It depends who you ask:
How to establish a sampling frame for traders?

Derek Baker and Nadhem Mtimet

"Sampling People That Don't Stand Still: Targeting Traders as Key Elements of Value Chain Function and Performance, and How They Can Be Sampled"

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How to establish a sampling frame for traders?

Derek Baker[1] and Nadhem Mtimet[2]

Abstract

Generation of pro-poor development benefits from upgrading agri-food value chains requires an understanding of markets and transactions, and the actors involved. This paper attempts to characterize pig traders in Uganda, their market linkages, perceptions of potential for value addition by way of valuation of product attributes, and perceptions of constraints. Past analyses of traders in other contexts has not reported robust methods for sampling, nor methods for engagement of traders for data collection. The current paper compares different sources of sample frames, and reports a workshop process for delivery of individual observations on traders. Characterization of traders reveals that many of them are also engaged in retail businesses, and that there is a separation between traders buying and selling piglets, and those dealing with grown pigs only. Market channels used are described. Source of sampling frame was found to affect the survey results obtained, and that this is a logical consequence of the nature of traders identified form different sources, principally their experience in the business. This disaggregation was most evident in the analysis of constraints faced.

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Introduction

Pig production offers an attractive opportunity to many smallholders in East Africa. The pig and pork sector in Uganda has grown substantially between 1990 and 2010: an annual average production growth of 3.5% and an increase in the number of pigs from 1.16 million to around 2.3 million (FAOSTAT, 2012). Pork production ranks second to beef in terms of production in Uganda (ILRI, 2011), and consumption is rising. These trends have been interrupted somewhat in recent years, particularly by outbreaks of African Swine Fever.

The Ugandan pig and pork value chain has not been studied in detail. However, establishment of market-driven investment and development in pigs requires an understanding of consumer and market requirements. In the case of pigs and pork in East Africa, and in Uganda, such understanding eludes researchers, investors and regulators alike. The dominant production type is smallholder production with a "scavenging" feed model. This imposes constraints on marketing opportunities (Baker et al., 2013), which have become a focus for several development efforts. Market arrangements appear to feature informal sales by traders and a variety of retail arrangements including ready-to-eat pork products. Government information and support systems have been slow to recognize the sector, with statistics widely considered to underestimate both pig production and pork consumption.

Governments, development organizations, NGOs and other development actors have an enduring commitment to production actors, particularly producers and smallholders Lemke and Za'rate, 2008). Studies focusing specifically on the agriculture and food sector's traders are rare. Studies including traders are generally focused on estimating costs and profits (Loc *et al.*, 2010; Macfadyen *et al.*, 2012; Minten *et al.*, 2013), or mapping the actors within the chain (Kocho *et al.*, 2011; Aoudji *et al.*, 2012). Ugandan pig and pork trading and retailing is largely unrecorded, and traders' roles in transport of pigs and other services are also unknown. Few studies have referred to Ugandan pig traders' degree of vertical integration into production, slaughter, retailing and services. Their degree of specialization and connections to alternative production models (piglet sales or pig fattening) also remains largely unreported.

Studies of actors within the value chain require a sampling procedure. Approaches to sampling traders, and comparisons of results drawn from different sampling bases, have been little studied. Well-accepted methods for such sampling are discussed amongst researchers less often than are anecdotes of poor sampling practice. This is particularly true in developing countries, and in the context of rapid assessment and value chain-oriented studies. There are few sources of a sampling frame: official data is inadequate (see above), so practitioners often seek alternative sources such as market actors linked to traders.

This paper features a study of pig traders in Mukono district, adjacent to Kampala city, in Uganda. The study's purpose was to characterize pig traders in terms of physical and economic variables, and aspects of pig and pork value chain governance and seasonality. The study also allows a comparison of results gained from different traders' sampling sources, and to assess the extent to which the source of the sampling frame influences the sample achieved and the results gained.

Processes for sampling and data collection

Discussion with any of researchers, government agencies, commercial actors and aid workers tend toward a conclusion that traders are hard to find, and when found are difficult to collect data from. Some of this difficulty is a consequence of traders' necessary movements between buying and selling locations and seasonal trading patterns. Some reflects landlessness or lack of linkages to social and economic infrastructure. An unknown factor is the oft-repeated suspicion that traders "do not want to be found" due to attitudes to officialdom in general and tax officials in particular. These issues contribute to difficulties with sample size and responses to sampling overtures.

Traders commonly work long and intermittent hours, so researchers find them difficult to access and engage in lengthy data collection exercises. Again, an impression prevails that traders are reluctant to share information. The implementation costs of survey methods that address dispersed and reluctant respondents are high, and this has led some researchers to engage in group discussions with traders: this procedure has not been formally analyzed, but seems likely to yield results contaminated and biased by peer interest and other group dynamics. An intuitively-appealing response to this problem is to use a workshop in combination with individual interviews, and this was applied in the current study.

The agricultural research literature reveals information about trader sampling in three forms:

- no information about sampling (Ajala and Adesehinwa 2007, Jabbar *et al.* 2008, Loc *et al.* 2010, Hap *et al.* 2012, Macfayden *et al.* 2012).

- reported random selection of respondents (e.g. by transects across geographic areas, and random draws from local censuses based on different sources) but little detailed explanation of sampling (Bista and Webb 2006, Abdulai and Birachi 2009, Kocho *et al.* 2011, Minten *et al.* 2013).

- reported details of the sampling procedure.

Within the latter group, Madzimure et al. (2011) used exhaustive sampling: visiting and questioning every trader active in a market on a given day. Wanyoike *et al.* (2010) established a sampling frame with a PRA exercise including producers, traders, retailers and consumers, and then sampled randomly in geographic areas, but employing some stratification. The study addressed dairy, which features frequent producer/trader/retailer/consumer interactions and is perhaps well-suited to PRA-type investigation. Haji (2010) also targeted specific markets, selected on the basis of perceived importance. These authors established a sample frame by consultation with local authorities, and sample size by proportionality with farmer/trader ratios, and then randomly selected the desired number of traders. Aoudji *et al.* (2012) used a purposive sampling procedure based around product types (being timber products) traded, and then randomly sampled from identified clusters of traders based on municipal information sources. Lagerkvist *et al.* (2013) assembled traders' lists with the assistance of the management of municipal markets. Traders were then selected by random draws using probability proportional to size sampling (also used by Suryadarma *et al.*, 2010).

Sources of sample frames

In the case of Ugandan pig traders, four potential sources of a sampling frame are apparent, with lists compiled by consultation with.

i.   *local producers*: one form of "snow-ball sampling", this requires a sample of the producers, introducing a new source of sampling error. This approach does allow a focus on producer types that may be the subject of related research.

ii. *local retailers*: largely as above, this approach also confronts a less developed database of retailers and poorly-documented diversity amongst retailers.

iii. *local processors*: also featuring a double sampling procedure, biases may be offset by exhaustive sampling (using the entire population) of what are commonly small numbers of processors.

Each of i, ii and iii above may well select for traders that are in some way specialized or aligned to a market segment. The extent to which such actors may also serve as traders is unknown, but clearly obstructs randomness in sampling.

iv. *local authorities*: traders' addresses and contact details may be maintained by local authorities. A simple and cheap option, a sampling frame constructed in this way is however certain to not contain traders that seek to avoid contact with officialdom, and furthermore the list may be rarely updated. Points of contact with local authorities (e.g. slaughter houses or animal health inspection points) may also offer useful records, but these select for traders engaged in a subset of activities.

Sampling and data collection

The current study employed three of the above sources of sample frames: a sample of local producers; a sample of local retailers; and a list obtained from local authorities. All three lists were provided with mobile telephone numbers and all traders on each list were called to issue invitations to a workshop and data collection event. Compensation for travel costs and time was offered, and lunch provided.

Seventy traders were contacted (see table 1), the names of 14 of whom were provided by both farmers and retailers. No single name appearing on the list provided by the local authority also appeared on either of the lists provided by producers and retailers. The 70 traders contacted included 63 men and 7 women. It is notable that among the 7 women's names, 2 were provided by retailers' and 5 by the local authority. No woman's name was provided by producers.

Table 1. Samples of traders, by sample frame source

Sampling source	Number of traders contacted[*]	Number of traders who participated to the workshop[*]	Percentage
Farmers/producers	22	16	73%
Retailers	28	11	39%
Local authority	18	6	33%

[*]14 traders belong to 2 different sampling sources (farmers and retailers lists).

The workshop was held in Mukono district in September 2012. Some 22 traders attended, an overall 31% response rate which varied by sample basis (the producers' list yielded a 73% response rate). A paper-based survey questionnaire was implemented with individual traders, interspersed with some discussion of problems and opportunities. Assistance with language and literacy was provided, and individual traders were kept separate while forms were filled in.

Traders' characteristics

All workshop participants/survey respondents were male, young (mean age about 32 years), with limited education (82% at primary level). Most traders (73%) operate informal (unregistered) enterprises, which commonly are small firms with less than 6 employees (mean of 3). Although the majority (82%) of traders identified pig trading[2] as their principal business activity, they all reported at least one additional business activity. In many cases (50%), traders have more than two such additional business enterprises.

All traders in the sample report buying pigs, but just 60% of traders buy piglets. Little evidence emerged of traders' buying piglets and selling grown pigs, thus performing a fattening function. Substantial variation in numbers of pigs purchased (one measure of size of enterprise) was observed, especially in peak season (see below). All pig traders are completely or partially supplied by farmers/producers (see figure 1), and some 23% of the traders reported being supplied also by other traders or collectors. Only a small proportion of traders buy pigs or piglets from abattoirs that engage in live sales alongside "wet market" meat sales (9%), or from farms associated with schools (4%).
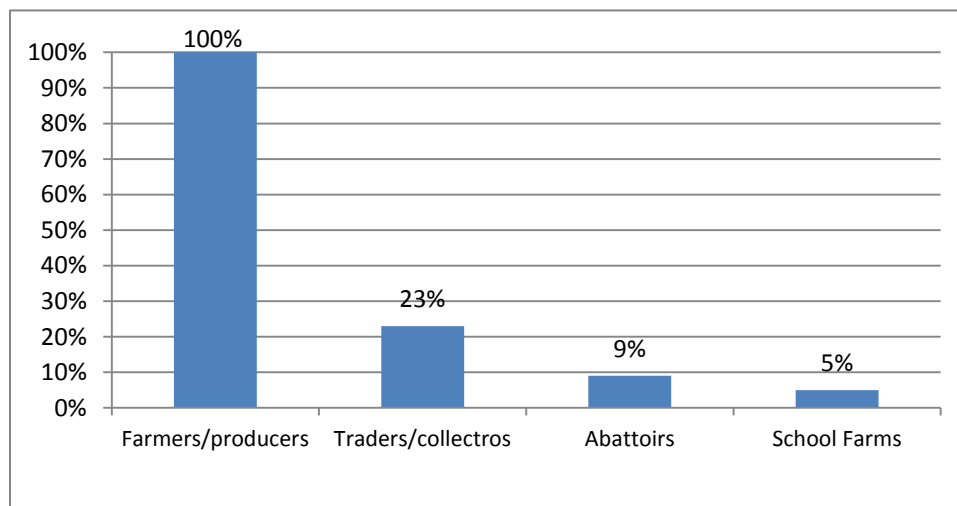

Figure 1. Reported suppliers of pigs and piglets to traders

The average number of reported suppliers per trader was 34. This number varies considerably amongst traders (from 6 to 100, s.d. 26). In terms of volume, the reported average numbers of

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[2] Uganda pig production features both production and sales of piglets (a breeding enterprise), and purchase of piglets for sale as grown pigs (a fattening enterprise). The interface between producers and traders therefore features sale of either or both piglets and grown (and partially-grown) pigs.

piglets and pigs purchased annually from each farmer/producer were 11 and 12 respectively. For traders supplied by other traders/collectors, the average number of these suppliers is around 14 and the average numbers of piglets and pigs purchased from each trader/collector are respectively 16 and 30 per year. Supply by abattoirs is associated with larger number of pigs purchased annually.

Many traders reported performing a retail function. These then listed "retailers" as their main sales channel. Including such results, some 82% of traders (see figure 2) reported that retailers and butchers are their most important customers. Small scale producers ranked second (46%) as traders' customers, as traders buy piglets and sell them on to producers for fattening. Collectors/traders (23%) represent another outlet. The number of traders reporting working with large scale producers or processors/abattoirs is relatively low (18%). This may well reflect the scale of operation: large scale producers, processors or abattoirs look for large purchase lots, which the majority of surveyed traders could not supply. This statement also applies to sales channels such as hotels, restaurants and ready-to-eat meat establishments.
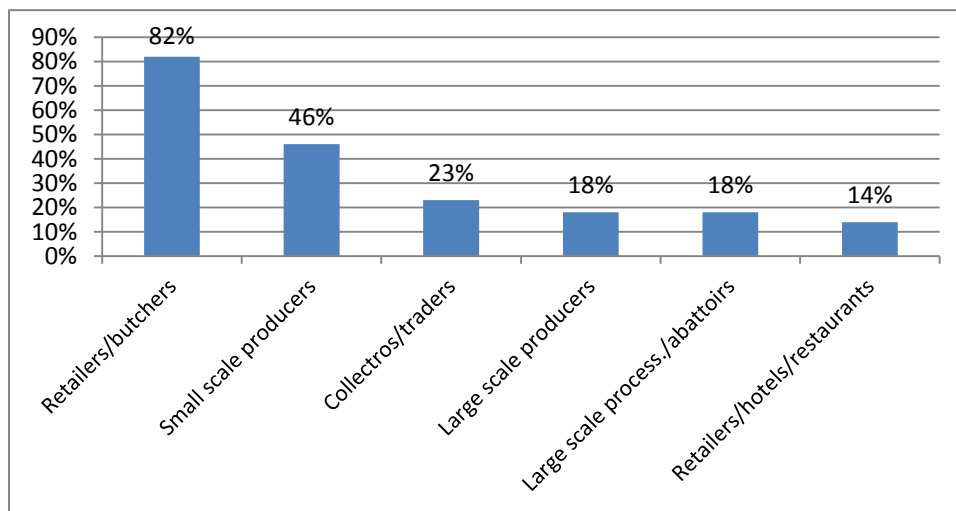

Figure 2. Reported buyers of pigs and piglets from traders

Traders reported selling pigs and piglets to about 4 fresh meat retailers or butchers on average, and selling around 59 pigs annually to each butcher/retailer on average. This number varies significantly among traders (3-120 pigs). In selling to small scale producers, each trader deals with an average of 19 producers, selling annually around 12 piglets to each one. The number of collectors/traders buying animals from each sampled trader is around 6, at a rate of about 3 pigs or piglets per year on average.

Seasonal variation was identified in both pig and piglet purchases and sales. For purchases, numbers in peak season are 86% higher than those in low season. The same pattern is observed for piglets' purchase (peak season exceeds low season by 74%).

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Table 2. Seasonal distribution of numbers of pigs and piglets purchased

Animal	Season	Mean	Median	Minimum	Maximum	Std. Deviation
Piglets	Peak season	25.46	20.00	10.00	70.00	19.34
	Low season	14.62	13.00	4.00	30.00	9.10
Pigs	Peak season	27.32	19.00	0.00	200.00	40.59
	Low season	14.68	10.00	3.00	80.00	15.93

Traders were asked to identify individually the months corresponding to peak and low sales volumes, reported in figures 3 and 4. Piglets' peak sales season corresponds to the period of December-February, and to the month of June. For the rest of the months, no clear differentiation was apparent. For grown pig sales, three peak periods were reported: October-December, April, and July; and three periods of low sales were reported: January-March, May, and August-September. Comparison between pigs' and piglets' sales' seasonality suggests opposing cycles: when sales volumes for one increase, the other declines. December is the sole time of the year identified by the traders as offering peak sales for both pigs and piglets.
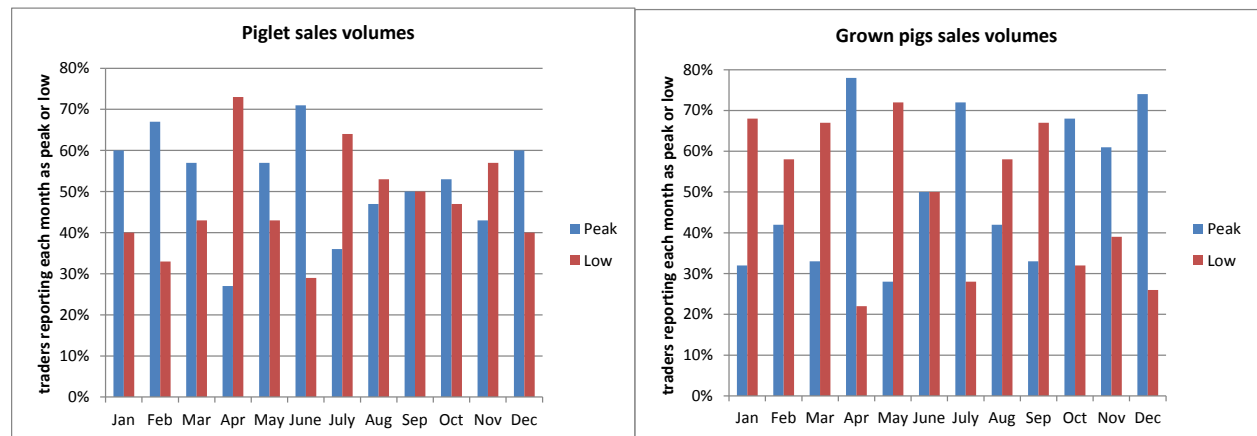
Figures 3 and 4. Reported peaks and lows in respectively piglets and pigs sales volumes

Effect of sampling source on traders' characterization

Results were disaggregated by traders' source of sampling frame (lists provided by retailers or producers (group 1, 16 traders in total), and a second group including traders contacted using the local authority's list (group 2, 6 traders). Statistical tests of differences between group means and groups' proportional characteristics were applied. Statistically significant results are presented in Table 3. Group 1 is a younger group (28 years on average) than is group 2 (around 42 years). This is reflected in differences in reported experience: an average of 13 years for group 2 and 5.3 years for group 1. This demarcation is used in further discussion of the results, with group 1 referred to as the "young" traders, and group 2 as the "experienced" traders.

The two groups trade in different markets: the majority of the young traders (75%) trade in piglets while just a few (17%) from the experienced group do so. In comparison to the experienced group, young traders are more involved in working and collaborating with groups of producers (cooperatives, associations). All the experienced traders operate formally registered businesses and pay tax, while just half the young traders are so registered.

Table 3. Characteristics of the disaggregated traders' sample

Variables	Groups		Statistical tests
	Group 1 (n_1=16) "Young"	Group 2 (n_2=6) "Experienced"	
Age (years)	28.19	42.17	10.691[a]***
Experience (years)	5.31	13.00	10.045[a]***
Piglets trading (%)	75%	17%	2.478[b]**
Purchase from group of producers (%)	81%	33%	2.149[b]**
Taxes payment (%)	50%	100%	2.171[b]**

[a] Corresponds to a T-test; [b] Corresponds to a Z-test

***, ** : statistically significant respectively at 1% and 5% levels

Effect of sampling source on traders' perceptions of pricing and customer preferences

Traders were asked to rate 15 attributes of pigs, so as to indicate their influence on pigs sales' price (0 = not important and 5 = very important). These attributes[3] were related mainly to the physical and visible aspects of the animal, but also extended to region-specific reports of disease outbreaks and some perceived quality attributes. In general, both traders' groups assigned similar scores to almost all attributes: live animal weight, apparent animal fat, carcass weight, carcass fat, animal conformation and shape, animal health, and disease outbreaks in trader's region are among the highly rated attributes affecting pigs' sales prices. Less important influences on price were identified as animal breed, coat color, history of health care of the animal, specific vaccinations or treatments, type of feed used, type of housing used, number of teats, and litter size. Statistically significant differences were apparent in the groups' different rating for a few attributes. "Young" traders' assigned higher scores to animal coat color, type of housing used and litter size. "Experienced" traders assigned higher importance to disease outbreaks in their region.

For the same set of attributes, traders were asked to categorize buyers' attitude:
  i)   buyer seeks or provides information or advice on this subject
  ii) buyer accepts or rejects animals on this basis
  iii) buyer pays a price premium or discount on this basis.

The results generally adhere to those concerning overall importance of attributes in pricing. Animal live weight, apparent fat, carcass weight, carcass fat, animal conformation/shape, animal health, and disease outbreaks in trader's region, were identified by the majority of traders (proportions between 70% and 100%) as factors where buyers seek/provide information, accept/reject animals, and pay a price premium or discount on their basis. Statistically significant differences were observed between the two trader groups: 57% of "young" traders reported that buyers seek/provide information on animal breed whereas not one "experienced" trader did so. The same result occurs for buyers' acceptance or rejection decision, and buyers' payment of a price premium for animal breed. In both cases the proportions of young traders'

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[3] Available from the author.

were 43% and those of experienced traders 0%. The same difference was recorded for animal coat color.

Effect of sampling source on traders' reported constraints

Traders were asked to report constraints faced, according to certain aspects of their business activities. Disaggregated by trader group, these results are presented in figures 5 and 6. Young traders report facing more buying-related constraints than do experienced traders (figure 5). The nature of constraints reported also varies considerably between the two groups, and the differences are consistent with differences in experience: young traders report limited funds, poor transport facilities, seasonality, storage capacities, animal health problems, and lack of trusted sources of supply. Experienced traders report more external influences, such as animal health and poor animal feeding.
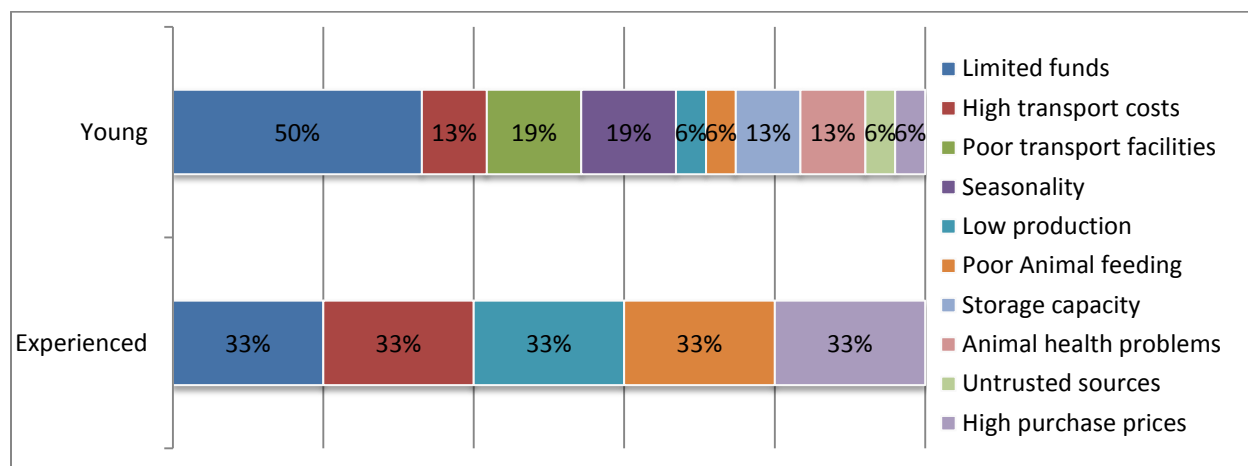

Figure 5. Constraints reported by each group: buying activities

Constraints nominated by traders associated with selling activities were subdivided in a similar fashion between the two trader groups. Again, the number of constraints identified (13) is higher in the case of young traders' group: experienced traders list 5. The types of constraints also differ: experienced traders most frequently (33%) cite animal disease, which was not listed at all by the young traders. Conversely, experienced traders identify as a constraint customers' inability to communicate needs, and this was not listed at all by young traders. "Lack of customers" (difficulty in finding buyers) was cited by both traders' groups, but more widely by the less experienced group. Similarly, only the young traders cited competition between traders as a constraint. These differences appear to reflect experienced traders' superior organization and relationships with other market actors.
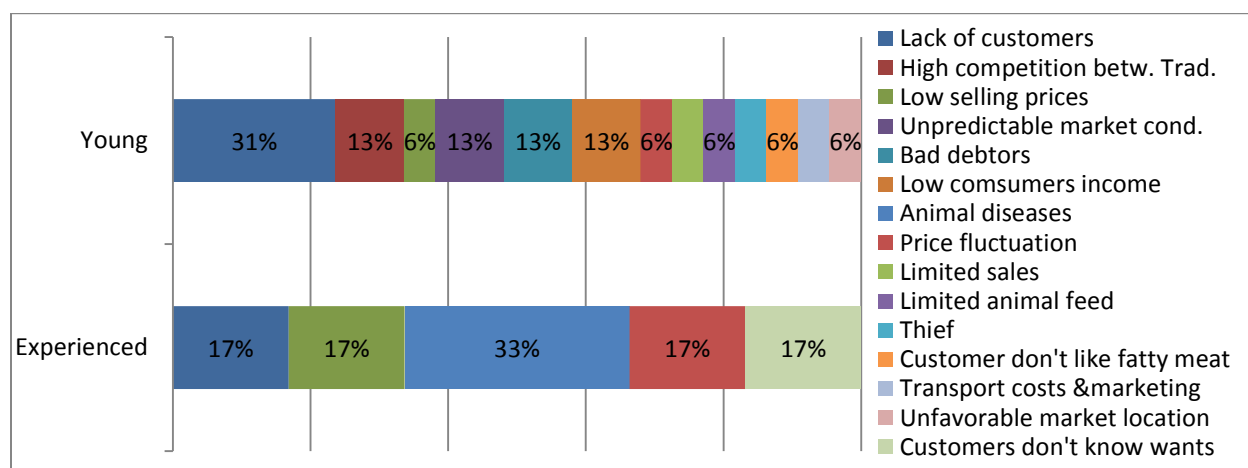
Figure 6. Constraints reported by traders - selling activities

Conclusions

This is the first known attempt to characterize pig traders in Uganda, their market linkages, perceptions of potential for value addition by way of valuation of product attributes, and perceptions of constraints. The study was also used to compare sources of sample frames for surveys.

Many of the traders studied are also involved in retail sales, but none appear to fatten pigs themselves. Farmers/producers are the main suppliers to pig traders, whereas retailers/butchers, and in lower proportion small scale producers, are their main customers. Traders are also active in supplying piglets to producers for fattening.

Three sources of sampling frames were used: local authorities, a sample of producers, and a sample of retailers. In the case of the producers and retailers' lists, some traders' names appeared in both lists. This suggests that the pig value chain in the studied locality is short: both producers and retailers deal with the same people. No names on the list supplied by the local authority appeared on the other two lists.

Disaggregation of the sample by origin of sample frame allowed identification of two groups: a first group (producers and/or retailers' list) composed of relatively young and inexperienced traders, and a second (from the local authority list) composed of older and more experienced traders. Statistically significant differences were identified between the two groups' perceptions of the influence on price of different live animal characteristics and attributes. These extended to differences in perceptions of customer value. Analysis of traders' nominated constraints revealed significant differences, which are explicable in terms of experience.

Despite the statistically robust results obtained, this study's sample (22) was small, as were the two sub-samples generated by its disaggregation by sources of sample information. Further work is needed using larger samples, and thus is currently underway with Ugandan pig traders.

It may be concluded that source of sampling information on traders can influence the results obtained from a survey.

References

Abdulai, A. and E.A. Birachi (2009) "Choice of coordination mechanism in the Kenyan fresh milk supply chain" *Review of Agricultural Economics* 31(1): 103-121.

Ajala, M.K., and A.O.K. Adesehinwa (2007) "Roles and efficiency of participants in pig marketing in the northern part of Nigeria*" Journal of Central European Agriculture* 8: 311–326.

Aoudji, A.K.N., A. Adégbidi, V. Agbo, G. Atindogbé, M.S.S. Toyi, A.S.I. Yêvidé, G.C. Ganglo, and P. Lebailly (2012) "Functioning of farm-grown timber value chains: Lessons from the smallholder-produced teak (Tectona grandis L.f.) poles value chain in Southern Benin" *Forest Policy and Economics* 15: 98–107.

Baker, D., K. Bosire, J. Cadilhon, A. Gelan, N. Mtimet, F. Wanyoike, M. Fadiga, W. Ochola, J. Jagwe and L. Nsiima (2013*) Identification and analysis of constraints faced by smallholder producers and traders in Tanzania and Uganda* Joint World Bank-FAO-ILRI publication. Funded by Bill and Melinda Gates Foundation.

Bista, S. and E.L. Webb (2006) "Collection and marketing of non-timber forest products in the far western hills of Nepal" *Environmental Conservation* 33(3): 244–255.

FAOSTAT (2012). www.faostat.org

Hap, N., S. Un, Y. Nobuyuki, T. Nakajima and T. Matsui (2012). Value chain analysis of five key fish species: inland fisheries of Cambodia. FAO report, p52.

Haji J. (2010) "The Enforcement of traditional vegetable marketing contracts in the eastern and central parts of Ethiopia" *Journal of African Economies* 19 5: 768-792.

Madzimure J., H. Saina, and G.P.K. Ngorora (2011) "Market potential for guinea fowl (Numidia meleagris) products" *Tropical Animal Health and Production* 43: 1509–1515.

ILRI (2011). Smallholder pig production and marketing value chain in Uganda: Background proposals for the CGIAR Research Program on Livestock and Fish, pp19. http://cgspace.cgiar.org/bitstream/handle/10568/16970/LivestockFish_PigVCUganda.pdf?sequence=1

Jabbar, M., S. Benin and E. Gabre-Madhin (2008) Market institutions and transaction costs influencing trader performance in live animal marketing in rural Ethiopian markets. *Journal of African Economies* 7(5): 747–764.

Kocho, T., G. Abebe, A. Tegegne and B. Gebremedhin (2011) "Marketing value-chain of smallholder sheep and goats in crop-livestock mixed farming system of Alaba, Southern Ethiopia" *Small Ruminant Research* 96: 101-105.

Lagerkvist, C.J., S. Hess, J. Okello, H. Hansson and N. Karanja (2013) "Food health risk perceptions among consumers, farmers, and traders of leafy vegetables in Nairobi" *Food Policy* 38: 92-104.

Lemke, U. and A.V. Za'rate (2008) "Dynamics and developmental trends of smallholder pig production systems in North Vietnam" *Agricultural Systems* 96: 207-223.

Loc, V.T.T., S.R. Bush and L.X. Sinh (2010) "High and low value fish chains in the Mekong Delta: challenges for livelihoods and governance" *Environment Development and sustainability* 12: 889–908.

Macfadyen, G., A.M. Nasr-Alla, D. Al-Kenawy, M. Fathi, H. Hebicha, A.M. Diab, S.M. Hussein, R.M. Abou-Zeid and G. El-Naggar (2012) "Value-chain analysis: An assessment methodology to estimate Egyptian aquaculture sector performance" *Aquaculture* 362–363: 18–27.

Minten, B., K.A.S. Murshid and T. Reardon (2013) "Food quality changes and implications: evidence from the rice value chain of Bangladesh". *World Development* 42: 100-113.

Suryadarma D., A. Poesoro, Akhmadi, S. Budiyati, M. Rosfadhila, and A. Suryahadi (2010) "Traditional food traders in developing countries and competition from supermarkets: Evidence from Indonesia" *Food policy* 35: 79-86.

Wanyoike, F., K.R. Mnenwa, N.Y.S. Mdoe, E.L.K. Osafo, L.D. Barton, L. Kurwijilla, A. Omore, S.J. Staal and M. Jabbar (2010) "Profit efficiency in informal dairy marketing in sub-Saharan Africa: The cases of Ghana and Tanzania" International Livestock Research Institute, working paper, pp21.