Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

SLU Global

Urban and Peri-urban Agriculture for Food Security in Low-income Countries
– Challenges and Knowledge Gaps

SLU-Global Report 2014:4

Urban and Peri-urban Agriculture for Food Security in Low-income Countries
– Challenges and Knowledge Gaps

Editors: **Ulf Magnusson** and **Kristin Follis Bergman**

SLU
LUNDS UNIVERSITET
UPPSALA UNIVERSITET

URBAN AND PERI-URBAN AGRICULTURE FOR
FOOD SECURITY IN LOW-INCOME COUNTRIES
– CHALLENGES AND KNOWLEDGE GAPS

Production: SLU Global
Editors: Ulf Magnusson and Kristin Follis Bergman
Cover photo: Richard Hopkins
ISBN: 978-91-576-9229-0 (print), 978-91-576-9230-6 (electronic)
Series: SLU-Global Report 2014:4
Electronic publishing: epsilon.slu.se
Key words: Urban agriculture, low-income, food security, livelihood
Layout: Södra tornet kommunikation, Uppsala
Print: Taberg Media Group 2014

This publication can be downloaded at
www.slu.se/slu-gobal
or ordered from global@slu.se

FSC

Urban and peri-urban pig farming in developing countries, with a focus on the African continent

Magdalena Jacobson[1], Jan Erik Lindberg[2], Nils Lundeheim[3]

[1]Department of Clinical Sciences,

[2]Department of Animal Nutrition and Management,

[3]Department of Animal Breeding and Genetics, Swedish University of Agricultural Sciences, Uppsala, Sweden

The World Health Organisation reports a big deficit in the supply of animal protein in developing countries. Pig production in the tropics has been recommended as a likely solution to this deficiency, which also provides important sources of income (Ajala, 2007; Kagira et al., 2010; Lekule & Kyvsgaard, 2003). Pigs have high reproducibility with early maturation and a short generation interval as well as high feed conversion efficiency and comparatively small space requirements. Therefore, in many countries it is a governmental goal to promote pig production (Ajala, 2007; Kagira et al., 2010; Lekule & Kyvsgaard, 2003; Muhanguzi et al., 2012; Mutua et al., 2010).

Pigs are commonly kept in urban and peri-urban areas and involve many people through pig farming, marketing live pigs, slaughtering and selling pork. A variety of pig production systems exist, ranging from large intensive commercial pig farms to free-range, traditional small-scale systems (Kagira et al., 2010; Lekule & Kyvsgaard, 2003). However, to increase pig production it is essential to adopt improved practices like disease control, housing, feeding and breeding technologies (Muhanguzi et al., 2012). The main limitations in pig production have been identified as parasites and diseases; high costs of inputs, such as feed; inadequate capital input; feed scarcity; space limitation; inadequate advisory services; lack of good quality breeding stock; poor and unorganized marketing; conflicts with neighbours; expensive veterinary drugs; and uncontrolled pig movement (Kagira et al., 2010; Karimuribo et al., 2011; Katongole et al., 2012; Muhanguzi et al., 2012). Intensive swine production is viable in large cities because of availability of industrial by-products and proximity to markets; nevertheless, 65–80% of pigs are kept in the traditional way (Lekule & Kyvsgaard, 2003).

DISEASE CONTROL

In the central region, pig farmers are often specialized and buy piglets from several sources to fatten them for slaughter or sell them for breeding purposes (Kagira et al., 2010; Karimuribo et al., 2011). The maintenance cost for sow keeping is high and few farmers keep boars, which are also rented out to other farmers (Kagira et al., 2010). Several critical diseases are spread because of trading and movement of pigs; this includes the practice of letting pigs roam around, scavenging in their surroundings. Important factors in the spread of diseases are associated with poor sanitation and hygiene, poor methods of pig husbandry, lack of proper meat inspection and disease control measures at slaughter (Phiri et al., 2003). Diseases such as cysticercosis and salmonellosis are common and pose a serious risk to public health (Ikwap et al., in press; Phiri et al., 2003). The "silent carriers" constitute a specific risk in the transmission of diseases by direct pig-to-pig contact, for example, viruses that can be transmitted by semen. Several zoonotic infections may cause severe diseases in humans, including leptospirosis, brucellosis, tuberculosis, Japanese B encephalitis, trichinosis, cysticercosis, and salmonellosis (Phiri et al., 2003). Other epizootic diseases, such as African swine fever (ASF), classical swine fever, foot and mouth disease and Aujeszky's disease, are of large economic importance. Also, endemic diseases may be devastating because of their high prevalence and contribution to low productivity (Wabacha et al., 2004). Several of these diseases may be spread by the use of fresh pork and slaughter wastes for feeding (Katongole et al., 2011). In surveys, most farmers reported experiencing disease problems among their pigs, most commonly parasitic diseases such as helminthosis, cysticercosis and ectoparasites, ASF, respiratory diseases, hind limb paralysis, abortion, diarrhoea, skin necrosis, gut edema, ear necrosis, loss of claws, unthriftiness, nutritional deficiencies and high mortality rate of unknown aetiology (Kagira et al., 2010; Karimuribo et al., 2011; Muhanguzi et al., 2012; Phiri et al., 2003; Wabacha et al., 2004). For several diseases diagnostic tests and effective vaccines are available. There is, however, usually little investment in animal health, as costs for veterinary services and drugs are considered high (Muhanguzi et al., 2012). Instead, farmers rely on other farmers or sales-people for advice and guidance regarding drug choices. Cheap anthelminthics or alternative medicines, such as local herbs and fish extracts, may be used (Kagira et al., 2010).

HOUSING

Building materials that allow for the confinement of pigs during the entire production process are expensive. Instead, pigs are kept in tree shades or local mud and wattle houses made by available cheap materials, such as reeds, mud and straw (Kagira et al., 2010; Muhanguzi et al., 2012). The shelters often have a mud floor that is rarely cleaned (Kagira et al., 2010) or, in some cases, a raised floor made of wooden materials (Karimuribo et al., 2011). Pigs can easily escape from such enclosures and roam around, increasing the likelihood of disease transmission and destruction of crops (Muhanguzi et al., 2012). Pigs may also be free ranging during the dry season and tethered during the rainy (crop) season. Only a few farmers keep pigs permanently indoors (Kagira et al., 2010). Improper housing has been identified as a major constraint in pig production (Karimuribo et al., 2011). A suitable piggery should have protection against environmental stress, good sanitation, good hygienic conditions, sufficient space, and minimal feed waste, while being as cheap as possible (Lekule & Kyvsgaard, 2003).

PHOTO: MAGDALENA JACOBSON

PHOTO: MAGDALENA JACOBSON

FEEDING

A pig diet is commonly based on various by-products generated from crop/food production (residues after harvesting crops), processing/preparation (peelings, leaves and stalks), marketing/distribution (market crop waste) and consumption (food leftovers) (Katongole et al., 2011; Katongole et al., 2012; Phengsavanh et al., 2010). In addition, diets may contain by-products from abattoirs (rumen content, slaughter waste), dairies (whey) and various food industries (Ajala, 2007; Kagira et al., 2010; Katongole et al., 2011; Muhanguzi et al., 2012). Food leftovers are obtained from homesteads, markets, restaurants/hotels, schools, food processing plants and waste dumpsites. Thus, there are concerns about the risks for both physical (metal, glass, plastic and ceramic objects) and microbial contaminants. In some cases supplementary feed is given, such as protein-rich ingredients and minerals (Karimuribo et al., 2011). A variety of feed resources are often available locally, although the amount may not be adequate and may be of poor nutritional quality (Kagira et al., 2010; Katongole et al., 2012; Phengsavanh et al., 2010). Weaning of piglets at an earlier age would increase profit, but would also require feed of high quality (Kagira et al., 2010). The bulk of carbohydrate and protein content of pig feed is obtained from maize, soya beans and fish. These ingredients are also the source of carbohydrates and

proteins for humans, thus, decreasing the availability as a source of feed and increasing the cost. Therefore, feed is often the single most expensive input in pig production and is associated with substantial price fluctuation. Diets consisting of maize and sorghum will only provide approximately 30% of the requirements of certain amino acids; thus, scavenging may have nutritional benefits (Lekule & Kyvsgaard, 2003). Additionally, in many countries water scarcity is a major problem and water may be provided from local rivers and lakes (Kagira et al., 2010; Muhanguzi et al., 2012).

PIG BREEDING

Pig production is often based on more or less "ad hoc" crossbreeding with indigenous breeds whose production potential is lower than the exotic "western" crossbreds, based on Landrace, Large white, Hampshire and Duroc breeds. These exotic crossbreds are often named by their commercial name, given by the commercial company they emanate from. The improved pig breeds have a higher production potential (ILRI, n.d.; Kagira et al., 2010), but need also a higher quality/quantity of feed than what is offered to local breeds. Thus, they may not adapt to the extensive production environment that exists. Also, the accessibility of exotic breeds is limited as the cost of them is considered high and accessing loans is difficult. This might result in the purchasing of exotic and expensive breeds to be used far too intensively, increasing the risk for inbreeding (Kagira et al., 2010). The majority of farmers purchase their breeding stock from other farmers (Kagira et al., 2010; Muhanguzi et al., 2012). The use of village boars combined with unrestricted pig movement increases the risk for transmission of diseases. Artificial insemination is, today, hardly used in small-scale pig production. The indigenous breeds may have valuable traits such as disease resistance and low demands for feed quantity/quality. Further, they survive under stressful environmental conditions, such as high disease incidence, poor nutrition, and high ambient temperatures, that will form a basis for low-input, sustainable agriculture (Lekule & Kyvsgaard, 2003).

TRENDS

The majority of people involved in livestock farming are women (Katongole et al., 2012; Phengsavanh et al., 2010); however, it is commonly the male head of household that is responsible for decision-making regarding pig production (Mutua et al., 2010). The importance of undertaking actions to involve women in decision-making has been recognized. Traditional production systems are regarded as wasteful and unprofitable; however, in Africa, intensive pig farming seems to be stagnant and the traditional sectors seem to be more sustainable (Kagira et al., 2010). Feed scarcity and disease are major constraints for the development of pig production in both urban and peri-urban areas (Katongole et al., 2012) as well as in rural areas (Phengsavanh et al., 2011). Competition of land for other purposes than agriculture is likely to increase the risk for feed scarcity in urban and peri-urban areas. Possibly, this will force production to gradually move to more rural areas with available land at lower costs. Improper feed formulation resulting in nutritionally inadequate diets is common, as is the occurrence of adulterated feed ingredients (Katongole et al., 2012).

OPPORTUNITIES

It is recommended that smallholder farmers form cooperative groups that would allow them to bargain for better feed and pig prices, seek better markets and increase the possibility of access to governmental micro-loans (Mutua et al., 2010). Future research should focus on the integration of smallholder farmers into the country's market chains. Further, access to quality extension services should be improved (Kagira et al., 2010).

It would be desirable to provide institutional support to ensure proper control programmes in meat inspection, slaughter hygiene and information on preventive measures to combat the spread of diseases such as cysticercosis and ASF (Lekule & Kyvsgaard, 2003). To minimize the risk for spread of these devastating diseases, it may be necessary to raise pigs in confinement, thereby excluding the possibility to roam around (Lekule & Kyvsgaard, 2003; Mutua et al., 2010; Phiri et al., 2003). In some countries, it is possible to buy boars from local government-owned trade centers. The possibility to set up breeding centres to provide health-controlled replacement stock at subsidized rates should be explored to decrease the spread of diseases by the uncontrolled movement of pigs (Kagira et al., 2010). In a more distant future, it would be desirable to increase the use of AI and to adopt the concept of quarantines. A further strategy would be to design and disseminate simple, relevantly designed pig houses suited to, and affordable for the poor rural population to control the spread of diseases (Lekule & Kyvsgaard, 2003).

It is necessary to develop feed strategies based on cheap, locally produced feed stuffs (Lekule & Kyvsgaard, 2003). The concept of feed conservation seemed entirely new to most of the farmers in Kampala, Uganda (Katongole et al., 2012). A similar situation is prevailing among resource-poor farmers in other parts of the world (Phengsavanh et al., 2010; Phengsavanh et al., 2011). The implementation of proper feed conservation techniques should make it possible to safely store feed surplus and, thereby, better cope with feed scarcity to the benefit of animal health and performance.

Improved pig breeds will yield higher cash revenue, but will also increase economic risk for the farmer because of the higher maintenance costs (Kagira et al., 2010). Breeding traits that are optimal for marginal environments should be identified and well-controlled trials should be preformed to provide knowledge on the advantages/disadvantages of using genetic material from exotic pig breeds. Irrespective of the outcomes of these trials, local breeds should be genetically characterised and preserved as genetic resources (Kagira et al., 2010). The use of crossbreds might preferably be used in commercial and large-scale enterprises, whereas the indigenous breeds might be better suited for smallholder farms (Lekule & Kyvsgaard, 2003).

KNOWLEDGE GAPS

The presence and prevalence of various diseases is largely unknown. As a first step, it is important to identify the causes of mortality in piglets so that measures can be undertaken to increase piglet survival, thereby improving production (Ikwap et al., in press; Wabacha et al., 2004). Further, the occurrence of various diseases must be defined to provide a list of targeted investigations and measures that will need to be undertaken in future studies on prevalence, routes of transmission, et cetera.

Livestock farmers use several indigenous criteria to judge the nutritional quality of available feed resources (Lumu et al., 2013; Phengsavanh et al., 2010), which includes disease resistance, feed intake, growth/body condition, hair coat appearance, faecal output and texture, and level of production. Despite this, farmers put more importance on availability and cost as opposed to nutritional quality when choosing feed resources. Thus, there is a need to sensitize farmers on the importance of nutritional quality to ensure better feed utilization, improved disease resistance and pig performance.

Indigenous pig breeds need to be genetically characterized to secure the maintenance of valuable local traits; additionally, well-controlled trials should be performed to provide knowledge on the advantages/disadvantages of using genetic material from exotic pig breeds.

REFERENCES

Ajala, M. K. (2007). Analyses of factors affecting the management of pigs in Kaduna state, Nigeria. Agricultural Journal, 2(2), 343-347.

Ikwap, K., Erume, J., Owiny, D., Nasinyama, G., Melin, L., Bengtsson, B., Lundeheim, N., Fellström, C., & Jacobson, M. (in press). Salmonella species in piglets and weaners from Uganda: Prevalence, antimicrobial resistance and herd-level risk factors. Preventive Veterinary Medicine, E-pub. ahead of print, http://dx.doi.org/10.1016/j.prevetmed.2014.03.009

ILRI. (n.d.). Performance comparisons of indigenous and exotic breeds and their crosses. International Livestock Research Institute. Retrieved December 18, 2013, from http://ilri.org/InfoServ/Webpub/fulldocs/AnGenResCD/docs/ValueIndiAnPopBreedExotic/5Performance.htm#P139_23138

Kagira, J. M., Kanyari, P. W. N., Maingi, N., Githigia, S. M., Ng'ang'a, J. C., & Karuga, J. W. (2010). Characteristics of the smallholder free-range pig production system in western Kenya. Tropical Animal Health Production, 42(5), 865-873.

Karimuribo, E. D., Chenyambuga, S. W., Makene, V. W., & Mathias, S. 2011. Characteristics and production constraints of rural-based small-scale pig farming in Iringa region, Tanzania. Livestock Research for Rural Development, 23(8), 1-9.

Katongole, C., Nambi-Kasozi, J., Lumu, R., Bareeba, F., Presto, M., Ivarsson, E., & Lindberg, J. E. (2012). Strategies for coping with feed scarcity among urban and peri-urban livestock farmers in Kampala, Uganda. Journal of Agriculture and Rural Development in the Tropics and Subtropics, 113(2), 165-174.

Katongole, C. B., Sabiiti, E., Bareeba, F., & Ledin, I. (2011). Utilization of market crop wastes as animal feed in urban and peri-urban livestock production in Kampala. Journal of Sustainable Agriculture, 35(3), 329-342.

Lekule, F. P., & Kyvsgaard, N. C. (2003). Improving pig husbandry in tropical resource-poor communities and its potential to reduce risk of porcine cysticercosis. Acta Tropica, 87(1), 111-117.

Lumu, R., Katongole, C. B., Nambi-Kasozi, J., Bareeba,F., Presto, M., Ivarsson, E., & Lindberg, J. E. (2013). Indigenous knowledge on the nutritional quality of urban and peri-urban livestock feed resources in Kampala, Uganda. Tropical Animal Health and Production, 45(7), 1571-1578. doi: 10.1007/s11250-013-0401-8

Muhanguzi, D., Lutwama, V., & 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.

Mutua, F., Arimi, S., Ogara, W., Dewey, C., & Schelling, E. (2010). Farmer perceptions on indigenous pig farming in Kakamega district, western Kenya. Nordic Journal of African Studies, 19(1), 43-57.

Phengsavanh, P., Ogle, B., Stür, W., Frankow-Lindberg, B. E., & Lindberg, J. E. (2010). Feeding and performance of pigs in smallholder production systems in Northern Lao PDR. Tropical Animal Health and Production, 42(8), 1627-1633. doi: 10.1007/s11250-010-9612-4

Phengsavanh, P., Ogle, B., Stür, W., Frankow-Lindberg, B. E., & Lindberg, J. E. (2011). Smallholder pig rearing systems in Northern Lao PDR. Asian-Australasian Journal of Animal Science, 24(6), 867-874.

Phiri, I. K., Ngowi, H., Afonso, S., Matenga, E., Boa, M., Mukaratirwa, S., Githigia, S., Saimo, M., Sikasunge, C., Maingi, M., Lubega, G. W., Kassuku, A., Michael, L., Siziya, S., Krecek, R. C., Noormahomed, E., Vilhena, M., Dorny, P., & Willigham III, A. L. (2003). The emergence of Taenia solium cysticercosis in Eastern and Southern Africa as a serious agricultural problem and public health risk. Acta Tropica, 87(1), 13-23.

Wabacha, J. K., Maribei, J. M., Mulei, C. M., Kyule, M. N., Zessin, K. H., & Oluoch-Kosura, W. (2004). Health and production measures for smallholder pig production in Kikuyu division, central Kenya. Preventive Veterinary Medicine, 63, 197-210.