silage business centers opened in Masaka and Kamuli



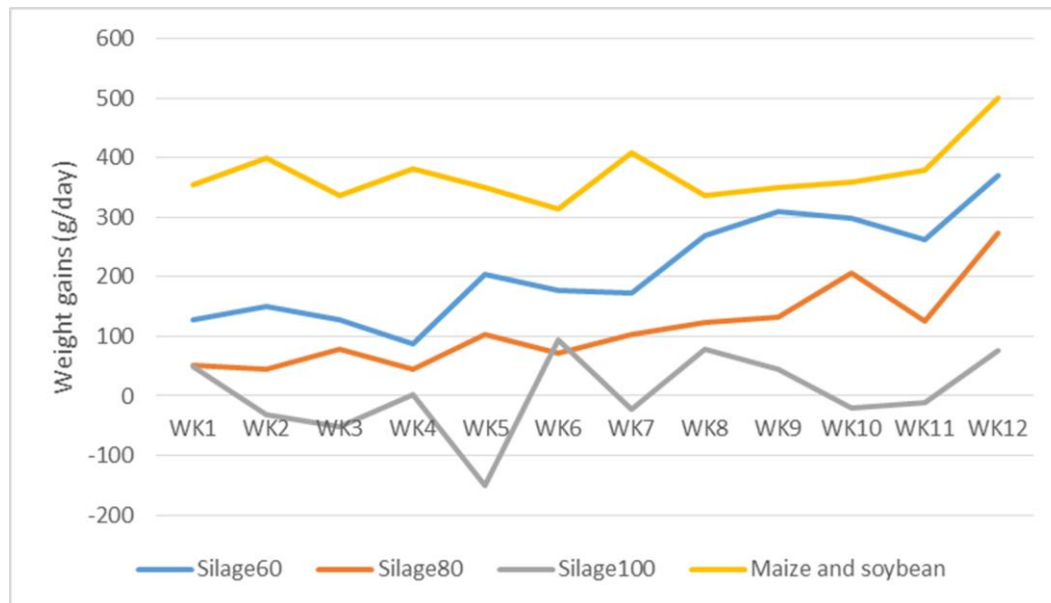
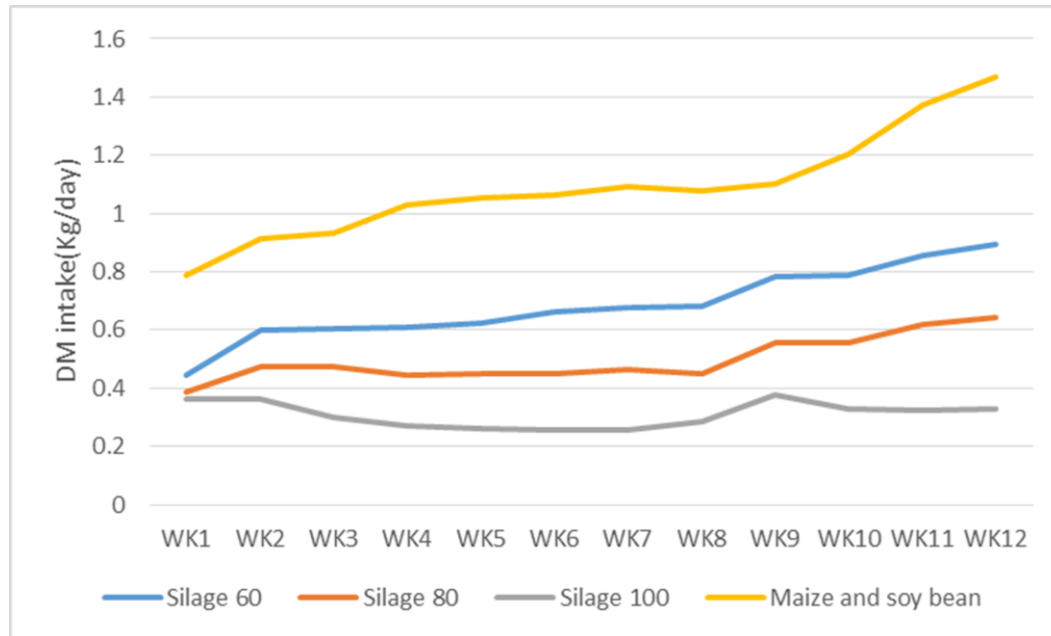
What we did (IV)

■ Forages

- Evaluated on-station (with BURZADI) and on-farm forages that are suitable for feeding pigs (low fiber, high protein)



Key findings



Significance

- Potential of sweetpotato based silage to alleviation of dry season feed shortages smallholder farms
- Potential to improve use of local feed resources to improve pig nutrition
- Business opportunities around small scale silage making (Twekembe youth group already making and selling silage)

Implementing partners and their roles

Institution	Role (s)
Local governments: Masaka, Mukono, Kamuli, Hoima& Lira	<ul style="list-style-type: none">• Implementation of interventions with the farmers
NGOs: CHAIN UG Ltd, VEDCO, ISU-UG	<ul style="list-style-type: none">• Piloting dissemination models for promotion and scaling up
NARS: NaLiRRI, MUZARDI, BUGIZARDI	<ul style="list-style-type: none">• Hosting the on- station feeding trials
Makerere University	<ul style="list-style-type: none">• Determine and document economic optimum levels of energy/protein supplementation using locally available feed resources• Conduct on-station silage trials determining levels of additives for cost effective silage production• Student supervision
Pig Production & Marketing	<ul style="list-style-type: none">• Linking farmers to markets• Scaling up research findings

5. Value Chain Development Results and interventions

Backdrop: Major constraints

- Weak value chain linkages
- Limited access by farmers to critical business development services needed to boost pig production
- Poor bargaining power by pig farmers for better terms
 - Limited capacity to estimate pig weight as a measure for determining value
- Lack of designated slaughter places in both urban and rural areas.
 - Backyard slaughters common and not regulated (lack of pork inspection)



Interventions

- Developing equations for predicting pig live weight using body measurements in pigs – in collaboration with Iowa State University (*ongoing*)
- Pig business hub model developed and tested for feeds supply – Masaka district (Kabonera-Kyanamukaaka pig cooperative).
- 135 members of pig farmer groups trained in business and governance issues.
- Business plan developed for centralised pig slaughter facility in Masaka district. *Target outcomes:* improved food safety, better pricing, and improved biosecurity
- Multi-stakeholder Platforms (MSPs) developed for visibility of pig value chain and knowledge sharing for stakeholders



6. Capacity development interventions

Development and dissemination of extension manuals

Action

- 8 manuals developed
- Training of extension staff conducted



Outcome

- Use of manuals for training of farmers
 - Implemented in partnership with PPM
 - Mukono District Local Government

Training and Education

Category	Number of beneficiaries	Institutions
MSc	7	Makerere University
PhDs	5	Guelph University, Berlin University, Makerere University
Internships	7	Makerere University, Earth University, Kyambogo University
Post Docs	2	ILRI/ Makerere University
Short term trainings for partners	55	Mukono, Kamuli, Masaka local governments, drug stockists, pig traders
Value chain actors trainings	About 2100	Smallholder farmers and value chain actors from, Kamuli, Masaka, Mukono and Lira

Gaps for further intervention

Policy and regulation

- Quality assurance for commercial feeds and livestock drugs supply
 - National Feeds policy in place to promote animal production and productivity **but** lacks a legal framework for implementation.
 - Feed Bill drafted **but** not enacted
 - National Drug Policy implemented through the National Drug Authority **but** lacks extensive outreach
- Meat policy in place **but** lacks articulation and implementation of pork quality assurance and standards

CGIAR Research Program on Livestock

livestock.cgiar.org



The program thanks all donors and organizations which globally support its work through their contributions to the [CGIAR system](#)

The **CGIAR Research Program on Livestock** aims to increase the productivity and profitability of livestock agri-food systems in sustainable ways, making meat, milk and eggs more available and affordable across the developing world.



This presentation is licensed for use under the Creative Commons Attribution 4.0 International Licence.