**VIETNAM NATIONAL UNIVERSITY**

**OF AGRICULTURE (VNUA)**

# IMPROVING THE LIVELIHOOD OF SMALL FARMERS IN THE PIG VALUE CHAIN: EXPERIENCES IN THE NORTH OF VIETNAM

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## Abstract

Livestock sector in general and pig production in particular are important in Vietnam not only for supplying food for its growing population but also for their significant contributions to the country's economy. Smallholder pig producers which are common, are estimated to supply at least 80% of pork in total pork production in the country. The paper airms to draw a picture of pig production performance of small farmers based on the survey data of ILRI-VNUA and value chain approach. It is believed that pig smallholders in Vietnam perform a weak market orientation, and they do not have full information about market. Therefore, some implications should be as small pig farmers need facilitation from the government and training & improving veterinary network are needed; Government management on input and output markets should be strengthened effectively; The private sector should participate actively in the chains; and Awareness of food safety of people should be improved.

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# Improving the Livelihood of Small Farmers in the Pig Value Chain: Experiences in the North of Vietnam

## 1. Introduction

Livestock production contributed about 18% total Vietnam's GDP in 2010 and this figure is expected to rise up to 20% in 2020 (MARD, 2012). The pig sector consistently contributed about 74-80% of the total meat production in Vietnam during 2000-2012 (Nga *et al.,* 2013). Small-scale production predominates in the pig sector, with more than 4 million pig-raising smallholders in the country, of which 52% are raising 1-2 pigs (GSO, 2011), and supplying at least 80% of Vietnam's pork consumption (Lapar et al., 2011). ACIAR-ILRI-CAP (2008) shows that pig production generates about 14% of household income and one-fourth of total household income from agriculture. This source of income is important because it provides a source of quick cash in times of emergency or a shortfall in household cash requirement due to a crop failure, medical emergencies, a family death, natural disasters, or other reasons. Therefore, the pig sector is critically important in agriculture and rural economy, especially small farmers.

Little is known on the participation of smallholders in pig value chains in Vietnam. Lapar *et al. (2010)* and Lapar *et al.* (2011) spend special concerns of smallholders in pork value chain in Vietnam and highlight key recommendations to enhance smallholder participation in the emerging pork value chains. This paper aims to characterize the participation of smallholders in the pig value chain in Northern Vietnam, identify factors affecting smallholders pig production performance, and opportunities to improve smallholders' income in the chain.

## 2. Site Description & Methodology

### Site description

Hung Yen and Nghe An are provinces with fairly high pig herd sizes in the North of Vietnam, which are estimated 1,014,900 and 623,300 heads in 2013 respectively (GSO, 2014). The former represents for a more developed production, while the later represents a more rural and less developed pig value chain (ACIAR, 2012). Hung Yen is located in the Red River Delta, comprises one city (Hung Yen) and nine districts. Nghe An is located in Northern Central Coast, comprises one city (Vinh), two towns (Cua Lo and Thai Hoa), and 17 districts.

### Sampling & data collection

Three districts are chosen from each province, representing different pig value chain gradients (Rural – Rural (R-R), and Rural- Peri urban/ Urban (R-PU(U))) as consulted from a group discussion with the local governments and departments of agriculture & rural development. In Hung Yen province, Tien Lu, Van Giang, and Khoai Chau districts were selected and three districts in Nghe An (Do Luong, Hung Nguyen, and Dien Chau) were selected. In each district, three communes are selected by randomly taking from pig density groups (low, medium, and high), summed up to 18 communes in 6 districts. Farmers are then randomly selected from the list of pig farmers provided by veterinary staff in communes. Other actors (input trader, collector, pig trader, slaughter men, processor, retailer, and consumer) were selected by a convenient way in the chosen communes/towns. Total sample size is 1025, consisting of 420 farmers (this paper limits to only farmers producing finished pigs, which are 318 households) and 416 consumers. The remains are other actors along the chain.

Descriptive comparative statistics and gross margin analysis are employed to characterize actors (mostly farmers) in the chains, and provide the analysis of economic performance of pig production in different production systems and location.

## 3. Findings

### 3.1. The pig value chain

*Mapping of the pig value chain. The* generic pig value chain includes input traders (feed & veterinary), pig producers, slaughterhouses, retailers, processors, and consumers. The longest marketing channel includes all of these actors, while the shortest one has no intermediate actors between producers and consumers. Many actors perform several functions, for example, a farm household could produce pigs, buy pigs from other farmers to slaughter, process and sell raw meat and processed meat to local consumers. About 60% of pigs was consumed at local areas (districts & communes) (Fig.1) and very little was processed (2% of total produces). About half of finished pigs were sold to slaughterhouses (mostly slaughtermen locally), and nearly half of produced pigs were sold to pig collectors/traders then moved to other provinces. Few farmers slaughtered their pigs at home to sell directly to local consumers (in the same village). Therefore, pig traders & slaughterhouses are the most important buyers.

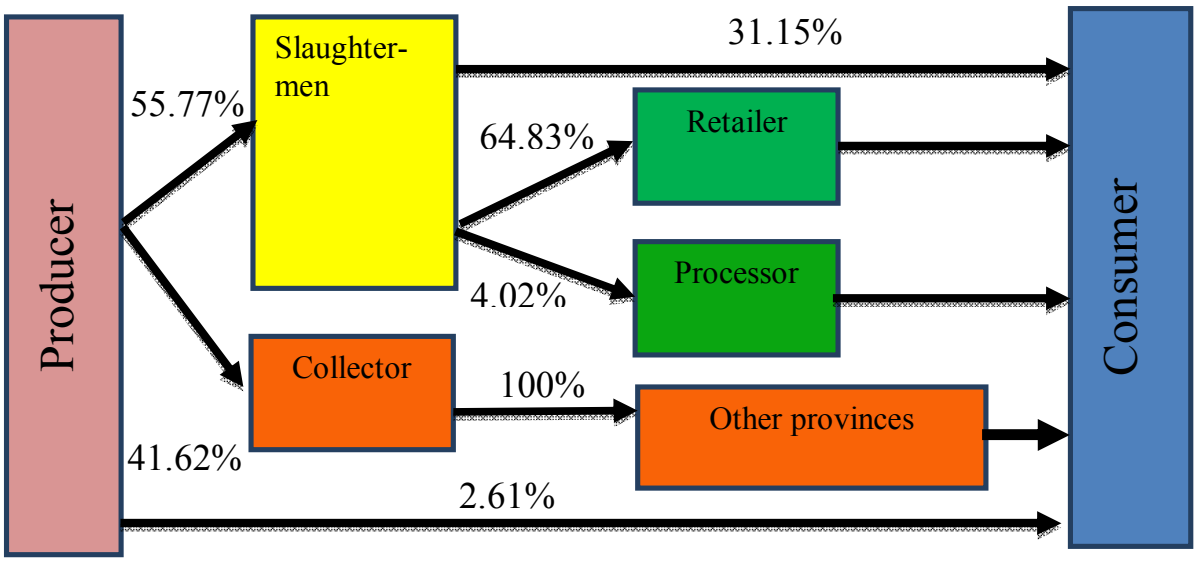


**Figure 1: Map of pig value chain in Hung Yen and Nghe An**
Source: survey of ILRI-VNUA, 2013

The survey of Traders and other actors was implemented in rural areas (except consumers), therefore the channel farmer-collector was not fully investigated. Within provinces, there are typically 4 marketing channels: (1) Farmer - Slaughtermen - Retailer- Consumer; (2) Farmer - Slaughtermen cum retailer - Consumer; (3) Farmer – Slaughtermen – Processor - Consumer; and (4) Farmer - Consumer.

*Farmer profile.* About one-third of respondents were males in Nghe An province, while this figure was about two-thirds in Hung Yen, reflecting the fact that pig production is relatively more important sources of income for farm households in Hung Yen than Nghe An, which attracts more participation from male labors. On average, a typical farm size was about 4 people (Table 1). Primary economic activities of a household head were animal keeping (47% of total households), crop production (18% of total households). Among those, animal production was the primary activity of about two-thirds of household heads in Hung Yen (Table 1).

**Table 1. Socio-demographic of farm households**

| | Hung Yen | Nghe An | Total |
|---|---|---|---|
| Respondent as male (%) | 63.7 | 33.2 | 48.6 |
| Household head as male (%) | 93.9 | 96.6 | 95.2 |
| Household head age (years) | 48.3 | 48.2 | 48.3 |
| Household head education level (%) | | | |
| None | 0.9 | | 0.5 |
| Primary | 5.2 | 1.5 | 3.4 |
| Secondary and high school | 90.1 | 89.8 | 89.9 |
| Other | 3.8 | 8.8 | 6.2 |
| HH primary activity (%) | | | |
| Crops | 14.6 | 20.2 | 17.4 |
| Animal keeping (incl. pigs) | 64.2 | 29.8 | 47.1 |
| Other | 21.2 | 50.0 | 35.5 |
| Farm household size (people) | 3.6 | 3.7 | 3.6 |

*Source: Computing from survey data in 2013 by ILRI – VNUA*

### 3.2.Pig production performance

*Scale of production.* The majority of farmers rear 1-30 pigs/cycle while a few rear more than 30 pigs/cycle (Table 2). A rural-rural value chain is typically characterized by pig flows within a commune/district, meanwhile, a rural-peri urban (urban) pig value chain represents by pig flows from a rural area to a peri-urban or urban area. Farmers at three different scales participate in both types of Value chains, but those producing 1-10 pigs/cycle seemingly participate more on rural-rural value chain. It can be seen that pig production scale is generally higher in Hung Yen (Table 2).

**Table 2. Scale of pig production by location & type of value chain gradient**

| Pig herd size | Location | | Value chain Gradient | | Total (n=318) |
|---|---|---|---|---|---|
| | Hung Yen (n= 183) | Nghe An (n=135) | Rural-rural (n=179) | Rural-peri urban (urban) (n=139) | |
| 1-10 | 39.7 | 77.8 | 60.3 | 49.6 | 55.7 |
| 10-30 | 53.8 | 20.0 | 34.7 | 46.1 | 39.6 |
| >30 | 6.5 | 2.2 | 5.0 | 4.3 | 4.7 |

*Source: Computing from survey data in 2013 by ILRI – VNUA*

*Basic pig production infrastructure.* The pig house area is larger in Hung Yen as compared to Nghe An, estimated to be about 78$m^2$ and 29$m^2$, respectively (Table 3). Most of pig barns are constructed and equipped with water pump and lights. Only half of Hung Yen farmers invested in water system and few invested in feed mixer (Table 3). The pig density in both provinces is fairly low. The reason is that farmers remained some slots of their barns empty due to low pig prices during the survey time.

**Table 3. Pig house condition**

| Items | Hung Yen | Nghe An | Total |
|---|---|---|---|
| 1. Housing area ($m^2$) | 77.9 | 29.1 | 60.9 |
| 2. Pig barn is constructed (% of hh) | 99.5 | 98.1 | 99.1 |
| 3. Pig density ($m^2$/head) | 5.6 | 4.5 | |
| 4. Tools for pig production (%hh has) | | | |
| Water pump | 99.5 | 88.0 | 95.6 |
| Halogen | 73.1 | 10.1 | 45.8 |
| Lights | 88.2 | 86.1 | 87.8 |
| Water system | 51.4 | 9.6 | 36.1 |
| Feed mixer | 2.8 | 0 | 1.9 |
| Fans | 82.1 | 41.8 | 65.5 |
| 5. Biogas for waste treatment | 55.7 | 22.1 | 45.8 |

*Source: Computing from survey data in 2013 by ILRI – VNUA*

*Production performance.* In the last pig cycle, an average farm household reared about 14 pigs and there is a considerable difference between Hung Yen and Nghe An, with the herd size in Hung Yen is about 50% higher than in Nghe An (Table 4). Farmers in Hung Yen finish a pig cycle in about 146 days, with a higher level of live weight of pigs sold than in Nghe An. On average, a pig farm household in Hung Yen produced about 1.8 tons (live weight), almost three times as high as those in Nghe An. There is no significant difference in these performance criteria in pig production between two types of value chain gradient.

**Table 4. Pig production output in the latest cycle, by location & value chain gradient**

| Performance criteria | By location | | | By value chain gradient | | | All |
|---|---|---|---|---|---|---|---|
| | Hung Yen (1) | Nghe An (2) | (1) – (2) | R – R (3) | R – PU (U) (4) | (3) – (4) | |
| 1. Pig herd size | 16.4 | 9.5 | 6.9*** | 12.8 | 14.4 | $-1.6^{ns}$ | 13.5 |
| 2. Time/cycle (day) | 145.9 | 99.8 | 46.2* | 124.3 | 129.2 | $-4.9^{ns}$ | |
| 3. Monthly gaining weight (kg) | 20.1 | 16.1 | 4.0*** | 18.4 | 18.5 | $-0.1^{ns}$ | 18.4 |
| 4. Total output (kg) | 1776.9 | 586.9 | $1190.0^{***}$ | 1258.8 | 1297.6 | $-38.8^{ns}$ | 1275.8 |
| 5. Average live pig weight (kg/head) | 107.0 | 60.8 | $46.23^{***}$ | 86.8 | 88.4 | $-1.6^{ns}$ | 87.5 |

*Source: Computing from survey data in 2013 by ILRI – VNUA*

*Note: ***,*, and ns: Significance at 1%, 10% and non-significant, respectively.*

*Cost and income from pig production.* On average, a farm household had to spend about VND 3.5 million to produce a 100 kg of live weight pig and earned about VND 0.7 mil. Prices of live pig were clearly different between locations and value chain gradient. Farmers in Hung Yen obtained higher prices than those in Nghe An and likewise for farmers in R-PU/U value chain as compared with R-R value chain (Table 5). It could be explained by the fact that Hung Yen is located near big cities (Hanoi, Hai Phong) and the emergence of industrial zones in the province. The farmers in R-R value chain received lower prices than the others because traders often offered higher prices than local slaughtermen. Eventhough the variable costs are different between locations and value chain gradients, gross margins and net farm incomes are not

statistically different. It could be seen that net farm incomes from pig production in Nghe An varied drastically, with farmers incurring lost in the last pig cycle. The same pattern is observed for R-R farmers (Table 5). Along the chain, the daily-working rate of farmers is lowest, estimated to be VND 143,000, as compared to slaughtermen's (VND 345,000) or processors' (VND 231,000).

**Table 5. Gross margin analysis of pig production, latest cycle, by location & VC gradient**

*(For 100kg of live weight)*

| | By Location | | | By VC Gradient | | | All |
|---|---|---|---|---|---|---|---|
| | Hung Yen (1) | Nghe An (2) | (1)-(2) | R - R (3) | R – PU (U) (4) | (3)-(4) | |
| TR | 4452.5 | 4158.1 | 294.4* | 4256.1 | 4414.5 | -158.4*** | 4325.4 |
| | *(360.6)* | *(637.3)* | | *(542.5)* | *(464.7)* | | *(515.2)* |
| Varriable Costs | 3680.2 | 3472.3 | 207.9* | 3512.9 | 3686.1 | -173.2** | 3588.5 |
| | *(618.7)* | *(959.6)* | | *(803.1)* | *(752.4)* | | *(784.9)* |
| Gross margin | 772.3 | 685.9 | 86.4$^{ns}$ | 743.2 | 728.5 | 14.7$^{ns}$ | 736.8 |
| | *(584.1)* | *(953.5)* | | *(833.3)* | *(664.9)* | | *(763.2)* |
| Netfarm income | 742.8 | 658.2 | 84.6$^{ns}$ | 715.9 | 697.9 | 18.0$^{ns}$ | 708.0 |
| | *(587.6)* | *(948.4)* | | *(831.4)* | *(664.8)* | | *(762.0)* |

*Source: Computing from survey data in 2013 by ILRI – VNUA*
*Note: number in parentheses are standard errors.*

*Value added a long pig value chain.* Within the R-R value chain, farmers in the marketing channel 4 could generate highest value added, amounted to about VND 883,000 per 100 kg pig (live weight) and cover total value added of this channel (as no intermediate actor existed). However, only few farmers could operate all functions in the chain. On average, farmers generated a value added of approximately VND 750,000 per 100 kg pig (live weight), accounting for about half of value added in the chain (Figure 2).

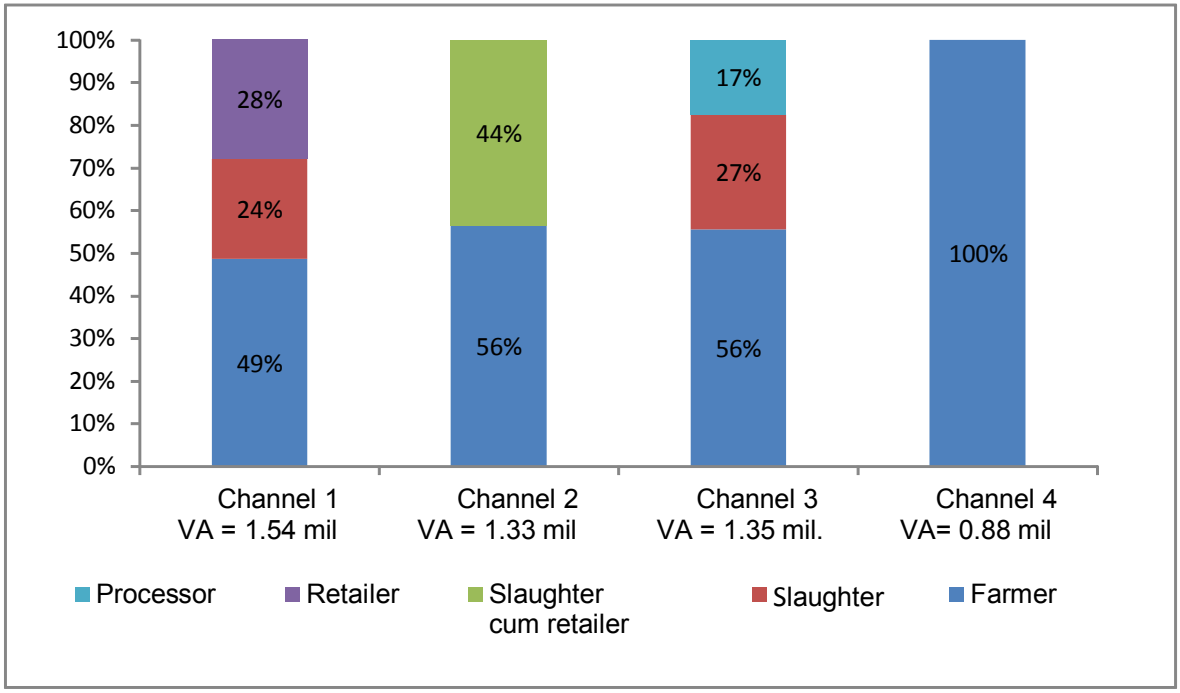


**Figure 2. Value added distribution in the R-R pig value chain**

### 3.3. Factors affecting pig production performance and opportunities to improve smallholder's income along the pig value chain

*Disease & farmer capability to respond.* More than one-fourth of piglets got sick during the latest pig cycle, while about 5% of growing and fattening pigs suffered this problem (*Survey data in 2013 by ILRI – VNUA)*. Diarrhea is the most common disease infecting pigs (more than 90% piglet and about one-fourth of growing & fattening pigs – Table 6). However, farmers reported that PRRS, FMD, head edema are of the most serious diseases affecting pigs (hamper growth, prolong time cycle, and death in pig production). In 2012, about 2% of piglets and growing/fattening pigs were dead because of diseases (Table 7). This incurred a higher cost for production.

**Table 6. Disease profile in pig production** *(% of pigs infected)*

| Item | Piglets | Growing pigs | Finished pigs |
|---|---|---|---|
| Diarrhea | 91.1 | 27.0 | 24.5 |
| Pneumonia | 3.0 | 6.2 | 33.4 |
| Fever | 1.9 | 12.5 | 9.5 |
| PRRS | 1.6 | 15.9 | 14.8 |
| Head edema | 1.2 | 1.7 | 5.4 |
| Pasteurellosis | 0.5 | 5.9 | 6.2 |
| Salmonellosis | 0.4 | 3.0 | 2.9 |
| FMD | 0.3 | 5.9 | 3.1 |
| Polio | 0 | 21.8 | 0.3 |

*Source: Computing from survey data in 2013 by ILRI – VNUA*

**Table 7. Pig mortality rate**

| | Location | | Value chain gradient | | All |
|---|---|---|---|---|---|
| | Hung Yen | Nghe An | R - R | R-PU(U) | |
| Sick piglet (% in total) | 43.5 | 26.3 | 27.0 | 50.9 | 37.9 |
| Dead piglet (% in total) | 1.9 | 1.7 | 1.5 | 2.4 | 1.9 |
| Sick fattening pig (% in total) | 20.4 | 6.96 | 10.1 | 23.5 | 16.3 |
| Dead fattening pig (% in total) | 2.3 | 1.48 | 1.6 | 2.6 | 2.0 |

*Source: Computing from survey data in 2013 by ILRI – VNUA*

The prevalence of pig disease origins from several sources. Piglet quality is rarely certified by a line agency; farmers buy piglet from various sources, even from open markets, therefore, piglet origin and health are not assured. Even piglets produced in big sow farms are in threat of degrading in quality as reported by department of livestock, Hung Yen province, due to the homogeneity when cross-breeding among pig population for long period. Besides that, farming practices in pig production are not strictly complied with regulated standards. Vaccine utilization is not applied by all farmers (Figure 3); or when their pigs got sick, about two-thirds of farmers treat by themselves, but many of them did not feel confident in doing this. Farmers (especially in Hung Yen) reported they were lack of knowledge and skills in diagnosing and curing diseases in a timely and effectively fashion. In addition, about 8% of farmers sold sick pigs away or

slaughtered for home consumption, and about 8% of farmers threw dead sick pigs away. These practices might be a source of disease spread.

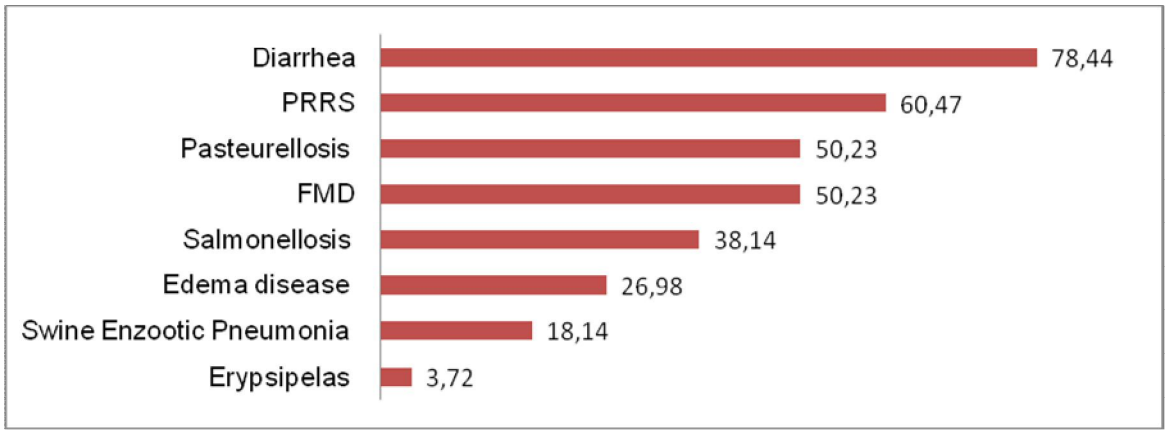


**Figure 3. Application of vaccine for pigs (% farm household)**
*Source: Computing from survey data in 2013 by ILRI – VNUA*

*Veterinary services quality.* In most of cases, farmers buy veterinary medicine and treat sick pigs themselves. However, it was reported about low and very low effectiveness of veterinary medicine for pigs nowadays, especially in Nghe An. Farmers reported that they had to use higher doses/frequency of drugs for pig disease treatments but still could not treated infected pigs successfully. For example, in the past, farmers applied 1-2 injections, but they have increased to 4-5 injections for the same disease in recent years. In many cases, drugs are expired but detected only when farmers failed in treatments. Also, public veterinary services should be improved in terms of veterinary staff qualification and equipment for the services, such as containers for vaccine during trips to farms. Farmers are also concerned of "new" diseases in pigs that even veterinary staff does not know and not able to diagnose, which is reported to be serious to farm households.

*Input prices & Output prices.* Feed accounts for about 80% of total cost of pig production, thus, feed prices and output prices largely decide the net income of pig production. Feed prices and pig prices have been moving unfavourably for producers in the last several years, especially since 2012 (Figure 4). The fluctuation of feed prices & pig prices is the main reason caused a high volatility in the net farm income of pig production as shown in Table 5. This is reported the most important factor constraining pig production at farm level. In the pig value chains, small farmers are price takers, therefore, they need supports from government.
Generally, farmers are not aware of reasons of low pig prices in recent years. Observations in markets and interviews with traders and consumers revealed that cheaper meat importation, sustain domestic meat supply, sustain and/or decrease demand for meat (partly due to food safety concern) might have contributed to create the excess supply of pig meat in the market. However, the picture might be worse when Vietnam joins TPP (Trans-Pacific Strategic Economic Partnership Agreement) with import tax for pork down from 20% to 0% (According to Vietnam Department of Customs, Vietnam imported meat of about 107,000 tons in 2011 and 92,000 tons in 2012). Even domestically produced pork is preferred to imported meat, but price competition (especially for low and medium – income consumer) and changing consumer shopping and eating style (especially young generation in cities) likely are unfavorable for the domestic pig industry.

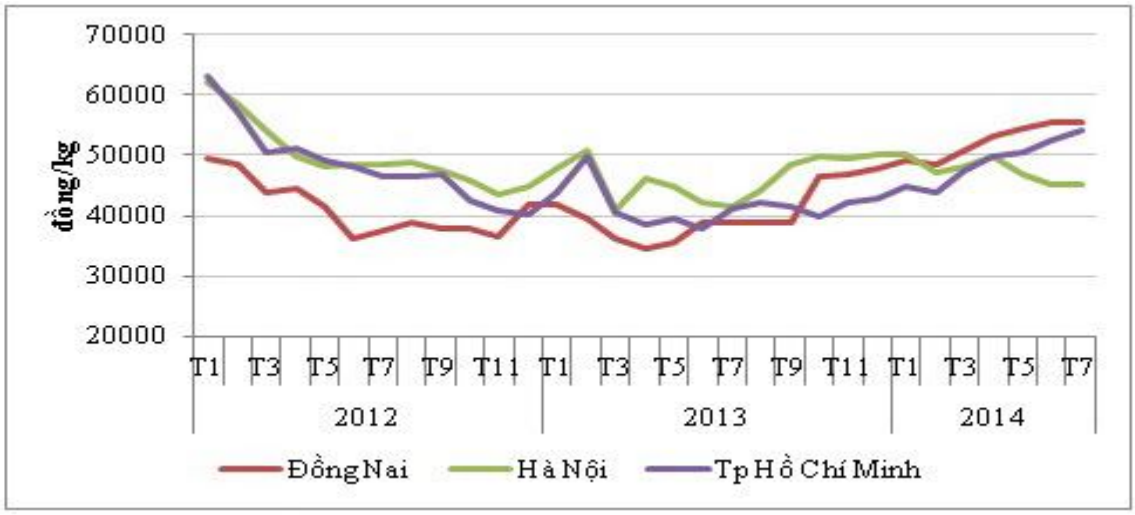


**Figure 4. Pig price in selected provinces (VND/kg live weight)**
*Source: My Y (2014)*

*Food safety*. Food safety in pork supply has become of much concern recently with use of antibiotic substances and Beta-agonist, with residues excessed the permission, and it is believed to have negative effect to human health. At present, there is no formal linkage in the pig value chains from stallholders to retailer, therefore, pork could not be traced. Almost farmers do not know where their pigs are moved to outside their districts/provinces. Similarly, most of consumers do not know the origin of pork they buy, especially from open markets in urban areas. However, consumers are willing to pay for pork with good quality (safe to human health), with the price premium of about 20% higher as compared to prevailing prices (Table 8). This is likely to be a market opportunity for pig farmers.

**Table 8. Consumer willingness to pay for safe pork (n = 416)**

| | Value |
|---|---|
| 1. Willing to buy safe pork with higher price (% of total respondent) | 92.6 |
| Price premium (%) | 21.4 |
| 2. Not willing to buy safe pork with higher price (% of total respondent) | 6.7 |
| Believe that pork is of good quality | 48.4 |
| Do not trust in certification of safe pork | 35.5 |

*Source: Computing from survey data in 2013 by ILRI – VNUA*

## 4. Conclusion

A basic description of pig value chains in Hung Yen and Nghe An provinces emphasizing farmers' participation reveals that generally pig smallholders in Vietnam perform a weak market orientation, and they do not have (and apparently, are not concerned about) full information about market (especially final consumers in urban/peri urban areas). This coupled with constraints in resources including knowledge and capabilities discouraging farmers to participate successfully in the pig value chains. In addition, institutional issues (which could not be covered in this paper, i.e. setting and management of meat standards, or other government regulations in case of market failure) should be taken into consideration in the pig industry as a whole as well as for smallholders specifically. Increasing integration with the world economy will likely bring small pig farmers more threats than opportunities. Therefore, government initiatives in facilitating innovation and upgrading are conditional for the development of pig value chains,

and therefore, for the welfare of numerous small pig farmers. Several policy implications are proposed: (i) Small pig farmers need facilitation from the government to improve their capability in production, while training & improving veterinary network are needed; (ii) Government management on input and output markets should be strengthened effectively; (iii) A system of quarantine & certification of meat should be established and operated in an effectiveness and transparent manner; (iv) Encouraging and facilitating the private sector to participate in the chains as chain leaders to promote the development of pig value chains; (v) There is a need to raise awareness of food safety for consumers and other actors, and enhance consumers' trust while a market information system (price, demand, supply) should be established; (vi) Policies and regulations in pig value chains must be reviewed to be consistent and transparent; and finally, the government should consider that the pig sector exposes sensitively to the economic integration which opens the domestic economy/ agriculture sector to the global context; especially for smallholders.

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