The Analysis of Traders in a Developing Country Value Chain:
Pig traders in Uganda

Nadhem Mtimet[*1] and Derek Baker[2]

[1]Scientist: Policy, Trade and Value Chains team, International Livestock Research Institute (ILRI), PO Box 30709, 00100, Nairobi, Kenya. n.mtimet@cgiar.org

[2]Team leader: Policy, Trade and Value Chains team, International Livestock Research Institute (ILRI), PO Box 30709, 00100, Nairobi, Kenya. d.baker@cgiar.org

Abstract

This study analyzed pig traders in Mukono district in Uganda. The main objective was traders' characterization in terms of trading activities, seasonal fluctuations, networking, and business constraints. A second objective was comparison of results across sampling sources, and to assess the extent to which these sources influence research results. Data on traders was collected through a survey questionnaire. The survey employed samples from 3 separate sample frames: traders identified by each of retailers, farmers, and local authorities.

The results indicated a limited number of intermediaries (actors), in the pig value chain in the locality studied. A large proportion of traders are also involved in the retailing function (principally as butchers). Farmers/producers remain the main suppliers to pig traders, whereas retailers/butchers, and in lower proportion small scale producers, are the main customers of these traders. Pig traders are facing many constraints in their day-to-day operations. Limited funds, transport costs and poor transport facilities are the most-cited constraints to traders' buying activities. Business environment constraints (lack of customers, high competition between traders, unpredictable market conditions, etc.) are the most frequently-cited constraints to selling activities.

Traders were segmented into two groups in the basis of their sampling list origin: a first group composed of those drawn from the producers' or retailers' lists, and a second group composed by traders drawn from the local authority's list. Results indicated that the former group is mainly composed of young and inexperienced traders, in contrast to the second group which is composed of aged and experienced traders. Traders groups' constraints analysis showed that the two groups of traders are experiencing different constraints, especially the young and inexperienced traders who cited a large number of problems. These results highlight the importance of the sampling source.

*: Corresponding author: Tel: + 254 20 422 3482

Email: n.mtimet@cgiar.org

Introduction

Pig production and consumption in Uganda has increased exponentially during the last two decades. Pig production grew by an annual average of 3.5% in this period, increasing from 57,600 tons in 1990 to 113,100 tons in 2010 (FAOSTAT, 2012). The number of pigs has also increased, from 1.16 million in 1990 to around 2.3 million in 2010.

However, in the last three years the rate of increase in pig production in Uganda has slowed. In 2011, pig production confronted African Swine Fever in several districts, with heavy losses (Meat Trade News Daily, 2011). Aside from animal health and food safety concerns, the Ugandan pig value chain has not been studied in detail, despite its increasing importance in terms of meat production (pork production ranks second after beef (ILRI, 2011)), and consumption.

Development organizations, NGOs and research centers generally focus their effort and interests on production (essentially producers and smallholders) (Rab *et al.*, 2006; Lemke & Za'rate, 2008). In the agricultural and agro-food sector, studies focusing specifically on 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).

Actors within the value chain, such as traders, are not easy to sample and well-accepted methods are not readily used. This is especially true in the context of developing countries where official data are in many cases non-existent (due to a dominance of informal markets) or out of date. Hence official sources of a sampling frame are unreliable. Traders are generally connected to other actors in the value chain such as producers, processors, retailers, other traders, and in some cases exporters. These linkages offer alternative sources of a traders' sampling frame. In general, approaches to sampling traders, and comparisons of results drawn from different sampling bases, have been little studied.

The present study focuses on analyzing pig traders in Mukono district in Uganda. We are mainly interested in characterizing pig traders in terms of economic variables, aspects of pig and pork value chain governance, pig trading activities (pigs/piglets purchase and selling, peak and low seasons, networking, etc.), and the main day-to-day constraints that they face. A second objective is to compare the results from different traders' sampling sources, and to assess the extent to which these sources influence research results.

Issues in the sampling and interview process

As stated above, sampling actors along the value chain is not an easy task. Contacting and interviewing traders are, similarly, more difficult than is the case for other value chain actors such as producers, processors, and retailers. Some such difficulties related to traders' necessary movements between locations, lack of spare time, and a general reluctance to divulge information to those perceived as competitors or as agencies of government.

A second constraint, this time on researchers, when surveying traders is the cost in terms of time and logistic expense. Individual face-to-face interview necessitates travel to meet traders. An intuitively-appealing response to this problem is to employ a workshop exercise, to which traders

would be invited. While more cost effective, this approach offers no guarantee of trader participation in sufficient numbers to generate statistically meaningful results.

To elaborate a list of traders to be used for sampling, four possible sources seem appropriate:

i. *Information from a sample of local producers*: this obviates the need to contact a sample of local producers. Although it may be easier to contact local producers than to contact traders, it necessitates time and a list – perhaps not itself composed of a representative sample - of these producers. This approach may increase sampling error as the traders' sample is provided from a list of traders issued from a sample of producers, in a snowball-type sampling procedure.

ii. *Information from a sample of local retailers*: as above, this requires a sample of other value chain actors – in this case local retailers – based on existing lists of such actors.

iii. *Information from a sample (or exhaustive list) of local processors*: again as above, this requires contacting a set of local processors. Generally the number of local processors is low compared to the number of producers, traders or retailers. For this reason, it could be possible to contact, if an exhaustive list is available, all the local processors. Because processors may deal with a subset of available product, and may deal with larger-volume traders, samples from this list are expected to be different (in terms of volumes and values of products' quantities marketed) from those assembled from other sampling frames.

iv. *Information from local authorities*: information about traders' address and contact could be obtained from a list supplied by the local authorities. This approach is easier, quicker, and cheaper than those outlined above. Its two major disadvantages are that such a list may be rarely updated, and moreover be incomplete due to traders preferences to be not registered on any official list.

In the current study we attempted using three different sample frames: a list of traders issued from a sample of local producers (a survey of producers was being conducted at the same time), a list of traders obtained from a sample of local retailers, and a third list of traders obtained from local authorities.

In the context of agricultural research, and more specifically in value chain analysis, when one or more actors are studied, sampling respondents is an important empirical step that influences the quality of the results and of its inference to the target population. Literature review allows identification of three common situations:

i) no information at all about the sampling strategy and how respondents have been selected (Ajala and Adesehinwa 2007, Jabbar *et al.* 2008, Loc *et al.* 2010, Hap *et al.* 2012, Macfayden *et al.* 2012)

ii) researchers indicating that respondents have been randomly selected but without any other explanation and details (Bista and Webb 2006, Abdulai and Birachi 2009, Kocho *et al.* 2011, Minten *et al.* 2013).

iii) detailed information is provided about sample selection (Rab *et al.* 2006, Wanyoike *et al.* 2010, Aoudji *et al.* 2012, Lagerkvist *et al.* 2013)

Data collection

Data on traders was collected through a survey questionnaire implemented with individual traders following a workshop in Mukono district, near to the city of Kampala in Uganda, in September 2012. As outlined above, the survey employed samples from 3 separate sample frames: traders identified by each of retailers, farmers, and local authorities. Seventy traders were contacted to attend the workshop, with a turnout of 22 traders representing an overall 31% response rate, which varied by sample basis (the producers' list yielded a 73% response rate). Table 1 summarizes the samples.

Of the 70 traders contacted, 14 names were provided by both farmers and retailers, which could indicate that the pig value chain in Mukono district is local, with few intermediaries between producers and retailers. Gender participation in the sampling and survey entailed 63 men and 7 women, indicating that pig trading is overwhelmingly a male activity. 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. Detail of traders' samples, by sampling 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).

Results

Traders participating in the survey are all male, and generally young (mean age around 32 years), with little education (82% at primary level). The majority of traders (73%) operate informal (non-registered) enterprises. These latter are generally small firms with less than 6 employees (3 on average).

The majority of traders (82%) declared that pig trading is their main business activity. At the same time all of them have at least one additional business activity. In many cases (50%), traders have more than two sources of income.

Survey results for the number of pigs and piglets[1] purchased per month indicate variation between low and peak seasons. The average number of pigs purchased during the peak season is 86% higher than that in low season. The same pattern is observed for piglets' purchase (74% increase from low to peak season). It is important to note that all sampled traders buy pigs (only one trader does not buy pigs in peak season). Only 60% of traders are involved in piglets

---

[1] Two general modes of pig production occur in Uganda: production and sales of piglets, and purchase of piglets for fattening and sale as grown pigs. Traders' activities then serve these two models by dealing in pigs and/or piglets.

purchase. Substantial variation in pigs purchase numbers is observed amongst traders, especially in peak season.

Similarly, traders were asked to identify individually the months corresponding to peak and low sales volumes. Figures 1 and 2 show the proportion of peak or low seasons traders' indications (we have intentionally omitted the cases were no indication has been provided). 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 could be detected. In relation to pig sales, three peak periods could be observed: October-December, April, and July. Three periods of low sales could be observed: January-March, May, and August-September. Comparison between pigs' and piglets' sales' seasonality reveals some opposing cycles: when one increases, the other declines. December is the sole time of the year nominated by the traders as providing peak sales for both pigs and piglets.
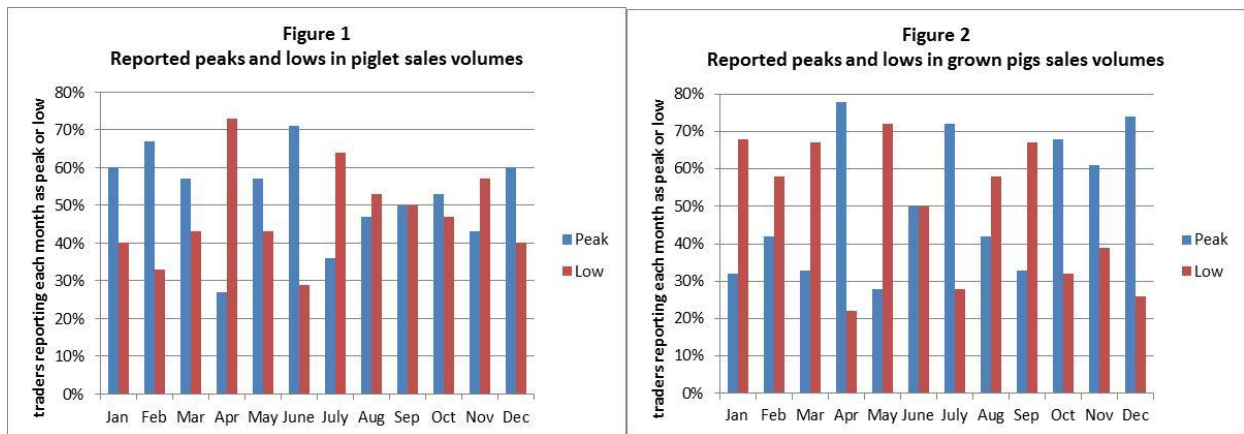
Figures 1 and 2. Reported peaks and lows in respectively piglets and pigs sales volumes

As would be expected, all pig traders are completely or partially supplied by farmers/producers. Some 23% of the traders are also supplied by other traders or collectors. Only a small proportion of traders buy pigs or piglets from abattoirs that engage in live sales (9%), or from farms associated with schools (4%). Abattoirs, which primarily function in animal slaughter, play also, in many cases, a role of the wet market where both meat and live animals are marketed. Traders reporting being supplied by abattoirs are also supplied by other traders or collectors. In terms of number of suppliers, on average each trader is working with 34 producers. This number varies considerably among traders (from 6 to 100, s.d. 26).The average numbers of piglets and pigs purchased annually from each farmer/producer are about 11 and 12 respectively.

For traders supplied by other traders/collectors, the average number of these suppliers is around 14. The average numbers of piglets and pigs purchased annually from each trader/collector are respectively around 16 and 30. As expected, these averages are higher than for supply by farmers/producers. Only two traders are supplied by abattoirs. On average, the number of pigs purchased per year per abattoir is around 53. Finally, one trader reported buying pigs from school farms, at an annual average of 3 pigs/school-farm.

Some 82% of traders report that retailers and butchers are their most important customers. This majority result is to be expected, as many traders report also being themselves butchers or retailers in a vertically integrated market presence. Small scale producers ranked second (46%)

as traders' customers, as traders buy and sell piglets. Collectors/traders (23%) represent another outlet. The proportion of traders working with large scale producers or processors/abattoirs is relatively low (18%). This could be explained by the fact that large scale producers, processors or abattoirs are generally looking for a large number of animals/quantities of meat that the majority of surveyed traders is unable to offer. The same statement applies to selling products to hotels, restaurants and premises offering ready-to-eat meat products to consumers.

Segmentation of traders' by sampling source

The second objective of our study was to compare the results from the different sampling sources. Traders who participated in the survey were divided by 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).

Group means test and group proportion tests were applied to several variables. The statistically significant results are summarized in Table 2. Group 1 is composed of younger persons (28 years on average) than is group 2 (around 42 years). This is reflected in reported experience, as group 2's traders report an average of 13 years' experience compared to group 1's 5.3 years. Group 1 could be referred to as the "young" traders, and group 2 as the "experienced" traders.

The majority of the young traders (75%) are involved in piglets' trading, compared to just a few (17%) from the experienced group. In comparison to the experienced group, young traders are more involved in working and collaborating with groups of producers (cooperatives, associations). Experienced traders who have formally registered companies are all subjects to tax payment. In the case of young traders, the proportion did not exceed 50%.

Table 2. Characteristics of the segmented traders' groups

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

Traders have also been requested to rate (from 0 not important to 5 very important) a list of 15 attributes indicating their impact on pigs sales' price. These attributes were related mainly to the physical and visible aspects of the animal. Results indicated that both traders' groups have 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. On the other hand, 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 have been stated as less important on affecting animal price.

However some statistical significant differences arise among these ratings. In that sense, the "young" pig traders' identified slightly higher attributes' scores compared to the "experienced" ones' in the case of animal coat color, type of housing used, and litter size. Conversely, "experienced" traders assigned higher importance to the presence of disease outbreaks in their region, which indicates their high concern with this issue.

Using the same list of attributes, traders were asked about their buyers' (customers) attitude vis-à-vis of these attributes using three statements: 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 obtained results in general confirm those above concerning attributes' importance in animal sale price. Attributes such as animal live weight, apparent fat, carcass weight, carcass fat, animal conformation/shape, animal health, and disease outbreaks in trader's region, have been 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.

Nonetheless, some differences (statistically significant) arise between the two traders' groups. 57% of "young" traders stated that buyers seek/provide information on animal breed whereas not one trader (0%) from the "experienced" group confirmed this statement. The same is observed for buyers' acceptance or rejection decision, and buyers' payment of price premium for animal breed. In both cases the proportions of young traders' were 43% and those of experienced traders were 0%. The same general result is observed in the case of animal coat color attribute.

*Constraints faced, by source of sampling information*

Comparison of the constraints faced by the two groups of traders is presented in figures 3 and 4. Figure 3 reveals that young traders report facing more constraints in their buying activities (5 more constraints) than do experienced traders, although both groups provided the same proportion of responses. The experienced traders report limited funds, high transport costs, low production, poor animal feeding, and high purchase prices as their constraints. The young and non-experimented traders from the first group claim to be suffering from limited funds, poor transport facilities, and seasonality. They also report facing problems related to storage capacities, animal health problems, and untrusted sources. The differences in the constraints nominated are consistent with differences in experience, and extent of establishment in the business, and in the market.
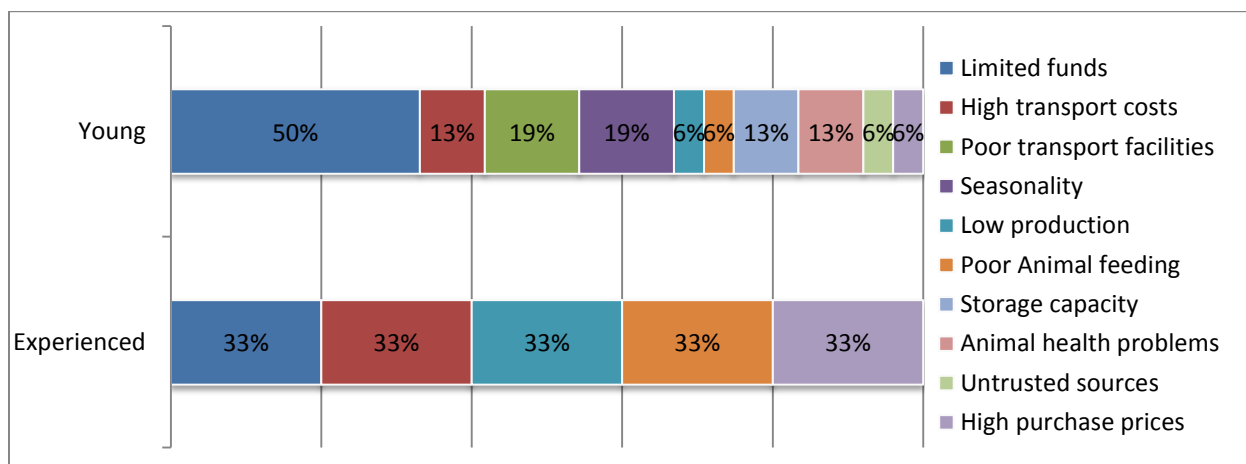
Figure 3. Main constraints faced by each group of traders in their day-to-day buying activities

The same pattern is observed for constraints nominated by traders for their day-to-day selling activities. First, the number of constraints (13) is higher in the case of young traders' group, compared to that (5) stated by the experienced group. The type of constraints is also somehow different. The most-cited constraint by the experienced traders is related to animal diseases (33%). This constraint was not cited at all by the young traders. A similar difference is observed in that experienced traders, but not young traders, cite customers' inability to communicate needs.

"Lack of customers" (interpreted as difficulty in finding buyers) was cited by both traders' groups, but more intensively by the less experienced group. Similarly, only the young traders cited high competition between traders as a constraint. These differences reflect likely superior organization and stronger market relationships amongst experienced traders, and between them and buyers.
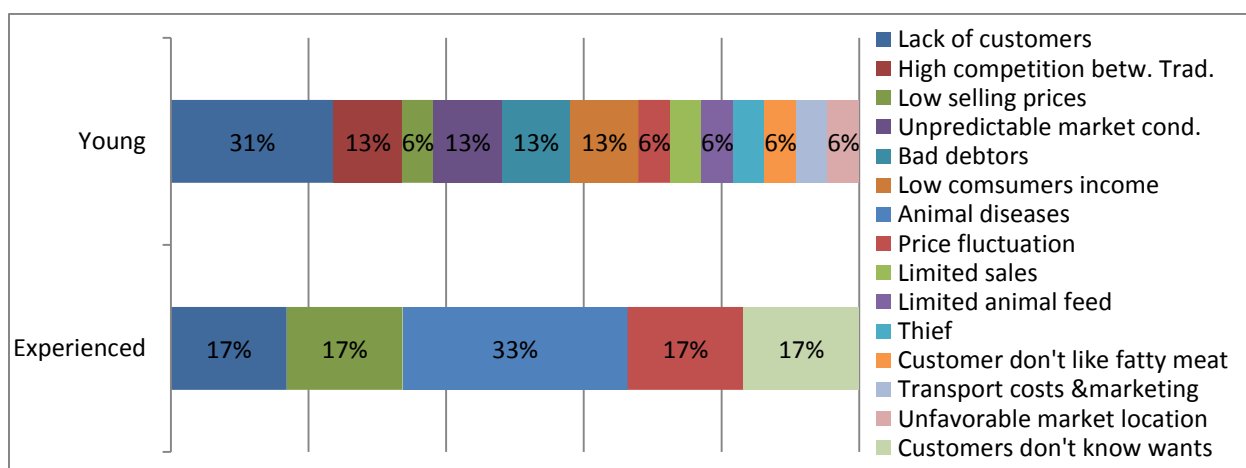
Figure 4. Main constraints faced by each group of traders in their day-to-day selling activities

Conclusion

This is the first known attempt to analyze pig traders in Uganda, focusing on their organization within the pig and pork value chain, the types of suppliers and customers that they are working

with, their interpretation of market signals, and the major constraints that they face. The results indicate that there is a limited number of intermediaries (actors), in the pig value chain in the locality studied. A large proportion of traders are also involved in the retailing function (principally as butchers). Farmers/producers remain the main suppliers to pig traders, whereas retailers/butchers, and in lower proportion small scale producers, are their main customers.

Traders participating in the survey were sampled from three traders' lists provided respectively by: 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 confirming that the pig value chain in the studied locality is short. The most striking feature of the segmentation of the sample according to origin of sampling information is that it allowed identification of two groups: a first group (producers and/or retailers' list) mainly composed of young and inexperienced traders, and a second (from the local authority list) composed of older and more experienced traders. Analysis of traders' nominated constraints revealed significant differences, which are explicable in terms of experience.

Pig traders report facing many constraints in their day-to-day operations. Limited funds, transport costs and poor transport facilities are the most-cited constraints to traders' buying activities. Business environment constraints (lack of customers, high competition between traders, unpredictable market conditions, etc.) are the most frequently-cited constraints to selling activities. Lack of clarity in understanding consumers' needs was also cited as a constraint. This result is supported to some extent by some differences between traders' reports of buyers' interpretation and communication of a range of animal and product attributes, and of the influence of these attributes on prices.

Source of sampling information was revealed to be a statistically significant explanation of variation both within the sample's information on traders' size, activities and characteristics, and associated with the constraints identified. The overall sample (22), and the two sub-samples by sources of sample information, were small. The results of the current study must be interpreted in that context and call for further work with Ugandan pig traders. The sample size also limits the available conclusions on sampling procedures for traders, but the results do indicate that source of sampling information on traders can influence the results obtained from a survey of traders. Further, limited overlap was identified between lists of traders delivered from different sources of sampling information and the implications of this result bears further examination.

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.

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.

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. Markting 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.

Rab, M.A., H. Navy, M. Ahmed, K. Seng and K. Viner 2006. Socioeconomics and values of resources in Great Lake-Tonle Sap and Mekong-Bassac area: results from a sample survey in Kampong Chhnang, Siem Reap and Kandal provinces, Cambodia. WorldFish Center Discussion Series, 4, 98p.

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