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Research Application Summary

Impact of Community Action Research Project (CARP+1) on the livelihoods of smallholder pig farmers in northern Uganda

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Abstract

Pig production in Uganda is largely constrained by high feed costs, poor breeds, foul smell in pig houses, and the fact that markets are not reliable for live pigs and products. To address the constraints, the Community Action Research Project (CARP+1) introduced user-friendly interventions to smallholder pig farmers in northern Uganda. This study aimed to establish the impact of the CARP+1 interventions on pig production and livelihoods of the smallholder pig farmers. Data were collected from 75 purposively selected farmers out of the 109 who kept pigs at the start of the CARP+1. Structured questionnaires, observations and interviews were used to collect the data. The number of farmers who were not keeping pigs decreased by 85.8% as a result of CARP+1 intervention. Farmers who kept over 16 pigs increased (P 0.05) from 0.00% to 3% after the intervention. Farmers who earned over Ugx 1,600,000 (annually) from pig production increased (P 0.05) from 3.3% to 13.2% after the intervention. As a result of the CARP+1 intervention, pig farmers were able to pay school fees for their children (63.3%) and purchase foodstuffs for their families (56.7%). Pig farmers (96.7%) were able to use the knowledge they got from the CARP+1 to improve the housing condition of pigs using deep floor on which indigenous microorganism liquid was applied, formulate cheap feed from local feedstuffs and disease control. In conclusion, the CARP+1 intervention significantly improved pig production and livelihoods of smallholder pig farmers in northern Uganda.

Keywords: CARP+1 interventions, impact, livelihoods, smallholder pig production, Uganda

Résumé

La production porcine en Ouganda est largement limitée par le coût élevé des aliments pour animaux, les mauvaises races, les mauvaises odeurs dans les porcheries et le fait que les marchés ne sont pas fiables pour les porcs et les produits dérivés. Pour faire face à ces contraintes, le projet de recherche-action communautaire (CARP+1) a introduit des interventions gratuites et faciles d'utilisation pour les petits éleveurs de porcs du nord de l'Ouganda. Cette étude visait à établir l'impact des interventions du CARP+1 sur la production porcine et les moyens de subsistance des petits éleveurs de porcs. Les données ont été collectées auprès de 75 agriculteurs sélectionnés à dessein sur les 109 qui élevaient des porcs au début du CARP+1. Des questionnaires structurés, des observations et des entretiens ont été utilisés pour collecter les données. Le nombre d'agriculteurs qui ne gardaient pas de porcs a diminué de 85,8% suite à l'intervention du CARP+1. Les agriculteurs qui gardaient plus de 16 porcs ont augmenté (P 0,05) de 0,00% à 3% après l'intervention. Les agriculteurs qui ont gagné plus de 1 600 000 Ugx (par an) grâce

à la production porcine ont augmenté (P 0,05) de 3,3 % à 13,2 % après l'intervention. Grâce à l'intervention CARP+1, les éleveurs de porcs ont pu payer les frais de scolarité de leurs enfants (63,3 %) et acheter des denrées alimentaires pour leur famille (56,7 %). Les éleveurs de porcs (96,7 %) ont pu utiliser les connaissances acquises dans le cadre du CARP+1 pour améliorer les conditions de logement des porcs en utilisant un sol profond sur lequel a été appliqué un liquide à base de micro-organismes indigènes, formuler des aliments bon marché à partir d'aliments locaux et lutter contre les maladies. En conclusion, l'intervention CARP+1 a amélioré de manière significative la production porcine et les moyens de subsistance des petits éleveurs de porcs du nord de l'Ouganda.

Mots clés : Interventions CARP+1, impact, moyens de subsistance, production porcine des petits exploitants, Ouganda.

Introduction

Pig production and marketing have the ability to improve the livelihoods of smallholder farmers because pigs mature very fast, have high multiplication rates, and pig products have ready market (Muhanguzi *et al.,* 2012; Baltenweck *et al.,* 2018; FAO, 2018). In Uganda, several opportunities exist such as increase in human population, East African integration and high number of pork facilities in rural and urban areas that could be exploited to increase pig production (Mulindwa, 2016). Additionally, Uganda produces 12% of pork in Sub Saharan Africa and was ranked third pork producer after Nigeria and South Africa (Guo, 2015). Despite the vast opportunities, pig population in Uganda has not considerably improved over the years as shown by 3.58, 3.69 and 3.58 million pigs in 2012, 2013 and 2014, respectively (UBOS, 2015). Uganda registered low pig numbers of 4.04 million compared to other livestock such as poultry (46.3 million), goats (15.7 million), and 14.4 million cattle (UBOS, 2017). Out of 86.4 million livestock reported in 2018, pigs were only 4.1 million (UBOS, 2018). With respect farmers keeping pigs, northern Uganda is more affected with only 14% farmers compared to other regions where central region leads with 56% farmers (Tatwangire, 2014).

The low pig population in Uganda is mainly attributable to the high cost of feeds, poor breeds, foul smell in pig houses, and the fact that markets are not reliable for live pigs and products (Muhanguzi *et al.,* 2012; Ouma *et al.,* 2013). In livestock production, feeds account for over 60% of the total production costs (Vinh *et al.,* 2013). There is need to minimise the cost of feeding pigs by using alternative (non-convectional) feedstuffs (Van An *et al.,* 2005; Thu Hong and Thanh Ca, 2013). Smallholder pig farmers in Uganda usually minimise the feeding costs by using alternative such as food crops and domestic by-products either entirely or as supplements to commercial concentrates (Deborah, 2011; Kabirizi and Zziwa, 2014; Kawuma, 2015). The artificial insemination (AI) as opposed to natural mating improves pig breeding, decreases the cost of keeping boars, and reduces movement of boars, hence minimizing disease transmission, and inbreeding (Ndyomugyenyi and Kyasimire, 2015). The cost of AI services could be further reduced by using local extended semen as alternative to commercially extended semen. Although methods to reduce foul smell from pig houses have been devised (Chastain, 2003), they are unaffordable by smallholder farmers. The use of indigenous microorganisms (IMO) has been suggested as a less costly alternative particularly under smallholder housing settings (Ndyomugyenyi and Kyasimire, 2015). To ensure profitability of the pig production enterprise, farmers need to access critical market information such as market location, type and quality of product demanded (Muhanguzi *et al.,* 2012). Marketing of pigs in Uganda is constrained by lack of understanding of the key customers and their interests with

regard to quantity, quality and trends in demand (Mulindwa, 2016). This arises due to inadequate access to market information in pig markets (Ouma *et al.* 2016).

To address the pig production constraints, user-friendly interventions were developed and introduced to smallholder pig farmers in northern Uganda by the Community Action Research Project (CARP+1). These were: (i) reduction of smell from pig houses by treatment of deep litter floor using indigenous micro-organism (IMO) liquid; (2) reduction of feed costs by formulation of feed from locally available feedstuffs; (3) use of local extenders as alternative to commercial extenders in pig artificial insemination and natural mating; (4) creation of profitable market linkages and effective information for farmers. Since introduction of the interventions to pig farmers by the CARP+1, no work has been done to establish their impact. Therefore, this study was conducted to establish the impact of the CARP+1 introduced user-friendly interventions on the pig production, incomes and livelihoods of the farmers. The study focused on: (1) livelihoods of smallholder pig farmers as a result of interventions; (2) motivation of the farmers to start pig rearing; (3) pig numbers before and after the intervention; (4) incomes from pig production before and after the intervention.

Methodology

A survey was conducted in Gulu and Omoro districts (longitude 30-32^{o}E, latitude 02-4^{o}N) in the sub-counties of Paicho, Koro and Ongako, northern Uganda. The data were obtained using structured questionnaires, observations and interviews. The data were obtained from 75 purposely selected pig farmers out of the 109 farmers who kept pigs at the start of the CARP+1.

Data analysis. Data were analysed using Statistical Package for Social Scientists (SPSS version 20.0.0). Descriptive statistics were generated to show percentages of different variables in the study. A t-test was used to establish whether the CARP+1 intervention had an effect on the pig production and income levels of smallholder farmers.

Results and discussion

Socio-demographic characteristics of pig farmers. Most pig farmers were married males aged above 36 years (Table 1). All the pig farmers had attained at least primary level of education. Most farmers were had an average family size of 5 people. The reason why majority of the pig farmers were married males and above 36 years of age could be due to overwhelming responsibilities like providing family basic needs, hospital bills and school fees amongst others, coupled with the polygamous nature of the families. Another reason could also be due to the profitable pork business and pork demand is expected to significantly increase since Gulu has been given a city status. This suggestion concurs with Karimuribo *et al.* (2011) who reported that majority of pig farming households were headed by married persons (82.9%) mostly males (65.9%) who were both monogamous and polygamous. In addition, Nsoso (2006) and Karimuribo *et al.* (2011) reported that, generally older people (<30 years) tend to get more interested in agriculture especially livestock farming compared to younger people. In a similar study, Njuki *et al.* (2011) and Mugonya *et al.* (2019) reported that majority of pig farmers (73.6%) were males probably because pig rearing has quick financial returns coupled with males dominancy over access, control and ownership of key production resources like land and finance in many households in the Sub

Sahara Africa (SSA), which gives them a higher leverage to invest in pig rearing. In addition, Kagira *et al.* (2010) also reported a higher percentage (48%) of male pig farmers in the age range of 19-76 years old who were household heads compared to their female (43%) counterparts and siblings (9%). Furthermore, Gcumisa (2016) reported that farmers who had attained at least some education level tended to rear more pigs than those who had no formal education. However, the current findings disagree with Petrus *et al.* (2011) and Halimani *et al.* (2012) who reported more (69.7%) females rearing pigs in relatively small herds (1-10 pigs) with piglets, weaners and sows dominating compared to 20.5% and 9.8% who were men and children, respectively.

Motivation of farmers to keep pigs

Majority of pig were motivated to rear pigs due to the quick returns they generate (Table 2). This concurs with Dhaubhadel and Ghimire (2002) who reported that, earning from pig rearing looks an impressive source of income generation in rural areas where poverty remains a big challenge. In addition, Nepali *et al.* (2000) also indicated that pig keeping is a profitable enterprise drawing a profit of 2500 South African Rand equivalent to 630778.56 Ugandan Shilling from the sale of one pig in 9-10 months period. Farmers (30%) were motivated to keep pigs as a result of the CARP+1 intervention. This could have been be due to the comparisons they made on other pig farmers who participated in the various CARP+1 research activities such as IMO deep litter floor housing, formulation of feed from local feedstuffs amongst others and, dissemination of research results.

Table 1. Socio-demographic characteristics of pig farmers

Variable	No. of pig farmers (N = 75)	% of pig farmers
Gender		
Male	45	60.0
Female	30	40.0
Age (years)		
18-35	20	26.5
>36	55	73.5
Marital status		
Married	55	73.3
Single	22	26.7
Occupation		
Farmers	70	93.3
Civil servants	3	3.4
Pensioners	2	3.3
Level of education		
No formal education	0	0.0
Primary	40	53.3
Secondary	17	23.3
Tertiary	18	23.4
Family size		
3-8	58	76.7
9-15	17	23.3

Table 2. Motivation to start pig rearing by farmers

Variable	No. of pig farmers (N=75)	% of pig farmers
Quick return from pigs	73	96.7
To cover family basic needs	62	83.3
To raise school fees and medical bills	45	60.0
CARP+1 project intervention	23	30.0

Impact of CARP+1 intervention on smallholder pig farmers

The number of farmers who were not keeping pigs significantly decreased (P 0.05; 85.8%) as a result of CARP+1 intervention and also those who reared above 16 pigs increased (P 0.05; 3%) (Table 3). As a result of the CARP+1 intervention, a number of stakeholders including the church leaders, community knowledge workers, farmers and TVET students created awareness on clean and hygienic rearing of pigs using IMO technology and, general pig management. They also learnt to prepare affordable feed for the pigs from available food crops such as sweet potato vines, cassava tubers and rice bran. This concurs with Saikia *et al.* (2017 who reported increased in the average number of pigs reared in each household from 1.96 to 3.58 numbers (82.65% increase) after obtaining training on improved and scientific methods of pig rearing. Tsado *et al.* (2014) also reported poor pig housing facility prior to training of pig farmers on improved methods of pig rearing and 29% of pig farmers who developed their pig rearing facility after the training.

Table 3. Percentage of farmers who kept pigs before and after CARP+1 intervention (N=75)

Variable	before CARP+1 intervention	after CARP+1 intervention	P-value
Not rearing pigs	23.3 ± 0.085^{a}	3.30 ± 0.000^{b}	0.000
Rearing 1-4 pigs	50.2±0.071	50.1±0.141	0.698
Rearing 5-10 pigs	23.4 ± 0.007^{b}	37.4 ± 0.976^{a}	0.002
Rearing 11-15 pigs	3.33±0.007b	6.62 ± 0.021^{a}	0.000
Rearing 16-20 pigs	0.000 ± 0.000^{b}	3.32 ± 0.007^{a}	0.000

Means within a row with different superscripts differ significantly (P≤0.05)

Due to the CARP+1 intervention, farmers who were earning over 1,600,000 Ugandan shillings per annum from pig production increased (P 0.05; 75%) (Table 4). This could possibly be due to the acceptability and adoption of the different improved methods of rearing pig by the smallholder pig farmers in their respective economic capacity. This suggestion concurs with Payang *et al.* (2013) and Saikia *et al.* (2017) who reported an average annual profit of 15,426 Indian Rupees equivalent to 754,876 Ugandan shillings per household who reared pigs prior to training of pig farmers as compared to 26,680 Indian Rupees equivalent to 1,305,577 Ugandan shillings per pig rearing household after being trained. In a similar study, Kumar *et al.* (2013) and Sharma *et al.* (2014) also reported increased in income of dairy farmers from 10,982 Indian Rupees equivalent to 537,398 Ugandan shillings to 13,590 Indian Rupees equivalent to 665,019 Ugandan shillings per animal per year as a result of increased milk production due to dairy training programmes carried out for productivity and profitability of dairy enterprise.

Table 4. Percentage of farmer earnings from pig production before and after CARP+1 intervention (N=75)

Income generation (Ugx per year)	Before CARP+1 intervention	After CARP+1 intervention	P-value
Not yet sold the pigs	23.35±0.071	63.3±0.071	0.000
100,000 - 500,000	30.0±0.141	0.350±0.071	0.000
600,000 - 1,000,000	33.1±0.085	9.95±0.071	0.000
1,100,000 - 1,500,000	6.60±0.014	13.6±0.085	0.000
>1,600,000	3.26±0.085	13.2±0.071	0.000

Livelihoods of farmers improved as a result of CARP+1 intervention in most aspects of the wellbeing of farmers (Table 5). Most farmers indicated that they were able to pay school fees for their children and purchased foodstuffs for their families due to the knowledge they obtained from CARP+1 intervention, which enabled them to realize pig production as a business. This could be due to better negotiation skills with pork buyers (Table 6), increase in the number of pigs kept, good performance and conditions of the pigs sold, and good quality of the pork sold.

Table 5. Contribution of pig production to the farmer livelihoods as a result of CARP+1 intervention

Variable	No. of farmers (N=75)	% of farmers
School fees and school requirements	47	63.3
Purchase of foodstuffs for the family	43	56.7
Hospital bills	32	43.3
Bought household items like furniture and utensils	32	43.3
Invested in the garden to open more land	25	33.3
Bought oxen or cow	10	13.3
Bought other animals like goats and sheep	13	16.7
Bought ox-plough	8	10.0
Top up the money for buying land	8	10.0
Building a new house or renovated old building	8	10.0
Invested in small scale business	5	6.70

Most farmers used the knowledge they got from the CARP+1 to improve on the housing of pigs using IMO deep litter floor (Figure 1), feed formulation and disease control (Table 6). This explains how farmers were willing to embrace new affordable interventions for pig production and also commit themselves to income generating activities, which could improve their livelihoods. This explanation concurs with Saikia *et al.* (2017) who reported that knowledge gained by pig farmers in various aspects of improved methods of pig farming were scientific housing improved

by 47.82%, piggery rearing by 38.04%, sources of improved breed by 32%, improved breed (31.82 %), caring of improved breed (29.17%), quality of feed (24.19%), preventive health care (13.47%), disease and disorder (8.5%). In a similar study, Srinivasa *et al.* (2013) also reported that training increased the knowledge level of farmers practicing sericulture and helped adopt improved technologies. In addition, Rahul and Rupasi (2001) reported that few pig owners had high level of knowledge regarding scientific and improved method of pig rearing. Furthermore, Saikia *et al.,* 2017 also reported low knowledge level of pig farmers of 1.78% before having their training on improved pig rearing and their knowledge level attained at 27.65% after obtaining the training.

Figure 1. IMO pig house made locally by one of the new pig farmers

Table 6. Knowledge uptake of farmers as a result of CARP+1 interventions

Variable	No. of farmers (N=75)	% of farmers
Improved my knowledge on IMO housing, feed formulation and disease prevention	73	96.7
Improved my knowledge on piggery as a business: how to contact buyers, negotiate prices and sell	25	33.3
Received start up pigs	13	16.7

Conclusion

This study ascertained that CARP+1 intervention significantly improved pig production and livelihoods of smallholder farmers.

Recommendations

Donors and policymakers should be influenced by the lessons learned from this project to fund designing of pig production programs which meet the needs and expectations of smallholder poor pig farmers bearing in mind the resource constraints and poor accessibility to quality services. Key amongst the areas of policy advocacy is enhancement of community based integrated service delivery system; local resource based feeding systems for pigs, establishment of pig farmer call centre and, linking pig farmers to pork processors. Smallholder pig farmer call centre should be established to timely respond to farmers' daily concerns and link them to pig and pork markets. There is still more scope for improving the livelihood of farmers through the adoption of improved methods of pig farming in due space and time with the adoption following policy measures to be undertaken by all concerned institutions and individuals through a very effective, integrated and complementary mode for the greater benefit of those farmers associated with pig rearing.

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