

Pork value chain businesses: A scoping study of pig aggregators, veterinary drug stockists and feed processors in central region, Uganda

Emily Ouma¹, Ben Lukuyu¹, Michel Dione¹, Christopher Sebatta², Stella Namazzi³ and Pius Lutakome¹

¹International Livestock Research Institute, c/o Bioversity International, P.O. Box 24384 Kampala, Uganda

²Department of Agribusiness and Natural Resource Economics, Makerere University, P.O. Box 7062 Kampala, Uganda

³National Crops Resources Research Institute, P.O.Box 7084, Kampala, Uganda



August 2021

CGIAR is a global partnership that unites organizations engaged in research for a food-secure future. The CGIAR Research Program on Livestock provides research-based solutions to help smallholder farmers, pastoralists and agro-pastoralists transition to sustainable, resilient livelihoods and to productive enterprises that will help feed future generations. It aims to increase the productivity and profitability of livestock agri-food systems in sustainable ways, making meat, milk and eggs more available and affordable across the developing world. The Program brings together five core partners: the International Livestock Research Institute (ILRI) with a mandate on livestock; the International Center for Tropical Agriculture (CIAT), which works on forages; the International Center for Agricultural Research in the Dry Areas (ICARDA), which works on small ruminants and dryland systems; the Swedish University of Agricultural Sciences (SLU) with expertise particularly in animal health and genetics and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) which connects research into development and innovation and scaling processes.


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

© 2021



This publication is copyrighted by the International Livestock Research Institute (ILRI). It is licensed for use under the Creative Commons Attribution 4.0 International Licence. To view this licence, visit <https://creativecommons.org/licenses/by/4.0>.

Unless otherwise noted, you are free to share (copy and redistribute the material in any medium or format), adapt (remix, transform, and build upon the material) for any purpose, even commercially, under the following conditions:

 **ATTRIBUTION.** The work must be attributed, but not in any way that suggests endorsement by ILRI or the author(s).

NOTICE:

For any reuse or distribution, the licence terms of this work must be made clear to others.
Any of the above conditions can be waived if permission is obtained from the copyright holder.
Nothing in this licence impairs or restricts the author's moral rights.
Fair dealing and other rights are in no way affected by the above.
The parts used must not misrepresent the meaning of the publication.
ILRI would appreciate being sent a copy of any materials in which text, photos etc. have been used.

Editing, design and layout—ILRI Editorial and Publishing Services, Addis Ababa, Ethiopia.

Photo credit: ILRI/K. Dhanji

Citation: Ouma, E, Lukuyu, B, Dione, M, Sebatta, C, Namazzi, S. and Lutakome, P. 2021. *Pork value chain businesses: A scoping study of pig aggregators, veterinary drug stockists and feed processors in central region, Uganda*. Nairobi, Kenya: ILRI.

Patron: Professor Peter C Doherty AC, FAA, FRS

Animal scientist, Nobel Prize Laureate for Physiology or Medicine—1996

Box 30709, Nairobi 00100 Kenya
Phone +254 20 422 3000
Fax +254 20 422 3001
Email ilri-kenya@cgiar.org

ilri.org
better lives through livestock

ILRI is a CGIAR research centre

Box 5689, Addis Ababa, Ethiopia
Phone +251 11 617 2000
Fax +251 11 667 6923
Email ilri-ethiopia@cgiar.org

ILRI has offices in East Africa • South Asia • Southeast and East Asia • Southern Africa • West Africa

Contents

Tables	vi
Figures	viii
Acronyms	ix
Working definitions	x
Executive summary	xi
Pig and pork aggregators	xi
Livestock feed processors	xii
Veterinary drug retailers/stockists	xii
Veterinary practitioners	xiii
Conclusion	xiv
1. Background	1
1.1 Contextual setting	1
1.2 Study sites and data collection	1
2. Pig and pork aggregator businesses	2
2.1 Pig and pork aggregators business models	2
2.2 Pig/pork aggregator demographic characteristics	4
2.2.1 Involvement of men and women in the business	4
2.2.2 Ownership of aggregators businesses by sex	4
2.2.3 Aggregator business experience	4
2.3 Involvement of live pig aggregators in activities in the value chain	5
2.4 Involvement of pork aggregators in activities in the value chain	5
2.5 Involvement of pork aggregators in pork products and by-products	7
2.6 Nature of aggregator businesses	7
2.7 Aggregator collective action	8
2.8 Suppliers for the pig/pork aggregator businesses	9
2.8.1 Mapping of pig supply routes and suppliers	9
2.8.2 Average number of live pigs purchased from suppliers	11
2.8.3 Repeat purchases by aggregators from farmers and village-based middlemen	12
2.8.4 Quantity of pork supplied to pork aggregators	12
2.8.5 Aggregator access to market-related information	13
2.8.6 Level of collaboration of aggregators with other traders	14
3. Livestock feed processors	15
3.1 Demographic characteristics of livestock feed processors	15
3.1.1 Ownership of livestock feed processing business by sex	15

3.1.2	Livestock feed processing respondents' characteristics	15
3.1.3	Nature of the feed businesses	16
3.2	Feed business characteristics	17
3.2.1	Basic characteristics	17
3.2.2	Labour input for the feed businesses	17
3.2.3	Contribution of the feeds business relative to other businesses	18
3.2.4	Livestock feeds traded	19
3.2.5	Sources of cereal-based feed ingredients	21
3.3	Livestock feeds value chain	22
3.4	Livestock feed processors' business models	22
3.5	Factors influencing the choice of suppliers	23
3.6	Factors influencing the choice of raw materials	24
3.7	Feed sales	24
3.7.1	Feed products and importance of products sold	24
3.7.2	Standardization and formulation among feeds businesses	25
3.7.3	Feed branding	26
3.8	Key informant results	27
3.8.1	Types of feeds traded	27
3.8.2	Perceptions regarding quality of feed ingredients, compounded feeds and supplements	28
3.8.3	Microsizing of inputs	29
3.8.4	Marketing strategies among feed processors	29
3.8.5	Technical support services for feed processors	29
3.8.6	Factors influencing the price of products and services	29
3.8.7	Losses emanating from infrastructural related issues	30
3.8.8	Access to credit	30
3.8.9	Innovation	30
4.	Veterinary drug retailers	32
4.1	Veterinary drug retailers' business models	32
4.2	Demographic characteristics of veterinary drug retailers/stockists	32
4.3	Livestock types served and health issues	34
4.3.1	Livestock types	34
4.3.2	Main livestock diseases that drug stockists provided drugs for in the last six months	34
4.4	Livestock drugs commonly stocked by veterinary drug retailers	36
4.4.1	Anthelmintics	36
4.4.2	Arachnidicides	36
4.4.3	Antibiotics	37
4.4.4	Vitamins/Iron supplements	37

4.5	Inspection and quality assurance	38
4.6	Access to credit among drug stockists	38
4.7	Policies and support services to drug stockists	38
5.	Veterinary practitioners	40
5.1	Demographic characteristics of the veterinary practitioners	40
5.2	Pig diseases commonly treated by veterinary practitioners	41
5.3	Veterinary drugs commonly used by practitioners in disease treatment	42
5.4	Main constraints facing veterinary practitioners	43
5.5	Credit	44
	5.5.1 Credit service among veterinary practitioners	44
	5.5.2 Access to credit by veterinary practitioners	44
5.6	Membership to professional associations and technical services accessed	46
6.	Conclusions	48
6.1	Pig and pork aggregators	48
6.2	Livestock feed processors	48
6.3	Veterinary drug retailers/stockists	48
6.4	Veterinary practitioners	49
7.	Recommendations	50
	References	51
	Annexes	52
	Annex I: Drugs and drug categories stocked	52

Tables

Table 1. Sampled respondents by sex and study site	4
Table 2. Ownership of aggregator business by sex	4
Table 3. Aggregator involvement in activities in the pig value chain	5
Table 4. Stage of aggregator involvement in the pork value chain	6
Table 5. Stage of your aggregator involvement in the pork products and by-products value chain	7
Table 6. Type of aggregator businesses	7
Table 7. Number of aggregators who belong to an association	8
Table 8. Name of association to which aggregators belong	8
Table 9. Main benefits from associating as pork/pig aggregators	8
Table 10. Sources of supplies to pork/pig aggregators (%)	9
Table 11. Percentage of live pig aggregators by the district of source	10
Table 12. Number of pig farmers that pig aggregators transacted with in the last 12 months	11
Table 13. Average number of live pigs purchased from suppliers in the last month	12
Table 14. Average number of repeated live pig purchases per aggregator from the same suppliers in the past one month	12
Table 15. Aspects of the information received by aggregators	14
Table 16. Level of collaboration by aggregators with other traders	14
Table 17. Ownership of Livestock feed processor's business by sex	15
Table 18. Position of the respondent in the company	15
Table 19. Average age and experience in the business	16
Table 20. Nature of feed business across the study sites	16
Table 21. Nature of feed businesses by gender	16
Table 22. Business characteristics of studied feed processors	17
Table 23. Number and categories of employees	18
Table 24. The average price of raw materials purchased	21
Table 25. Factors influencing the choice of suppliers	23
Table 26. Factors influencing the choice of raw materials	24
Table 27. Most important products in terms of sale	24
Table 28. Contribution of brand to business sales	26
Table 29. Composition of feed supplements sold	27
Table 30. Main animal feed concentrates used by feed processors	28
Table 31. Constraints faced by feed processors and suggested solutions	31
Table 32. Veterinary drug shop attendants by sex	32

Table 33. Veterinary drug shop attendants' education levels	33
Table 34. Veterinary drug shop attendants' specific education discipline	33
Table 35. Veterinary drug shop attendants' that received further training	33
Table 36. Veterinary drug shop attendant as the owner of the business	34
Table 37. Number of years spent by veterinary drug shop attendant's in the business	34
Table 38. Type of livestock mostly dealt with by veterinary drug shop attendant by district	34
Table 39. Main cattle diseases drug stockists have dealt with in the last six months	35
Table 40. Main shoats diseases drug stockists have dealt with in the last six months	35
Table 41. Main poultry disease problems drug stockists have dealt with in the last six months	36
Table 42. Most frequently stocked anthelmintic drugs sold to pig farmers	36
Table 43. Most frequently stocked arachnidicides sold to pig farmers	37
Table 44. Most frequently stocked antibiotics sold to pig farmers	37
Table 45. Frequently stocked vitamins/iron supplements sold to pig farmers	37
Table 46. Frequency of inspection of the drug stockists by the NDA	38
Table 47. Access to credit by drug stockists	38
Table 48. Sex of veterinary practitioners, by location	40
Table 49. Number of years in veterinary practice	41
Table 50. Categories of veterinary practitioners	41
Table 51. Prevalence of major pig diseases by district	41
Table 52. Most frequent service provided to pig farmers by veterinary practitioners	42
Table 53. Major constraints facing veterinary practitioners	43
Table 54. Veterinary practitioners who give credit to farmers	44
Table 55. Types of credit that veterinary practitioners give to farmers	44
Table 56. Number of Veterinary practitioners who receive credit from suppliers	45
Table 57. Number of veterinary practitioners who receive incentives from suppliers	45
Table 58. Veterinary practitioners accessing technical services	46
Table 59. Main provider of technical services to veterinary practitioners	46
Table 60. Special support needed by veterinary practitioners for effective operations	47
Table 61. Main government policies and how they affect veterinary practitioners' work	47

Figures

Figure 1. Typical live pig aggregator business model with a regulated abattoir	2
Figure 2. Typical live pig aggregator business model with unregulated backyard slaughterers	3
Figure 3. Typical pork aggregator /butchery business model	3
Figure 4. Frequency of aggregators by business experience	5
Photograph 1. A pork butchery in Buwaate cell, Kira municipality, Uganda	6
Figure 5. Map of main pig supply routes and suppliers to Kampala and Wakiso	9
Figure 6. Map of main pig supply routes and suppliers to Masaka and Mukono	10
Figure 7. Average monthly quantity (kg) of pork purchased by source per aggregator	13
Photograph 2. Pork weighing at an abattoir in Kira Municipality	13
Figure 8. Proportion of aggregators who received market information in the last 12 months	14
Figure 9. Type of livestock feeds traded	19
Figure 10. Type of energy rich feed ingredients purchased by feeds processor	19
Figure 11. Type of protein-rich feed ingredients purchased by feeds processor	20
Figure 12. Source of protein-rich feed ingredients	20
Figure 13. Source of energy-rich feed ingredients	21
Figure 14. Livestock feeds value chain	22
Figure 15. Livestock feed ingredients and mixed feed distribution channels	23
Figure 16. The proportion of feed business owning a feed formula	25
Figure 17. Source of formula for producing feeds	25
Figure 18. Feed businesses with a brand name	26
Figure 19. Feeds sales channels	26
Figure 20. A typical veterinary drug stockist business model	32
Figure 21. Main pig diseases drug stockists have dealt with (pooled sample) in the last six months	35
Figure 22. Age distribution of the sampled veterinary practitioners	40
Figure 23. Drugs most frequently provided to pig farmers	42
Figure 24. Proportion (in 100%) of most frequent drug provided to pig farmers	43
Figure 25. Percentage of vet practitioners who get incentives from their suppliers	45

Acronyms

ASF	African swine fever
BVM	Bachelor of Veterinary Medicine
CAHWs	Community Animal health Workers
DVOs	District veterinary officers
ILRI	International Livestock Research Institute
KCCA	Kampala Capital City Authority
UBOS	Uganda Bureau of Statistics
UGX	Ugandan shilling
UNBS	Uganda National Bureau of Standards
NARO	National Agricultural Research Organisation
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
NDA	National Drug Authority
KCCA	Kampala Capital City Authority

Working definitions

Pig aggregator:	A trader who purchases and bulks live pigs from farmers, middlemen and fellow traders and sells them off to other traders.
Pork aggregator:	A trader who purchases pork from the slaughter grounds (abattoirs, butcheries, etc.) and sells it in raw, roasted or fried form.
Drug retailers/stockists:	Small and medium drug shops that stock and dispense veterinary drugs to the veterinary practitioners or directly to farmers.
Veterinary practitioner:	Any person who treats animals or administers drugs to animals on behalf of the farmer.
Feed stockist/Feed processor	A small and medium business that stocks and sells feed ingredients and/or formulated feeds for livestock.

Executive summary

The International Livestock Research Institute (ILRI) in Uganda instituted a scoping study of pig and pork aggregators, livestock feed processors, veterinary drug stockists, and practitioners (veterinary doctors and paraveterinarians) under the project 'Improving pig productivity and incomes through an environmentally sustainable and gender-inclusive integrated intervention package in Uganda' or MorePork II. Funded by the Livestock CGIAR Research Program, the project targets to improve the incomes of pig value chain actors through marketing arrangements and sustainable integrated technology packages. The aim of this scoping study was to assess the business models, trading practices and networks of the pig value chain businesses. The information generated would inform the project's interventions and activities that are aimed at strengthening market linkages between the pig and pork aggregators, and pig farmers with backward linkages to input and service providers such as the veterinary drugs and feeds businesses. The scoping study was implemented in Masaka, Mukono, Wakiso and Kampala districts in 2019. The key results are summarized below.

Pig and pork aggregators

The sample comprised of 65 aggregators of whom 3% were live pigs only aggregators and 22% were pork only aggregators while about 75% of all aggregators were involved in both pig and pork aggregation as two complementary activities. In terms of gender, 89% of the interviewed aggregators were males and over 95% of the aggregator businesses were run as sole proprietorships. Live pigs were mainly sourced directly from farmers or through middlemen as indicated by 76% of the aggregators and middlemen (14%). For pork aggregators mainly pork butcheries, about 43% of those interviewed indicated sourcing pork from traders who slaughter pigs and supply while 53% slaughter in the backyard or source directly from the abattoir. Of the sampled aggregators, only 22% belonged to a trader association mainly from Masaka, Kampala and Mukono, indicating low levels of collective action among the aggregators.

Aggregators indicated that they mainly source their pigs from eastern and central Uganda. A notable observation was the criss-crossing of the aggregator routes for pig supply with some aggregators from Masaka for instance purchasing pigs from central and eastern region districts and transporting them through Kampala yet traders from Kampala also purchase pigs from greater Masaka and transport them to Kampala. Sourcing pigs from far areas was found to be driven by seasonal scarcities and quarantine imposition during disease outbreaks.

Over 75% of the aggregators indicated that they had purchased pigs from more than 50 farmers in the last year. This indicated the scattered nature of farmers and the low supply capacity, forcing aggregators to move around collecting one or two pigs from each farmer. The aggregators have the capacity to buy large numbers of pigs because an average aggregator had purchased about 120 pigs in just the last one month prior to the scoping study and had at least made about 10 repeated purchases from the same farmer.

Livestock feed processors

The sample size for the feed processors was 40 from the four districts. Results indicated that about 60% of the feed businesses were owned by men. Many of the business owners were middle-aged averaging 38 years. Most of the businesses had existed for about seven years and could be classified as small to medium enterprises, employing between one and six people. Though half of the sampled livestock feed businesses were mainly engaged in feed milling and mixing, an equal proportion (10% each) of feed businesses were engaged in feed mixing, commercial feed manufacturing and selling feed ingredients only.

Over 40% of the feed businesses were not registered as companies or business entities while about 68% of those operating feed businesses had received special training in feed processing. The feed business operators were not organized in associations and the results revealed that feed producer associations were absent in the study sites.

The sampled feed processors dealt in both raw material and processed pig feeds. Over 55% of the processors traded in raw materials, mainly maize bran, soybean, sunflower cakes, concentrates, silverfish and shells while 45% dealt in processed feeds. A notable observation was that only 45% of the sampled feed processors had a specific feed formula they followed. Many of them depended on the buyers to mix what they wanted. The raw materials traded in were mainly sourced from farmers, millers, importers and traders who also doubled as transporters. The feed processors depend on quality, cost, shelf-life and consumer preferences to make choices on what feed materials to stock. The quality and shelf life of the feed raw materials are mainly determined through visual checks such as colour, smell and appearance. The results also show that trading in imported pre-mixed concentrates for feed mixing is on the rise and companies such as Hendrix, Koudijs and Jubaili, mainly from the Netherlands, are the most common.

Compounded feed inputs were sold in different sizes as were locally produced inputs with the common unit of measurement used being the kilogram. However, there was variation in the package sizes for pellets with the 25 kg and 50 kg packs being the most common. The commonly used packaging materials included gunny bags and polythene bags possibly because of availability and affordability. The prices of most feed products were found to be variable. Several factors such as competition from traders from neighbouring countries, seasonality of supply of some inputs such as maize and maize bran, government policies on prices of in-country and imported products, low supply of silverfish and general fish price fluctuations were noted to influence the variability of livestock feeds.

Feed processors noted that the government needs to resolve some outstanding issues to make their business serve the farmers better including regulating quality of feeds and veterinary drugs on the market; facilitating traders to stock feed raw materials all year round; improving infrastructure, especially roads; protecting local feed products against competition from imported products; offering tax holidays to local manufacturers; scrapping taxes on silverfish; softening the conditions for obtaining loans and organizing extension sessions in feed formulation.

Veterinary drug retailers/stockists

A total of 17 veterinary drug stockists were interviewed in this study. The owners of the drug shops had either a degree (5), diploma (10) or certificate (2) in disciplines ranging from animal husbandry and animal production or animal production and management (12) or veterinary medicine (4). Minority (29%) of the respondents were owners of these veterinary drug shop businesses, implying that many were just employees. Seventy six per cent of the respondent had been employed in the business for two or more years. The veterinary drug stockists sourced the drugs from local drug manufacturers, wholesalers/distributors and importers. Their main buyers were the private veterinary practitioners and farmers.

Almost all the sampled veterinary drug stockists indicated that they mainly deal with farmers or practitioners who buy drugs to treat cattle, pigs, goats and sheep, and poultry as the main livestock. The main pig diseases that drug shops stock medication for are internal and external parasite infections including worms (71%) and mange (53%), swine erysipelas and swine pneumonia. Among the main pig anthelmintic drugs stocked and purchased by pig farmers and practitioners were Ivermectin, mentioned by 88% of the veterinary drug stockists, and Levamisole (41%). Others were liquid Albendazole, Liverside and piperazin. On the other hand, the most commonly stocked arachnidicides were Armitrazin (59%) and Nortraz (18%) in addition to dualdip, vectocid and cypermethrin.

Among the key infrastructural barriers that affect drug stockist businesses were poor roads that lead to delays in delivery of drugs, high taxation and license fees that lead to the high cost of business operations and unreliable energy supply/ power outages that lead to spoilage of drugs that require refrigeration. Among the operational solutions mentioned were the need to relax conditions for establishing Class B pharmacies to necessitate pharmacists to work hand in hand with veterinary doctors, streamlining conflicting roles between the National Drug Authority (NDA) and the Uganda National Bureau of Standards (UNBS) regarding the inspection of drugs, and government revising the taxes levied on veterinary drug distributors in addition to organizing veterinarians and paraveterinarians into district-based associations. They also advocated for the provision of refresher training in veterinary drug management and disease investigation and the removal of ineffective drugs from the market.

Veterinary practitioners

A total of 20 veterinary practitioners were sampled and interviewed from the four study sites. Eighty per cent of the practitioners were males and only 20% were females. Many of them were between the ages of 30–36 years many had 5–10 years or more of veterinary practice despite their averagely young age. Only 15% of the veterinary practitioners belonged to an association. Overall, 35% of the veterinary practitioners were fully trained veterinarians (with a Bachelor of Veterinary Medicine [BVM] degree), 40% were paraveterinarians and the rest were community animal health workers (CAHWs). Over 95% of the veterinary practitioners indicated that they treated poultry, pigs, cattle, sheep and goats, and about 30% mentioned treating rabbits.

Like the veterinary drug stockists, the interviewed veterinary practitioners indicated that the most common pig diseases they deal with are swine fever, mange, worms and swine erysipelas. In this work, they mainly use Levamisole and Ivermectin as anthelmintic drugs while arachnidicides (drugs against ectoparasites) used include Nortraz, Armitraz and Ivermectin. On the other hand, Oxytetracycline, Gentamycin and tetracycline were the most common antibiotics used by veterinary practitioners.

The main constraints in their practice were defaulting on credit by farmers after treating and saving their animals when they are cash-strapped. Other constraints were long distances travelled to reach farmers, which makes it costly for veterinarians; ineffective drugs on the market and poor response of animals to treatment as well as farmers resorting to self-treating their animals, which leads to drug resistance problems.

The veterinary practitioners indicated the need for more training sessions, provision of transport equipment, insurance against travel and disease risks, better tools and equipment and equipped laboratories for proper and timely disease diagnosis. Among the key policies that veterinary practitioners said affected their business were policies on transport, water supply, taxation and energy policies. They indicated that these directly limit movement, lowers profits and hinder productivity.

Conclusion

This study generally showed that there are no strong business relationships between aggregators and farmers within the pig value chain. Many of the transactions are one-off and even if repeated, there are no agreements. Aggregators and feed processors do not have any verbal or written contractual partnerships with farmers. However, there are loose mutual agreement arrangements between farmers and drug stockists and veterinary practitioners though the drug stockists and veterinary practitioners complained of non-committal and non-compliance, mistrust and breach of such agreements by farmers through defaulting in payment.

There is an urgent need to strengthen both horizontal and vertical linkages along the value chain. Value chain actors in each node should be organized into strong associations to build common interest and trust so that they can serve the farmers and consumers better. Additionally, there is need to catalyze linkages between farmers and service providers as well as buyers (aggregators) to insure them against risks but also allow buyers to invest in the production process to create backward and forward linkages in the pig value chain.

The drug suppliers and the veterinary practitioners also have several constraints that are likely to hinder pig production enterprises. These range from infrastructural (water, energy, laboratories, roads, etc.) to operational (limited refresher trainings, inspection, disease diagnosis, etc.) issues that require the intervention of government and development partners to address.

I. Background

I.1 Contextual setting

The pig sector in Uganda is a source of livelihood to more than 2 million households and the mainstay for several businesses countrywide. Demand for pork is increasing rapidly and the annual per capita pork consumption, estimated at 3.4 kg, is the highest in East Africa (FAO, 2011). Fuelled by the increasing demand, the number of pigs in Uganda increased from 0.2 to 4.1 million between 1980 and 2018 (UBOS, 2018). The bulk of the pig numbers are from the central region. Most of the pigs are raised under smallholder systems characterized by poor husbandry practices. Pork-related businesses have grown over time, catalyzed by the increased demand and consumption of pork, especially in the urban areas.

The International Livestock Research Institute (ILRI) is implementing a pig value chain project, 'Improving pig productivity and incomes through an environmentally sustainable and gender-inclusive integrated intervention package in Uganda' or MorePork II, which is funded by the CGIAR Research Program on Livestock. The project targets to improve the incomes of pig value chain actors through sustainable integrated technology packages and marketing arrangements between pig farmers and pig aggregators, with backward linkages to feed and veterinary drug stockists and other service providers. Little information exists on the key players and business models used by the pig aggregator and input and service provider businesses along the pig value chain in Uganda. A scoping study was therefore conducted by the project in 2019 in order to fill these gaps and better understand the trading practices and networks of the pig value chain businesses. The information generated will inform the project's interventions and subsequent activities. This report presents the results of the scoping study. The subsequent section of this section presents the study sites and data collection methods used. The subsequent sections present the results for each business category. The conclusions drawn based on the findings from the study are presented at the end of the report.

I.2 Study sites and data collection

The study was conducted in four districts: Masaka, Mukono, Wakiso and Kampala. These districts represent high pig production areas in the country and some such as Kampala and Masaka are high pork demand areas. The businesses targeted included live pig aggregators/pork aggregators, livestock feed processors, veterinary drug stockists and veterinary practitioners. The respondents were drawn from lists provided by local government staff in the respective districts, and in cases where a sampling frame was difficult to obtain, such as for the pig and pork aggregators, snowball sampling method was used. The district veterinary officers were the first points of contact in each district and guided the consultants implementing the study on the locations of the respondents. Structured and semi-structured questionnaires were used to collect the data from the respondents. Key informant interviews were also conducted with 14 large-scale processors.

A total of 65 aggregators was interviewed from the four districts. Of the 65 aggregators, 51 were live pig aggregators, 63 were pork aggregators while 49 dealt in both live pigs and pork aggregation. The aggregator business was dominated by men; 86% of the sampled aggregators were men. Forty animal feed processors were sampled and 38% of them were females. Key informant interviews were also conducted with 14 large-scale feed processors. Seventeen veterinary drug shops were selected and interviewed. Of the 17, 53% of the interviewed veterinary drug stockists were women. Twenty veterinary practitioners were interviewed, 20 % of them were women.

2. Pig and pork aggregator businesses

2.1 Pig and pork aggregators business models

Generally, pig aggregators source live pigs from smallholder farmers as well as large farms. Others, especially large-scale aggregators have village-based middlemen who bulk and scout for pigs from both large- and small-scale farmers. After bulking the pigs, the aggregators transport the pigs in trucks to a holding unit that is usually located within the abattoir or backyard slaughter vicinity. The animals are slaughtered in the abattoir or slaughter slab that is either privately owned or a public facility (for the case of Wambizzi pig abattoir in Kampala city). In Mukono and Masaka, there are no designated or visibly functional abattoirs for slaughtering pigs while in Wakiso and Kampala the abattoirs are designated by the local government, inspected regularly to ensure hygiene and carry out ante-mortem inspections of pigs and pork post-mortem. Kampala has one central abattoir, Wambizzi, which has the capacity to handle about 300 pigs a day and has fairly hygienic standards while Wakiso has medium-scale abattoirs with capacity of about 100 pigs a day with well-maintained hygiene standards. These are scattered within the municipalities of Wakiso, Nansana and Kira.

Figure 1 shows the business model for pig aggregators operating under regulated and organized environments, including the suppliers of pigs and sales customers. This model includes an abattoir where live pigs are offloaded into a holding unit on arrival from the villages and are slaughtered thereafter. Once the animals are slaughtered and inspected by veterinary personnel, the main buyers of the pork are traders that distribute it and butchers. The buyers who pick the pork from the abattoir include butchers/pork joints, traders, meat companies such as Fresh Cuts and individual consumers.

Figure 1. Typical live pig aggregator business model with a regulated abattoir.

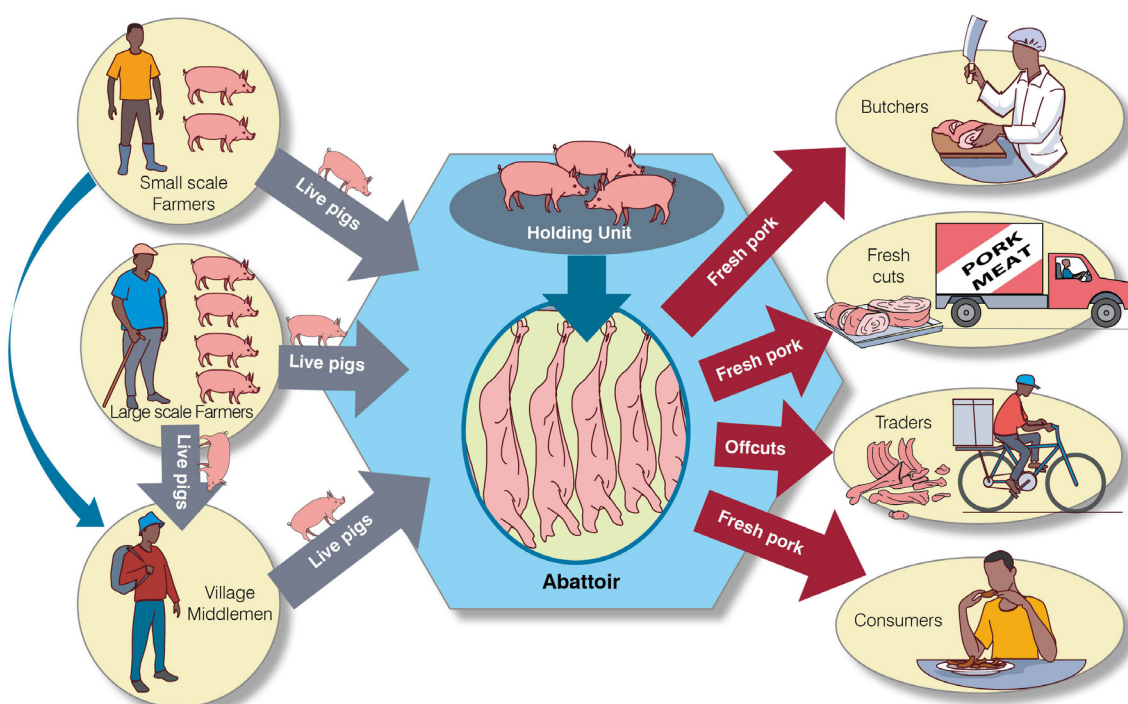
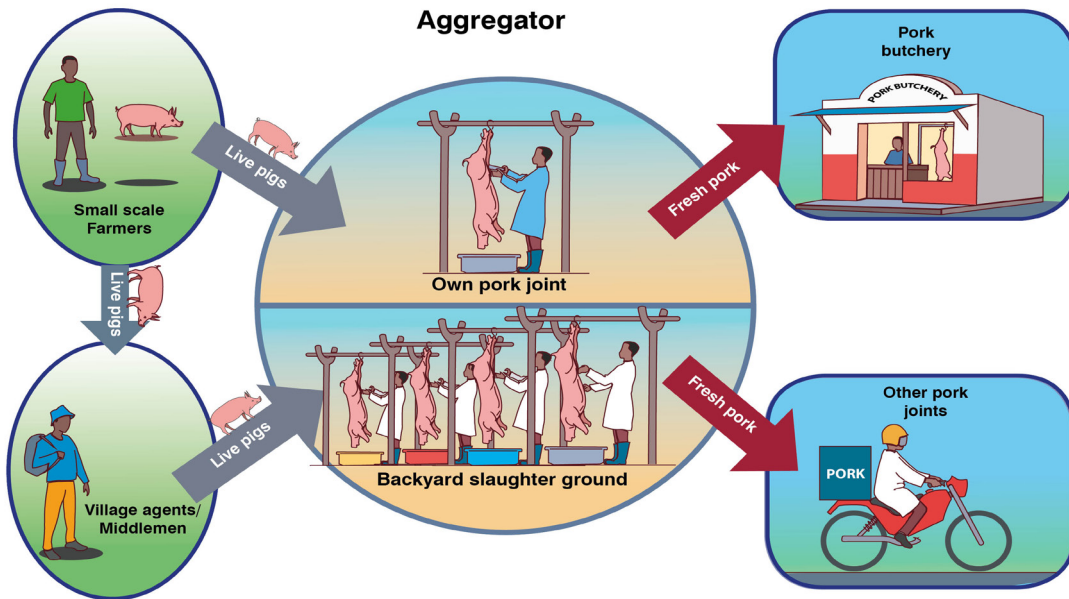


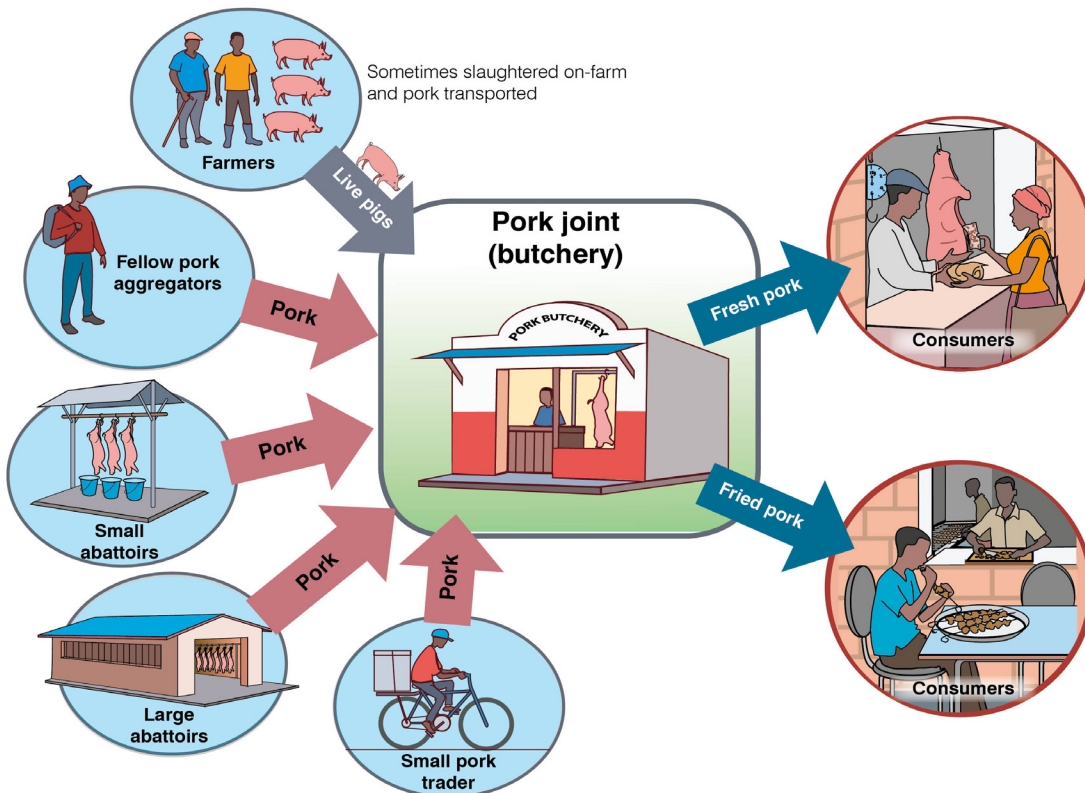
Figure 2 shows another model where aggregators slaughter the pigs in backyard slaughter slabs, and supply the fresh pork to their own pork joints within proximity of the slaughter grounds or to butchers and pork joints away from their premises. This model does not involve pork inspection in many cases.

Figure 2. Typical live pig aggregator business model with unregulated backyard slaughters.



Pork aggregators, on the other hand, source the pork from a diverse group of suppliers. They either source directly from farmers (from where pigs are either transported alive or slaughtered on-farm and fresh pork transported), fellow pork aggregators, small, medium and large abattoirs as well as other pork traders. The main buyers are consumers who buy fresh pork or those who buy fried pork at pork joints (Figure 3).

Figure 3. Typical pork aggregator /butchery business model.



I. Small abattoirs are mainly the backyard slaughters where no pig or pork inspection is done

2.2 Pig/pork aggregator demographic characteristics

2.2.1 Involvement of men and women in the business

The results show that 89% of the respondents interviewed at the pig/pork aggregation points in the four study sites were men (Table 1). However, in Mukono, 27% of the respondents were women. In most cases, the respondents were the overall managers found on-site in case of abattoirs and pork butcheries. This is an indicator of limited women participation at this node of the pig/pork value chain.

Table 1. Sampled respondents by sex and study site.

District	Frequency/percentage of sampled aggregators by sex					
	Male (n=58)		Female (n=7)		Total (n=65)	
	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent
Kampala (n=13)	12.0	92.3	1.0	7.7	13.0	100.0
Wakiso (n=15)	14.0	93.3	1.0	6.7	15.0	100.0
Masaka (n=22)	21.0	95.5	1.0	4.6	22.0	100.0
Mukono (n=15)	11.0	73.3	4.0	26.7	15.0	100.0
Pooled sample (n=65)	58.0	89.2	7.0	10.8	65.0	100.0

2.2.2 Ownership of aggregator businesses by sex

The results indicate that the pig and pork businesses are mainly owned by men who constitute over 86% of the sampled pork/pig businesses in the four districts. For instance, in Kampala, the pig/pork businesses sampled were solely owned by men (Table 2). However, there is a considerable number of women (40%) who own pig and pork businesses in Mukono District.

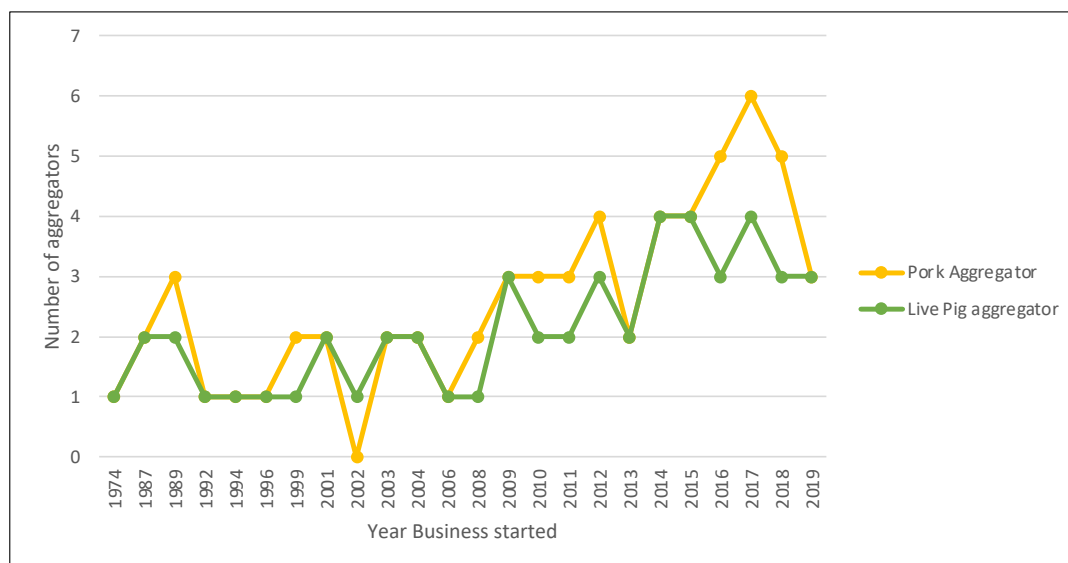
Table 2. Ownership of aggregator business by sex.

District	Frequency/percentage of sampled aggregators by sex					
	Male (n=56)		Female (n=9)		Total (n=65)	
	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent
Kampala (n=13)	12.0	92.3	1.0	7.7	13.0	100.0
Wakiso (n=15)	14.0	93.3	1.0	6.7	15.0	100.0
Masaka (n=22)	21.0	95.5	1.0	4.6	22.0	100.0
Mukono (n=15)	9.0	60.0	6.0	40.0	15.0	100.0
Pooled sample (n=65)	56.0	86.2	9.0	13.9	65.0	100.0

2.2.3 Aggregator business experience

The results show that out of the aggregators interviewed, the ones that started earliest commenced in 1974 (Figure 4). Most of the aggregators joined the pork business between 2012 and 2016 probably because of increased demand for pork in major urban areas. The same trend was observed for the live pig aggregators.

Figure 4. Frequency of aggregators by business experience.



2.3 Involvement of live pig aggregators in activities in the value chain

The aggregators were asked to point out the activities that they perform in the value chain as an indication of their level of involvement. The results show that the major activities played by aggregators in the live pig value chain are similar across the four study sites and mostly include buying pigs from farmers (78%) which are either transported as live animals (65%) or slaughtered on the farm (37%) and later pork transported to pork butcheries for sale (Table 3). In addition, they also sell live pigs to other traders (11%) with aggregators in Wakiso participating more in this activity (20%) than those in Masaka (4.6%).

Table 3. Aggregator involvement in activities in the pig value chain.

District	Percentage of live pig aggregators involved in the pig value chain				
	Buy pigs from farmers	Sell pigs (to traders)	Transport pigs	Slaughter on farm	Slaughter off farm
Kampala (n=12)	92.3	15.4	69.2	53.9	30.8
Wakiso (n=12)	80.0	20.0	73.3	26.7	20.0
Masaka (n=16)	72.7	4.6	63.6	36.4	36.4
Mukono (n=11)	73.3	6.7	53.3	33.3	40.0
Pooled sample (n=51)	78.5	10.8	64.6	36.9	32.3

2.4 Involvement of pork aggregators in activities in the value chain

As expected, the key activities played by pork aggregators across the study sites included roasting or frying pork and selling to consumers (Table 4). Overall, 46% of the pork aggregators bought pork from traders, 41% transported the pork from the source, indicating that the remaining 60% slaughter and operate at or near their business premises or they get supplies through deliveries.

Table 4. Stage of aggregator involvement in the pork value chain.

District	Percentage of aggregators within the pork value chain				
	Buy pork (from traders)	Transport	Sell pork (to traders)	Roast/ fry pork	Sell fresh pork to consumer
Kampala (n=13)	30.8	38.5	61.5	53.8	61.5
Wakiso (n=14)	42.9	42.9	64.3	35.7	64.3
Masaka (n=22)	50.0	50.0	22.7	100.0	100.0
Mukono (n=14)	57.1	28.6	14.3	92.9	100.0
Pooled sample (n=63)	46.0	41.3	38.1	74.6	84.1

However, a closer look at the results reveals that in Masaka, all sampled pork aggregators roasted or fried pork and sold it to consumers, implying that most of them operated a pork joint. There were some differences in the remaining three study sites. For instance, a higher proportion of aggregators in Mukono roasted or fried pork and sold it to consumers (86.7% and 93.3%, respectively) compared to Wakiso (33.3% and 60.0%) and Kampala (53.9% and 61.5%). This is possibly because several of the sampled aggregators in Kampala and Wakiso are large-scale operators supplying pork to the retailers/small pork butcheries and pork joints that fry and sell pork to final consumers. Some of the large-scale pork aggregators also own their own pork joints.

Photograph 1. A pork butchery in Buwaate cell, Kira municipality, Uganda (photo credit: ILRI/Sebatta Christopher).



Other activities that aggregators perform in the pork value chain include buying pork from traders, transporting pork and selling it to traders. In Kampala, Wakiso and Masaka study sites, there was a relatively equal proportion of aggregators who buy and transport pork. Whereas in Mukono, a few aggregators transport pork (26.7%) and purchase from traders (53.3%). They possibly purchase pork locally from neighbouring traders and operate pork retail points (butchery or pork joint).

2.5 Involvement of pork aggregators in pork products and by-products

The results reveal less involvement of aggregators in pork products and by-products businesses. The few who are involved in these mainly sell off directly to consumers, as indicated by 44.6% of aggregators across the four study sites (Table 5). Compared to other districts, Kampala aggregators performed several activities related to pork products/by-products such as purchasing from traders, processing and also selling directly to consumers or to other actors in the chain.

Table 5. Stage of your aggregator involvement in the pork products and by-products value chain.

Percentage of aggregators by channel of sale of pig products (e.g. trotters, snout, intestines)				
District	Buy (from traders)	Sell (not to consumer)	Process	Sell to consumer
Kampala (n=9)	15.4	53.9	15.4	53.9
Wakiso (n=7)	0.0	20.0	0.0	40.0
Masaka (n=13)	0.0	9.1	9.1	31.8
Mukono (n=10)	0.0	0.0	0.0	60.0
Pooled sample (n=39)	3.1	18.45	6.2	44.6

2.6 Nature of aggregator businesses

Most of the pork and live pigs aggregators run their businesses as sole proprietorships where traders raise capital and get started with minimum assistance from other sources (Table 6). They are responsible for their decisions and actions, and also enjoy the profits solely. Partnerships were on a limited scale only existing among pork aggregators as evidenced by the results with only 7% of aggregators in Wakiso engaging in this type of business. The aggregators revealed that lack of trust was one of the limitations of potential partnerships. Only 1% of the sampled aggregators had registered the business as a private company.

Table 6. Type of aggregator businesses.

	Pork aggregators (%)			Live pig aggregators (%)	
	Sole proprietorship (one-person business)	Partnership	Private company	Sole proprietorship (one-person business)	Private company
Kampala (n=13)	100.0	0.0	0.0	100.0	0.0
Wakiso (n=15)	85.7	7.1	7.1	91.7	8.3
Masaka (n=22)	100.0	0.0	0.0	100.0	0.0
Mukono (n=15)	100.0	0.0	0.0	100.0	0.0
Pooled sample (n=65)	96.8	1.6	1.6	98.0	2.0

2.7 Aggregator collective action

There was limited participation of aggregators in collective action such as in trade associations. Only about 22% of the sampled aggregators (of both pigs and pork) participated in collective action, despite the advantages that come with belonging to an association, such as increased access to information and market information among members (Table 7). Kampala and Masaka districts had a higher proportion of aggregators belonging to trader associations.

Table 7. Number of aggregators who belong to an association.

District	Percentage of aggregators belonging to an association
Kampala (n=13)	30.8
Wakiso (n=15)	6.7
Masaka (n=22)	27.3
Mukono (n=15)	20.0
Pooled sample (n=65)	21.5

Findings revealed that each study site had only one major association as indicated in Table 8.

Table 8. Name of association to which aggregators belong.

Name of association	Kampala	Wakiso	Masaka	Mukono	Total
Bamuto Abattoir	0.0	1.0	0.0	0.0	1.0
Greater Masaka Pig Traders Cooperative	0.0	0.0	6.0	0.0	6.0
Mukono Operators Association	0.0	0.0	0.0	1.0	1.0
Mukono Pork Butchers	0.0	0.0	0.0	1.0	1.0
Wambizzi Cooperative Society	4.0	0.0	0.0	0.0	4.0
Total	4.0	1.0	6.0	2.0	13.0

Aggregators who are members of the associations indicated some of the benefits they derived (Table 9). The key benefits indicated were networking with other traders and farmers, increased welfare of traders and increased sensitization on meat handling. It should be noted that coalescing around trader associations is still a new initiative, and this is evidenced by a high number of sampled traders who said they have not realized any benefits from their trader associations.

Table 9. Main benefits from associating as pork/pig aggregators.

Benefit from association	Frequency
No benefit yet; still organizing	5.0
Expand the business	1.0
Mediation of disputes among and between members	1.0
Networking with other pig/pork traders and farmers	2.0
Increased trader welfare and self help	2.0
Sensitization on meat handling	2.0
We get customers in one place	1.0
Customer care	1.0
Training from non-governmental organizations and government	1.0
Utilize economies of scale to sell large quantities	1.0
We share pork in times of scarcity	1.0
Total	18.0

2.8 Suppliers for the pig/pork aggregator businesses

The supply chain for both live pigs and pork across the four districts is short and is mostly dominated by pig farmers and pork traders (Table 10). Both pig and pork aggregators in Mukono District do not source pigs through middlemen and large pig traders. This could partly be an indicator of mistrust or increased transaction costs associated with trading with such actors. In Wakiso, however, middlemen and large pig and pork traders are prominent suppliers to pig and pork aggregators.

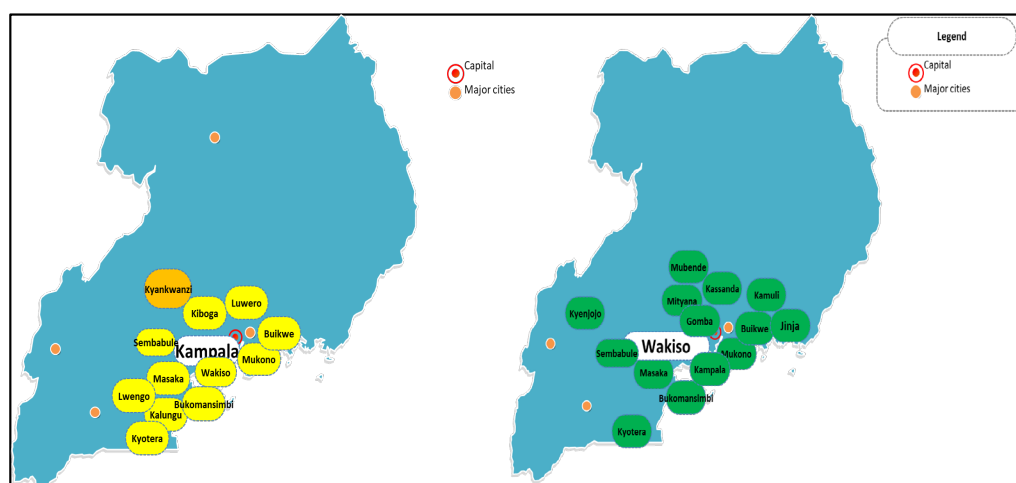
Table 10. Sources of supplies to pork/pig aggregators (%).

District	Pig aggregators				Pork aggregators			
	Pig farmer	Village middlemen	Large pig traders	Pork traders	Pig farmers	Village middlemen	Large pig traders	Pork traders
Kampala (n=13)	84.6	15.4	0.0	38.5	91.7	16.7	0.0	33.3
Wakiso (n=15)	78.6	21.4	27.3	35.7	100.0	33.3	23.1	16.7
Masaka (n=22)	72.7	18.2	6.3	68.2	100.0	25.0	4.6	56.3
Mukono (n=15)	71.4	0.0	0.0	78.6	100.0	0.0	0.0	63.6
Pooled sample (n=65)	76.2	14.3	8.7	57.2	98.0	19.6	6.9	43.1

2.8.1 Mapping of pig supply routes and suppliers

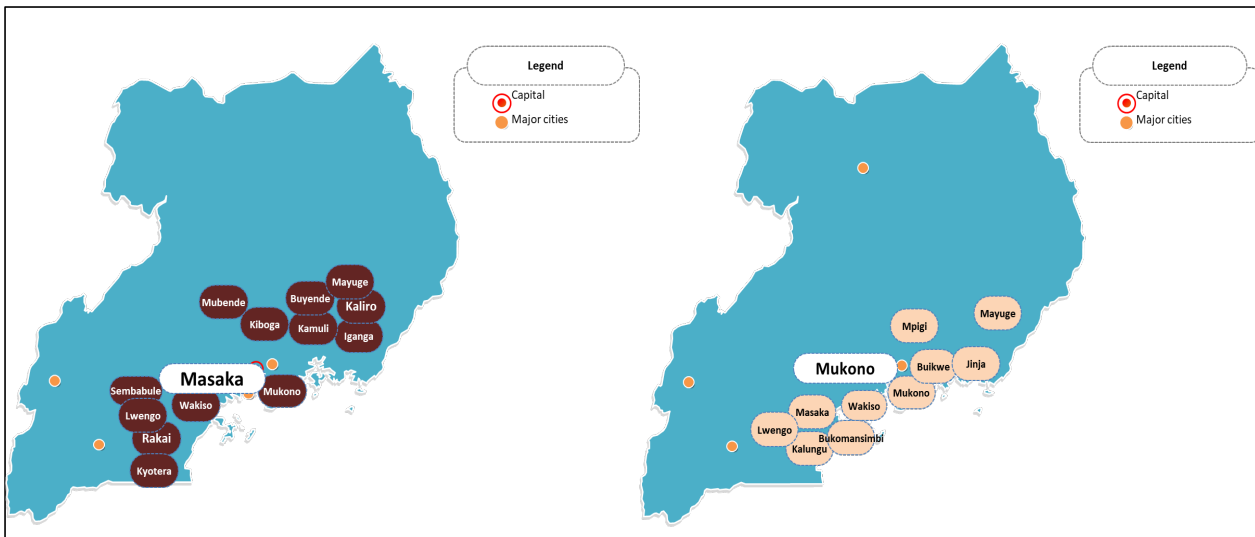
The interviewed aggregators indicated that they mainly source pigs from eastern and central Uganda. This is not surprising given that much of pig production takes place in those regions. Within Kampala, the pigs are mainly sourced from the nearby districts of Mukono, Wakiso, Luwero, Buikwe and within Kampala itself (Figure 5). Besides, pig aggregators in Kampala also source pigs from the greater Masaka districts of Kyotera, Masaka, Kalungu, Bukomansimbi, Lwengo and Sembabule. Other districts that supply aggregators in Kampala include Kiboga and Kyankwazi. Aggregators from Wakiso also source their pigs from the nearby districts of Wakiso, Mukono, Mpigi, Kampala, Buikwe, Jinja and Gomba. Similarly, like in other study sites, they also source pigs from the greater Masaka districts (Masaka, Bukomansimbi, Kyotera and Sembabule) and the eastern region, specifically Kamuli. Other districts that supply Wakiso include Kassanda, Kyenjojo, Mubende and Mityana.

Figure 5. Map of main pig supply routes and suppliers to Kampala and Wakiso.



On the other hand, aggregators in Mukono source for pigs within Mukono itself, greater Masaka districts and from the eastern region, especially Mayuge (Figure 6). In addition, aggregators in Masaka are mainly supplied by the greater Masaka districts (Lwengo, Masaka, Sembabule, Kyotera, Rakai and Kiboga) and eastern districts (Jinja, Kaliro, Kamuli, Buyende, Mayuge and Iganga). Other districts that supply Masaka are Mubende and Kiboga.

Figure 6. Map of main pig supply routes and suppliers to Masaka and Mukono.



The major pig supply districts for the pig aggregators interviewed include Masaka, Mpigi, Mukono and Wakiso (Table 11). Overall, 45% of the aggregators sourced pigs from Masaka and 41% from Mpigi District while 29% sourced from Mukono. Kampala aggregators mainly source live pigs from greater Masaka and Mpigi, while their Wakiso counterparts mainly source within the district. Masaka and Mukono aggregators source pigs largely from within the district and neighbouring districts.

Table 11. Percentage of live pig aggregators by the district of source.

Source district	Number of aggregators by site				
	Kampala (n=12)	Wakiso (n=12)	Masaka (n=16)	Mukono (n=11)	Total (n=51)
Masaka	41.7	16.7	100.0	-	45.1
Mpigi	50.0	25.0	75.0	-	41.2
Mukono	0.0	33.3	-	100.0	29.4
Wakiso	33.3	75.0	-	-	25.5
Lwengo	8.3	0.0	31.3	-	11.8
Luwero	0.0	16.7	25.0	-	11.8
Kampala	33.3	8.3	-	-	9.8
Bukomansimbi	16.7	0.0	12.5	-	7.8
Kyotera	33.3	0.0	-	-	7.8
Kamuli	25.0	0.0	-	9.1	7.8
Mubende	0.0	16.7	-	-	3.9
Buikwe	0.0	0.0	-	18.2	3.9
Jinja	16.7	0.0	-	-	3.9

Majority of the pig aggregators had dealt with more than 50 farmers from their supply districts in the year before this scoping study. However, Wakiso aggregators had dealt with less than 50 farmers from the supply districts, indicating a likelihood that the aggregators tended to buy more from the same farmers there as compared to the other three districts (Table 12).

Table 12. Number of pig farmers that pig aggregators transacted with in the last 12 months.

Source district	Range of number of farmers	Percentage of aggregators by site				
		Kampala (n=12)	Wakiso (n=12)	Masaka (n=16)	Mukono cypermethrin (n=11)	Total (n=51)
Masaka	<=50 farmers	0.0	50.0	25.0		21.7
	>50 farmers	100.0	50.0	75.0		78.3
Wakiso	<=50 farmers	50.0	55.6	-	-	53.9
	>50 farmers	50.0	44.4	-	-	46.2
Mubende	<=50 farmers		100.0	-	-	100.0
	>50 farmers		0.0	-	-	0.0
Kampala	<=50 farmers	25.0	0.0	-	-	20.0
	>50 farmers	75.0	100.0	-	-	80.0
Mukono	<=50 farmers		75.0	-	36.4	46.7
	>50 farmers		25.0	-	63.6	53.3
Lwengo	<=50 farmers	0.0	-	20.0	-	16.7
	>50 farmers	100.0	-	80.0	-	83.3
Bukomansimbi	<=50 farmers		-		-	
	>50 farmers	100.0	-	100.0	-	100.0
Kyotera	<=50 farmers		-	-	-	
	>50 farmers	100.0	-	-	-	100
Mpigi	<=50 farmers	50.0	33.3	16.7	-	28.6
	>50 farmers	50.0	66.7	83.3	-	71.4
Luwero	<=50 farmers	-	50.0	25.0	-	33.3
	>50 farmers	-	50.0	75.0	-	66.7
Buikwe	<=50 farmers	-	-	-	50.0	50.0
	>50 farmers	-	-	-	50.0	50.0
Jinja	<=50 farmers	100.0	-	-	-	100.0
	>50 farmers		-	-	-	
Kamuli	<=50 farmers	33.3	-	-	0.0	25.0
	>50 farmers	66.7	-	-	100.0	75.0

2.8.2 Average number of live pigs purchased from suppliers

The average volume of pig supplies from farmers per aggregator in the last one months was 119 pigs and 46 from middlemen (Table 13). Kampala and Wakiso had the highest numbers of pig supplies. Supplies from middlemen was an average of 85 pigs, but negligible for the other districts.

Table 13. Average number of live pigs purchased from suppliers in the last month.

	Average number of live pigs purchased monthly per aggregator by location			
	Pig farmers		Village-based middlemen	
	Mean	Std. Dev	Mean	Std. Dev
Kampala (n=12)	122.7	137.4	85.0	91.9
Wakiso (n=12)	271.5	511.6	7.0	3.5
Masaka (n=16)	50.9	37.4	-	-
Mukono (n=11)	57.3	56.9	-	-
Pooled sample (n=51)	119.2	261.9	46.3	69.5

2.8.3 Repeat purchases by aggregators from farmers and village-based middlemen

The number of times an aggregator buys from the same supplier in a given time is a proxy indicator of the relationship they have on one hand and the capacity of the supplier to sustain and satisfy demand on the other. In the case of pig aggregators, there was limited repeat purchases from the same suppliers except in Wakiso District where there was an average of 33 repeat purchases from the same farmers (Table 14). The aggregators indicated that Wakiso is a peri-urban area near Kampala and hence is easily accessible with lower transport costs. Therefore, farmers simply make calls in case they have pigs to sell and aggregators can easily pick them up. This explains the many repeated purchases for Wakiso, unlike other districts. The number of repeat purchases is an indicator of trust and potentially strong relationship between the aggregators and the farmers.

Table 14. Average number of repeated live pig purchases per aggregator from the same suppliers in the past one month.

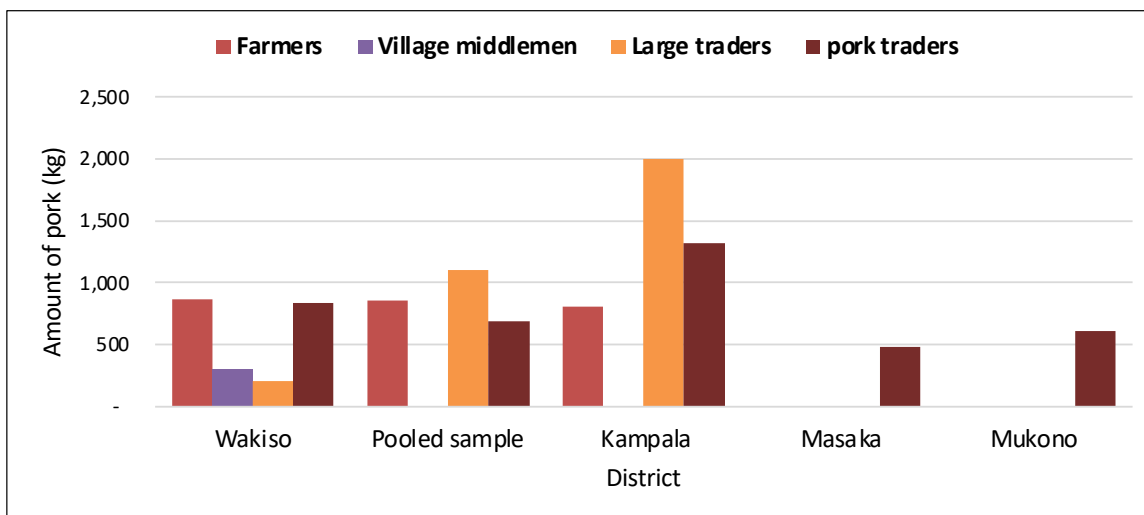
District	Number of times an aggregator purchased from a supplier per month					
	Pig farmers			Village-based middlemen		
	Mean	Std. Dev.	Number of aggregators	Mean	Std. Dev.	Number of aggregators
Kampala (n=12)	2.6	2.7	11.0	1.0	1.4	2.0
Wakiso (n=12)	33.5	92.1	11.0	1.5	0.7	2.0
Masaka (n=16)	4.1	7.2	16.0	-	-	-
Mukono (n=11)	3.6	5.8	10.0	-	-	-
Pooled sample (n=51)	10.4	44.6	48.0	1.3	1.0	4.0

2.8.4 Quantity of pork supplied to pork aggregators

The average volume of pork supplied to aggregators by large traders in the last one month was 1,100 kg, whereas farmers and village middlemen supplied an average of 850 kg and 688 kg, respectively (Figure 7). Farmers and pork traders supplied the largest quantity of pork to Wakiso whereas Kampala aggregators were mainly supplied by large pig traders and fellow pork traders². It is important to note that within the Masaka and Mukono study sites, pork was mainly sourced from pork traders in the last month.

2. Large pig traders are those that aggregate pigs from villages and slaughter them in abattoirs and supply other pork traders. Pork traders purchase the fresh pork at abattoirs and supply it to butcheries and pork joints.

Figure 7. Average monthly quantity (kg) of pork purchased by source per aggregator.



Photograph 2. Pork weighing at an abattoir in Kira Municipality (photo credit: ILRI/Sebatta Christopher).



2.8.5 Aggregator access to market-related information

Access to market information is often associated with increased participation in the marketing of live pigs and pork as it enhances better decision-making. The aggregators were asked whether they had received market information in the last 12 months. Figure 8 shows that all sampled aggregators in Kampala and Wakiso received market information related to pigs and pork business. There was a higher proportion of aggregators from Mukono who had received market information compared to Masaka.

The dominant type of market information received by over half of the studied aggregators across the four study sites was on pork and pig prices (Table 15). The main information received by aggregators within Kampala was related to the location of customers, customer preferences and pig and pork prices. In addition, more than half of the studied aggregators in Kampala also received information related to input market prices and the location of input providers. In the other districts, the main market information received was on customer preferences and pig and pork prices.

Figure 8. Proportion of aggregators who received market information in the last 12 months.

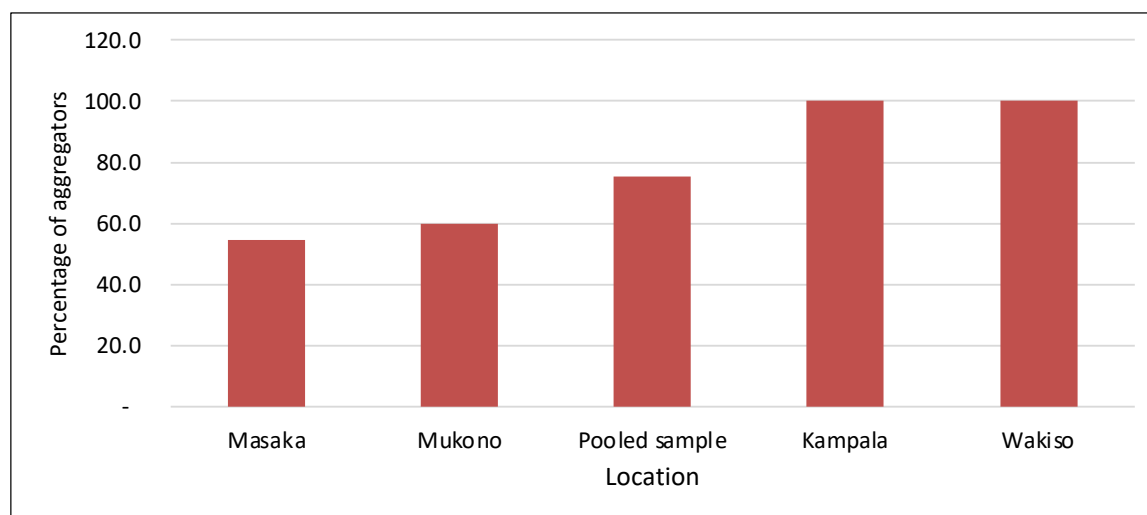


Table 15. Aspects of the information received by aggregators.

Market information type	Percentage of aggregators by type of information accessed				
	Kampala (n=13)	Wakiso (n=15)	Masaka (n=22)	Mukono (n=15)	Pooled sample (n=65)
Location of customers	92.3	100.0	9.1	0.0	44.6
Customer preferences	100.0	86.7	27.3	20.0	53.9
Pig and pork prices	92.3	93.3	45.5	46.7	66.2
Input market prices	61.5	40.0	0.0	0.0	21.5
Location of input providers	53.9	33.3	9.1	26.7	27.7

2.8.6 Level of collaboration of aggregators with other traders

The results showed that there was a limited level of collaboration among aggregators with traders probably due to mistrust (Table 16). The major areas of collaboration included agreeing on prices paid, quality standards, price information, sharing pork during scarcity, price information and information on market conditions. It is important to note that the collaboration was carried out often or occasionally depending on need.

Table 16. Level of collaboration by aggregators with other traders.

Area of collaboration	Percentage of aggregators responding		
	Often	Occasionally	Never
Access to inputs or services	19.1	7.9	73.0
Providing large product volumes to specific buyers	24.6	18.5	56.9
Agreeing on prices paid or areas served	26.2	20.0	53.9
Joint transport of pigs/pork	13.9	20.0	66.2
Agreeing on quality standards used	23.1	35.4	41.5
Access to credit	10.8	18.5	70.8
Price information	23.1	23.1	53.9
Information on market conditions	18.8	26.6	54.7
Sharing pork in times of scarcity	9.5	33.3	57.1

3. Livestock feed processors

3.1 Demographic characteristics of livestock feed processors

3.1.1 Ownership of livestock feed processing business by sex

The results indicate that the livestock feeds business is mainly owned by men, 63% of the surveyed feed processing businesses were owned by men (Table 17). However, in Kampala an equal proportion of the businesses surveyed were owned by men and women.

Table 17. Ownership of Livestock feed processor's business by sex.

District	Frequency/percentage of sampled aggregators by sex					
	Male (n=25)		Female (n=15)		Total (n=40)	
	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent
Kampala (n=10)	5.0	50.0	5.0	50.0	10.0	100.0
Wakiso (n=8)	5.0	62.5	3.0	37.5	8.0	100.0
Masaka (n=12)	8.0	66.7	4.0	33.3	12.0	100.0
Mukono (n=10)	7.0	70.0	3.0	30.0	10.0	100.0
Pooled sample (n=40)	25.0	62.5	15.0	37.5	40.0	100.0

3.1.2 Livestock feed processing respondents' characteristics

The majority of the respondents interviewed were owners or managers of the feed businesses (Table 18). Others were sales staff and cashiers.

Table 18. Position of the respondent in the company.

Position	Frequency	Percentage
Owner	18.0	45.0
Sales staff	5.0	12.5
Cashier	3.0	7.5
Manager	13.0	32.5
Supervisor	1.0	2.5

The average age of the respondents was 37.6 years (Table 19). Kampala had relatively older respondents with an average age of 42 years. The feed businesses have been in existence for an average of 6.9 years, though the Kampala-based businesses had been in existence longer, (9) years.

Table 19. Average age and experience in the business.

District	Mean/Standard deviation of sampled aggregator					
	Age (Years)		Years the company has been in business		Experience of respondent (Years)	
	Mean	S.D	Mean	S.D	Mean	S.D
Kampala (n=10)	41.5	4.6	9.3	4.3	6.5	4.2
Wakiso (n=8)	35.5	6.9	6.2	5.9	5.1	6.2
Masaka (n=12)	37.3	6.8	6.7	2.5	4.8	2.5
Mukono (n=10)	35.7	8.9	5.8	4.2	4.8	4.2
Pooled sample (n=40)	37.6	7.1	6.9	4.2	5.3	4.2

3.1.3 Nature of the feed businesses

Fifty per cent of the feed businesses surveyed were mainly engaged in feed milling and mixing. There was an equal proportion of feed businesses that were solely engaged in feed mixing and commercial feed manufacturing (Table 20). Sampled feed businesses within Mukono, Masaka and Wakiso were mainly engaged in both feed milling and mixing and selling of feed ingredients only. A possible explanation for the observed scenario is that most livestock farmers have their own formulations and only refer to the feed processors for ingredients and milling services.

Table 20. Nature of feed business across the study sites.

District	Frequency/percentage of sampled feed business							
	Feed milling and mixing (n=20)		Feed mixing only (n=4)		Commercial feed manufacturer (n=4)		Feed ingredients only seller (n=12)	
	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent
Kampala (n=10)	4.0	40.0	2.0	20.0	2.0	20.0	2.0	20.0
Wakiso (n=8)	4.0	50.0	1.0	12.5	1.0	12.5	2.0	25.0
Masaka (n=12)	6.0	50.0	1.0	8.3	0.0	0.0	5.0	41.7
Mukono (n=10)	6.0	60.0	0.0	0.0	1.0	10.0	3.0	30.0
Pooled sample (n=40)	20.0	50.0	4.0	10.0	4.0	10.0	12.0	30.0

Results further revealed that over 83% of feed businesses that sell feed ingredients are owned by men (Table 21) with only 16.7% being owned by women, the dominance of men is attributed to the nature of work, which involves a lot of movement to source for ingredients. There is an equal proportion of men and women who own feed businesses involved in feed mixing and manufacturing commercial feeds.

Table 21. Nature of feed businesses by gender.

Business type	Frequency/percentage of sampled feed businesses by gender					
	Male (n=25)		Female (n=15)		Total (n=40)	
	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent
Feed milling and mixing	11.0	55.0	9.0	45.0	20.0	100.0
Feed mixing only	2.0	50.0	2.0	50.0	4.0	100.0
Commercial feed manufacturer	2.0	50.0	2.0	50.0	4.0	100.0
Feed ingredients only seller	10.0	83.3	2.0	16.7	12.0	100.0
Pooled sample	25.0	62.5	15.0	37.5	40.0	100.0

3.2 Feed business characteristics

3.2.1 Basic characteristics

The results show that 60% of the feed businesses were not registered as companies probably due to the strict requirements for company registration. However, their trading operations were legal since they possessed trading licences (Table 22). Kampala and Wakiso had the highest number of registered businesses. Most of the people operating the feed businesses had received specialized training in feed processing. About 68% of the business owners indicated that they had been trained. The results also showed absence of feed producer associations in the study sites. Only 10% of the businesses belonged to feed producer associations. Most feed businesses, 68%, possessed equipment for feed processing, 78% had storage facilities and only 30% owned a truck for transporting feeds.

Table 22. Business characteristics of studied feed processors.

Characteristic	Study sites				
	Kampala (n= 10)	Wakiso (n=8)	Masaka (n=12)	Mukono (n=10)	Overall (n=40)
Company registration					
• Registered	5 (50.0)	6 (75.0)	3 (25.0)	2 (20.0)	16 (40.0)
• Not registered	5 (50.0)	2 (25.0)	9 (75.0)	8 (80.0)	24 (60.0)
Own a feed processing operation					
• Yes	7 (70.0)	5 (62.5)	6 (50.0)	9 (90.0)	27 (67.5)
• No	3 (30.0)	3 (37.5)	6 (50.0)	1 (10.0)	13 (32.5)
Whether the business has own retail outlet					
• Yes	4 (40.0)	6 (75.0)	7 (58.3)	3 (30.0)	20 (50.0)
• No	6 (60.0)	2 (25.0)	5 (41.7)	7 (70.0)	20 (50.0)
Own storage facilities					
• Yes	10 (100)	7 (87.5)	8 (66.7)	6 (60.0)	31 (77.5)
• No	-	1 (12.5)	4 (33.3)	4 (40.0)	9 (22.5)
Own trucks for feed transport					
• Yes	3 (30.0)	3 (37.5)	5 (41.6)	1 (10.0)	12 (30.0)
• No	7 (70.0)	5 (62.5)	7 (58.3)	9 (90.0)	28 (70.0)
Membership in feed producer associations					
• Yes	3 (30.0)	-	1 (8.3)	-	4 (10.0)
• No	7 (70.0)	8 (100)	11 (91.7)	10 (100)	36 (90.0)
Special training in processing					
• Yes	8 (80.0)	6 (75.0)	5 (41.7)	8 (80.0)	27 (67.5)
• No	2 (20.0)	2 (25.0)	7 (58.3)	2 (20.0)	13 (32.5)

* Percentages in parentheses

3.2.2 Labour input for the feed businesses

The workforce in the feed businesses is dominated by men, mainly hired as full-time employees (Table 23). This is because the business is laborious due to the bulkiness of the products being sold.

Table 23. Number and categories of employees.

Study site	Full-time employees			
	Gender	Minimum	Maximum	Average
Kampala	• Male	0	5	3
	• Female	0	2	1
Wakiso	• Male	1	12	4
	• Female	0	18	3
Masaka	• Male	0	6	2
	• Female	0	4	1
Mukono	• Male	1	16	4
	• Female	0	2	1
Total number of full-time employees	• Male	0	16	3
	• Female	0	18	1
	Part-time employees			
	Gender	Minimum	Maximum	Average
Kampala	• Male	0	5	1
	• Female	0	0	0
Wakiso	• Male	0	6	2
	• Female	0	6	2
Masaka	• Male	0	5	1
	• Female	0	0	0
Mukono	• Male	0	4	1
	• Female	0	0	0
Total number of employees	• Male	0	6	1
	• Female	0	2	1
	Family labour employees			
	Gender	Minimum	Maximum	Average
Kampala	• Male	0	2	1
	• Female	0	1	1
Wakiso	• Male	0	2	1
	• Female	0	2	1
Masaka	• Male	0	1	1
	• Female	0	2	1
Mukono	• Male	0	1	1
	• Female	0	1	1
Total number of family labour	• Male	0	2	1
	• Female	0	2	1

3.2.3 Contribution of the feeds business relative to other businesses

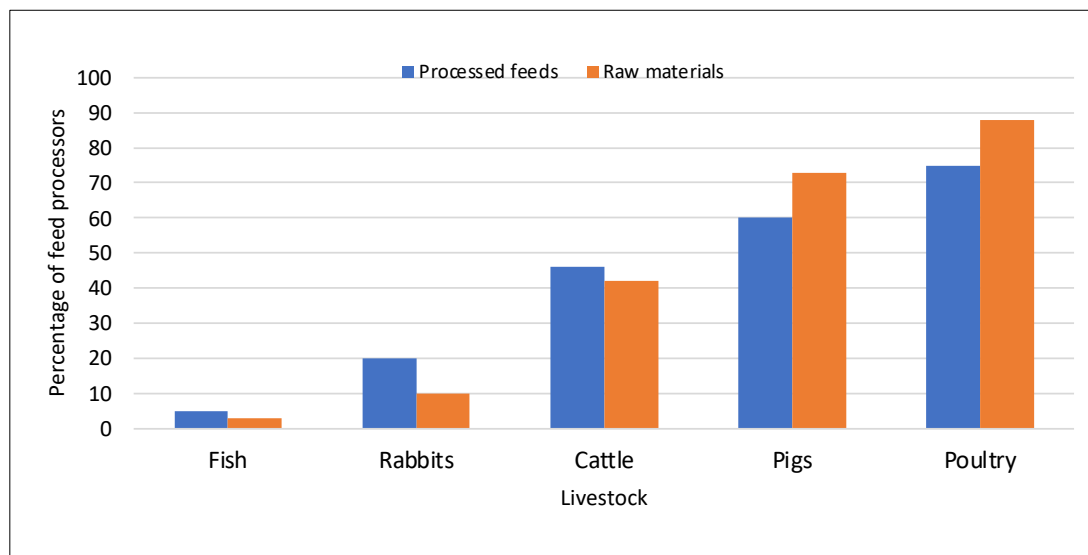
The respondents were asked to rate the contribution of the feeds business relative to other businesses that they dealt in. Over 59% of the respondents indicated that 100% of their investments and capital are in the feeds business. Similarly, 54% of the actors noted that feeds business contributes 100% to the household income when compared to other businesses. This implies that feeds business is an important enterprise for those that are currently engaged in it.

3.2.4 Livestock feeds traded

3.2.4.1 Livestock species targeted

The results showed that the dominantly traded livestock feeds both in terms of raw materials and processed feeds are for poultry followed by pig and cattle feeds (Figure 9). Feeds for rabbits and fish are also an emerging growth area for the feed businesses.

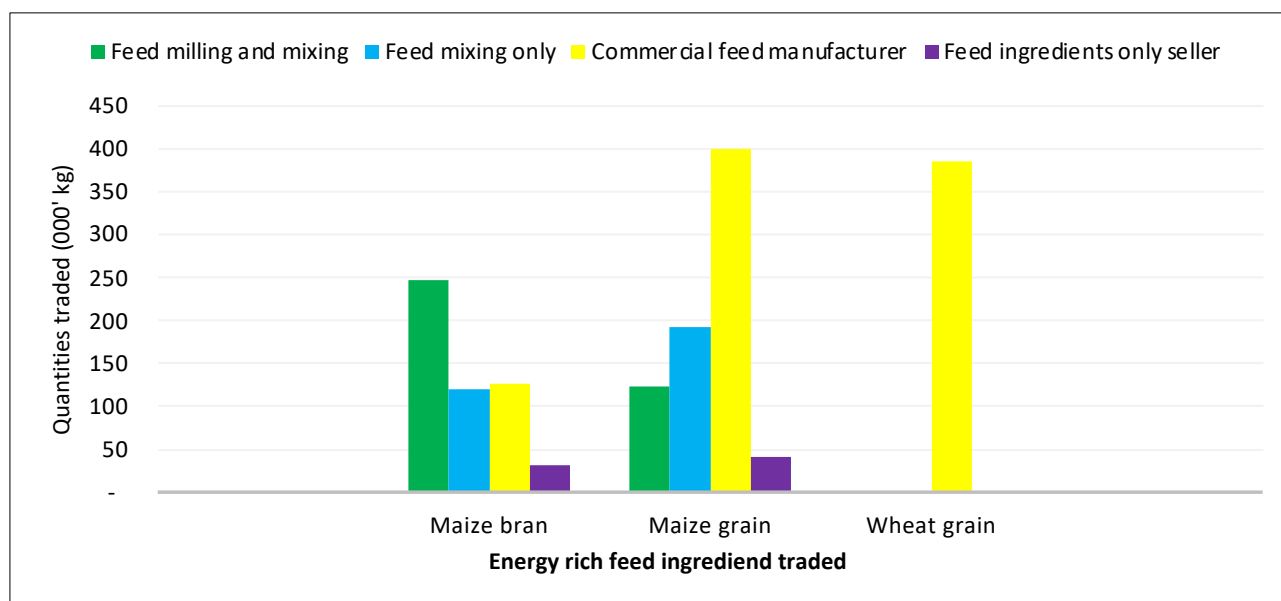
Figure 9. Type of livestock feeds traded.



3.2.4.2 Type of feed raw materials traded

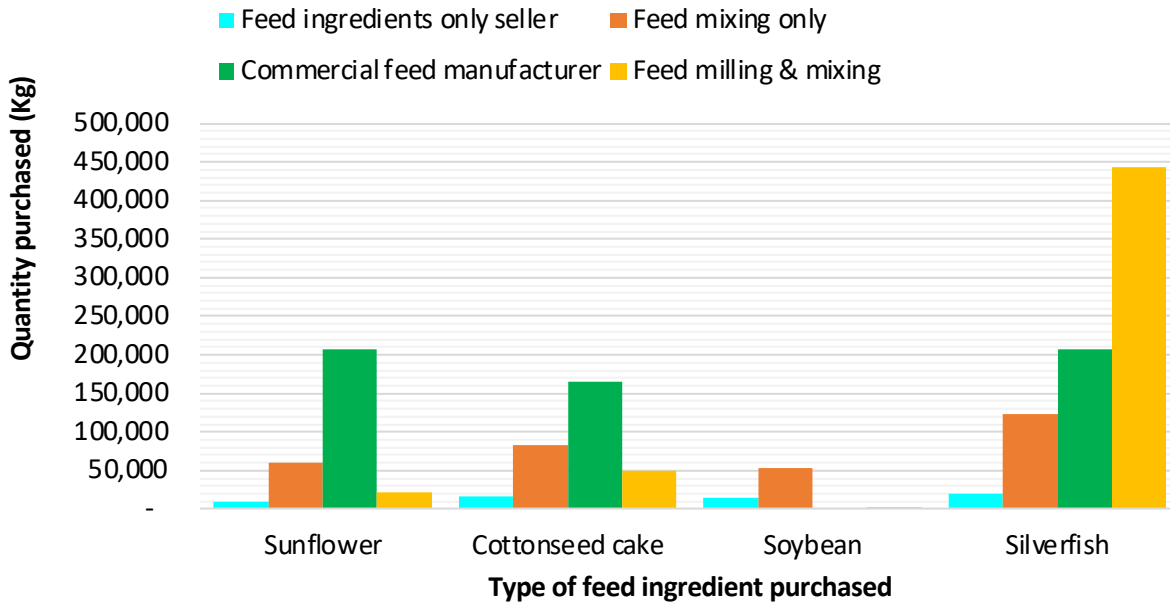
The feed raw materials traded can be classified into proteins and (energy-rich) cereals. The most commonly traded energy-rich feed ingredients are maize grain and maize bran (Figure 11). Maize grain is mainly purchased by commercial feed manufacturers while maize bran is commonly purchased by feed businesses, which are involved in feed milling and mixing. Wheat grain is solely traded by commercial feed manufacturers while wheat bran is solely traded by feed milling and mixing businesses.

Figure 10. Type of energy rich feed ingredients purchased by feeds processor.



Soybean, cottonseed cake, sunflower cake and silverfish are the commonly traded protein-rich feed ingredients (Figure 11). As expected, large volumes of silverfish are mainly traded by businesses engaged in feed milling and mixing while large volumes of cottonseed cake and sunflower cake are mainly used by commercial feed manufacturers.

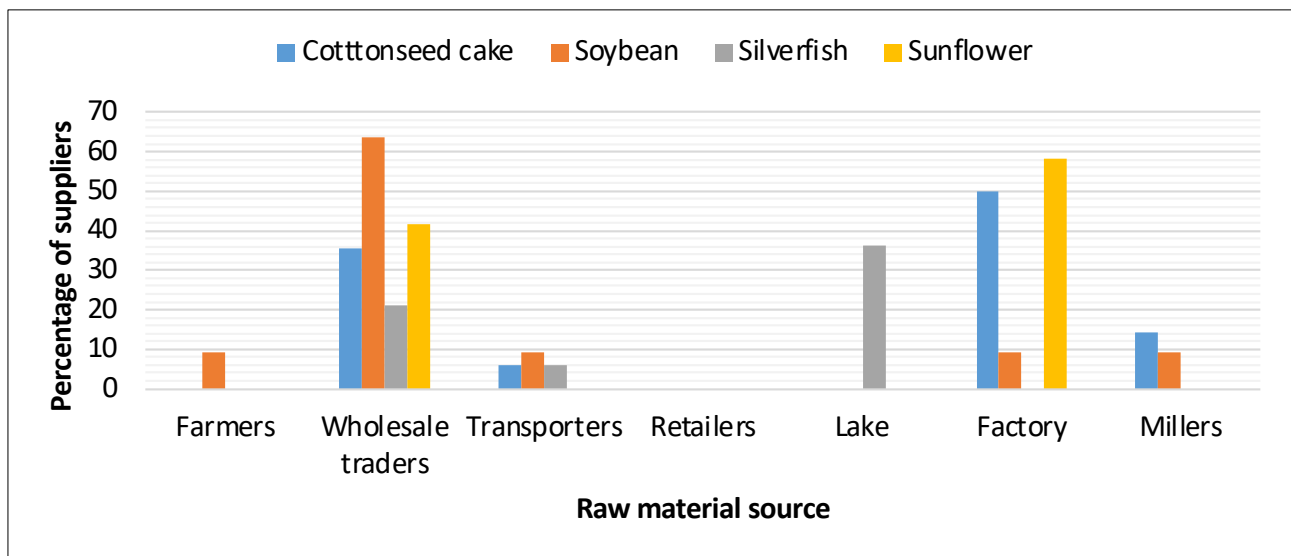
Figure 11. Type of protein-rich feed ingredients purchased by feeds processor.



3.2.4.3 Sources of protein-based feed ingredients

Soybean was mainly supplied by wholesale traders (91%) and farmers (9%) while silverfish was mainly sourced from the wholesale traders (73%) and directly from the lake (27%) where it is supplied by fishermen (Figure 12). Sunflower and cottonseed cake were mainly sourced from oil processing factories and wholesale traders who procure large volumes from the oil processing factories.

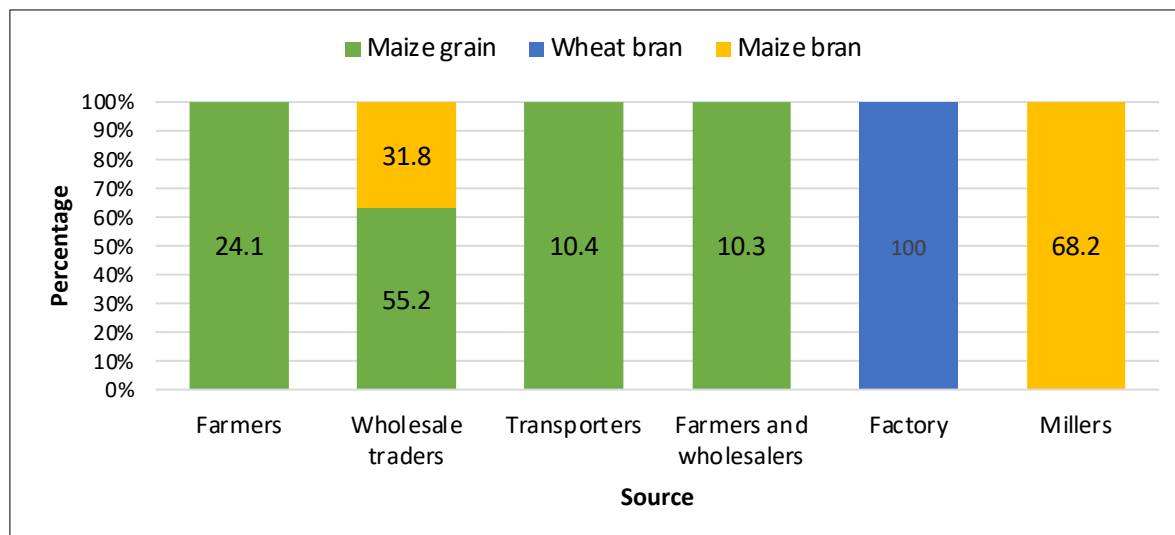
Figure 12. Source of protein-rich feed ingredients.



3.2.5 Sources of cereal-based feed ingredients

Wheat bran was solely sourced from grain milling factories, while maize bran was sourced from grain milling factories and wholesale traders (Figure 13). Maize grain was mainly sourced from wholesale traders, farmers and transporters.

Figure 13. Source of energy-rich feed ingredients.



3.2.5.1 Pricing of raw materials traded

The prices for feed ingredients are displayed in Table 24. The results show that maize bran is the cheapest among the energy-rich feed ingredients with an average purchase price of UGX900 per kilogram while maize grain was the most expensive at UGX1,200 per kilogram. For the protein-rich feed ingredients, sunflower cake was the cheapest at UGX900 per kilogram while silverfish was the most expensive at UGX3,500 per kilogram. It is also important to note that the nutritionally balanced feed ingredients such as concentrates were the most expensive among all the feed ingredients in the market.

Table 24. The average price of raw materials purchased.

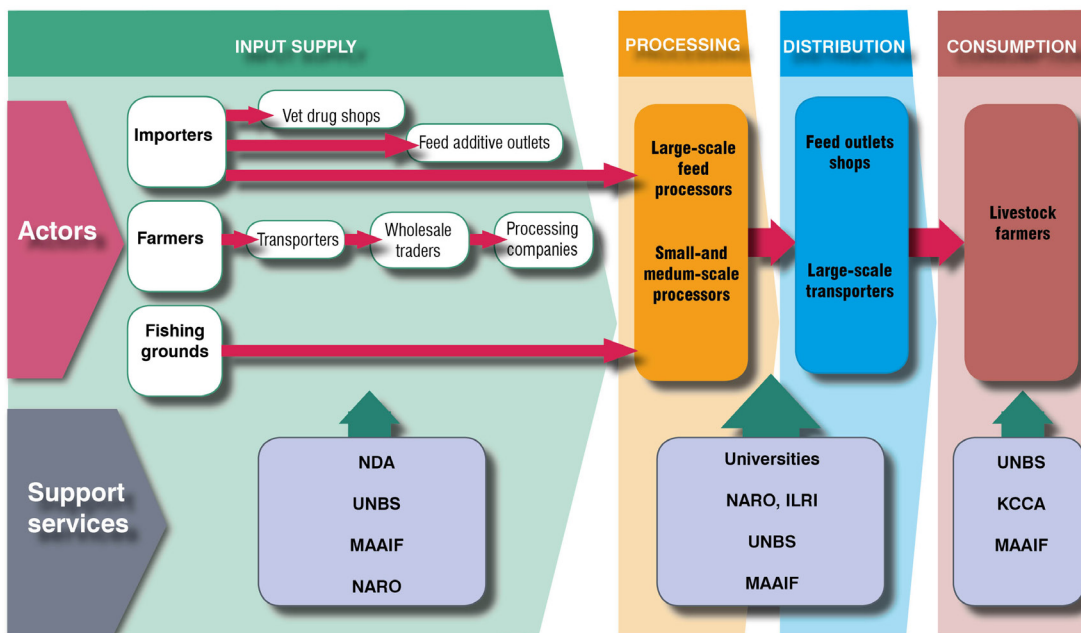
Type of raw material	Average purchase price (UGX/kg)
Concentrate	3,700
Silverfish	3,500
Booster	2,900
Soybean	2,300
Maize grain	1,200
Cottonseed cake	1,100
Maize bran	900
Sunflower cake	850
Limestone	370

3.3 Livestock feeds value chain

The livestock feeds value chain is composed of the feed input supply node, processing node, distribution node and consumption node as displayed in Figure 14. The actors that supply feed ingredients are importers, fishermen, farmers, processing factories and wholesale traders. Importers mainly supply feed additives such as concentrates, premixes and boosters. They, in turn, supply these directly to the feed processors, veterinary drug shops and specialized feed outlet shops. Other key actors under the input distribution node are farmers who are engaged in the production of maize grain and soybean, which is supplied to wholesale traders through transporters. Some farmers also supply directly to the processors. The fishermen directly supply silverfish and lake shells to feed processors. Processing factories are the other key actors under the input node and supply oil cakes and cereal brans. After the feed ingredients have been sourced, they are processed into varied feed types under the processing node by grading, cleaning and sorting, milling, mixing, packaging and branding. The key actors under the processing node are commercial feed manufacturers and small- and medium-scale feed manufacturers and backyard feed processors. The commercial feed manufacturers are large-scale and have established feed brands. Unlike the commercial feed manufacturers, the small- and medium-scale feed processors' processing activities are similar and only differ in the scale of production. Once the feeds have been processed they are distributed through large-scale transporters to consumers or distributed to other selling outlets. The domestically distributed feeds are used by livestock farmers for pig, poultry and dairy production.

There are several institutions providing support functions in the feeds value chains. These include the NDA, the Ministry of Agriculture Animal Industry and Fisheries (MAAIF), UNBS, ILRI and the National Agricultural Research Organisation (NARO). The support offered is in the form of technical advice, quality and standards enforcement, and livestock feeds research

Figure 14. Livestock feeds value chain.

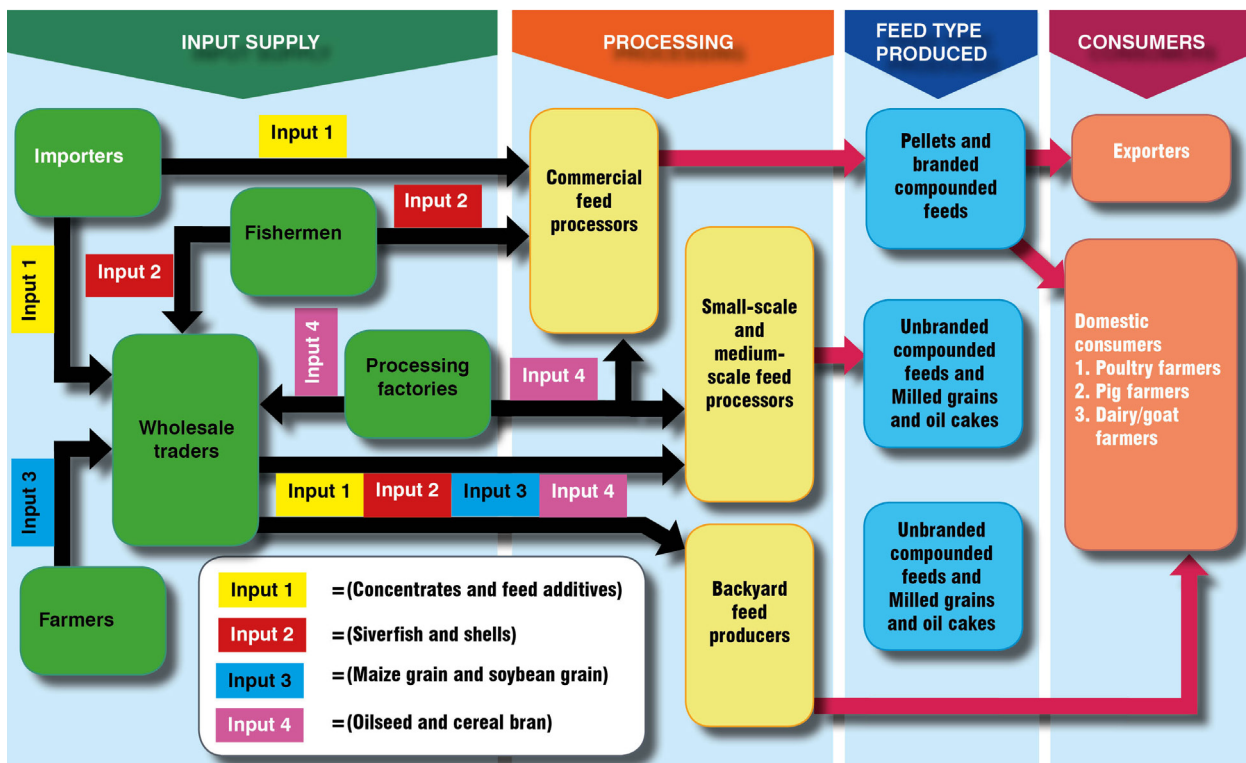


3.4 Livestock feed processors' business models

A total of 40 feed processor businesses were surveyed in the study sites. Figure 15 shows the business models including the suppliers, ingredients supplied, the nature of feed business, the feed types produced and the type of customers served. The major distributors of feed ingredients include wholesalers, farmers, processing factories and fishermen. These supply the ingredients to feed businesses, which are involved in milling feeds, feed milling and mixing and those that manufacture commercial feeds. The feed processors are categorized into commercial, small- and medium-scale and backyard processors. The commercial feed processors are usually large-scale registered companies

and these mainly use cereals, legume grains, silverfish and oilseed cakes to produce either pelleted feeds or branded and packed compounded feeds. The commercial feed processors supply processed feeds to medium- and large-scale feed processors that usually produce unbranded and unpacked compounded feeds and feed ingredients for farmers who have their own formulations. The backyard feed processors mainly buy processed feed ingredients from the small- and medium-scale processors and sell these as is to final consumers. The consumers of the produced feeds vary depending on the nature of the feed producer. For instance the commercial feed manufacturers are able to export the processed feeds because they aim to meet particular standards while the small- and medium-scale processors mostly sell to domestic livestock producers.

Figure 15. Livestock feed ingredients and mixed feed distribution channels.



3.5 Factors influencing the choice of suppliers

The factors which influence the choice of suppliers include trust, expected price level, quality of the product sold and payment arrangement (Table 25). Trust of the system was the most important factor for most feed businesses.

Table 25. Factors influencing the choice of suppliers.

Factor	Percentage
Expected price level	23.3
Variability of price	10.0
Payment arrangement	10.0
Trust of the system	33.3
Quality of product sold	23.3

3.6 Factors influencing the choice of raw materials

The most important factors influencing the choice of raw materials in first, second and third place, respectively, are quality, cost and consumer preference (Table 26). The determinants for quality vary depending on the nature of feed ingredient being purchased for instance good-quality maize grain has to be well dried to the right moisture content and should be pure white, while silverfish must have a nice aroma and be free of foreign matter. Other factors which influence the choice of raw materials are longer shelf, availability and the need for suppliers to supply bulk quantities of raw material purchased.

Table 26. Factors influencing the choice of raw materials

Parameter	Frequency	Percentage
Quality	35.0	34.3
Cost	25.0	24.5
Consumer preference	16.0	15.7
Longer shelf life	9.0	8.8
Availability	8.0	7.8
Bulk quantity	4.0	3.9
Desire to develop new products	2.0	2.0
None	2.0	2.0
Others	1.0	1.0

3.7 Feed sales

This section presents the results of the feed sales, feed types and how feed businesses operate.

3.7.1 Feed products and importance of products sold

Maize bran and broken maize were the most important feed ingredients, contributing 50% to the sales in the feeds business (Table 27). This is probably due to the increased use of concentrates in feed formulation especially for poultry feed in which maize bran and broken maize are key ingredients. Other ingredients which contribute to the feed product sales are silverfish, compounded feeds, boosters and concentrates.

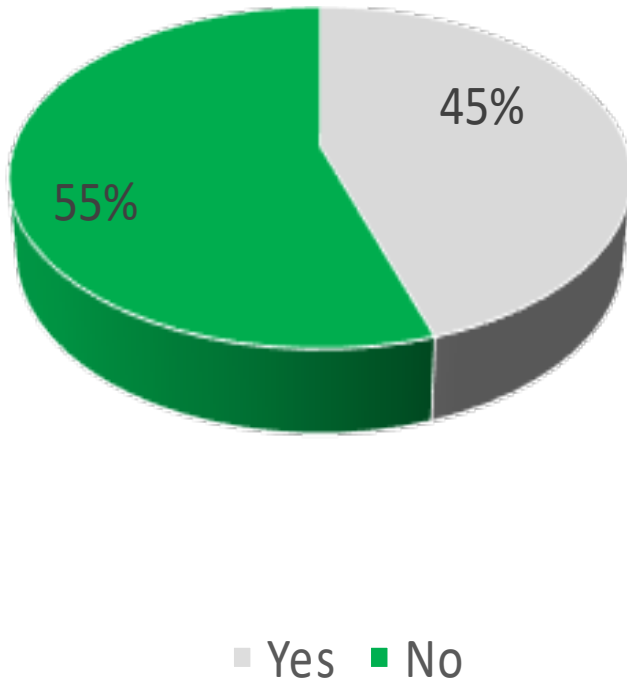
Table 27. Most important products in terms of sale.

Product	Frequency	Percentage
Maize bran	31.0	28.7
Broken maize	24.0	22.2
Silverfish	19.0	17.6
Cotton	10.0	9.3
Compounded feeds	10.0	9.3
Boosters	4.0	3.7
Concentrates	4.0	3.7
Soybean	2.0	1.9
Maize grain	1.0	0.9
Sunflower	2.0	1.9
Others	1.0	0.9

3.7.2 Standardization and formulation among feeds businesses

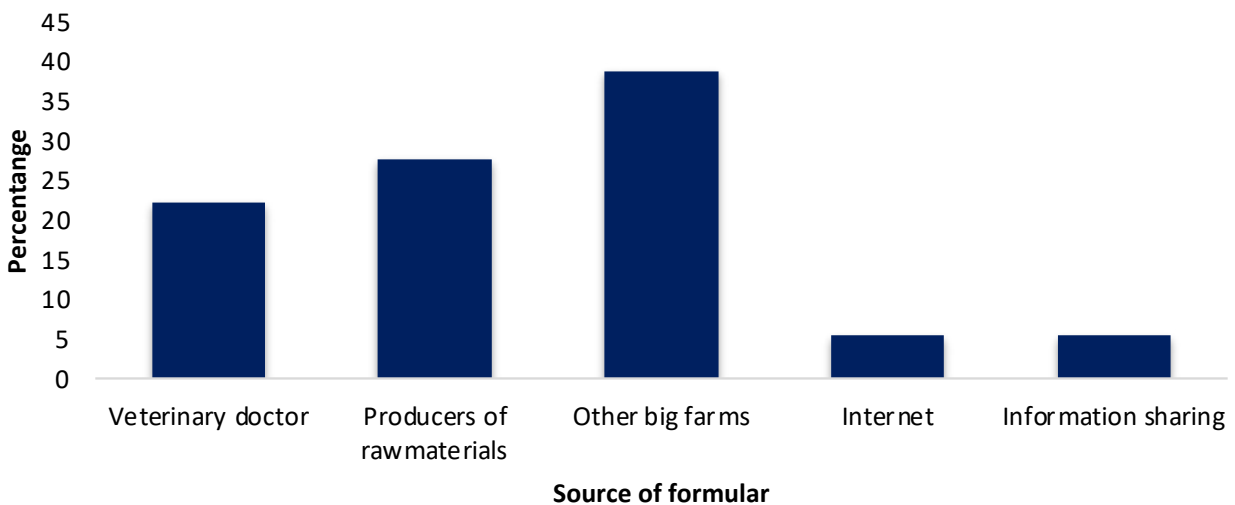
The respondents were asked whether they had a feed formula and also to state the source of the formula. The results show that 45% had a feed formula (Figure 16). This is not surprising since majority of the farmers who comprise the largest proportion of the customer base use their own formulas that have been customized to meet the costs and nutrient requirements of their livestock.

Figure 16. The proportion of feed business owning a feed formula.



The feed formulae are mainly sourced from big farms, producers of raw materials and veterinary doctors (Figure 17). It is important to note that the internet and information sharing are among the least important sources of feed formula information.

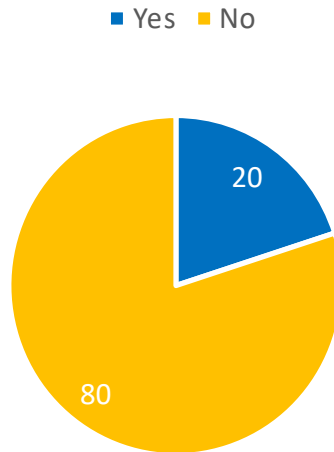
Figure 17. Source of formula for producing feeds.



3.7.3 Feed branding

Results show that only 20% of the feeds businesses owned a feed brand (Figure 18) and so this presents challenges in ensuring production of good quality products. In addition, the lack of a brand limits the participation of feed businesses in the export market.

Figure 18. Feed businesses with a brand name.



Out of the eight businesses that had a brand, only four mentioned that the brand contributed 100% to their sales (Table 28), while the rest mentioned that the brand contributed between 50% and 99% of their sales.

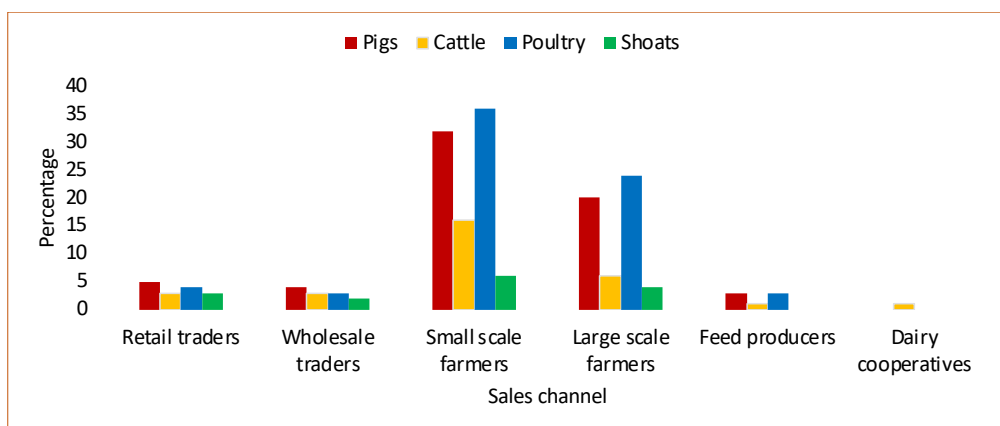
Table 28. Contribution of brand to business sales.

Percentage of sales attributed to brand	Frequency
50	2.0
60	1.0
99	1.0
100	4.0

3.7.3.1 Livestock feed sales channel

The results showed that the commonly used channel for selling livestock feeds are small-scale and large-scale farmers (Figure 19). These mainly buy feeds for poultry followed by pigs and cattle in first, second and third place, respectively. In addition, wholesale and retail feed traders and producers are the other sales channels used by feed processors to sell feeds.

Figure 19. Feeds sales channels.



3.8 Key informant results

Key informant interviews were conducted in order to get a deeper understanding of the commercial feeds value chain in terms of product types, flows, supply and demand, marketing strategies and other support services such as credit and infrastructure. Individuals with vast knowledge about the livestock feeds value chain were interviewed and also additional information was sought on the effect of policies and regulations on feed trading. The respondents for the key informant interviews included district officials from the production department of the study districts and managers who had been in the feeds business for over 10 years. In total 14 key informants were interviewed.

3.8.1 Types of feeds traded

3.8.1.1 Cereal-based feeds

According to the key informants, the main cereal-based feed ingredients sold were maize bran, broken maize and rice bran, which are a key carbohydrate source for livestock whose owners mainly use concentrates. There is some limited trade in rice bran occurring mainly during periods when maize bran is scarce. It was noted that the farmers who buy the mentioned cereal ingredients are in urban and peri-urban areas and are mainly commercial farmers, unlike the rural subsistence oriented farmers. The subsistence farmers use locally available feeds such as food leftovers, weeds, banana peelings for pigs and practice free-range system for poultry production.

3.8.1.2 Feed supplements/boosters

The feed supplements that were traded in the market were mostly composed of premixes mainly used in compounding feeds for poultry and pigs. Table 29 shows some of the available brands in the studied feed outlets including their composition.

Table 29. Composition of feed supplements sold.

Type of feed supplement	Composition (vitamins) per kg	Other composition per kg
Vitamix (broiler 30%)	Vitamins per kg Vitamin A 33,300 IU Vitamin D3 6,660 IU Vitamin E 84.0mg Vitamin B1 6.2 mg Vitamin B2 16.7 mg Vitamin B3 33.3 mg Vitamin B6 6.7 mg Vitamin B12 100.0 mg	Methionine 6,992 mg Lysine 6,340 mg Others Niacin 3.3 mg Folic acid 333.0 Choline chloride 1,670.0 mg
Newsmax	No composition	
Premix	Vitamin A, D3, E, B1, B2, B6)	
Supamix Pig Premix	Vitamin A 19,000,000 IU Vitamin D3 2,000,000 IU Vitamin E 30,000 IU Vitamin B12 11 mg Vitamin B1 2,000 mg Vitamin B2 5,000 mg Vitamin B6 3,800mg	Niacin 35,000 mg Pantothenic Acid 16,000 mg Folic acid 2,000 mg Biotin 160 mg Choline chloride 380,000 mg Manganese 40,000 mg Zinc 135,000 mg Iron 160,000 mg Copper 40,000mg Iodine 40,000 mg Cobalt 280 mg Selenium 120 mg

3.8.1.3 Concentrates

A number of concentrates are imported and traded in the market. The brand names of the imported concentrates include Hendrix, Koudijs and Jubaili. The composition of these concentrates was not listed on the packaging material. There are several locally manufactured concentrates available in the market. Table 30 shows the concentrates as well as their composition.

Table 30. Main animal feed concentrates used by feed processors.

Concentrates	Composition (vitamins) per kg	Other composition per kg
Wonder Pig	Amino acids, vitamins, organic calcium, phosphorous, probiotics, carbohydrates and proteins	
Big Pig	Vitamin B3 (2,000,000 IU), Vitamin E (20,000 IU) Vitamin K, (2,000 mg) Vitamin B6 (2,000 mg) Vitamin B12 (12 mg)	Biotin (50,000 mg) Folic acid (1,200 mg) Cobalt (300 mg) Copper (8,000 mg) Pantothenic acid (2000 mg) Niacin (18,000 mg) Chlorine q (60,000 mg) Zinc (60,000 mg) Selenium (100 mg)
Pig Grow	Vitamin A (25,000,000 IU), Vitamin B3 (50,000,000 IU) Vitamin E (5,000 IU) Vitamin B1, (0.6 g) Vitamin B12 (0.0075 g) Vitamin B4 (1.5 g)	Pathonate (0.1 g) Magnesium sulphate (0.1 g) Sodium sulphate (0.1 g) Feroous Sulphate (0.02 g) Biotin (4.75 g) Lysine (4.75 g) Nicotinic acid (5,000 g)
Egg Booster	Crude protein Amino acids Crude fibre Metabolized energy Enzymes Minerals Other vital nutrients	
Meat Booster	Growth stimulants Crude protein Metabolized energy Amino acids Crude fibre Minerals	

Regarding seasonality, the key informants indicated that the demand for concentrates is generally high throughout the year. However, the demand for cereal-based feed ingredients such as maize bran, maize grain is seasonal and is highest in January and February.

3.8.2 Perceptions regarding quality of feed ingredients, compounded feeds and supplements

The key informants were asked to indicate the parameters used in assessing quality of feed ingredients and supplements. They indicated the main quality parameters to be texture (assessed through feeling), colour, appearance, smell (not mouldy), clean, moisture content and experimentation. There was an indication that the quality attributes, which result in the best prices of the feed ingredients, vary based on the type of ingredient being traded. For instance, when trading maize bran, feed processors will usually pay a high price for maize bran which is light brown. For cottonseed cake, a high price is paid for one which is greenish, an indicator that it is not burnt. Besides, it must have a nice aroma and should be less fibrous. For maize grain, preference is given to that which has been dried to the right

moisture content, is free of stones and other foreign material, and is whitish. Lastly, ingredients such as silverfish and shells have to be clean, free of stones, dirt and other foreign material and should have attained the right moisture content which they check physically by biting or observation.

3.8.3 Microsizing of inputs

The key informants indicated that the locally produced inputs are sold in different sizes and the common unit of measurement used is the kilogram. The amount stocked generally depends on consumer demand. However, variations were realized in the package sizes for pellets, which were presented in 25 kg and 50 kg packs. The commonly used packaging materials were gunny bags and polythene bags because they were readily available and affordable.

3.8.4 Marketing strategies among feed processors

The key informants were asked whether they experienced any problems in finding suppliers for the feed products that they sell. They indicated that there were no issues associated with supplies. Usually there is a large number of suppliers who sell feed inputs and readily market their products at the processor's premises as part of their business strategy.

To ensure a constant supply of products for sale, feed processors adopt a number of strategies including regular stocking of products, establishing a good supplier base, having a good trading relationship with suppliers by making prompt payments, deposits, honouring credit and being loyal.

The feed processors do not face any problems in finding customers. They adopt a number of strategies to attract customers including selling quality products, offering credit and technical services related to feeds and feeding, advertising their businesses through mass media, and conducting follow-up visits to clients. Referrals by existing clients is another strategy that the businesses encourage through the existing customer base. In addition, in order to ensure customer loyalty, the feed processors offer advisory services, provide price discounts and diversify products sold to meet customer needs. Some of the large feed processors export feeds to Rwanda and the Democratic Republic of Congo.

3.8.5 Technical support services for feed processors

Feed processors usually receive technical advice from actors in the feed business on feeds and feeding once a quarter or annually. The topics covered usually include use of new concentrates and drugs, which have been introduced in the market. In addition, they are also trained in feed formulation, feed mixing, feed quality management and storage. Most of the key informants noted that they find the information useful since it is a source of knowledge that they also extend to their customers.

3.8.6 Factors influencing the price of products and services

The prices of most feed products were found to be variable. A number of factors were noted to influence the price variability of feed products including:

- reduced agricultural productivity in the country,
- competition from traders from neighbouring countries,

- seasonality of supply of some inputs such as maize and maize bran,
- government policies on prices of in-country and imported products,
- low supply of silverfish and
- price fluctuations of fish.

In order to overcome some of the challenges associated with price volatility, the following measures are adopted by some of the feed processors:

- stocking large quantities of inputs when prices are low,
- sourcing for maize from places where there is high production,
- Selling feed products at existing prices in order to retain customers and
- stocking some feed ingredients such as silverfish, in bulk.

3.8.7 Losses emanating from infrastructural related issues

It is worth noting that feed product losses as a result of transport and storage are commonly experienced by the traders. The major cause of losses while the feed products are being transported is moisture loss, price volatility from the time of purchase up to the time of sale, spillage during transportation and high transport costs. The major causes of the feed product loss during storage are poor storage facilities, which result in rotten produce, pests and loss in weight of the feed products as a result of moisture content loss.

The feed processors have adopted strategies to overcome such losses including construction of better storage facilities, fumigation of storage facilities, regular maintenance of store hygiene, use of hermetic bags and purchasing feed products that have been dried to the right moisture content level. To reduce transport losses, some of the strategies adopted include negotiations with transporters to reduce the transport charges.

3.8.8 Access to credit

Credit in the form of deferred payment is a necessary service that sellers usually extend to their buyers out of the need to maintain customer loyalty. The credit is usually interest-free and lacks clear repayment terms, though some sellers usually condition their customers to pay their previous credit before they can be advanced new credit. Due to the risk of defaulting by customers, the feed processors screen the customers to ensure some level of credit-worthiness. The conditions include loyalty, trustworthiness, good repayment history and a long trading relationship with the feed processor.

Access to financial credit is a critical service for the smooth operation of any business as it enables the players to increase their stock and also diversify the products traded. However, the key informants indicated that financial credit is not easily accessible mainly because of high interest rates, low cash flows and lack of collateral by most traders, which limits their ability to take loans from formal financial institutions such as commercial banks.

3.8.9 Innovation

Key informants indicated that actors in the feeds business usually offer technical advice to their customers and this usually focuses on feed formulation, feeding requirements for different livestock species, feed storage, appropriate animal housing hygiene and feeding regimes, animal disease management and biosafety measures. However, most traders lacked technical training in feed processing and therefore do not effectively offer technical advice to the farmers.

Although there are no feed traders' associations, there is some level of integration of the feed traders by other actors in the value chain such as farmers, feed manufacturers, fellow traders and veterinary doctors. The benefits realized from the integration are minimal since the focus is mainly on the trading process.

There are efforts by most traders to expand into new markets. This is through practices such as opening feed trading outlets in new locations to cater to unmet demand for feeds especially in areas where livestock farming is a new enterprise. Besides, there are innovations by traders to venture into non-traditional products such as silage making and adapting to prevailing market need by availing new products such as concentrates.

3.8.9.1 Constraints in compound feeds/ supplementary feeds

The feed processors were asked to mention the constraints that they faced in the feeds business and also to suggest possible solutions. The constraints were later grouped into two thematic areas – those related to policy issues and technical know-how (Table 31).

Some of the constraints under the policy theme included adulteration of feeds; use of inappropriate feed formulas, which leads to poor quality feeds; insufficient information on the nutrient composition of concentrates and commercial feeds; increased exports of maize and increased competition from feed ingredient imports especially concentrates.

Table 31. Constraints faced by feed processors and suggested solutions.

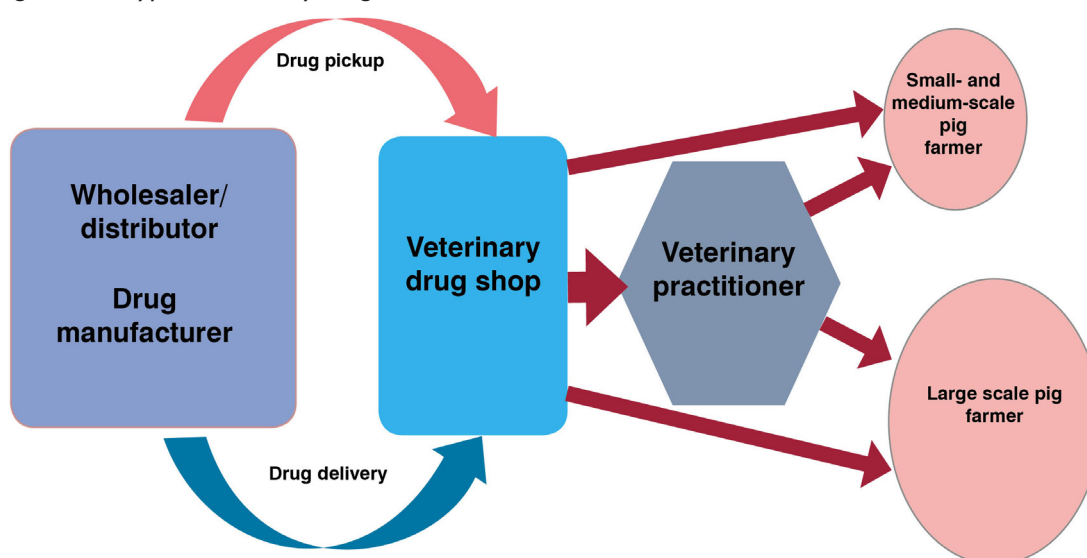
Themes	Constraints	Suggested solutions
Policy issues	<ul style="list-style-type: none"> • Adulteration of feeds • Use of inappropriate feed formulas resulting in poor-quality feeds • Insufficient information on the nutrient composition of commercial concentrates and other compounded feeds • Low supply of feed ingredients such as maize due to increased exports for maize grain • High-priced commercial feed ingredients (e.g. concentrates) • Price fluctuations • Competition from imported products 	<ul style="list-style-type: none"> • Government enact the Feed Bill to regulate the feeds industry • Feed processors need to be more informed and ethical • Need to conduct nutrient analyses of all commercial compounded feeds and concentrates • Government regulate the export of maize • Government reduce taxes of imported feed ingredients • Government effect its policy on supporting traders to stock raw materials and also set up a price ceiling for raw materials
Technical know-how	<ul style="list-style-type: none"> • Lack of knowledge about feeds and ingredients • Bad debts from farmers • Limited purchasing power of commercially formulated feeds by most farmers resulting from farmers' own formulations 	<ul style="list-style-type: none"> • Feed processors to conduct follow up visits • Screening of farmers for credit and entering into contractual agreements • Increased farmer sensitization on proper feed formulation

4. Veterinary drug retailers

4.1 Veterinary drug retailers' business models

Generally, drug retailers/stockists that were interviewed receive the veterinary drugs from large manufacturing companies such as MTK Uganda Limited, Quality Chemicals, Norbrook and others who transport and distribute them to the veterinary shops (Figure 20). Others source the drugs from wholesalers and distributors who are mainly found in 'container' village in Kampala. The main buyers of the drugs are livestock farmers and the veterinary practitioners who buy to treat animals in farms.

Figure 20. A typical veterinary drug stockist business model.



4.2 Demographic characteristics of veterinary drug retailers/stockists

A total of 17 drug stockists from the study sites were interviewed. Fifty three per cent of the respondents were women and 47% men (Table 32). Wakiso and Kampala had a higher percentage of female attendants (60%) than Mukono (33%) compared to males.

Table 32. Veterinary drug shop attendants by sex.

District	Male		Female		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Masaka	2.0	50.0	2.0	50.0	4.0	100.0
Mukono	2.0	66.7	1.0	33.3	3.0	100.0
Wakiso and Kampala	4.0	40.0	6.0	60.0	10.0	100.0
Total	8.0	47.1	9.0	52.9	17.0	100.0

NB: Only one shop attendant from Kampala was interviewed, hence it was combined with Wakiso District

Majority of the veterinary drug shop attendants had attained a degree or diploma. Only 12% of the sampled drug shops had attendants with certificates (Table 33). Those with certificates were not fully left to manage the shops. In most cases, the owners were professional veterinary personnel who would leave the attendants to serve customers when they are away in the field to treat livestock. It is worth noting that the qualifications of attendants were also related to the type of drugs a drug shop is allowed to stock (the NDA categorizes them as Type A, B and C) according to information from the respondents. For instance, some drug shops are not allowed to stock and supply vaccines.

Table 33. Veterinary drug shop attendants' education levels.

District	Degree		Diploma		Certificate	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Masaka (n=4)	1.0	25.0	3.0	75.0	0.0	0.0
Mukono (n=3)	1.0	33.3	2.0	66.7	0.0	0.0
Wakiso and Kampala (n=10)	3.0	30.0	5.0	50.0	2.0	20.0
Total (n=17)	5.0	29.4	10.0	58.8	2.0	11.8

Seventy per cent of the sampled drug shops had attendants who were specialized in animal husbandry and animal production or animal production and management, who then served as paraveterinarians. The rest had veterinary medicine specialization (Table 34).

Table 34. Veterinary drug shop attendants' specific education discipline.

District	Education (discipline) – % of respondents	
	Animal husbandry and production or animal production and management	Veterinary Medicine
Masaka (n=4)	75.0	25.0
Mukono (n=3)	66.7	33.3
Wakiso and Kampala (n=10)	70.0	30.0
Total (n=17)	70.6	29.4

In terms of career development and further training on the job, 53% of the attendants had not received any training. Some of those trained received training in community animal health work (18%), especially for those in Mukono. Others received training in animal husbandry, and poultry and livestock disease management, among other areas (Table 35).

Table 35. Veterinary drug shop attendants' that received further training.

Training	Percentage of drug shops			
	Masaka (n=3)	Mukono (n=3)	Wakiso and Kampala (n=10)	Total (n=17)
Animal husbandry	0.0	0.0	10.0	5.9
CAHW	0.0	0.0	30.0	17.6
Drugs	33.3	0.0	0.0	5.9
Poultry and animal disease management and prevention	0.0	0.0	10.0	5.9
None	66.7	66.7	50.0	52.9
General poultry management	0.0	33.3	0.0	5.9
Veterinary training	33.3	0.0	0.0	5.9

Majority of the veterinary drug shop attendants were not the owners of the businesses. Results indicate that 71% of attendants were hired staff (Table 36).

Table 36. Veterinary drug shop attendant as the owner of the business.

District	Frequency	Percentage
Masaka (n=4)	2.0	50.0
Mukono (n=3)	1.0	33.3
Wakiso and Kampala (n=10)	2.0	20.0
Total (n=17)	5.0	29.4

In terms of longevity on the job, over 75% of sampled veterinary drug shop attendants had stayed in those businesses for two or more years, though the majority had stayed for 2–4 years (Table 36). Longevity on the job can be perceived as a key element in establishing relations with customers and understanding customer needs and addressing it. It also reflects the demand and availability of clients that sustain these business for years.

Table 37. Number of years spent by veterinary drug shop attendant's in the business.

Years	Masaka		Mukono		Wakiso and Kampala		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
0–1	1.0	33.3	0.0	0.0	2.0	22.2	3.0	18.8
2–4	1.0	33.3	3.0	100.0	4.0	44.4	8.0	50.0
5–10	1.0	33.3	0.0	0.0	3.0	33.3	4.0	25.0
More than 10	0.0	0.0	0.0	0.0	1.0	11.1	1.0	6.3

4.3 Livestock types served and health issues

4.3.1 Livestock types

The majority of the veterinary drug shop attendants mentioned cattle, pigs, goats and sheep and poultry as the livestock that farmers mostly buy drugs for from their drug shops. (Table 38).

Table 38. Type of livestock mostly dealt with by veterinary drug shop attendant by district.

	Percentage of vet drug stockists by livestock whose drugs are stocked				
	Poultry	Cattle	Pigs	Shoats	Rabbits
Masaka (n=4)	100.0	100.0	100.0	50.0	0.0
Mukono (n=3)	100.0	100.0	100.0	66.7	0.0
Wakiso and Kampala (n=10)	70.0	100.0	100.0	100.0	0.0
Overall sample (n=17)	82.4	100.0	100.0	82.4	0.0

4.3.2 Main livestock diseases that drug stockists provided drugs for in the last six months

The main pig health issues that the stockists provided drugs for included swine fever, worm and mange. Over 80% of all the sampled veterinary drug stockists mentioned swine fever and over 70% mentioned worms (Figure 21). Other diseases mentioned included swine erysipelas and swine pneumonia.

Swine erysipelas and swine pneumonia were only mentioned by the veterinary drug stockists from Wakiso/Kampala and Masaka. For cattle, the main diseases that veterinary drug stockists across the four districts deal with are East Coast fever, trypanosomiasis, anaplasmosis, mastitis and babesiosis (Table 39).

Figure 21. Main pig diseases drug stockists have dealt with (pooled sample) in the last six months.

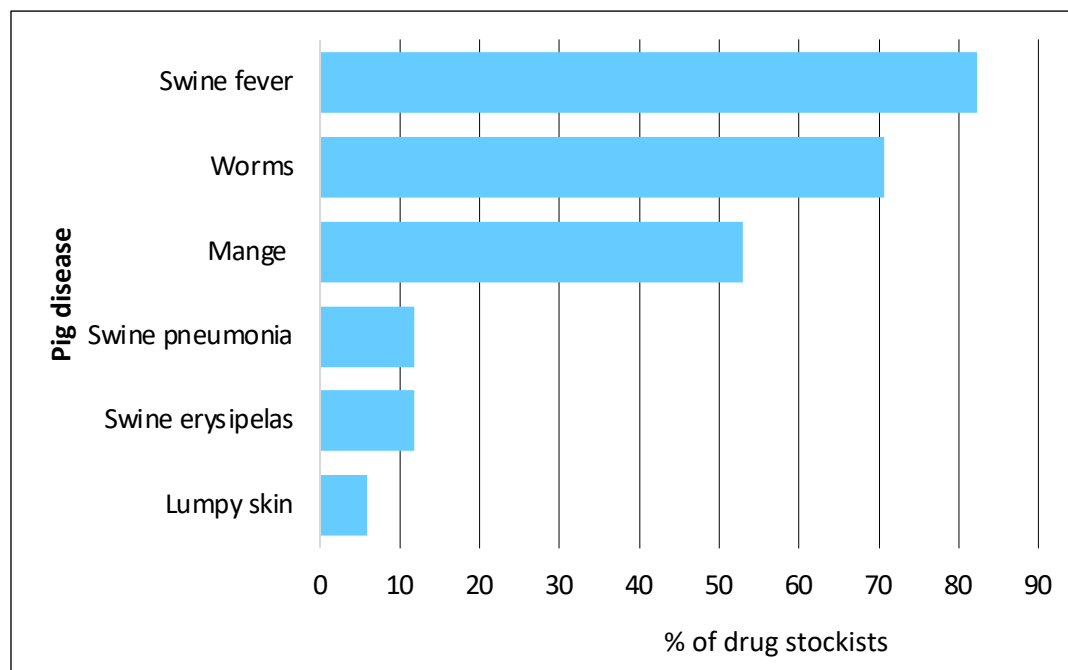


Table 39. Main cattle diseases drug stockists have dealt with in the last six months.

	Percentage of vet drug stockist by cattle disease whose drugs are demanded								
	East Coast fever	Anaplasmosis	Mastitis	Worms	Mange	Trypanosomiasis	Babesiosis	Bloat	Foot-and-mouth disease
Masaka (n=4)	100.0	75.0	25.0	0.0	25.0	75.0	25.0	0.0	0.0
Mukono (n=3)	100.0	0.0	33.3	33.3	0.0	33.3	33.3	33.3	33.3
Wakiso and Kampala (n=10)	100.0	30.0	10.0	40.0	10.0	40.0	10.0	0.0	10.0
Overall sample (n=17)	100.0	35.3	17.7	29.4	11.8	47.1	17.7	5.9	11.8

Trypanosomosis and anaplasmosis were mentioned by relatively more stockists from Masaka compared to those in the other sites. The veterinary drug stockists indicated that the main goat and sheep diseases they dealt with were worms (59%). The Wakiso and Kampala stockists also dealt with peste des petis ruminants (PPR or goat plague) and mange (Table 40).

Table 40. Main shoats diseases drug stockists have dealt with in the last six months.

District	Percentage of veterinary drug stockist by SHOATS disease whose drugs are demanded					
	PPR (goat plague)	Lumpy skin	Bloat	Trypanosomiasis	Worms	Mange
Masaka (n=4)	0.0	0.0	0.0	0.0	50.0	0.0
Mukono (n=3)	0.0	33.3	33.3	33.3	66.7	0.0
Wakiso and Kampala (n=10)	20.0	0.0	0.0	10.0	60.0	30.0
Total (n=17)	11.8	5.9	5.9	11.8	58.8	17.7

Poultry in the four sampled districts were mainly treated for Newcastle disease (94%), Gumboro (71%) and coccidiosis (59%) by the veterinary drug stockists (Table 41). Other important diseases included fowl pox, fowl typhoid and infectious coryza.

Table 41. Main poultry disease problems drug stockists have dealt with in the last six months.

Percentage of vet drug stockist by poultry disease whose drugs are demanded							
District	Newcastle	Gumboro	Infectious coryza	Microplasmosis	Coccidiosis/chronic respiratory disease	Fowl pox	Fowl typhoid
Masaka (n=4)	100.0	75.0	0.0	0.0	75.0	25.0	25.0
Mukono (n=3)	100.0	100.0	100.0	0.0	0.0	66.7	0.0
Wakiso and Kampala (n=10)	90.0	60.0	20.0	10.0	70.0	20.0	20.0
Total (n=17)	94.1	70.6	29.4	5.9	58.8	29.4	17.7

4.4 Livestock drugs commonly stocked by veterinary drug retailers

4.4.1 Anthelmintics

Anthelmintics are a group of antiparasitic drugs that expel parasitic worms (helminths) and other internal parasites from the body by either stunting or killing them and without causing significant damage to the host. Among the main pig anthelmintic drugs stocked by veterinary drug stockists and purchased by pig farmers were Ivermectin, mentioned by 88% of the veterinary drug stockists, and Levamisole, mentioned by 41% of the sampled veterinary drug stockists (Table 42). Others are Albendazole (liquid), Liverside and piperazin. Albendazole was stocked by only Masaka and Wakiso drug shops and piperazin by only Wakiso stockists.

Table 42. Most frequently stocked anthelmintic drugs sold to pig farmers.

District	Anthelmintic drugs stocked by drug stockists (%)					
	Ivermectin	Levamisol	Albendazole (liquid)	Piperazin	Normectin	Liverside
Kampala (n=1)	100.0	100.0	0.0	0.0	0.0	0.0
Masaka (n=4)	100.0	50.0	25.0	0.0	25.0	25.0
Mukono (n=3)	100.0	66.7	0.0	0.0	0.0	0.0
Wakiso (n=9)	77.8	22.2	22.2	22.2	11.1	11.1
Total (n=17)	88.2	41.2	17.7	11.8	11.8	11.8

Notes: Some of the drugs above have several trade names but with the same active ingredients. For purposes of information on which drugs are stocked in Kampala and Wakiso separately, we did not merge Kampala with Wakiso.

4.4.2 Arachnidicides

Arachnidicides are drugs against ectoparasites and many veterinary drug stockists (59%) indicated that they stock Armitrazin and 18% supply farmers with Nortraz for treatment (Table 43). Others are Dualdip, Vectocid, Cypermethrin and Streptomycin.

Table 43. Most frequently stocked arachnidicides sold to pig farmers.

District	Drug stockists stocking arachnidicides (drugs against ectoparasites) (%)					
	Nortraz	Dualdip	Vectocid	Cypermethrin	Streptomycin	Armitrazin
Kampala (n=1)3	0.0	0.0	0.0	0.0	0.0	100.0
Masaka (n=4)	0.0	0.0	25.0	25.0	0.0	75.0
Mukono (n=3)	0.0	0.0	0.0	33.3	33.3	33.3
Wakiso (n=9)	33.3	22.2	11.1	11.1	22.2	55.6
Total (n=17)	17.7	11.8	11.8	17.7	17.7	58.8

Note: Some of the drugs above have several trade names but with the same active ingredients

4.4.3 Antibiotics

Over 70% of the veterinary drug stockists indicated that they stock Oxytetracycline, about 30% indicated that they stock tetracycline and gentamicin (Table 44).

Table 44. Most frequently stocked antibiotics sold to pig farmers.

District	Antibiotics				
	Tetracycline	Penicillin	Gentamicin	Oxytetracycline	Penstrep
Kampala (n=1)	0.0	0.0	100.0	100.0	0.0
Masaka (n=4)	0.0	25.0	0.0	100.0	25.0
Mukono (n=3)	0.0	33.3	0.0	66.7	33.3
Wakiso (n=9)	55.6	22.2	44.4	55.6	22.2
Total (n=17)	29.4	23.5	29.4	70.6	23.5

Note: Some of the drugs above have several trade names but with the same active ingredients

4.4.4 Vitamins/Iron supplements

Over 70% of the veterinary drug stockists stock multivitamins and about 30% stock ferrum/iron (Table 45).

Table 45. Frequently stocked vitamins/iron supplements sold to pig farmers.

District	Vitamins/Iron supplement			Premix
	Multivitamin	Ferrum/Iron	Tonimix	
Kampala (n=1)	0.0	0.0	0.0	0.0
Masaka (n=4)	50.0	50.0	25.0	0.0
Mukono (n=3)	33.3	33.3	0.0	0.0
Wakiso (n=9)	100.0	22.2	11.1	11.1
Total (n=17)	70.6	29.4	11.8	5.9

3. For purposes of information on which drugs are stocked in Kampala and Wakiso separately, we did not merge Kampala with Wakiso.

4.5 Inspection and quality assurance

The veterinary drug stockists in the four districts indicated that the drug shops are inspected by the NDA. Majority of them indicated that they are inspected monthly, quarterly or once a year (Table 46).

Table 46. Frequency of inspection of the drug stockists by the NDA.

Frequency of inspection	Kampala (n=1)	Masaka (n=4)	Mukono (n=3)	Wakiso (n=9)	Total (n=17)	
	%	%	%	%	%	Frequency
5 times a year	0.0	25.0	0.0	0.0	5.9	1.0
Monthly	0.0	0.0	66.7	22.2	23.5	4.0
Once a year	100.0	0.0	0.0	33.3	23.5	4.0
Quarterly	0.0	50.0	33.3	33.3	35.3	6.0
Half-year	0.0	0.0	0.0	11.1	5.9	1.0
Once every two months	0.0	25.0	0.0	0.0	5.9	1.0

Note: All the drug stockists indicated they get inspected at least once a year

4.6 Access to credit among drug stockists

Only 18% of the drug stockists interviewed had accessed financial credit in the last 12 months and these were mainly from Masaka and Wakiso districts (Table 47). Credit was mainly sourced from microfinance institutions (MFIs) and banks. In terms of ease of access to credit, 35% of the stockists opined that credit is easily accessible. The drug stockists indicated that low capital base, high interest rates and lack of collateral were key barriers to credit access.

Table 47. Access to credit by drug stockists.

District	Percentage who used credit to boost your business
Kampala (n=1)	0.0
Masaka (n=4)	50.0
Mukono (n=3)	0.0
Wakiso (n=9)	11.0
Total (n=17)	18.0

4.7 Policies and support services to drug stockists

The drug stockists indicated that the main policies challenges that affect veterinary drug businesses are related to high energy (electricity) tariffs and power outages, trading licenses, transport costs, and taxation. Poor road infrastructure affects the businesses by causing delays in delivery of drugs resulting in high transaction costs and spoilage of drugs that need refrigeration. The power outages result in spoilage of drugs, especially those that require refrigeration. The stockists also indicated that high taxes and license fees result in high cost of business operations. The drug stockists suggested that energy tariffs should be reduced and more electricity generated, to ensure stability in supply. In addition, they indicated that revising the tax regimes related to veterinary drugs downwards, as well as energy tariffs could be effective ways to reduce the cost of their business operations.

Several other areas were identified by the stockists to enhance the veterinary drug business. These included strengthening quality assurance systems to ensure drug effectiveness and stamping out of counterfeits in the market and refresher training in drug management and disease investigation.

5. Veterinary practitioners

5.1 Demographic characteristics of the veterinary practitioners

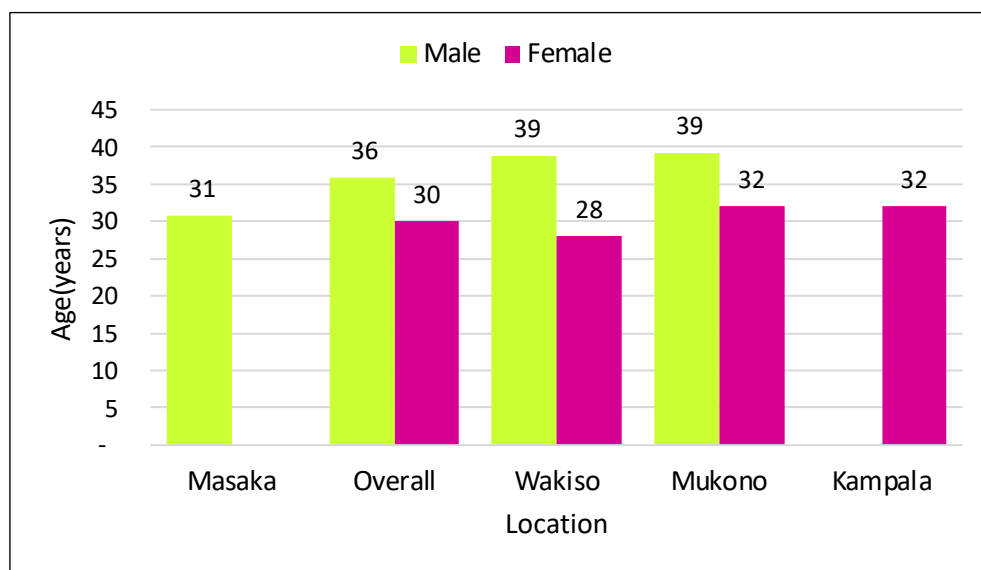
A total of 20 veterinary practitioners were interviewed 80% of whom were men (Table 48). In Masaka District all the interviewed practitioners were men.

Table 48. Sex of veterinary practitioners, by location.

District	Sex of veterinary practitioner				
	Male		Female		Total
	Frequency	Per cent	Frequency	Per cent	Frequency
Kampala	0	0.0	1	100.0	1
Masaka	6	100.0	0	0.0	6
Mukono	4	80.0	1	20.0	5
Wakiso	6	75.0	2	25.0	8
Total	16	80.0	4	20.0	20

The sampled veterinary practitioners were aged between 28 and 39 years. The female veterinary practitioners tended to be younger than their male counterparts (Figure 22).

Figure 22. Age distribution of the sampled veterinary practitioners.



The majority of the veterinary practitioners had more than five years' of experience. Forty five per cent had 5–10 years' experience while 35% had more than 10 years' experience (Table 49).

Table 49. Number of years in veterinary practice.

District	Number of vet practitioners by number of years in practice				
	0-1	2-4	5-10	More than 10 years	Total
Kampala (n=1)	0.0	0.0	1.0	0.0	1.0
Masaka (n=6)	0.0	1.0	3.0	2.0	6.0
Mukono (n=5)	0.0	1.0	1.0	3.0	5.0
Wakiso (n=8)	2.0	0.0	4.0	2.0	8.0
Total (n=20)	2.0	2.0	9.0	7.0	20.0

Most of the veterinary practitioners (40%) were paraveterinarians, with diploma-level training in animal husbandry or related field. Thirty five per cent had bachelor-level training in veterinary medicine and 25% were CAHWs, usually with certificate-level training (Table 50). Mukono and Wakiso districts had a higher proportion of veterinarians with a bachelor's degree relative to the other locations. The livestock types that the practitioners in all the sites deal with include pigs, poultry, sheep and goats. A few practitioners, especially in Mukono District, work with rabbits.

Table 50. Categories of veterinary practitioners.

District	Percentage		
	Veterinarian (BVM)	Paraveterinarian	CAHW
Kampala (n=1)	0.0	100.0	0.0
Masaka (n=6)	16.7	83.3	0.0
Mukono (n=5)	60.0	40.0	0.0
Wakiso (n=8)	37.5	0.0	62.5
Overall (n=20)	35.0	40.0	25.0

5.2 Pig diseases commonly treated by veterinary practitioners

The most common pig diseases that the veterinary practitioners in the sampled districts deal with are swine fever, mange, worms, lumpy skin disease and swine erysipelas. Many of the interviewed veterinary practitioners in Mukono and Masaka districts reported dealing more with swine fever, mange and worms in pigs (Table 51).

Table 51. Prevalence of major pig diseases by district.

Disease	Number of veterinary practitioners reporting the disease by district				
	Kampala (n=1)	Masaka (n=6)	Mukono (n=5)	Wakiso (n=8)	Total (n=20)
Swine fever	0.0	4.0	3.0	7.0	14.0
Mange	0.0	3.0	4.0	4.0	11.0
Worms	1.0	4.0	5.0	7.0	17.0
Lumpy skin	1.0	1.0	1.0	1.0	4.0
Swine erysipelas	0.0	1.0	1.0	2.0	4.0
Swine pneumonia	0.0	0.0	1.0	1.0	2.0

Veterinary practitioners offer a number of services to pig farmers. The main ones are the treatment of the animals, vaccination, deworming and extension advice. Over 80% of the sampled veterinary practitioners indicated that they treat, deworm and offer extension services to farmers (Table 52).

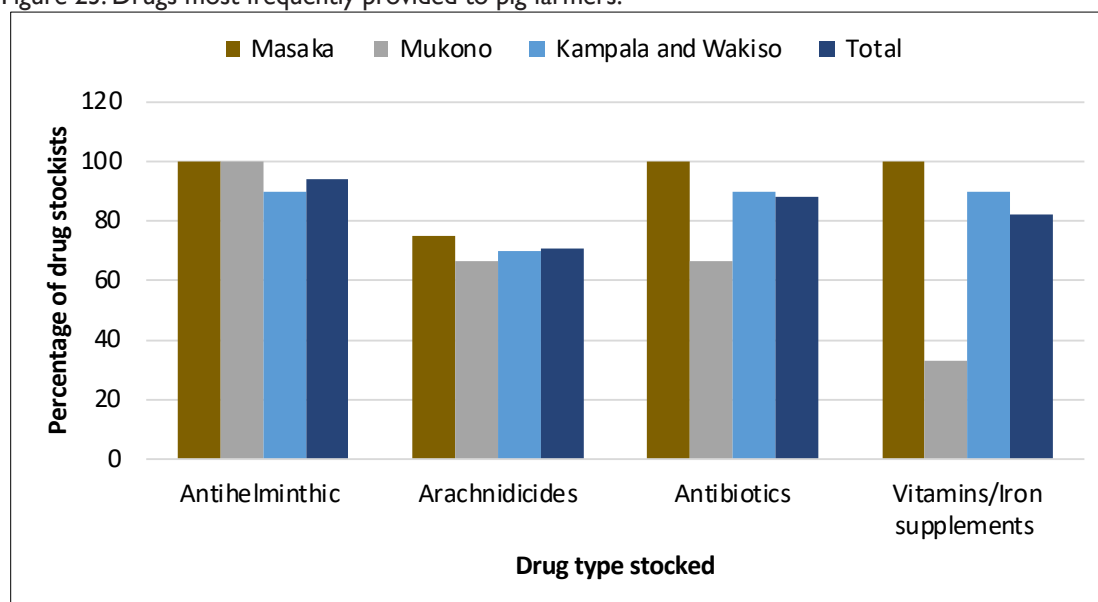
Table 52. Most frequent service provided to pig farmers by veterinary practitioners.

District	Percentage of veterinary practitioners offering the services					
	Treatment	Prevention – vaccination	Deworming	Advise/training – extension	Castration/ docking	Others (e.g. Surgery)
Kampala (n=1)	100.0	0.0	100.0	100.0	0.0	0.0
Masaka (n=6)	66.7	50.0	66.7	50.0	0.0	33.3
Mukono (n=5)	100.0	60	60.0	100.0	0.0	20.0
Wakiso (n=8)	100.0	75.0	100.0	100.0	12.5	0.0
Total (n=20)	90.0	60.0	80.0	85.0	5.0	15.0

5.3 Veterinary drugs commonly used by practitioners in disease treatment

Overall, over 80% of the drug stockists were found stocking anthelmintic drugs, antibiotics and vitamins/iron supplements while 71% of them stocked arachnidicides (drugs against ectoparasites). See Annex I for details of specific drugs per category stocked. The most common anthelmintic drugs in the sampled districts were Levamisole and Ivermectin while common arachnidicides included Nortraz, Armitraz and Ivermectin. Oxytetracycline, gentamicin and tetracycline were the most common antibiotics that veterinary practitioners mainly used in treating livestock (Figure 23).

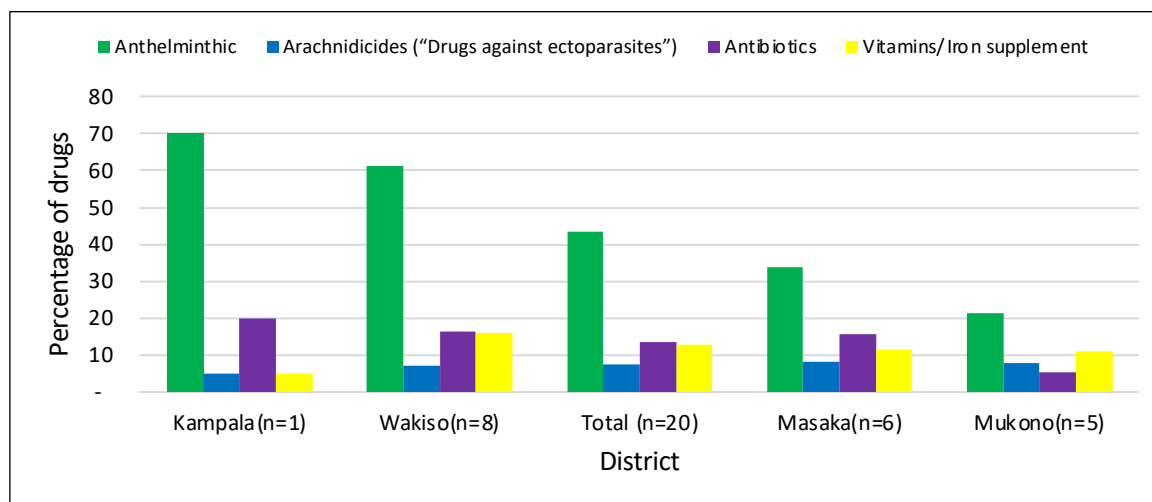
Figure 23. Drugs most frequently provided to pig farmers.



Note: Some of the drugs above have several trade names but with the same active ingredients.

Among the main veterinary drugs used by veterinary practitioners in pig treatment, anthelmintic drugs form over 40% of the proportion followed by arachnidicides (Figure 24). Use of antibiotics accounts for about 16% of all drugs.

Figure 24. Proportion (in 100%) of most frequent drug provided to pig farmers.



5.4 Main constraints facing veterinary practitioners

Several issues were indicated by the veterinary practitioners as constraints experienced in their work. Many of them mentioned defaulting on credit by farmers who do not pay them after treating their animals when they are cash-constrained. Other challenges included long distances travelled to reach farmers, which makes it costly on their part, counterfeit/fake drugs in the market that they use and animals fail to respond to treatment and farmers resorting to self-treating their animals, which leads to drug resistance problems (Table 53).

Table 53. Major constraints facing veterinary practitioners.

Constraint ¹	Frequency	Constraint ²	Frequency	Constraint ³	Frequency
		Exploitation of farmers by unqualified para-vets	1	Fake drugs on market	1
Bad debts/Defaulting farmers	4	High cost of drugs	1	Farmers have no experience in livestock management	1
Fake doctors in the field	1	High cost of feeding ingredients	1	High costs of drugs	2
High prevalence of African swine fever (ASF)	1	defaulters	1	lack of exposure to new technologies	1
High taxes on drugs	1	delayed responses to new out breaks	1	Long distances /location of farmers	1
Ignorance of farmers	2	failure to pay private vets	1	None	1
ignorance of urgent of the disease	1	Fake drugs (counterfeit)	1	poor roads /lack of transport means	1
		Farmers are poor	1	Poverty among farmers	2
Lack of vaccines on market to treat swine fever	1	Farmers negative perception that drug are freely given by government	1	Unqualified feed producers/processors	1
Long distances to reach farmers	1	low pay	1	Unreliable farmers in livestock business	1
low adoption rates on modern practises	1				
Poor animal management by farmers	1	Poor quality drugs mainly Arachnidicides	1	Total	20

Constraint ¹	Frequency	Constraint ²	Frequency	Constraint ³	Frequency
Poor quality drugs	1	Resistance to vaccinations	3		
Poverty among farmers	1	Scarcity of some drugs	1		
Self-treatment by farmers	1	Self-treatment by farmers	1		
Some farmers do not implement the advise	1	Unfavourable government policies on drug sale	1		

5.5 Credit

5.5.1 Credit service among veterinary practitioners

About 80% of the sampled veterinary practitioners indicated that they give credit to farmers. Masaka and Wakiso had a higher number of veterinary practitioners giving credit to farmers relative to other sites (Table 54). Many of the veterinary practitioners give credit in the form of treatment or drugs (Table 55).

Table 54. Veterinary practitioners who give credit to farmers.

District	Do you give credit to your customers (farmers)?					
	Yes		No		Total	
	Per cent	Frequency	Per cent	Frequency	Per cent	Frequency
Kampala	100.0	1.0	0.0	0.0	100.0	1.0
Masaka	83.3	5.0	16.7	1.0	100.0	6.0
Mukono	80.0	4.0	20.0	1.0	100.0	5.0
Wakiso	75.0	6.0	25.0	2.0	100.0	8.0
Total	80.0	16.0	20.0	4.0	100.0	20.0

Table 55. Types of credit that veterinary practitioners give to farmers.

District	None	Types of credit (frequency)		
		Deferred payments/ treatment on credit	Drugs	Total
Kampala	0.0	0.0	1.0	1.0
Masaka	1.0	5.0	0.0	6.0
Mukono	4.0	1.0	0.0	5.0
Wakiso	3.0	5.0	0.0	8.0
Total	8.0	11.0	1.0	20.0

5.5.2 Access to credit by veterinary practitioners

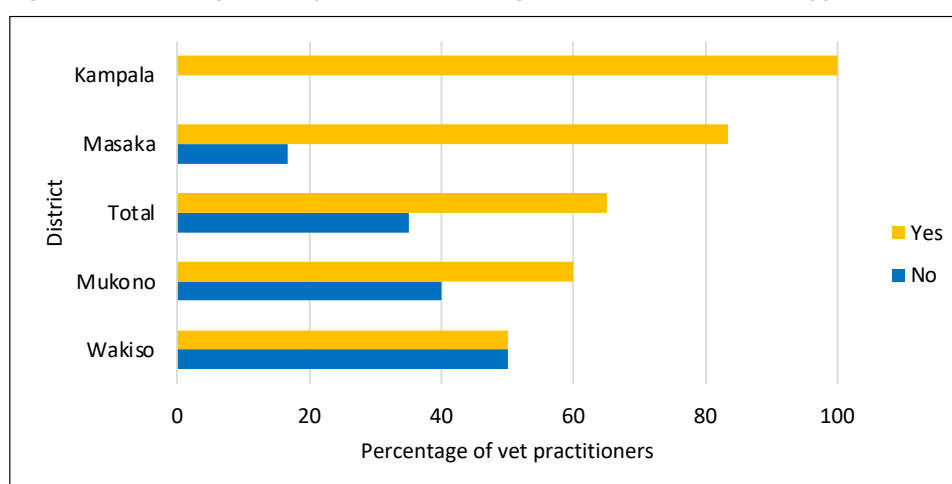
The veterinary practitioners indicated that they get credit. Sixty per cent of the veterinary practitioners confirmed that they receive credit from their suppliers (Table 56).

Table 56. Number of Veterinary practitioners who receive credit from suppliers.

District	Veterinary practitioner who receive credit from his drug suppliers?	
	Frequency	Percentage
Kampala (n=1)	1.0	100.0
Masaka (n=6)	3.0	50.0
Mukono (n=5)	4.0	80.0
Wakiso (n=8)	4.0	50.0
Total (n=20)	12.0	60.0

In addition to getting credit from their suppliers, a good number of the interviewed veterinary practitioners indicated that they also get other incentives. Over 65% of all interviewed veterinary practitioners said they receive one or two incentives (Figure 25).

Figure 25. Percentage of vet practitioners who get incentives from their suppliers.



The main incentives received from veterinary practitioners' suppliers are training sessions on how to use drugs, discounts on bulk purchases, availing free drugs to conduct research on particular diseases, promotional materials such as posters, adverts and calendars, and technical advice on the use of new drugs or tools (Table 57).

Table 57. Number of veterinary practitioners who receive incentives from suppliers.

Incentives from suppliers	Frequency of vet practitioners				
	Kampala	Masaka	Mukono	Wakiso	Total
Training on drug use	0.0	2.0	2.0	1.0	5.0
Adverts of new drugs	0.0	0.0	0.0	1.0	1.0
Avail free drugs to conduct research	0.0	1.0	0.0	0.0	1.0
Discounts on bulk purchases	1.0	1.0	1.0	1.0	4.0
Credit	0.0	1.0	0.0	0.0	1.0
Promotional materials e.g. posters, calendars	0.0	3.0	0.0	1.0	4.0
Technical advice	0.0	0.0	0.0	1.0	1.0

When asked whether they have used cash or credit to boost their businesses in the last one year, only two veterinary practitioners had borrowed money from a financial institution to boost their business.

5.6 Membership to professional associations and technical services accessed

Overall, only 15% of the veterinary practitioners belonged to an association with all districts having low percentages of practitioners belonging to a business association. Several of them, 80%, indicated that they had access to technical services (Table 58). Except Wakiso District where 50% of the veterinary practitioners had access to technical services, all practitioners in other districts indicated they access these services.

Table 58. Veterinary practitioners accessing technical services.

District	Belong to an association		Access technical services	
	Frequency	Percentage	Frequency	Percentage
Kampala (n=1)	0.0	0.0	1.0	100.0
Masaka (n=6)	1.0	16.7	6.0	100.0
Mukono (n=5)	1.0	20.0	5.0	100.0
Wakiso (n=8)	1.0	12.5	4.0	50.0
Total (n=20)	3.0	15.0	16.0	80.0

The main technical services accessed were related to disease diagnosis, treatment, feed formulation and vaccination. These are mainly provided by MAAIF, drug companies, drug suppliers, district veterinary officers and fellow veterinarians (Table 59).

Table 59. Main provider of technical services to veterinary practitioners.

Service Provider	Frequency
Drug companies	1.0
NARO, MAAIF	2.0
Internet	2.0
Supervisors	1.0
NDA	1.0
Kuku Chick	1.0
Suppliers of products	2.0
District vet officers	1.0
Drug companies	3.0
FAO	1.0
Fellow vets	5.0

The sampled veterinary practitioners indicated the need for more training, provision of transport equipment, accidents and health insurance services, better tools and equipment, more and better equipped laboratories for proper and timely disease diagnosis (Table 60).

Table 60. Special support needed by veterinary practitioners for effective operations.

Type of support	Frequency
Subsidize on some expensive tools	1.0
Availing capital	1.0
Additional training to vets /refresher courses	1.0
Construct and well-equip regional labs	1.0
Further technical training in an agroveter practice	1.0
More trainings	2.0
None	3.0
Offering credit with little interest	1.0
Refresher trainings on disease diagnosis	1.0
Transport means like motorcycles, cars	2.0
Provide insurance services to vets	1.0

Table 61 shows the key policy issues that impact on the business of veterinary practitioners. These mainly include issues around transport, water supply, taxation and energy policies. The veterinary practitioners indicated that these directly limit movement, lower profits and hinder productivity. They suggested an upgrade of roads, reduction of energy and water tariffs and decentralization of the veterinary practitioner registration to enable them to cooperate and also coalesce under one umbrella.

Table 61. Main government policies and how they affect veterinary practitioners' work.

Policy area	What is the constraint and how does it affect your business?	Proposed solutions
Transport	Poor roads make it difficult to reach farmers	Government to improve rural road infrastructure
	Poor roads increase the transaction costs through transport leading to high fees charged to farmers to recover costs	
Water supply	Hinders animal production	Reduce cost of water
Taxation	Increases cost of doing business and reduces incomes	Revise tax regimes imposed on businesses and consider start-ups and small businesses
Registration of all vets and practitioners	High fees (UGX 250,000)	Registration should be decentralized

6. Conclusions

In this section, we make general conclusions based on the results and field observations about the operations of pig and pork aggregators, feed processors, drug stockists and veterinary practitioners.

6.1 Pig and pork aggregators

The pork business is a lucrative activity especially in the urban areas of Kampala, Masaka, Mukono and Wakiso where it engages a number of actors. Pig and pork aggregation are complementary activities and the business is dominated by men. The actors that supply the pig and pork aggregators mainly include small-scale farmers, middlemen and pork traders who are spread all over the country with the majority of farmers being in eastern and central districts of Uganda. However, the pork business is associated with increased transaction costs since most farmers are smallholders and this lowers the repeat purchases forcing aggregators to source for pigs from distant places especially during periods of scarcity and during disease outbreaks which necessitate quarantine. The low participation in trader associations hampers access to collective marketing benefits such as bulking and market information access and increases transaction costs.

6.2 Livestock feed processors

Though there is increased participation of women, the livestock feeds business is still dominated by men. The characteristics of the studied feed businesses showed that they ranged from small to medium enterprises and had been in existence for seven years on average. The traded feed ingredients were dominated by locally produced energy-rich feed ingredients (such as maize grain and maize bran) and protein-rich ingredients such as silverfish, cottonseed cake, soybean and sunflower cake. However, there has been an increase in demand for concentrates that are more nutritionally balanced and of good quality when compared to the locally existing protein-rich ingredients, though the former come at a high cost.

The absence of a Feeds Bill means that the feeds business is largely unregulated. There are many counterfeit feed products, adulterated feed ingredients, poor quality compounded feeds and feeds mixes that use the wrong formulae leading to exploitation of farmers and poor animal productivity. Besides, feed producer groups are absent, which reduces lobbying for better services. However, initiatives by commercial feed manufacturers and veterinary doctors are in place to skill actors in the feeds businesses

6.3 Veterinary drug retailers/stockists

The veterinary drug outlets are owned by individuals with formal training in either veterinary medicine or animal production and management. However, their employees range] from those with certificates up to degree level training. The veterinary drug stockists source the drugs from local drug manufacturers, wholesalers/distributors and

importers. Their main buyers are the private veterinary practitioners and farmers. Most stockists have and sell drugs pig diseases, especially for swine fever, mange and worms, the main pig health challenges in the country. The pig anthelmintic Ivermectin was among the most stocked and purchased by pig farmers and veterinary practitioners. The critical challenges affecting the veterinary drug business include high taxation and license fees, unreliable energy supply, strict requirements for establishing Class B drug shops, conflicting roles between the NDA and the UNBS regarding the inspection of drugs and the high cost of drugs. The veterinary drug stockists emphasized the need for additional support in the form of training in drug and disease management.

6.4 Veterinary practitioners

Veterinary practice has been a male-dominated profession but it is increasingly attracting females and male youths. The practitioners have formal qualifications in veterinary medicine and there is an increased number of community animal health workers and paraveterinarians working in this field to meet the demand for veterinary services, which cannot be met by public veterinarians alone. The commonly treated livestock are pigs, cattle, poultry and shoats. The main constraints in their practice include defaulting on credit by farmers, long distances travelled to reach farmers, counterfeit drugs in the market, self-treatments by farmers and exploitation of farmers by unqualified individuals.

7. Recommendations

Based on the field observations and results of this scoping study, the following recommendations are made:

1. The high demand for pork around the four urban/city study areas of Kampala, Masaka, Mukono and Wakiso should be used as an entry point to create good working relations between the pig/pork aggregators and the pig farmers by creating stronger linkages through market systems development and other business models. In addition, the aggregators need to be sensitized to support the farmers through linkages with inputs and service providers such as feed processors and drug stockists in order to boost pig production and quality of pigs supplied in the market, which will create a win-win situation for all actors.
2. Further research and interventions are needed to understand the constraints that hinder women from participating in the business nodes of the pig value chain. For instance very few women participate as pig or pork aggregators.
3. The MorePork II project should advocate for regulation of the livestock feed industry by engaging its partners in the private sector and government (MAAIF, NDA, UNBS etc.) to establish clear and enforceable feed standards. Advocacy is still needed to tackle the problem of counterfeit veterinary drugs.
4. There is still a need for capacity development of all the actors across the pig value chain. Farmers and aggregators, as well as feed processors, need sensitization about the importance of cooperation and collective action. Also, farmers and drug stockists and veterinary practitioners need sensitization on good customer relations and the importance of cultivating mutual trust. Horizontal integration is key within the various nodes of the value chain, for instance, paraveterinary associations, farmers associations, feed processors associations and veterinary drug stockists' associations should be strengthened and established where none exist.
5. Interventions that target food safety to ensure that pig/pork products are safe for human consumption, right from pork inspection to the food/pork consumption (including in pork joints) need to be implemented and scaled.
6. The pork and pork products processing/value addition node within the pig value chain is still poorly developed, yet it has the potential to spark supply end synergies, where farmers can earn better prices for their pigs. There is need to support innovations, product development and knowledge generation to develop this node.

References

- Atherstone, C., Galiwango, R. G., Grace, D., Alonso, S., Dhand, N. K., Ward, M. P. and Mor, S. M. 2019. Analysis of pig trading networks and practices in Uganda. *Tropical animal health and production* 51 (1): 137–147.
- FAO (Food and Agriculture Organization of the United Nations). 2011. *Mapping supply and demand for animal-source foods to 2030*. T.P. Robinson & F. Pozzi (Eds). Animal Production and Health Working Paper. No. 2. Rome. (Available from: <http://www.fao.org/3/i2425e/i2425e00.pdf>).
- Muhangi, D., Masembe, C., Berg, M., Ståhl, K. and Ocaido, M. 2014. Practices in the pig value chain in Uganda; implications to African swine fever transmission. *Livestock Research for rural development* 26 (5): 94
- Ouma, E. A., Dione, M. M., Lule, P. M., Pezo, D. A., Marshall, K., Roesel, K. and Jagwe, J. 2015. *Smallholder pig value chain assessment in Uganda: Results from producer focus group discussions and key informant interviews*. ILRI Project Report. Nairobi, Kenya: ILRI.
- Tatwangire, A. 2014. *Uganda smallholder pigs value chain development: Situation analysis and trends*. ILRI Project Report. Nairobi, Kenya: ILRI.
- Twine, R. and Njehu, A. 2020. *Uganda smallholder pig value chain development: Situation analysis and trends*. Nairobi, Kenya: ILRI.
- UBOS (Uganda Bureau of Statistics). 2018. *Uganda Bureau of Statistics, Statistical Abstract, 2018*. (Available from: https://www.ubos.org/wp-content/uploads/publications/05_2019STATISTICAL_ABSTRACT_2018.pdf).

Annexes

Annex I: Drugs and drug categories stocked

		Percentage of drug stockists
Anthelmintic	Ivamectin	88
	Levamisol	41
	Albendazole (liquid)	18
	Piperazin	12
	Normectin	12
	Liverside	12
Arachnidicides	Armitrazin	59
	Nortraz	18
	Cypermethrin	18
	Streptomycin	18
	Dualdip	12
	Vectocid	12
Antibiotics	Oxytetracyclin	71
	Tetracycline	29
	Gentamicin	29
	Penicilin	24
	Penstrep	24
Vitamins/iron supplement	Multivitamin	71
	Ferrum/iron	29
	Tonimix	12
	Premix	6