RESEARCH PROGRAM ON Livestock

More meat, milk and eggs by and for the poor

Report of the pig welfare assessment baseline survey in selected districts of Uganda

MorePork II project, Uganda

Final report

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Acronyms

ASF	African swine fever
BCS	body condition scoring
EFSA	European Food Safety Authority
EU	European Union
GI	gastro-intestinal
No.	number
ODK	Open Data Kit
OIE	*Office International des Epizooties*/World Organisation for Animal Health

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Executive summary

This report describes the pig welfare status in selected districts of Uganda. The data were collected using a structured questionnaire format designed based on criteria and principles of animal welfare. The core welfare principles have four basic components and 12 animal-based criteria adapted from the European Food Safety Authority (EFSA) and the Welfare Quality® project funded by the European Union (EU) . The questionnaire was adjusted to the Uganda pig farming context and rolled out in four districts: Masaka, Mukono, Wakiso and Mpigi. In all districts, 270 farms with 4,380 pigs were sampled. Welfare assessment was done at individual and group levels.

In all farms visited, 91.5% of the pens had cooling facilities, while cold protection (for adults) was available in 99% of the pens. Regarding freedom to move within a pen, about 680 pens were scored and in 81% of the pens, pigs were free to move. In 11.4% of the pens, pigs had limited freedom to move while in 7.6% of the pens, pigs had restricted movement. In terms of space, the mean pen area per farm was 8.4 m2, and on average 1.3 sows per pen was observed. Out of 317 pens observed, 89.3% had roofing, while 10.7% them of had bedding material. However, there was a shortage of clean and adequate water. Concerning individual animal observations, all welfare indicators which suggest a link between quality of facilities provided to pigs and the corresponding consequence(s) such as the health status of pigs were captured. These include cachexia, sickness, deaths, body lesions and syndromes of different kinds.

Based on the data generated through group- and individual-level observations, welfare concerns were higher on the core principles of health, nutrition and freedom of movement. In the health category, respiratory signs were noted in 7.1% of sows and 4.3% of other types of pigs. Diarrhoeic symptoms were observed in 5.1% of the sows and in 18.9% of other group of pigs combined. Among the specific diseases, African swine fever (ASF) was associated with most cases of ill thrift, gastro-intestinal (GI) disorders and acute deaths. The high proportion (90%) of emaciated pigs and the lack of clean water supply for 63% of sows and 52.2% of growers in all surveyed districts both underscore the presence of serious feeding and nutritional concerns. While these findings are not exhaustive for Uganda, they can be sufficiently informative to describe the welfare context that could constrain achievement of anticipated project goals in the study districts. There is a need for strategic interventions that address the observed health, nutrition and housing challenges of pigs in Uganda. It is therefore critical to improve the prevailing farm management systems as well as enhance pig-welfare awareness and knowledge amongst farmers and extension workers.

1 Introduction

1.1 Overview of Uganda's smallholder pig production systems

Owing to the growing demand for pork, pig production by smallholder farmers in Uganda has dramatically increased among over the last three decades. The evidence is in the rapidly growing pig-farm businesses, estimated at more than 3 million in the specified period (Ouma et al. 2014). Nevertheless, this relatively young livestock industry seems to be constrained by a range of factors that include disease, nutrition and other management aspects. Hence, pork production may fail to match prevailing demand. Technically, Uganda's pig production systems can be characterized as low-input low-output systems (Ouma et al. 2015; Chenais et al. 2017). In terms of production intensity, there are three systems: free-range or scavenging, small- to medium-scale (tethered or housed) and large-scale production systems. Depending on production flow type, three main systems are practised: farrow to finish, farrow to wean and wean to finish, with the farrow to finish being the predominant system. Pigs can be confined in sheds or pens, tethered, or left to roam under the free-ranging system (Dione et al. 2014; Ikwap et al. 2014). Confinement is common in urban or peri-urban settings while tethering or free-ranging is common in rural settings (Kungu et al. 2019). Most pigs (> 90%) in Uganda's MorePork II project districts are raised under sheltered confinement. In Uganda, most farmers keep a small number of pigs (3–10), with an average of 2.6 sows per year (Ikwap et al. 2014; Gertzell et al. 2021). In most farms, pigs are sometimes not segregated by age groups and are fed together in the same pens or groups. Generally, pigs are fed on local forage, crop residues such as maize bran and/or kitchen waste (Ouma et al. 2013). Due to the high costs of raw materials, only a small proportion of farms produce their own compounded feeds. A small proportion of farms buy commercial feeds, but the high cost of feeds and lack of credibility on quality control systems (due to feed adulteration) among commercial feed producers limit their market share.

1.2 Constraints to pig rearing in Uganda: focus on animal health

Uganda's pig rearing systems are characterized by poor biosecurity practices, hygiene and inappropriate behaviour of value chain actors, which increase the risks of infectious disease outbreaks such as African swine fever (Dione et al. 2015; Nantima et al. 2015; Dione et al. 2018). Other key constraints to pig production in Uganda are poor nutrition and reproductive management (Gertzell et al. 2021). Value chain actors do not have adequate knowledge and technical skills on proper biosecurity practices to limit the risks of disease transmission within and between farms (Nantima et al. 2015; Mutua and Dione, 2021). In Uganda, diseases pose a significant risk to pig welfare and production. The endemic African swine fever outbreaks (no vaccine available) are reported annually in Uganda (Muhangi et al. 2015). Vaccines are not available for diseases that are vaccinatable. Smallholder production systems are characterized by poor biosecurity, which explains increased incidence of diseases posing control challenges (Beltran-Alcrudo et al., 2017). The high disease burden in pig smallholder systems in Uganda calls for improvements in herd health practices (Dione et al. 2018). Knowledge on pig welfare, beyond health, and its impact on productivity among farmers and other value chain actors is non-existent and requires attention. Despite existence of relevant laws and regulations regarding

animal health and welfare (Animal Diseases Act, Animals Prevention of Cruelty Act, etc.), animal welfare in Uganda is considered a low priority by both public and private sector players.

1.3 Background to the pig welfare survey

Animal welfare is now recognized globally as a major component of the United Nations sustainable development goals for ensuring sustainable food production due to its close linkage with productivity, food safety and environmental health (FAO 2016; Doyle et al. 2018; Doyle et al. 2021). It is a key component of herd health management which directly affects pig productivity. Evidence for a positive correlation between animal welfare and productivity has been documented (Lyons et al. 1995; OIE 2011). Being a biological concept, animal welfare is a scientifically measurable concept with the overall goal of improving animal health, productivity, enhancing food safety and minimizing greenhouse gas emissions (Doyle et al. 2021). The World Organisation for Animal Health (OIE) defines animal welfare as the ability of an animal to cope with the environment in which it is placed. In this context, an animal is in good welfare if it is well-nourished, comfortable, healthy and able to express innate (natural) behaviour (OIE, 2011, FAWC, 2009). In line with this definition, there are five domains of animal welfare that need to be addressed: nutrition, physical environment, health, behavioural interactions and mental state (Mellor et al. 2020; Doyle et al. 2018, FAWC, 2009). In addition, good animal welfare also takes into consideration disease prevention, veterinary treatment for illness, injuries and humane handling of animals (OIE, 2011). These are the cardinal components of welfare which affect herd health and hence economic performance.

This welfare survey used established scientific methods to assess pig welfare using both quantitative and qualitative measures in a systematic manner. The assessment was done at group and individual pig levels, using the core welfare principles and indicators. This animal welfare assessment framework was adapted from the European animal welfare indicators, derived from the EU directive 2008/120/EC, which stipulates the minimum standards for the protection of all farmed animals, including pigs. This welfare assessment framework was further derived from EFSA (2012a, 2012b) and the EU-funded Welfare Quality® project, which used four core principles and 12 animal-based criteria as guidelines for assessing animal welfare. The core principles (also adapted from Mellor et al. 2020) include good housing (physical environment), good feeding (nutrition), good health and the freedom to express appropriate (natural) behaviour, from which the 12 specific criteria/welfare indicators were generated. This overall framework was adapted to suit Uganda's pig production context, as some of the criteria used in the EU countries were not applicable in our setting.

1.4 Objective of the pig welfare survey

The key objective of the welfare survey was to establish the status of pig welfare in selected districts of high pig density in central Uganda as a critical component for improving pig herd health and welfare.

This welfare survey constituted a baseline for assessing the impacts of pig welfare interventions. The data and information generated provided the current status of pig welfare in Uganda to guide future district- and herd-level health interventions.

2 Materials and methods

2.1 Study approach

This survey was conducted in the four MorePork II project districts of Uganda: Masaka, Mukono, Wakiso and Mpigi. The MorePork II project aims at improving pig productivity and incomes through an environmentally sustainable and gender-inclusive integrated intervention package. The main intervention of the project is implementing and evaluating an integrated strategy for improving pig productivity and performance through improved pig herd health, reproductive management, improved genetics and better feeding, and linkages to the market arrangements. This study served as a baseline for animal health interventions. Two districts (Mukono and Masaka) were selected as the project intervention sites, while the other two (Mpigi and Wakiso) were the project control sites.

We used a before-and-after design in which farmers were trained on various aspects of herd health, with a focus on welfare in the intervention districts. Later, *ex post* assessments will be done to evaluate the impacts of the training on welfare indicators. However, for ethical reasons, farmers in the control districts will also be trained after impact evaluation.

A structured questionnaire was developed to collect welfare indicators. The questionnaire was pretested in Wakiso and Mukono Districts by the investigators before field use. The tool was configured in Open Data Kit (ODK) to ease the collection and archiving of data. The tool captured information on farm demographics, herd structure, health conditions (disease, injuries, lameness, etc.), physical comfort (environment), behavioural assessments (social, exploratory and human-animal interactions) and nutrition. In addition to the animal-based measures, the welfare assessment considered observations of on-farm practices, housing facilities and equipment to get more detailed information. The tool was designed in such a way as to enable objective evaluation of key welfare indicators, based on established scientific guidelines (EFSA, 2012a, 2012b; Mellor et al. 2020).

2.2 Study period and duration

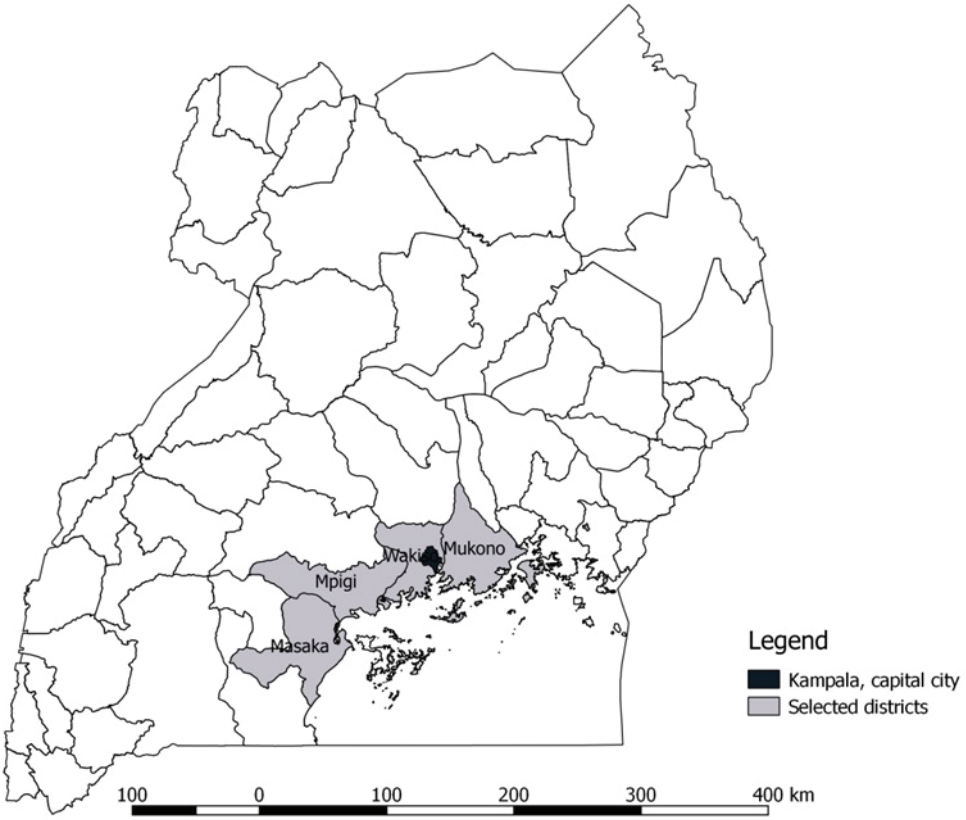
The study was conducted from April to May 2021 and lasted two weeks. Enumerators were veterinary extension workers selected from the target districts. They were trained in the use of the tool and how to score for pig welfare. The field data collection was supervised by two senior veterinary researchers who were part of the investigating team. Data were cleaned by checking and correcting any errors made during entry.

2.3 Study sites, sampling of farms, pens and pigs

The study sites were selected during the MorePork II project design phase as districts with a high pig population density in central Uganda. Scoping studies showed that most farmers who were linked to aggregators in the pilot districts were located within the greater Mukono and greater Masaka areas. Masaka and Mukono were identified as the project intervention sites, while Mpigi and Wakiso Districts were the control sites.

In each district, a list of pig farmers linked to pig aggregators was randomly sampled for this survey. Out of a sampling frame of about 650 farmers, a sample size of 240 farmers was computed. To account for possible errors in entry, we sampled up to 270 farms during the survey. In each farm, sampling of individual pens and pigs for welfare assessment was done randomly. However, specific distinction was made for sows and other pig categories (weaners, growers and boars) when scoring individual pigs for the key welfare indicators. In each farm, the enumerators obtained the total number of pens from which they randomly sampled a given number of pens. In each pen where there was more than one pig, individual pigs were randomly sampled and scored for specific welfare indicators. Scoring for key welfare indicators was done following a structured questionnaire which was configured in the ODK tool. Figure 1 shows where the study was conducted.

Figure 1. Sites where the pig welfare survey was conducted



Credit: ILRI/Michel Dione.

2.4 Sample size determination

In each district, a list of pig farmers linked to pig aggregators was used as a sampling frame (~650 farmers) from which random sampling was done. Based on preliminary survey data, the current estimated proportion of farms that had good welfare practices stood at 20%. Following the training, we expected that at least 30% of farmers would adopt good welfare practices. Since we sampled the same farms in a before-and-after interventional design, the following binomial comparison equation was used to compute the required sample size (Dohoo et al. 2003):

$$n_0 = \left(Z_{\alpha/2} + Z_{\beta}\right)^2 (p_0 + p_1) - (p_0 - p_1)^2 \Big/ d^2 \qquad Eq\ (1)$$

where n_0 = is the required sample size per sample; $Z_{\alpha/2}$ is the standard Z-score from a normal distribution (1.96), Z_{β} is the value of Z required for 80% power (-0.84); p_0 =0.2; p_1 = 0.3 and d = as the minimum detectable difference of 10% (0.1). Using this equation, a sample size of 124.4 farms was required. Thus, for the two samples, the required sample size was n_1 = 124.4 x 2 = 248.8 farms in all districts. To account for possible dropouts, the total sample size was raised to 270 farms.

2.5 Data management and analysis

Data were collected both at group and individual animal level. For group level welfare assessment in general, data were obtained at farm level. However, since one or more farm subunits or pens were observed separately as a distinct entity, a pen was the smallest unit of analysis for herd level data. For individual pig level indicators, a pig was the unit of analysis. Data were captured, cleaned, coded and validated. The validated data were then transferred to STATA version 14 (*Stata Corp., College Station, TX, USA*) for descriptive summary statistics.

3 Results

3.1 Farm owners' demography and herd characteristics

The demography of pig farm owners in this study was characterized by age, sex, marital status, area of residence and family role, i.e. father, mother, son or daughter. Of the respondents interviewed, 56.3% were female ranging between 19–88 years while 43.7% were male ranging between 17–80 years. The majority (70%) of farm owners were married followed by single, widowed and divorced individuals in that descending order (see Table 1).

Table 1: Profile of respondents

District	No. of farmers	Gender frequency (%)		Marital status frequency (%)			
		Female	Male	Married	Single	Divorced	Widowed
Masaka	76	45 (59.2)	31 (40.8)	50 (65.8)	17 (22.4)	2 (2.6)	7 (9.2)
Mukono	76	50 (65.8)	26 (34.2)	56 (77.6)	13 (17.1)	1 (1.3)	6 (7.9)
Mpigi	65	33 (50.8)	32 (49.2)	43 (66.1)	10 (15.4)	2 (3.1)	10 (15.4)
Wakiso	53	27 (50.9)	26 (49.1)	40 (75.5)	12 (22.6)	1 (1.9)	0 (0.0)
Total	270	155 (57.4)	115 (42.6)	189 (70.0)	52 (19.3)	6 (2.2)	23 (8.5)

3.1.1 Family level farm ownership and pig breeds

Mothers own nearly half of the pig farms in the study area. Fathers were the second-highest owners followed by whole family as owners and sons or daughters. Crossbreeds were the predominant pig breed kept in the farms while pure exotic breed pigs represented the smallest proportion (7%). Farms in Mpigi kept the highest proportion of local pigs, while Masaka farms kept the least. This could be due to consumer preferences, market demand and/or farmer access to improved breeds. Local breeds (20.4%) and farms that keep different breeds in the same farm (24%) represent the remainder of the farms (see Table 2).

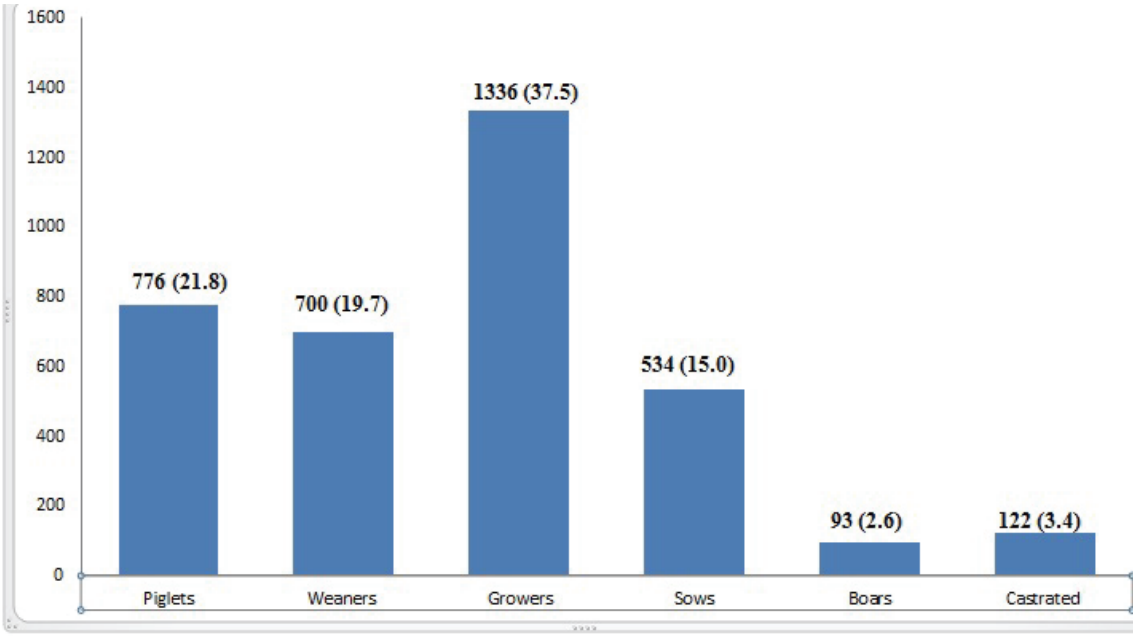
Table 2: Demographics of pig owners and pig breeds kept

District	No. of farms	Farm owners' frequency (%)				Pig breeds frequency (%)			
		Father	Mother	Son/ daughter	Whole family	Local	Cross	Exotic	Mixed
Masaka	76	15	37	1	23	2 (2.6)	40 (52.6)	11 (14.5)	23 (30.3)
Mukono	76	28	38	0	10	11(14.5)	49 (64.5)	1 (1.3)	15 (19.7)
Mpigi	65	13	27	1	24	37 (56.9)	10 (15.4)	2 (3.1)	16 (24.6)
Wakiso	53	25	19	2	7	5 (9.4)	32 (60.4)	5 (9.4)	11 (20.8)
Total	270	81 (30.0)	121 (44.8)	4 (1.5)	64 (23.7)	55 (20.4)	131 (48.5)	19 (7.0)	65 (24.1)

3.1.2 Pig herd composition

In all districts, growers and weaners were dominant, followed by piglets, sows and boars in that order. Only 26.7% of the farms kept boars in their pens contrasted with 65.2% of the farms having at least one sow indicating the possibility of sharing boars between farms. This indicates the presence of potential risk of transmission of reproductive and contagious diseases between the farms (see Table 3 and Figure 2).

Figure 2. Pig class and corresponding frequency in study areas (percentages in parentheses).



3.1.3 Pig herd dynamics

Pig herd composition in the studied districts was established through purchases, gifts and farm births. At the time of the study, there were more than 3,100 pigs in the 270 sampled herds. The offtake through home consumption, selling and gifts given out to friends or family members was estimated to be as high as 976 (21%) pigs. The largest proportion of pig offtake (19.7%) was through selling of pigs while gifts given out and gifts received represented less than 1% each. Household consumption of pork appeared to be very low as only a very small percentage of pigs was slaughtered at home (0.4%; range: 0.1% in Mukono to 0.9% in Mpigi). About 304 (6.5%) pigs were reported to have been lost or died due to various causes (Table 3). Of all the deaths or losses, the highest proportion (8.3%) was reported in Mukono. The next highest death rate/loss was reported in Mpigi (7.3%) followed by Masaka (6.9%) and Wakiso (3.7%).

Table 3: Pig herd dynamics in four surveyed districts

District	Age group	Number of pigs by the age group								Total live	No. of farms			
		Current no. (%)	Born	Purchased (%)	Sold live	Slaughtered at home	Died or missing	Received as gift	Given out as gift		No. of farms sampled	No of farms keeping group	% (district)	% out of 270
Masaka	Piglets	197 (95.6)	212	0 (0.0)	0 (0.0)	0 (0.0)	8 (3.9)	0 (0.0)	1 (0.5)	206	76	14	18.42	5.18
	Weaners	195 (48.3)	85	19 (4.7)	128 (31.7)	0 (0.0)	59 (14.6)	2 (0.5)	1 (0.2)	404	76	34	44.74	12.59
	Growers	310 (43.8)	0	54 (7.6)	275 (38.9)	3 (0.4)	35 (4.9)	23 (3.2)	7 (1.0)	707	76	59	77.63	21.85
	Sows	146 (82.5)	96	0 (0.0)	20 (11.3)	2 (1.1)	3 (1.7)	6 (3.4)	0 (0.0)	177	76	47	61.84	17.41
	Boars	27 (90.0)	0	0 (0.0)	3 (10.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30	76	20	26.31	7.41
	Sub-total	875 (57.4)	393	73 (4.8)	426 (27.9)	5 (0.3)	105 (6.9)	31 (2.0)	9 (0.6)	1524				
Mukono	Piglets	119 (67.2)	141	0 (0.0)	11 (6.2)	0 (0.0)	41 (23.2)	3 (1.7)	3 (1.7)	177	76	17	22.37	6.30
	Weaners	120 (53.1)	7	30 (13.3)	54 (23.9)	0 (0.0)	19 (8.4)	0 (0.0)	3 (1.3)	226	76	30	39.47	11.11
	Growers	256 (85.3)	0	8 (2.7)	29 (9.7)	1 (0.3)	5 (1.7)	1 (0.3)	0 (0.0)	300	76	63	82.89	23.33
	Sows	92 (93.9)	0	2 (2.0)	1 (1.0)	0 (0.0)	3 (3.1)	0 (0.0)	0 (0.0)	98	76	49	64.47	18.15
	Boars	16 (94.1)	0	0 (0.0)	1 (5.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	17	76	15	19.74	5.56
	Sub-total	603 (73.7)	148	40 (4.9)	96 (11.7)	1 (0.1)	68 (8.3)	4 (0.5)	6 (0.7)	818				
Mpigi	Piglets	194 (93.3)	81	0 (0.0)	2 (0.96)	0 (0.0)	11 (5.3)	0 (0.0)	1 (0.5)	208	65	10	15.38	3.70
	Weaners	162 (61.1)	62	11 (4.1)	66 (24.9)	0 (0.0)	17 (6.4)	1 (0.4)	8 (3.0)	265	65	23	35.38	8.52
	Growers	312 (55.6)	1	21 (3.7)	156 (27.8)	5 (0.9)	53 (9.4)	0 (0.0)	14 (2.5)	561	65	50	79.92	18.52
	Sows	132 (80.0)	0	3 (1.6)	32 (17.2)	6 (3.2)	10 (5.4)	1 (0.5)	2 (1.1)	186	65	45	69.23	16.67
	Boars	23 (82.1)	0	0 (0.0)	5 (17.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	28	65	16	24.61	5.92
	Sub-total	823 (65.9)	144	35 (2.8)	261 (20.9)	11 (0.9)	91 (7.3)	2 (0.2)	25 (2.0)	1248				
Wakiso	Piglets	184 (89.3)	144	0 (0.0)	0 (0.0)	0 (0.0)	22 (10.7)	0 (0.0)	0 (0.0)	206	53	14	26.41	5.18
	Weaners	167 (72.0)	0	3 (1.3)	52 (22.4)	0 (0.0)	9 (3.9)	1 (0.4)	0 (0.0)	232	53	22	41.51	8.15
	Growers	356 (82.8)	0	4 (0.9)	61 (14.2)	0 (0.0)	9 (2.1)	C	0 (0.0)	430	53	48	90.57	17.78
	Sows	148												
(88.1)	0	0 (0.0)	20 (11.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	168	53	35	66.04	12.96		
	Boars	27 (90.0)	0	0 (0.0)	3 (10.0)	0 (0.0)	0 (.00)	0 (0.0)	0 (0.0)	30	53	21	39.62	7.78
	Sub-total	882 (82.7)	144	7 (0.7)	136 (12.8)	0 (0.0)	40 (3.7)	1 (0.1)	0 (0.0)	1066				
	Overall	3183 (68.4)	829	155 (3.3)	919 (19.7)	17 (0.4)	304 (6.5)	38 (0.8)	40 (0.9)	4656	270			

3.1.4 Herd sizes of farms

Most of the pig farms kept a small number of pigs comprising of more than one age class (see Table 4). Overall, 140 (51.9%) farms kept five or fewer pigs of different classes. More than 71% of the farms (n=192/270) kept 10 pigs or less. Only 35 farms had 20 or more of pigs. Among the latter, only 2 farms, one in Mpigi (n=317) and the other in Wakiso (n=186), had more than 100 pigs at the time of farm visit (data not shown).

Table 4: Pig class versus herd size in surveyed districts

District	Pig class	No. of farms keeping	Range of no. of pigs kept	Farms with <20 pigs	Farms ≥ 20 pigs
Masaka	Piglets	14	1–35	12 (7 farms ≤10 pigs)	2
	Weaners	34	1–23	32 (21 farms ≤ 5 pigs)	2
	Growers	59	1–33	56 (42 farms ≤ 5 pigs)	3
	Sows	47	1–20	46 (42 farms ≤ sows)	1
Mukono	Piglets	17	1–19	17 (6 farms ≤ 5 pigs)	0
	Weaners	30	1–13	30 (23 farms ≤ 5 pigs)	0
	Growers	63	1–30	61 (51 farms ≤ 5 pigs)	2
	Sows	49	1–8	49 (48 farms ≤ 5 pigs)	0
Mpigi	Piglets	10	2–100	7 (3 farms ≤ 5 pigs)	3
	Weaners	23	1–70	21 (16 farms ≤ 5 pigs)	2
	Growers	50	1–120	49 (40 farms ≤ 5 pigs)	1
	Sows	45	1–25	44 (39 farms ≤ 5 pigs)	1
Wakiso	Piglets	14	4–35	10 (8 farms ≤ 10 pigs)	4
	Weaners	22	1–70	20 (15 farms ≤ 5 pigs)	2
	Growers	48	1–60	46 (29 farms ≤ 5 pigs)	2
	Sows	35	1–32	34 (28 farms ≤ 5 pigs)	1

3.1.5 Reproductive management

Castration practice

More than 45% of the respondents revealed that they castrate their pigs, regardless of age of pigs. Mukono District had the highest proportion of farms that practised castration as opposed to Wakiso District that had the lowest proportion (see Table 5). Of the 122 farms that reported practising castration, 80 (65.6%) did not have any boar during the farm visit (data not shown).

Table 5 Proportion of farms which practise castration in surveyed farms

Districts	Total no. of farms	Frequency of farms with castration practice, n (%)	Frequency of farms with no castration practice n (%)
Masaka	76	37 (48.7)	39 (51.3)
Mukono	76	43 (56.6)	33 (43.4)
Wakiso	53	17 (32.1)	36 (67.9)
Mpigi	65	25 (38.5)	40 (61.5)
Total	270	122 (45.2)	148 (54.8)

3.2 Pig welfare

3.2.1 Resource-based welfare indicators

Data for resource-based indicators were generated from group-level welfare assessment at farm level. However, since one or more of farm subunits or pens were observed separately as distinct entities, a pen was the smallest unit of analysis for herd level data. In addition, demographic profiles of the owners were used to demonstrate the pattern of welfare indicators. In this connection, age was grouped by the investigators into three categories namely, young, mid-age and older adults. Farm owners whose ages were between 17 and 35 were considered as youth, those between 36 and 50 years as mid-age adults and those above 50 years were all classified as old-age adults.

3.2.1.1 Thermal comfort

Level of thermal comfort in farms with cooling facility

In the four districts where the survey was conducted, thermal comfort was assessed in 341 pens from 270 farms visited for presence of cooling facilities and cold protection. Results showed 91.5% of the pens had a cooling facility, while cold protection was available in 99% of the pens. All the pens in the farms visited had shades. Only three of them had water for cooling purpose (Table 6).

Table 6: Availability of cooling facilities and number of pigs observed panting

District	Total no. of farm pens observed	No. of pens with cooling facility (%)	Type of thermal regulation facility and corresponding frequency (%)			Class and no. of pigs observed panting	
			Water (%)	Shade (%)	Cold protection (%)	Sows	Other pigs
Masaka	74	64 (86.5)	2	64	67	3	0
Mukono	106	98 (92.5)	1	98	98	1	0
Wakiso	95	90 (94.7)	0	90	80	1	0
Mpigi	66	60 (90.9)	0	60	64	0	0
Total	341	312 (91.5)	3 (0.1)	312 (100)	309 (99)	5	0

Level of thermal comfort in farms with no cooling facility

Among the farm pens visited, 8.5% of them had no cooling facility, yet no pig was observed to pant in the sow or other pig categories (Table 7).

Table 7: Frequency of panting pigs in farms where no cooling facility was observed

Districts	Total no. of farms observed	Frequency of farms with no cooling facility (%)	Class and frequency of pigs panting	
			Sows	Others
Masaka	74	10	0	0
Mukono	106	8	0	0
Wakiso	95	5	0	0
Mpigi	66	6	0	0
Total	341	29 (8.5)	0	0

Owners' demographic profile and farm cooling facility

Among farms pens with cooling facilities, 45.5% of them were female-owned, while the rest (54.2%) were male-owned. On the other hand, 69% of pens with no such facility belonged to female farmers. Details of the demographic profile for presence or absence of cooling facilities are in Table 8.

Table 8: Owner profile and status of cooling facility in farms visited

Owner profile	Category	No. of pens with cooling facility (%)	No. of pigs panting	No. of pens with no cooling facility (%)	No. of pigs panting
Gender	Female	143 (45.8)	2	20 (69)	0
	Male	169 (54.2)	3	9 (31)	0
Age category	Young	64 (20.5)	1	4 (13.8)	0
	Mid-age	135 (43.3)	3	9 (31)	0
	Old	113 (36.2)	1	16 (55.2)	0
Marital status	Single	60 (19.2)	0	19 (65.5)	0
	Married	227 (72.8)	5	5 (17.2)	0
	Divorced	3 (0.1)	0	5 (17.2)	0
	Widowed	22 (7.1)	0	0 (0)	0
Total		312 (91.5%)	5	29 (8.5)	0

3.2.1.2 Ease of movement

The other parameter used to look for welfare status in this survey was ease of movement. This was examined by classifying the level of freedom pigs had in their premises into three categories: **free—** where all pigs could lie down at the same time, accessed food and water easily and had freedom of movement; **moderately free—**pigs had relative freedom, i.e. all pigs could not lie down at the same time but could access feed and water easily; and, **restricted—**all pigs could neither lie down nor had access to water and feed at the same time.

Overall farm level movement welfare

Like the preceding welfare parameter, ease of movement was also assessed at premises level and the pigs in 680 (81%) pens visited had freedom of movement. However, pigs in 96 (11.4%) pens had limited freedom of movement, while pigs in 64 (7.6%) pens were restricted and could not move when they needed to (Table 9).

Table 9: Farm pens observed and corresponding ease of movement assessments

District	Total no. of farm pens observed (%)	Ease of movement category and corresponding frequency		
		Free (%)	Moderate (%)	Restricted (%)
Masaka	222 (26.4)	144 (64.9)	61(27.5)	17 (7.6)
Mukono	247 (29.4)	218 (88.3)	8 (3.1)	21(8.5)
Wakiso	201 (23.9)	192 (95.5)	8 (4.0)	1 (0.5)
Mpigi	170 (20.3)	126 (74.1)	19 (11.2)	25 (14.7)
Total	840	680 (81.0)	96 (11.4)	64 (7.6)

Owners' profile and ease of movement at farm level

The ease of movement of pigs in their respective pens was also observed along the owner's demographic profile, i.e. gender, age and marital status. For this parameter, of 81% of all pens where pigs were reported to move freely, 51.6% were owned by females and the remaining 48.4% by males. Likewise, among pens with moderate movement restriction, 53.1 % belonged to female owners, while the remaining 46.9% belonged to males. For the restricted category, the females accounted for 75% and the remaining 25% pens were owned by male farmers. Table 10 provides the details for the rest of the owners profile category.

Table 10: Owner profile and ease of movement in farm pens

Owner profile	Category	Ease of movement category and corresponding frequency with proportion		
		Free (%)	Moderate (%)	Restricted (%)
Gender	Female	351 (51.6)	51 (53.1)	48 (75)
	Male	329 (48.4)	45 (46.9)	16 (25)
Age category	Young (18–35 yrs)	146 (21.5	24 (25)	11 (17.2)
	Mid-age (36–50 yrs)	290 (42.6	32 (33.3)	26 (40.6)
	Old (>50 yrs)	244 (35.9	40 (41.7)	27 (42.2)
Marital status	Single	138 (20.3	11 (11.5)	36 (56.3)
	Married	489 (71.9)	66 (68.8)	13 (20.3)
	Widowed	6 (0.9)	10 (10.4)	3 (4.7)
	Divorced	47 (6.9)	9 (9.4)	12 (18.8)

3.2.1.3 Physical comfort

The comfort of pigs is partly attributed to the state of the pens in which they live. The facilities may mean places to rest, feed, move and express their natural behaviour like defecation, mating and others. Thus, floor spacing, floor type and roofing were some of the physical facilities considered in this survey for two groups: piglets and sows.

Piglets

Of the four districts surveyed, piglet physical facility data were obtained only from Masaka and Mukono. Altogether, 76 pens were observed in both districts and 12 (15.8%) of them were noted to have crib space. Roofing and bedding were seen in 72 (94.7%) and 15 (19.7%) of the pens, respectively (Table 11).

Table 11: Piglets' physical facilities by district

District	No. of pens observed (%)	No. of pens with crib space (%)	No. of farm pens with roofing (%)	No. of farm pens with bedding (%)
Masaka	55 (72.4)	11 (20)	51 (92.7)	12 (21.8)
Mukono	21 (27.6)	1 (4.7)	21 (100)	3 (0.1)
Wakiso	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Mpigi	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	76 (100)	12 (15.8)	72 (94.7)	15 (19.7)

Sows

Unlike piglets, data on physical facility of sows were obtained from all four districts for 317 pens. The mean pen area in was 8.4 m^2 with 1.3 sows on average per pen. Out of 317 farm pens, 89.3% had roofing while 10.7% had bedding material (see Table 12).

Table 12: Pen area, roofing, bedding and number of sows per pen in four surveyed districts

District	Total no. of pens scored in farms visited	Average pen area in m^2	Average no. of sows per pen	No. of farm pens with roofing (%)	No. of pens with bedding (%)
Masaka	73	5.5	1.1	66 (90.4)	4 (5.5)
Mukono	97	10.6	1.4	91 (93.8)	9 (9.3)
Wakiso	85	9.7	1.3	81 (95.3)	17 (20)
Mpigi	62	6.4	1.3	45 (72.6)	4 (6.5)
Total	317	8.4	1.3	283 (89.3)	34 (10.7)

Pen floor type for piglets and sows by district

The floor types were summarized in line with district for both sows and piglets as shown in Table 13. Three types of floors were noted for both groups: concrete or murram, slatted floor and deep litter. The proportion of farm pens with a concrete or murram floor were 81.5 % and 89.3% for sows and piglets respectively. Slatted floor or raised platform was observed for 9.1% of sows and 5.3% of piglet pens. In the deep litter category, the calculated proportion was 9.4% for sows and 5.3% for piglets.

Table 13: Floor type by district for sows and piglets

District	Floor type and corresponding frequency of farm pens					
	Solid/concrete		Slatted floor		Deep litter	
	Sows (%)	Piglets (%)	Sows (%)	Piglets (%)	Sows (%)	Piglets (%)
Masaka	59 (22.7)	50 (74.6)	10 (34.5)	1 (25)	4 (13.3)	3 (75)
Mukono	78 (30)	17 (25.4)	17 (58.6)	3 (75)	3 (10)	1 (25)
Mpigi	51 (19.6)	na	1 (3.4)	na	9 (30)	na
Wakiso	72 (27.7)	na	1 (3.4)	na	14 (46.7)	na
Total	260 (81.5)	67 (89.3)	29 (9.1)	4 (5.3)	30 (9.4)	4 (5.3)

na: not available

3.2.1.4 Water availability

Water availability for different classes of pigs

Pigs need water for both drinking and cooling their bodies. Therefore, the constant availability and quality of the water supplied was one of the resource-based welfare indicators in this survey, with pigs classified into two categories: sows and growers. For sows, data were available from all four districts but for growers, only from Masaka and Mukono Districts. More than 89% of pig farms in all four districts had continuous water supply for sows, while farms with growers that had continuous water supply was above 93% in Wakiso and Mukono (see Table 14).

Table 14: Farms with continuous water access in surveyed districts

District	Pig category	Total no. of pens observed	No. of farm pens with continuous water access (%)
Masaka	Sows	80	75 (93.8)
	Growers	254	236 (92.9)
Mukono	Sows	102	95 (93.1)
	Growers	253	240 (94.9)
Wakiso	Sows	92	82 (89.1)
	Growers	na	na
Mpigi	Sows	67	64 (95.5)
	Growers	na	na

na: not available

Owner's demographic profile and quality of water supply in farms where there was continuous water supply

The other parameter considered in addition to availability of water was cleanness of the water supplied. Analysis was done on 316 sow and 476 grower pens where continuous water access was reported. It revealed that 63% of the water supplied to growers and 52.2% of the water to sows was unclean. In both cases the proportion of pens owned by females constituted higher proportion of unclean water supply compared to male-owned farms. The highest proportion of unclean water supply was observed in mid-age category (Table 15).

Table 15: Owner profile and clean water supply for pigs

Demography profile	Category	No. of farm pens with continuous water supply	Water cleanness status and corresponding frequency			
			Clean		Not clean (No.)	
		Sows (%)	Growers (%)	Sows (%)	Growers (%)	Sows (%)	Growers (%)
Gender	Female	157 (49.7)	325 (68.3)	59 (18.7)	124 (26.1)	98 (31.0)	201 (42.2)
	Male	159 (50.3)	151 (31.7)	92 (29.1)	52 (10.9)	67 (21.2)	99 (20.8)
Age category	Young	51 (16.1)	208 (43.7)	16 (5.1)	75 (15.8)	35 (11.0)	133 (27.9)
	Mid-age	133 (42.1)	183 (38.4)	72 (22.8)	65 (13.7)	61 (19.3)	120 (25.2)
	Old	132 (41.8)	85 (17.9)	63 (19.9)	37 (7.8)	69 (21.8)	48 (10.1)
Marital status	Single	59 (18.7)	0 (0.0)	33 (10.4)	0 (0.0)	26 (8.2)	0 (0.0)
	Married	226 (71.5)	401 (84.2)	105 (33.2)	145 (30.5)	121 (38.3)	256 (53.8)
	Divorced	3 (0.9)	0 (0.0)	2 (0.6)	0 (0.0)	1 (0.3)	0 (0.0)
	Widow	28 (8.9)	75 (15.8)	11 (3.5)	31 (6.5)	17 (5.4)	44 (9.2)

3.2.2 Animal-based welfare measures

The animal-based welfare indicators data were generated both from group level observation and individual animal-based observation. Health- and behavioural-related issues were assessed as shown below.

3.2.2.1 Behavioural assessment

Data on behavioural aspects of the pigs were collected from social, exploratory and human-animal interaction perspectives.

Social behaviour

In 95% of the pens, pigs showed positive behaviour. Pigs in 745 pens were scored for social behaviour and the corresponding data were collected (see Table 16).

Table 16: Owner profile and patterns of pig social behaviour

Demography	Category	Total no. of pens observed	No. of pens with positive behaviour n (%)	No. of pens with negative behaviour (%)
Gender	Female	398	375 (50.3)	23 (3.1)
	Male	347	333 (44.7)	14 (1.9)
Age	Young	154	146 (19.6)	8 (1.1)
	Mid-age	318	301 (40.4)	17 (2.3)
	Old	273	261 (35.0)	12 (1.6)
Marital status	Single	133	126 (16.9)	7 (0.9)
	Married	531	503 (67.5)	28 (3.9)
	Divorced	19	18 (2.4)	1 (0.1)
	Widowed	62	61 (8.2)	1 (0.1)

Exploratory behaviour

Exploratory behaviour was assessed by placing an object into the pen (a water bottle, bucket or shoe) and observing how many curious pigs approached the object within a minute or less. The number of animals per pen, number of animals exploring the pen and number of animals approaching the object were all noted. These data were collected from 786 farm pens, of which 54.3 % were owned by females and 45.7% by males. The average number of animals per

pen, average number of animals exploring the pen and number approaching the object were all noted alongside the demographic profile of the owners in Table 17.

Table 17: Owner profile and pig exploratory behaviour in the studied farms

Demography	Category	No. of pens in farms visited (%)	Average no. of pigs per pen	Average no. of pigs exploring the pen	Average no. of pigs approaching the object in<1 minute
Gender	Female	427 (54.3)	2.1	2.0	1.9
	Male	359 (45.7)	2.4	2.2	2.1
Age	Young	165 (21.0)	2.1	1.9	1.8
	Mid-age	327 (41.6)	2.1	2.0	1.9
	Old	294 (37.4)	2.4	2.3	2.2
Marital status	Single	141 (17.9)	2.1	1.9	1.9
	Married	560 (71.2)	2.2	2.1	2.0
	Divorced	19 (2.4)	1.9	1.9	1.6
	Widowed	66 (8.4))	2.6	2.6	2.5

Human-animal interaction

Data on the human–animal interactions aspect were documented based on the reaction pigs manifested (approaches in ≤ 1 min) when a farmer or family member or an attendant in charge of the pigs entered the pen. This aspect was also observed on 788 farm pens and summarized by owners' demographic profile in Table 18.

Table 18: Human–animal interaction observed in studied farms

Demography	Category	No. of pens in farms visited (%)	Average no. of pigs per pen	Average no. of pigs exploring the pen	Average no. of pigs approaching the person
Gender	Female	425 (53.9)	2.1	1.9	1.8
	Male	363 (46.1)	2.3	2.2	2.1
Age	Young	168 (21.3)	2.2	2.0	1.9
	Mid-age	324 (41.1)	2.1	1.9	1.8
	Old	296 (37.6)	2.3	2.2	2.1
Marital status	Single	147 (18.7)	1.9	1.8	1.8
	Married	554 (70.3)	2.2	2.1	2.0
	Divorced	18 (2.3)	1.9	1.9	1.7
	Widowed	69 (8.8)	2.6	2.5	2.4

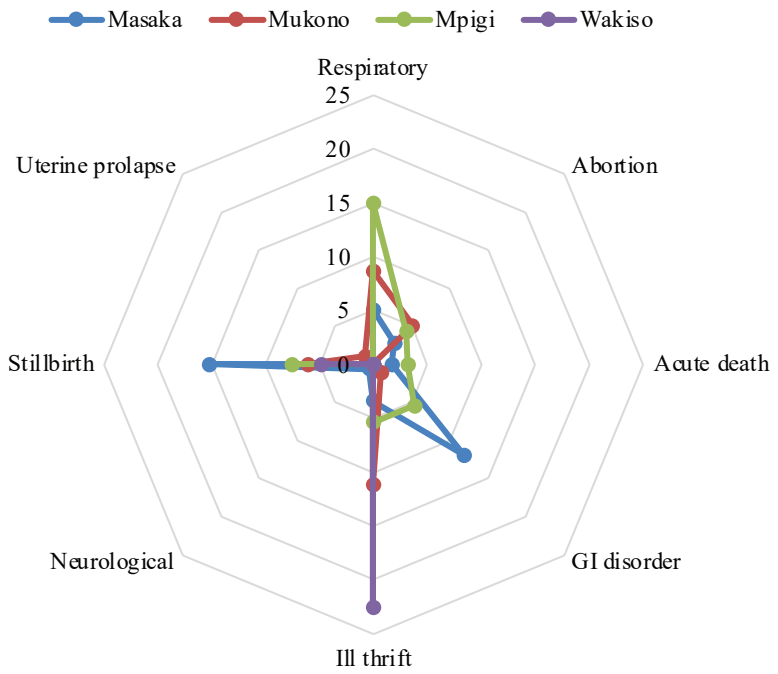
3.2.2.2 Ill health affecting welfare of sows

Several disease syndromes were observed in sows in all the study districts. The most common syndrome was ill thrift affecting 31.4% (n=11/35) of farms in Wakiso. Stillbirth and gastrointestinal disorders were more frequently observed in sows in farms located in Masaka. Respiratory distress was higher in Mpigi (see Table 19 and Figure 3). Uterine prolapse was reported only in Wakiso. Acute death appeared to be low and was only reported in Mpigi and Masaka. Coughing was the most common sign of respiratory distress. Diarrhoea associated with infectious diseases or dietary changes—especially feeding on green fodder such as sweet potato vines—was reported as one of the most common clinical signs of digestive disorders. Respiratory disorders were presented as coughing. Worm infections were frequently reported as associated with coughing in sows. ASF was the most mentioned specific pig disease in the study, associated with ill thrift, GI disorders and sudden death (see Table 19)

Table 19: Health and welfare challenges (sows)

District	No. of farms	No. of farms with sows	No. of sows in farms	Health/welfare disorders observed	No. of sows affected (%)	No. of farms affected (%)	Major clinical signs or symptoms observed
Masaka	76	47	177	Abortion	5 (2.8)	4 (8.5)	Abortion between 2–3 months
				Stillbirth	27 (15.2)	11 (23.4)	1–3 dead foetuses together with live piglets; in one farm 1–2 mummified foetuses in 14 sows among live ones were reported
				Uterine prolapse	0 (0.0)	0 (0.0)	
				Respiratory	9 (5.1)	7 (14.9)	Coughing (suspected worms), chronic cough; nasal discharge
				Neurological	1 (0.6)	1 (2.1)	Uncoordinated movement
				GI disorders	21 (11.9)	10 (21.3)	Diarrhoea, dietary diarrhoea, anorexia or low appetite
				Ill thrift	6 (3.4)	3 (6.4)	poor appetite, staggering and fever in different sows
				Acute death	3 (1.7)	1 (2.1)	Suspected ASF
Mukono	76	49	98	Abortion	5 (5.1)	4 (8.2)	Early to late pregnancy following febrile illness, earthquake
				Stillbirth	6 (6.1)	6 (12.2)	Sickness, fever, dystocia, half of foetuses born dead
				Uterine prolapse	1 (1.1)	1 (2.0)	Dystocia
				Respiratory	8 (8.7)	6 (12.2)	Coughing, sneezing
				Neurological	0 (0.0)	0 (0.0)	
				GI disorders	1 (1.0)	1 (2.0)	Diarrhoea
				Ill thrift	11 (11.2)	7 (14.3)	Poor feeding, anorexia, rough hair coat, scratching
				Acute death	0 (0.0)	0 (0.0)	
Mpigi	65	45	186	Abortion	8 (4.3)	6 (13.3)	Abortions at early gestation
				Stillbirth	14 (7.5)	12 (26.7)	Fever, dystocia, infections, abnormal foetus, few piglets affected per farrowing (1–2 foetuses)
				Respiratory	28 (15.0)	9 (20)	Cough suspected of worm infection, fever
				Neurological	0 (0.0)	0 (0.0)	
				GI disorders	10 (5.4)	8 (17.8)	Diarrhoea, excess green feed, suspected ASF
				Ill thrift	10 (5.4)	6 (13.3)	Fever, anorexia, postpartum loss of condition, suspected ASF
				Acute death	6 (3.2)	2 (4.4)	Suspected ASF
Wakiso	53	35	168	Abortion	0 (0.0)	0 (0.0)	
				Stillbirth	8 (4.8)	7 (20)	Fever, infections, mummification, thunderous noise
				Respiratory	0 (0.0)	0 (0.0)	
				Neurological	0 (0.0)	0 (0.0)	
				GI disorders	0 (0.0)	0 (0.0)	
				Ill thrift	38 (22.6)	11 (31.4)	Anorexia, dullness, rough hair, weakness
				Acute death	0 (0.0)	0 (0.0)	

Figure 3. Reproductive health conditions and other disorders observed in sows



3.2.2.3 Health challenges in other pig age groups

At an individual animal and farm level, farms in Masaka and Mpigi had a higher proportion of animals affected by GI disorders. On respiratory disorders, pigs in Mukono had a higher animal level prevalence. Mpigi had by far the highest proportion of farms with animals that showed signs of respiratory distress. Wakiso had the highest number of farms affected by ill thrift while the numbers of pigs affected in Mukono and Wakiso Districts were equal. At both individual animal and farm levels, Masaka had the highest cases of acute death reports. When they occurred, cases of acute death were mostly attributed to ASF. Commonly observed symptoms in this class of pigs included diarrhoea, coughing, anorexia, dullness, paralysis and circling in pigs affected by GI disorders, respiratory distress, ill thrift and neurological disorders (see Table 20 and Figures 4 and 5).

Table 20: Health and welfare challenges of other pigs

District	No. of farms	No. of farms with other pigs	No. of other pigs in farms	Health and welfare disorders observed	No. of sows affected (%)	No. of farms affected (%)	Major clinical signs or symptoms observed and some of the commonly suspected causes
Masaka	76	71	1347	Respiratory	79 (5.9)	8 (11.3)	Cough attributed to suspected worms, infectious diseases
				Neurological	0 (0.0)	0 (0.0)	
				GI disorders	427 (31.7)	36 (50.7)	Diarrhoea mostly in piglets and weaners, change of diet to green forage especially sweet potato vines, worms
				Ill thrift	7 (0.5)	1 (1.4)	Suspected ASF
				Acute death	78 (5.8)	11 (15.5)	Suspected ASF in most, GI disturbance in 1 and unknown in 1

District	No. of farms	No. of farms with other pigs	No. of other pigs in farms	Health and welfare disorders observed	No. of sows affected (%)	No. of farms affected (%)	Major clinical signs or symptoms observed and some of the commonly suspected causes
Mukono	76	75	720	Respiratory	10 (13.9)	6 (8)	Coughing
				Neurological	2 (0.3)	2 (2.7)	Circling, paralysis
				GI disorders	35 (4.9)	18 (10.7)	Diarrhoea
				Ill thrift	22 (3.1)	5 (6.7)	Anorexia, refusal to eat
				Acute death	2 (0.3)	1 (1.3)	ASF
Mpigi	65	60	1062	Respiratory	86 (8.1)	28 (46.7)	Coughing, suspected worms
				Neurological	0 (0.0)	0 (0.0)	
				GI disorders	251 (23.6)	31 (51.7)	Diarrhoea in weaners and piglets, worms, feed change especially to green fodder
				Ill thrift	13 (12.2)	2 (3.3)	Shivering, anorexia, unknown fever
				Acute death	0 (0.0)	0 (0.0)	
Wakiso	53	52	898	Respiratory	0 (0.0)	0 (0.0)	
				Neurological	0 (0.0)	0 (0.0)	
				GI disorders	50 (5.6)	10 (19.2)	Diarrhoea, rough hair coat, anorexia, swollen belly
				Ill thrift	110 (12.2)	13 (25)	Anorexia, shivering, dullness, poor feeding
				Acute death	0 (0.0)	0 (0.0)	

Figure 4. Health challenge in pigs other than sows at individual level: percent of farms that reported a specific health disorder.

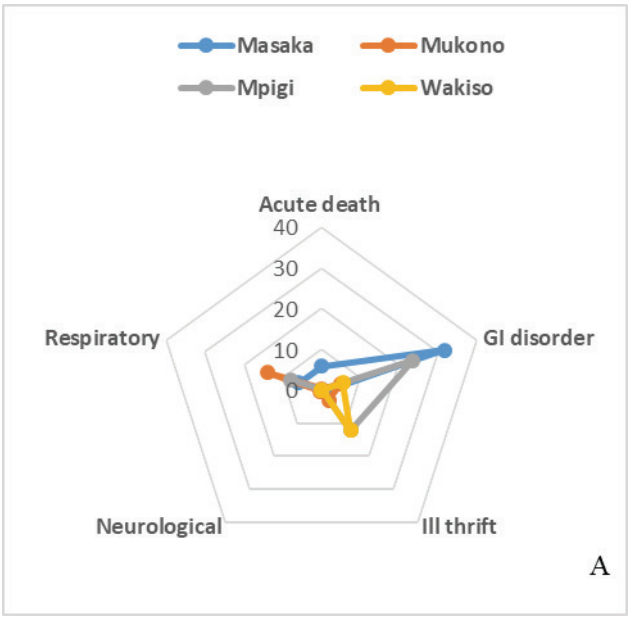
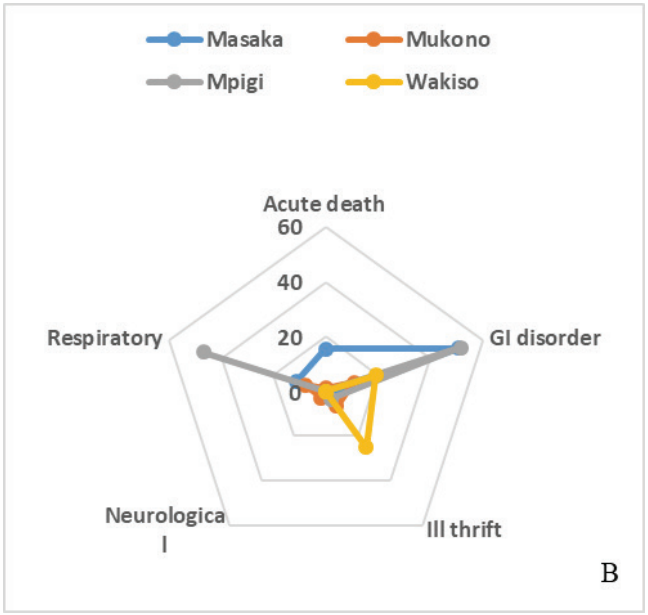


Figure 5. Health challenge in pigs other than sows at farm level: percent of farms that reported a specific health disorder.



3.2.2.4 Physical injuries or discomfort

The most common indicator of physical discomfort in all class of pigs except for piglets was the presence of faeces on their bodies. Most of the pigs were affected by a moderate degree of faecal soiling, which is an indicator of poor farm hygiene. The other important physical condition observed was diarrhoea in all groups of sampled pigs. The presence of faecal contamination of pigs might also have contributed to the level of diarrhoea observed in pigs as most diseases causing diarrhoea are transmitted through the faecal-oral route. Shoulder sores, leg swellings and tail injuries were the other important injuries observed in pigs (see Table 21).

Table 21: Physical injuries in all classes of pigs except piglets

Classes of Pigs	Type of lesion/ marks on the body	No. of pigs with the case (%)	Severity level (proportion and frequency)	
			Moderate	Sever
Sows (n=255)	Leg swelling	8 (3.1)	7	1
	Shoulder sore	10 (3.9)	9	1
	Wound on the body	6 (2.4)	6	0
	Tail injury	2 (0.8)	2	0
	Faeces on the body	82 (32.2)	62	20
	Diarrhoea/Scoring	24 (9.4)	18	6
Weaners (n=151)	Leg swelling	1 (0.7)	1	0
	Shoulder sore	2 (1.3)	2	0
	Wound on the body	0 (0.0)	0	0
	Tail injury	0 (0.0)	0	0
	Faeces on the body	35 (23.2)	33	2
	Diarrhoea/Scoring	17 (11.3)	15	2
Growers (n=430)	Leg swelling	10 (2.3)	7	3
	Shoulder sore	19 (4.4)	18	1
	Wound on the body	12 (2.8)	11	1
	Tail injury	3 (0.7)	3	-
	Faeces on the body	142 (33.0)	117	25
	Diarrhoea/Scoring	40 (9.3)	31	9

Classes of Pigs	Type of lesion/ marks on the body	No. of pigs with the case (%)	Severity level (proportion and frequency)	
			Moderate	Sever
Boars (n=66)	Leg swelling	1 (1.5)	1	0
	Shoulder sore	0 (0.0)	0	0
	Wound on the body	1 (1.5)	1	0
	Tail injury	0 (0.0)	0	0
	Faeces on the body	14 (31.8)	13	1
	Diarrhoea/Scoring	4 (6.1)	3	1
Fatteners (n=6)	Leg swelling	0 (0.0)	0	0
	Shoulder sore	0 (0.0)	0	0
	Wound on the body	0 (0.0)	0	0
	Tail injury	0 (0.0)	0	0
	Faeces on the body	1 (16.7)	1	0
	Diarrhoea/Scoring	0 (0.0)	0	0

3.2.2.5 Nutritional status

The body condition of 90% of the pigs in the different classes of pigs was scored from thin to very thin (emaciated). Only 92 (9.9%) pigs had a body condition score of 3 (moderate) and no single pig scored 4 or 5. This suggests most pigs were under suboptimal feeding in both quantity and quality of feeds in all the surveyed districts.

Table 22: Class of pigs and body condition profile (n=932)

Class of pigs	Production status	Total no. of pigs (%)	Body condition (frequency and proportion affected)		
			Score 1 or 2: Thin (%)	Score 3: Moderate (%)	Score 4 or 5: Fat (%)
Sows (269)	Dry	93 (10.0)	86 (92.5)	7	0
	Pregnant	112 (12.0)	83 (74.1)	29	0
	Lactating	62 (6.65)	57 (91.9)	5	0
	na	2 (0.8)	2 (100)	0	0
Weaners	na	143 (15.3)	142 (99.3)	1	0
Growers	na	440 (47.2)	401 (91.1)	39	0
Boars	na	74 (7.9)	63 (91.1)	11	0
Fatteners	na	6 (0.6)	6 (100)	0	0

na: Not available

Body condition scores (BCSs) of pigs did not appear to be influenced by gender, age or marital status of farmers (see Table 23).

Table 23: Owner profile and pig body condition score (n=932)

Profile	Category	Total no. of animals	BCS and corresponding frequency		
			Thin	Moderate	Fat
Gender	Female	495	445 (89.9)	50 (10.1)	0 (0.0)
	Male	437	395 (90.4)	42 (9.6)	0 (0.0)
Age	Young (17–35)	195	170 (87.2)	25 (12.8)	0 (0.0)
	Mid-age (36–50)	388	350 (90.2)	38 (9.8)	0 (0.0)
	Old 51 (>50)	349	320 (91.7)	29 (8.3)	0 (0.0)
Marital status	Single	177	154 (87.0)	23 (13)	0 (0.0)
	Married	665	605 (91.0)	60 (9.0)	0 (0.0)
	Divorced	20	17 (85)	3 (15)	0 (0.0)
	Widowed	70	64 (91.4)	6 (8.6)	0 (0.0)

Masaka had a slightly lower proportion of thin pigs compared to the other three districts. The highest proportion of pigs with moderate BCS was observed in Masaka (see Table 24). In general, the largest proportion of pigs in all districts were in the thin category (Table 24). Perhaps this may indicate the poor nutritional welfare across all the districts.

Table 24: District level pig body condition scores

District	Total no. of pigs	Body condition score and corresponding frequency		
		Thin (%)	Moderate (%)	Fat (%)
Masaka	233	197 (84.5)	36 (15.5)	0 (0.0)
Mukono	279	260 (93.2)	19 (6.8)	0 (0.0)
Mpigi	188	172 (91.5)	16 (8.5)	0 (0.0)
Wakiso	232	211 (90.9)	21 (9.1)	0 (0.0)
Total	932	840 (90.1)	92(9.9)	0 (0.0)

3.2.2.6 Lameness

The prevalence of lameness appears to be low in all the study areas. Only 42 (4.5%) pigs closely examined demonstrated clear signs of limping. District-wise, the lowest number of lame pigs was reported in Mukono, while the highest was in Mpigi. A majority (66.7%) of lame pigs were categorized under moderate degree of severity (Table 25).

Table 25: Distribution of lameness in pigs in four Uganda districts

District	Total no. pigs	No. of pigs limping, n (%)	Severity of lameness and corresponding frequency		
			mild	moderate	severe
Masaka	227	16 (7.0)	4	10	2
Mukono	273	1 (0.4)	0	0	1
Mpigi	189	21 (11.1)	3	17	1
Wakiso	238	4 (1.7)	0	1	3
Total	927	42 (4.5)	7 (16.7)	28 (66.7)	7 (16.7)

No major difference in frequency of lameness was observed in relation to the owners' profile, i.e. gender and age. However, pigs kept by divorced and widowed individuals had a higher number of lameness cases (see Table 26).

Table 26: Owner profile and lameness frequency in pigs

Profile	Category	Total no. of pigs	No. of pigs limping (%)	Severity of lameness and corresponding frequency		
				Mild	Moderate	Severe
Gender	Female	500	24 (4.8)	5	16	3
	Male	427	18 (4.2)	2	12	4
Age	Young	190	11 (5.8)	1	7	3
	Mid-age	389	19 (4.9)	3	13	3
	Old	348	12 (3.4)	3	8	1
Marital status	Single	177	11 (6.2)	2	7	2
	Married	661	21 (3.2)	4	13	4
	Divorced	17	4 (23.5)	0	3	1
	Widowed	72	6 (8.3)	1	5	0

#: Number

The degree of limping due to injury by pig category appeared to be the same as shown in Table 27.

Table 27: Lameness severity level in different classes of pigs

Class of pigs	Total no.of pigs	Severity level (proportion and frequency), n (%)			
		No injury	Mild	Moderate	Severe
Sows	262	242 (92.4)	4 (1.5)	13 (4.9)	3 (1.1)
Weaners	141	139 (98.6)	0 (0.0)	2 (1.4)	0 (0.0)
Growers	440	423 (96.1)	3 (0.7)	10 (2.3)	4 (0.9)
Boars	77	74 (96.1)	0 (0.0)	3 (3.9)	0 (0.0)
Fatteners	7	7 (100)	0 (0.0)	0 (0.0)	0 (0.0)
Total	927	885 (95.4)	7 (0.8)	28 (3.0)	7 (0.8)

4 Major findings

Demographic profile of farm owners

- Pigs were kept by both female and male farmers. Majority of the farms (56%) were owned by female farmers compared to 44% by male farmers.
- Married individuals owned 70% of the farms, followed by single (19%), widowed (9%) and divorced (2%) individuals.
- In terms of family ownership, most of the farms (45%) were owned by mothers, followed by fathers (30%). Only 1% of the farms were owned by either sons or daughters. The remainder of the farms (24%) belonged to the whole family.
- Nearly half of the pigs kept by farmers in the four districts were crossbred, followed by mixed breeds (24%) and local (20%) breeds. Only small numbers of pure exotic breed pigs were kept in the farms visited.
- Growers followed by weaners were the predominant age class of pigs kept by farmers. Piglets, sows and boars make up the remainder of the numbers in that decreasing order.
- Nearly three-quarters of the farms did not have boars during the visit. Of 176 farms that kept sows for reproductive purposes, 102 of them did not have boars. This implies that boars may be shared among pig farms, implying the risk of transmission of reproductive and other infectious disease between farms.
- Most pig farms kept different classes of pigs in their pens. The mean number of other classes of pigs kept per farm was five.

Housing

- Shade was the most used cooling facility.
- Cooling facility was not available in 8.5% of the premises/pens visited.
- The observed mean pen area was 8.4 m^2 and on average, 1.3 sows were kept per pen.
- Out of 317 farm pens visited, 89.3% had roofing while only 10.7% had bedding materials.

Feeding/nutritional status

- Over 89% of pig farms in all four districts had continuous water supply for sows, while the proportion for growers was above 93% in Wakiso and Mukono Districts.
- Among facilities with continuous water supply, 63% of the water supplied to growers and 52.2 % of the water to sows was not clean.

- Lack of adequate nutrition appeared to be the most important welfare problem observed in the study area. More than 90% of pigs in the study area were classified as thin or emaciated.

Health

Sows

- Many ill health conditions were reported from all the study districts. Ill thrift in farms in Wakiso, stillbirth and GI disorders in Masaka and respiratory distress in Mpigi represent the most common disease symptoms observed in sows.
- Among the clinical signs observed, cough was frequently associated with worm infections while diarrhoea was associated with infectious diseases or feed changes.
- ASF was associated with most cases of ill thrift, GI disorders and acute or sudden deaths.

Other pigs

- Pigs in farms in Masaka and Mpigi more frequently suffered from GI disorders compared to those in other districts. Pigs in Mukono had higher individual animal level prevalence of respiratory disorders.
- Acute death in this group of pigs was lower: when it occurred, it was associated with ASF.

Physical injury in pigs other than piglets

- Faecal soiling was the most common mark observed in pigs. Diarrhoea/scouring is the other common sign of disease observed.
- Shoulder sores (0–4.4%), wounds on the body (0–2.8%), leg swellings (0.7–3.1%) and tail injury (0–0.8%) affected a relatively smaller number of pigs.

Lameness

- Limping pigs represented less than 5% of all studied pigs in the area. Mild and severe lameness was observed in 0.8% of sampled pigs each, while 3% represented moderately severe cases of lameness.
- Pigs in Mukono District had the lowest percentage of lameness (0.4%) while Mpigi District had the highest (11.1%).
- Although conclusions from such small number of pigs could be misleading, farms owned by divorced (n=4/17) and widowed (n=6/72) owners had higher proportion of lame pigs.

Movement freedom and behavioural patterns

- Pigs in 23.5% of the pens visited had full or partial restriction of movement.
- Most of the pigs observed showed positive behaviour and reasonably explored their environment. They were also found interactive with owners or attendants.

Castration

- Castration was not practised in most farms in Masaka, Mpigi and Wakiso Districts. More than half (56.6%) of farms in Mukono District practised castration.
- Of the 122 farms that reported practising boar castration, 80 (65.6%) did not have any boar during the farm visit.

5 Implications

- The findings provided clear evidence of welfare compromises regarding clean water supply, nutritional deficiency and health-related aspects. Based on the core principles of animal welfare, this suggests that pig production systems in the surveyed districts of Uganda are operating below optimal welfare standards.
- Thus, pigs kept in this system are likely producing far below their natural potential and the intended project vision may not be realized if the situation continues.
- The pork obtained from such system may not fulfil required standards of quality, quantity and food safety.
- The businesses operating under such scenarios may not be profitable and are unable to create sustainable job opportunities in the future, with adverse impacts on livelihoods.
- If no remedial interventions are designed, the food self-sufficiency goal could be compromised at both family and community levels.

6 Recommendations

Considering the above findings and the anticipated implications, it is imperative to undertake strategic interventions in the following areas to improve pig production systems in Uganda:

- Improve feed and water supply in both quantity and quality. The interventions must consider the local context and required standards in order to optimize the natural demand for the animals (age, sex, physiological status) and the outputs expected.
- The health management system needs to be strategic and should consider the herd health approach in order to address animal wellbeing and reproduction to maintain productivity.
- Diseases affecting the welfare and productivity of pigs need to be prioritized. The control interventions should be designed strategically in line with a one health approach to simultaneously protect pigs, the public and the environment.
- The management system in which the pigs are kept need to be improved so that animals are treated humanely.
- Farmers should be trained on animal welfare principles so that they understand the link between health, productivity and safety of products obtained from animals kept under optimal welfare conditions.

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