

Enhancing pig production and marketing for smallholder farmers in Northern Uganda

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Abstract

Pig production is suited to smallholder production because pigs have unique characteristics such as faster growth rates, ability to be kept on small pieces of land, high multiplication rates, ability to feed on many feedstuffs, and pig products have ready market. However, pig production is constrained by unavailability of quality feeds and unsustainable use of local feed resources; poor breeds; ready markets for pig products are not reliable; inadequate extension services; and odour in pig houses. This study aims to address key constraints in pig production and marketing by promoting sustainable breeding, management and marketing practices. The objective is being achieved using: (1) multi-stakeholder platform comprising of farmers, TVET and University students; private sector, CBO, traders, pork joint operators and input dealers; (2) collaborative community action research and dissemination; (3) communication to enhance community engagement and joint learning; (4) experiential learning and sharing experiences. Before the project started, a baseline survey was conducted in the districts of Kitgum, Gulu and Omoro. The baseline survey showed that 87.5% of pig farmers were married; 72.9% were males, and average age was 33 years. Apart from pigs, farmers grew mainly simsim, cassava, maize, millet, sorghum, sweet potatoes, and reared chickens, and goats and 95.8% of them had limited access to extension services. Most (93.8%) farmers sold live pigs, and 22.9% of them sold the pigs to roasters and butchers. All farmers used natural mating for breeding compared to only 2% who used Artificial insemination. Few (2%) farmers used Indigenous microorganisms to control smell from pig houses. Most farmers reported that diseases (89.6%) and feed scarcity (43.8%) were the major limitations to pig production. In order to increase smallholder pig production in northern Uganda, there is need to improve pig value chain through feeding, northern Uganda, value addition, and marketing.

Key words: Artificial insemination, community action research, feed scarcity, indigenous microorganisms, northern Uganda, value-added pork products

Résumé

La production porcine est adaptée à la production de petits exploitants car les porcs ont des caractéristiques uniques telles que des taux de croissance plus rapides, l'aptitude à être gardé sur de petites parcelles de terrain, des taux de multiplication élevés, l'aptitude de se nourrir de nombreux aliments et les produits porcins ayant un marché prêt. Cependant, la production porcine est contrainte par l'indisponibilité d'aliments de qualité et l'utilisation non durable des ressources

alimentaires locales; races pauvres; les marchés prêts pour les produits porcins ne sont pas fiables; services de vulgarisation inadéquats; et l'odeur dans les porcheries. Cette étude vise à répondre aux principales contraintes de la production et de la commercialisation des porcs en encourageant des pratiques d'élevage, de gestion et de commercialisation durables. L'objectif est en train d'être atteint en utilisant : (1) une plate-forme plateforme acteurs multiples composée d'agriculteurs, de TVET et d'étudiants universitaires; le secteur privé, le CBO, les commerçants, les co-exploitants de porcs et les marchands d'intrants; (2) recherche et diffusion collaboratives sur l'action communautaire; (3) la communication pour améliorer l'engagement communautaire et l'apprentissage conjoint; (4) l'apprentissage expérientiel et le partage d'expériences. Avant le commencement du projet, une enquête de base a été menée dans les districts de Kitgum, Gulu et Omoro. L'enquête de base a montré que 87,5% des éleveurs de porcs étaient mariés; 72,9% étaient des hommes et l'âge moyen était de 33 ans. A part les porcs, les agriculteurs cultivaient principalement du simsim, du manioc, du maïs, du millet, du sorgho, des patates douces et élevaient des poulets et des chèvres et 95,8% d'entre eux avaient un accès limité aux services de vulgarisation. La plupart (93,8%) des agriculteurs ont vendu des porcs vivants et 22,9% d'entre eux ont vendu les porcs aux torréfacteurs et aux bouchers. Tous les agriculteurs ont utilisé l'accouplement naturel pour la reproduction, comparativement à seulement 2% qui ont utilisé l'insémination artificielle. Peu (2%) d'agriculteurs ont utilisé des micro-organismes autochtones pour contrôler l'odeur des porcheries. La plupart d'agriculteurs ont indiqué que les maladies (89,6%) et la pénurie d'aliments (43,8%) étaient les principales limitations de la production porcine. Pour augmenter la production porcine des petits exploitants dans le nord de l'Ouganda, Il est nécessaire d'améliorer la chaîne de valeur des porcs par l'alimentation dans le nord de l'Ouganda, la valeur ajoutée et la commercialisation.

Mots-clés: insémination artificielle, recherche d'action communautaire, pénurie d'aliments, micro-organismes indigènes, nord de l'Ouganda, produits de porc à valeur ajoutée

Introduction

Pig production and marketing have the potential to improve the livelihoods of smallholder pig farmers (Muhanguzi *et al.*, 2012). This is because pigs have unique characteristics such as faster growth rates, high multiplication rates, and ability to feed on many crop and animal products (Ndyomugenyi and Kyasimire, 2015). In Uganda, the central region dominates (56%) in pig production while northern region is the least with only 14% pig farmers (Tatwangire, 2012). However, pig population has not significantly changed over the years as indicated by the population of 3.58, 3.69 and 3.58 million in 2012, 2013 and 2014, respectively (UBOS, 2015). A number of opportunities exist such as increase in human population, incomes and the number of pork facilities in rural and urban areas that could be exploited to increase pig production (Mulindwa, 2016). Despite the opportunities, pig production and marketing in Uganda are constrained by high cost of quality feeds; poor breeds; foul smell in pig houses; and markets are not reliable for live pigs and products (Ouma *et al.*, 2013).

At 60-80%, feeding costs accounts for the largest proportion of livestock production costs (Thu Hong and Thanh Ca, 2013). The increasing cost of conventional feedstuffs for livestock

production necessitates the need to find less expensive alternatives (Thu Hong and Thanh Ca, 2013). Although local feedstuffs are less costly alternatives, farmers are not aware of their nutritional composition, and therefore cannot formulate a balanced feed for their pigs (Ndyomugenyi and Kyasimire, 2015).

The use of artificial insemination (AI) as alternative to natural mating could improve pig breeding. The use of AI reduces movement of boars, hence minimizing disease transmission, and inbreeding (Ndyomugenyi and Kyasimire, 2015). However, using AI is expensive, and unaffordable by smallholders (Muhanguzi *et al.*, 2012). Additionally, keeping boars for breeding is costly for smallholders who are characterized by rearing few sows (Ndyomugenyi and Kyasimire, 2015). The cost of AI services could be reduced using local semen extenders as alternative to commercial extenders.

Managing smell from pig units is a big challenge to most farmers. Methods to reduce foul smell from piggeries have been recommended (Chastain, 2003) but they are unaffordable by smallholder farmers. The use of Indigenous microorganisms (IMO) has been suggested as a less costly alternative (Ndyomugenyi and Kyasimire, 2015) but its effectiveness under local housing settings has not been fully established.

To ensure profitability, smallholder pig farmers need to access critical market information such as market location, type of product demanded, quality standards and when the product is demanded (Muhanguzi *et al.*, 2012). The challenge affecting the marketing of pigs in Uganda is lack of understanding of key customers, their interests in terms of quantity, quality and trends in demand (Mulindwa, 2016). This arises due to inadequate access to market participation in pig markets (Ouma *et al.*, 2016). Enhancing profitable market participation along the value chains strengthens the competitiveness of the value chains and ensures increased income status of smallholders (KIT and IIRR, 2010). There is need to identify and classify primal markets and customer segments for pigs and pig products. Through this, consumers will be classified into relevant segments by products demanded, income, location, seasons and behaviour. This will enable pig farmers to target specific market segments with specific products, hence increasing the profitability of the pig enterprise.

To enable smallholders improve their livelihoods through pig production, there is urgent need to look for ways of reducing the aforementioned constraints. Therefore, this study aimed to contribute to improved household livelihoods through promotion of sustainable breeding, management and marketing in pig value chain in northern Uganda. This will be achieved through: (1) promoting the efficient use of diets from local feedstuffs; (2) testing and disseminating the use of Indigenous Micro-organisms for reducing foul smell in pig housing; (3) evaluating and promoting the use of local semen extenders in Artificial Insemination; (4) assessing, promoting the profitable market linkages and establishing effective information for farmers. The specific hypotheses for each of the objectives are being developed for different research components.

The project envisions three primary result areas: (1) Capacity building where (i) 19 students will be trained including 1 PhD, 8 MSc and 10 BSc; (ii) 12 pig AI technicians trained to offer AI services to pig farmers; (iii) 750 farmers trained to use AI for pig breeding; (2) Sustainable pig production technologies developed including (i) local feed formulae for production of pigs with quality pork; (ii) local semen extenders to substitute more costly commercial extenders in AI; (iii)

IMO products to reduce smell from pig houses; (3) Profitable market linkages developed (i) where pig marketing groups will be formed; groups linked to agri-business incubation centre whose purpose is to exhibit the developed technologies; (ii) communication platform to link the marketing groups with potential pig markets; and (iii) central pork processing unit established to train farmers on value-added pork products.

Methodology

The project is being conducted in Gulu, Kitgum and Omoro districts in northern Uganda. The general project design and description is shown in Figure 1.

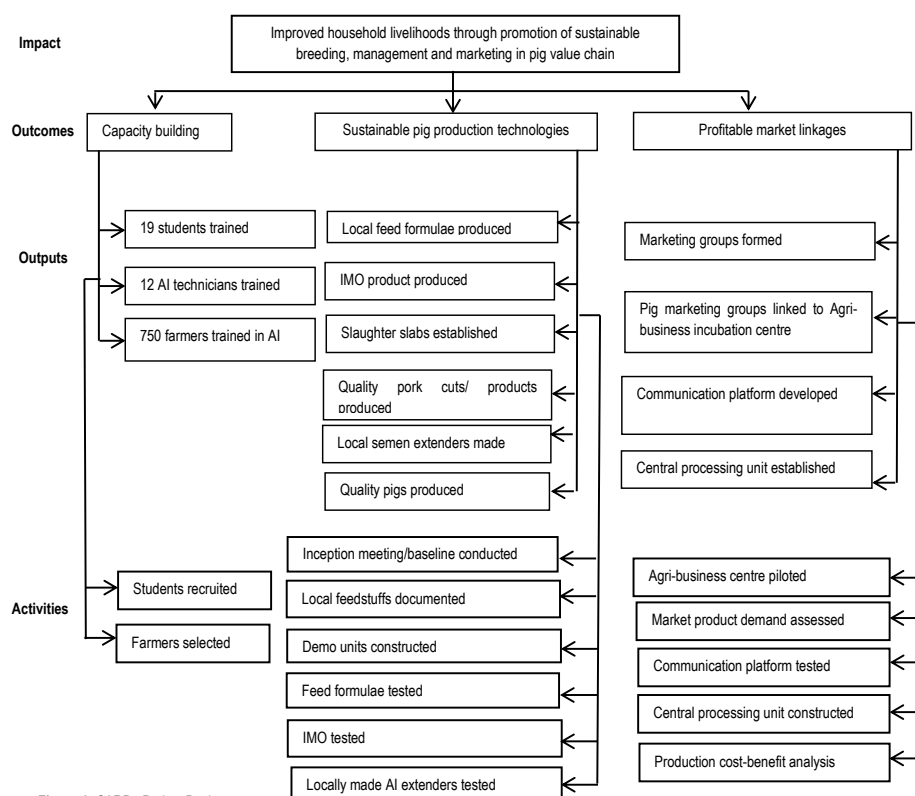


Figure 1: CARP+ Project Design

Four approaches are being used to implement the project (Figure 2): (1) multi-stakeholder platform consisting of smallholder pig farmers; TVET institution; MSc and BSc students; private sector; Community Based Organisation (CBO); traders/processors; pork joint operators; and input dealers; (2) collaborative community action research and dissemination of information and research output; (3) communication to enhance community engagement and joint learning; (4) experiential learning and sharing experience.

Before the project started, stakeholders meeting consisting of 49 participants was organised (Figure 3). Following the inception meeting, a baseline survey was conducted to obtain the underpinning data on pig value chain. Survey based on three criteria: (1) demographic information; (2) general production information on crops cultivated and livestock reared;

access to extension and agricultural information; (3) general pig production information; pig feeds and feeding; pig breeding and use of Artificial insemination; and pig hygiene and smell reduction. A cross-sectional survey was adopted with the use of structured questionnaires and interviews, administered to a random sample of 252 pig farmers from Kitgum, Gulu and Omoro districts. The data were analysed using SPSS and descriptive statistics.

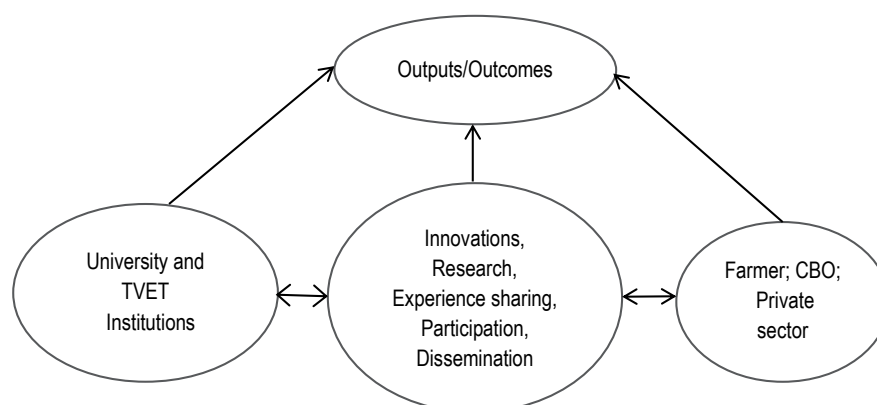


Figure 2: Institution-community interaction in CAPRP+ project



Figure 3: Stakeholder meeting attended by 49 stakeholders in October 2017 included representatives from ILRI; Chairperson, Wealth Creation; five representatives from CBO, TVET and Private Sector; District Production Department; Vice Chancellor; HODs; PhD and MSc. students.

Results and discussion

Stakeholder planning meeting and community engagement. The meeting discussed the over view of the CARP+ (i.e., community action research integrating university, TVET and other actors); experiences from the International Livestock Research Institute (ILRI) in implementing CARP projects; CARP+ design and implementation updates; roles of students and partners in CARP+ implementation; and setting the stage for implementation of the CARP+. The participants presented what needed to be done to successfully implement the CARP+. It was agreed that the

implementation of the project (study) should target all the nodes of the pig value chain. Based on the outcome of the planning meeting, a baseline survey and several visits were made to the communities. Through the visits, six host farmers were identified with a total of over 200 farmers attached to these host farmers. The visits enabled students and research team to identify real challenges (particularly housing and feeding) faced by smallholder pig farmers in pig production and finding ways of solving them via research. Four groups under the host farmers were involved in IMO technology and coordinated by TVET and Private Sector, and the other two based on local feed resources were coordinated by the CBO. Additionally, 2 AI units were established at TVET and Private Sector's centres; 1 IMO unit at TVET centre; and 1 feed trial unit at CBO centre. A total of 10 demonstration units were established. Communities were actively involved in construction of demonstration units (Figure 4).



Figure 4: Community involvement in construction of demonstration units

Baseline survey

Most smallholder pig farmers were married males and the average age of respondents was 33 years (Table 1). Many married males keeping pigs was probably due to increased responsibilities that required quick income generation. Males kept pigs more than females probably because pigs attracted high revenue and men in many families controlled resources that had high financial returns (Ndyomugenyi and Kyasimire, 2015). However, the age of the respondents who kept pigs in the current study (33) contradicts with the findings of Ndyomugenyi and Kyasimire (2015) who showed the age of pig keepers to be over 50 years. This meant that youths in the current study reared pigs instead of looking for jobs because they earned considerable income from the enterprise. The farmers grew mainly simsim, cassava, maize, millet, sorghum, sweet potatoes, and reared chicken, and goats and had limited access to extension services.

Harnessing the crop-pig integration could increase pig and crop production, hence livelihoods of communities. The pig production enterprise easily integrates in the crop production system on many smallholder farms and makes use of extra family labour (Ndyomugenyi and Kyasimire, 2015). In addition, the community action research augments the weak extension services among communities as it encourages working together with farmers in experimentation process, experiential learning and sharing experiences. In this way, researchers are able to solve challenges affecting communities in a holistic way, hence improving pig production. Over 60% of smallholder pig farmers did not house their pigs. Each smallholder farmer kept at least four pigs that were either tethered or left to scavenge

for their own feed (Figure 5). There is a need for smallholders to adopt management systems, which reduce the movement of pigs from place to place without injuring the animals (Figure 5). Leaving pigs to roam in the villages is one route of transmission of parasites and diseases such as African swine fever.

Majority of the farmers sold live pigs (Table 1) to roasters and butchers who mainly came from the urban centres. Most farmers sold live pigs because they lacked technical skills and knowledge of adding value to pig and pig products. This finding agrees with Tatwangire (2014) who reported that 98% of pigs were sold as live animals with limited or no value addition. Over 70% of smallholders fed their pigs on fresh cassava and wandering jew. Whereas the current study agrees with that of Muhanguzi *et al.* (2012) who reported that most farmers fed their pigs on cassava, it contrasts that of Ndyomugenyi and Kyasimire (2015) who indicated that many farmers fed the pigs on maize bran and yam leaves. The varying findings show that feed resources for pig production are locality-specific. Majority of the smallholder farmers used natural mating and only 2% used Artificial insemination (AI) for breeding their pigs because AI being new, most farmers were probably not aware about its existence. Few (2%) farmers used Indigenous microorganism to reduce smell from pig houses because it was probably a new technology in the area. Limited use of Artificial insemination and Indigenous microorganism technologies in the study area justifies the need for their promotion for smallholder pig production.

General information on pig production and marketing

Serial number	Variable %	Respondents, N=252
1	Gender	
	Male	72.9
	Married	87.5
2	Age	33.3
3	Crops cultivated	
	Simsim	91.7
	Cassava	87.5
	Maize	72.9
	Millet	72.9
	Sorghum	72.9
	Sweet potato	62.5
4	Livestock reared	
	Pigs	100
	Chicken	89.6
	Goats	81.3
5	Access to extension services	4.20
6	Method of pig rearing	
	Free range	39.6
	Tethering	29.2
7	Housing	

	No housing	66.7
8	Marketing	
	Sell live pigs	93.8
	Main buyers	
	Roasters and butchers	22.9
9	Main feedstuffs used for pig feeding	
	Fresh cassava	97.7
	Wandering jew	70.8
10	Pig breeding	
	Natural mating	100
	Artificial insemination	2.10
11	Use Indigenous microorganisms	2.10
12	Limitations to pig production	
	Diseases	89.6
	Scarcity of feeds	43.8



One of the host farmers (seated on ground), whose lactating sow was cut through the abdomen by the rope as she tethered it. CARP+ research assistant (red shirt) participates in first aid

Figure 5: Smallholders leave pigs to roam looking for own feed, tethered using ropes or poorly housed

In agreement with other researchers (Ouma *et al.*, 2013), most farmers in the current study reported that diseases and feed scarcity were the major limitations to pig production. Diseases such as African swine fever (ASF), worm burden and external parasites such as mange were common. Farmers reported that ASF caused 100% mortality in pigs. Feedstuffs commonly used for feeding pigs were reported to be seasonal, and therefore, were not sustainably used by farmers.

The findings so far suggests that;

- Youths play a significant role in pig production and marketing.
- Crop-pig integration is important in solving feed scarcity in pig production.
- Locally available pig feed resources are highly variable and locality-specific.
- Community action research augments the limited extension services among communities.

- Housing pigs minimizes risks of disease transmission and injury of the animals due to tethering.
- Most farmers sell live pigs due to lack of technical skills and knowledge about value addition.
- There is need to improve pig value chain through feeding, value addition, and marketing.

The study is still on-going to clarify on more of the issues highlighted above.

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References

- Chastain, J. P. 2003. Air quality and odour control from swine production facilities. https://www.clemson.edu/...files/swine/sch9_03.pdf.
- KIT and IIRR. 2010. Value chain finance: Beyond microfinance for rural entrepreneurs. Royal Tropical Institute, Amsterdam; and International Institute of Rural Reconstruction, Nairobi, Kenya.
- Muhanguzi, D., Lutwama, V. and Mwiine, F. N. 2012. Factors that influence pig production in Central Uganda - Case study of Nangabo Sub-County, Wakiso district. *Veterinary World* 5 (6): 346-351, doi: 10.5455/vetworld.2012.346-351.
- Mulindwa, C. 2016. Training guide: Pig and pigmeat marketing in Uganda. <http://www.rtb.cgiar.org/wp-content/uploads/2015/06/Guide-on-Pig-Marketing-Final.pdf>.
- Ndyomugenyi, E. K. and Kyasimire, J. 2015. Pig production in Kichwamba Sub-county, Rubirizi district, Uganda. *Livestock Research for Rural Development* 27 (10).<http://www.lrrd.org/lrrd27/10/kuro27199.htm>
- Ouma, E., Ochieng, J., Dione, M. and Pezo, D. 2016. Governance structures and constraints along the Ugandan smallholder pig value chains. <http://ageconsearch.umn.edu/handle/246976>.
- Ouma, E., Dione, M., Lule, P., Roesel, K. and Pezo, D. 2013. Characterization of smallholder pig production systems in Uganda: constraints and opportunities for engaging with market systems. *Livestock Research for Rural Development* 26 (3): 56.
- Tatwangire, A. 2012. Situation analysis of smallholder pig value chains in Uganda. <http://www.livestock-fish.wikispaces.com/VCD+Uganda>
- Thu Hong, T. T. and Thanh Ca, L. 2013. The protein content of cassava residue, Soybean waste and rice bran is increased through fermentation with *Aspergillus oryzae*. *Livestock Research for Rural Development* 25, Article #132. Retrieved April 18, 2020, from <http://www.lrrd.org/lrrd25/7/hong25132.htm>
- Uganda Bureau of Statistics (UBOS) 2015. Statistical Abstract. <http://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/abstracts/2015%20statistical%20abstract.pdf>.