PIG PRODUCTION AND FARM INCOME IN THE PIG VALUE CHAIN IN HUNG YEN AND NGHE AN PROVINCES

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ABSTRACT

The livestock sector in general and pig production in particular is important in Vietnam not only for supplying food for its growing population but also for its significant contributions to the country's economy. Smallholder pig producers which are predominant, supply at least 80% of pork in the market in the country. This paper aims to draw a picture of pig production performance of small farmers based on the survey data of ILRI-VNUA using a value chain approach. It is estimated that the income of pig smallholders was, on average, VND 765 thousand per 100 kg pig live pig weigh; regional differences in income were statistically significant. Pig diseases, feed use, and measures applied for disease protection had significant effects on farm income. However, different perceptions on food safety were not significantly associated with income levels of farmers. A long time is likely to be needed to change the perception and behaviors of farmers on food safety.

Keywords: Income, pig value chain, smallhoder.

Chăn nuôi lợn và thu nhập của hộ trong chuỗi giá trị thịt lợn ở tỉnh Hưng Yên và Nghệ An

TÓM TẮT

Ngành chăn nuôi nói chung và chăn nuôi lợn nói riêng ở Việt Nam có vai trò quan trọng không chỉ cung cấp thực phẩm cho người tiêu dùng với quy mô ngày càng gia tăng, mà còn quan trọng bởi sự đóng góp đáng kể vào nền kinh tế quốc gia. Các hộ chăn nuôi nhỏ lẻ phổ biến và cung cấp khoảng 80% lượng thịt lợn cho thị trường. Bài báo này mô tả tình hình chăn nuôi lợn của các hộ chăn nuôi nhỏ tỉnh Hưng Yên và Nghệ An, sử dụng số liệu điều tra của ILRI-VNUA trong chuỗi giá trị. Kết quả cho thấy thu nhập từ chăn nuôi lợn của hộ là 765 nghìn đồng cho 100 kg thịt lợn hơi và có sự khác nhau lớn giữa 2 tỉnh. Dịch bệnh, sử dụng thức ăn, các biện pháp phòng trừ dịch bệnh có ảnh hưởng đến thu nhập từ chăn nuôi lợn. Tuy nhiên, thu nhập của các nhóm hộ có nhận thức về vệ sinh an toàn thực phẩm với thịt lợn không khác nhau. Do đó để thay đổi ý thức của người dân đối với vấn đề an toàn thực phẩm sẽ đòi hỏi thời gian dài hơi hơn.

Từ khóa: Chuỗi giá trị thịt lợn, hộ chăn nuôi, thu nhập.

1. INTRODUCTION

Livestock production contributed to about 18% of Vietnam's total GDP in 2010 and this figure is expected to rise up to 20% by 2020 (MARD, 2012). The pig sector consistently contributed about 74 - 80% of the total meat production in Vietnam during 2000 - 2012 (Nga *et al.,* 2014). 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.*, 2010; Lapar and Tiongco, 2011). Income from pig production is important because it provides a

source of quick cash in times of emergency or a shortfall in household cash requirements 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 economies, especially to small farmers.

This paper aims to characterize the pig production and income of the sector, focusing on smallholders in the pig value chain in Northern Vietnam, and draws attention to important implications for improving income from participation in the pig value chain.

2. SITE DESCRIPTION AND METHODS

2.1. Site description

Hung Yen and Nghe An are provinces with fairly high pig herd sizes in the North of Vietnam, which are estimated to have more than one million and 623 thousand heads, respectively, in 2013 (GSO, 2014). The former is located in the Red River Delta and represents a more developed production, while the latter is located in the Northern Central Coast and represents a more rural and less developed pig value chain (ACIAR, 2012).

2.2. Sampling and data collection

A survey was conducted in 2013 and 2014 in two provinces that were representative of different pig systems in the north. The site selection was implemented as follows: In each province, a group discussion with the local governments and departments of agriculture and rural development was conducted, and as a result, three districts were chosen representing different pig systems and value chains. In Hung Yen province, Tien Lu, Van Giang, and Khoai Chau districts were selected, while in Nghe An, they were Hung Nguyen, Do Luong, and Dien Chau districts. In each district, three communes were selected randomly based on pig density groups (low, medium, and high); a total of 18 communes in 6 districts were finally picked. Farmers were then randomly chosen from the list of pig farmers provided by veterinary staff in the communes. The total sample size was 318 farmers who produced finished pigs. In addition, focus group discussions involving different value chain actors were also conducted for mapping and describing the pig value chain in the study sites.

Descriptive comparative statistics and gross margin analysis were employed to characterize farmers and provide the basis for analysis of the economic performance of pig production. In addition, a test of the means was also used to determine the differences among groups of pig producers and locations.

3. FINDINGS

3.1. Pig production performance

Farmer profile. About one-third of the respondents were male in Nghe An province, while this figure was about two-thirds in Hung Yen, reflecting the fact that as pig production becomes a relatively more important source of income for farm households, as observed in Hung Yen than in Nghe An, it has attracted more participation from male labors. On average, a typical household size was about 4 people (Table 1). Primary economic activities of a household head were animal keeping (47% of total households) and crop production (17% of total households). Animal production was the primary activity of about two-thirds of household heads in Hung Yen (Table 1).

Scale of production. The majority of farmers reared less than 30 pigs/cycle (more than 95% in the research sites). It can be seen that the pig production scale was generally higher in Hung Yen with more than half of households raising 10-30 pigs per cycle. The pig density in both provinces was fairly low (Table 1). The reason seemed to be that farmers kept some slots of their barns empty due to low pig prices at the time the survey was conducted.

Production performance. Using information from the most recent pig cycle, a farm household was estimated to raise about 13.5 pigs, on average; there was a considerable

difference in estimates of this figure between Hung Yen and Nghe An, with the herd size in Hung Yen about 50% higher than that in Nghe An (Table 2). Farmers in Hung Yen finished a pig cycle in about 146 days, with a higher level of live weight of pigs sold than that in Nghe An. On average, a pig farm household in Hung Yen produced about 1.8 tons (live weight) per cycle, almost three times more than a typical pig raising household in Nghe An. The same picture was observed for the average live pig weight in Hung Yen and Nghe An. On average, pig farmers in Hung Yen sold pigs at a 107 kg live weight while in Nghe An the number was only 61 kg. In addition, the pig productivity in Hung Yen was higher than that in Nghe An (with 4 kg per month) (Table 2). This means that farmers in Hung Yen finished pigs in a more intensive way, having a more commercialized pig production than pig farmers in Nghe An.

Table 1. Characteristics of pig farm households

Items	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 (%)			
Primary	5.2	1.5	3.4
Secondary and high school	90.1	89.7	89.9
Other	4.7	8.8	6.7
Household head 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
Housing area for pig production (m^2)	77.9	29.1	60.9
Pig density (m^2/head)	5.6	4.5	5.0
Pig herd size (% of households)			
1-10 (pigs)	39.7	77.8	55.7
10-30 (pigs)	53.8	20.0	39.6
>30 (pigs)	6.5	2.2	4.7
Water system for pig production (% hh has)	51.4	9.6	36.1
Biogas for waste treatment (% hh has)	55.7	22.1	45.8

Source: Computing from survey data by ILRI - VNUA

Table 2. Pig production in the latest cycle

Items	Hung Yen (1)	Nghe An (2)	Differences (1) - (2)	Average
Pig herd size	16.4	9.5	6.9***	13.5
Time/cycle (day)	145.9	99.8	46.2*	
Monthly gaining weight (kg)	20.1	16.1	4.0***	18.4
Total output (kg)	1,776.9	586.9	1,190.0***	1275.8
Average live pig weight (kg/head)	107.0	60.8	46.23***	87.5

Source: Computing from survey data by ILRI - VNUA. The number is calculated per household
*Note: ***,*, and ns: Significance at 1%, 10% and non-significant, respectively*

Table 3. Economic performance of pig production in the latest cycle
(1000 vnd per 100kg of live pig weight)

Items	Hung Yen (1)	Nghe An (2)	Differences (1) - (2)	Average
Total revenue	4452.5	4158.1	294.4*	4327.4
	(360.6)	*(637.3)*		*(515.2)*
Variable costs	3650.2	3472.3	177.9*	3561.9
	(618.7)	*(959.6)*		*(784.9)*
Income from pigs	822.3	685.9	136.5*	765.6
	(584.1)	*(953.5)*		*(763.2)*

Source: Computing from survey data by ILRI - VNUA
*Note: number in parentheses are standard errors; *: Significance at 10%.*

Table 4. Pig income from different production systems (unit: 1000 vnd)

Items	Income per 100 kg live pig weight			Household income from pigs		
	Nghe An	Hung Yen	T-test	Nghe An	Hung Yen	T-test
Buying breeds						
- Households self-produced breeds	943.9	809.6	134.3^{ns}	1625.0	12621.3	-10996.3***
- Households bought breeds	754.1	453.2	300.9**	-163.7	9861.0	-10024.8***
T-test	189.8^{ns}	356.4***		1788.7*	2760.3^{ns}	
Type of feed used						
- Households used mixed feeds	900.3	750.8	149.5^{ns}	476.5	12458.4	-11981.9***
- Households used industrial feeds	654.5	634.5	20.1^{ns}	4020.4	11003.2	-6982.8^{ns}
T-test	245.8*	116.4^{ns}		-3543.9^{ns}	1455.2^{ns}	

Source: Computing from survey data by ILRI - VNUA
*Note: ***,**, and *: Significance at 1%, 5% and 10%, respectively. ns: non-significant;*
The means have been tested between provinces and items

Cost and income from pig production. On average, a farm household spent about VND 3.56 million to produce 100 kg of live weight pig, earning about VND 4.3 million in revenue and 0.76 million in income. It could be seen that the outputs and incomes from pig production in Hung Yen and Nghe An were significantly different. It was observed that all indicators of costs, outputs, and income of pig production in Hung Yen were higher than those in Nghe An (Tables 2 and 3). This may suggest that the pig systems in Hung Yen are relatively larger and more specialized than those in Nghe An.

At the research sites, pig farmers used two types of piglets, namely self-produced and bought from outside. Farmers who were raising sow or produced their own piglets had much higher incomes than those who bought piglets from the market. It is likely that self-produced piglets were of better quality and cost less than purchased piglets. In terms of feed, households using mixed feeds had higher incomes per 100 kg of live pig weight but relatively lower household incomes vis-à-vis those using industrial feed. Farmers using industrial feeds had higher total household incomes from pigs (about 80% higher). These findings have interesting implications: as scale increases, pig raising households tend to shift to using industrial feed, which is likely to be driven by labor requirements, i.e., less labor is required than when using mixed feeds. However, this may also reduce feed cost efficiency, given the relatively lower income gained per kg of live

weight of output. It thus appears that smallholders are still efficient at what they do, in the absence of other more remunerative labor use, e.g., using labor intensive feeding practices that enabled them to reduce their cash requirement for producing pigs. This situation could shift or change in the near future contingent on what economic opportunities will emerge that could raise the opportunity cost of labor in Nghe An and other similar contexts in Vietnam.

3.2. Pig diseases and income

Diseases and farmer capability to respond. Results of the survey showed that more than one-fourth of piglets got sick during most pig cycles at the time of the surveys, while about 5% of growing and fattening pigs suffered this same problem. Diarrhea was the most common disease infecting pigs (more than 90% of piglets and about one-fourth of growing and fattening pigs) (*Survey data in 2013 and 2014 by ILRI - VNUA).* However, farmers reported that porcine reproductive and respiratory syndrome (PRRS or blue ears), food and mouth disease (FMD), and head edema were the most serious diseases affecting pigs (e.g., these diseases hamper growth, prolong production cycle, and lead to death in pig production). In 2012, about 2% of piglets and growing/fattening pigs died because of diseases, with diarrhea being the most common cited disease for pigs and generating the highest cost for pig production (see Figure 2).

It was observed that the income per 100 kg live pig weight was higher and statistically significantly different between farmers having dead pigs and those without dead pigs. There were no statistical differences in income per 100 kg live weight of pigs produced between households who reported having pigs with diseases and those not having pigs with diseases. However, the household income from pigs of farmers who were applying disease protection measures was much higher than those households not applying the same measures. Farmers with larger scale pig production were always looking for the best practices in finishing pigs although they reported that their pigs had diseases. Households

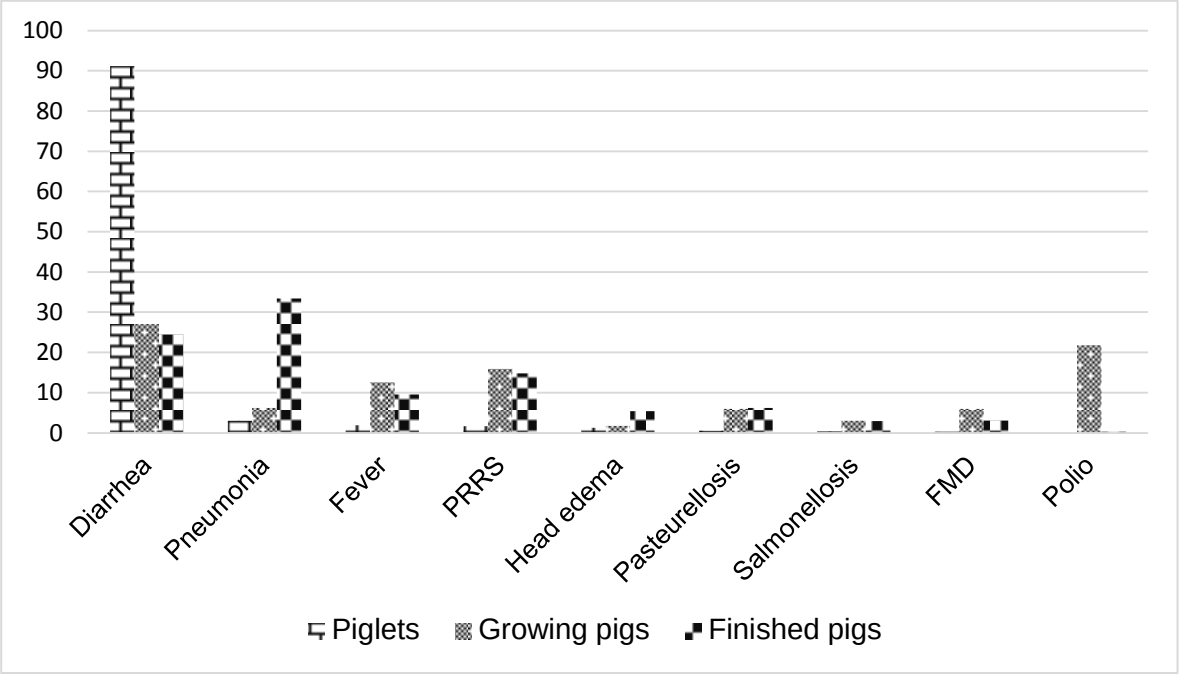

Figure 2. Disease profile in pig production *(% of pigs infected)*

Source: Computing from survey data by ILRI - VNUA

Table 5. Relationships between pig diseases and income (unit:1000 VND)

Items	Income per 100 kg live pig weight			Household income from pigs		
	Nghe An	Hung Yen	T-test	Nghe An	Hung Yen	T-test
Households having and not pig diseases						
- Having pig diseases	873.1	676.1	197.0**	1080.3	11973.9	-10893.7***
- No pig diseases	856.8	799.4	57.4ns	394.4	9373.2	-8978.8***
T-test	16.3ns	-123.3ns		685.8ns	2600.7ns	
Households having pig deaths						
- Having pig deaths	703.8	641.8	62.0ns	115.5	11144.1	-11028.6***
- Households with no pig deaths	927.3	715.5	211.8**	1205.3	11990.1	-10784.8***
T-test	-223.5ns	-73.8ns		-1,089.7ns	-846.0ns	
Measures of pig disease protection of HH						
- Disease protection measures	725.6	650.3	75.3ns	164.1	14596.4	-14432.3***
- No measures	817.3	610.5	206.8ns	347.4	7583.6	-72362.0***
T-test	-91.7ns	39.8ns		-183.3ns	7012.8*	

Source: Computing from survey data by ILRI - VNUA
*Note: ***,**, and *: Significance at 1%, 5% and 10%, respectively. ns: non-significant;*
The means have been tested between provinces and items.

with small scale production had less incentive to use disease protection measures, likely due to resource constraints. In addition, the prevalence of pig disease was likely caused by several factors. Piglet quality was limited; farmers usually bought piglets from various sources, even from open markets, with the piglet origin unclear and health status not assured. Even piglets produced in big farms were in threat of degrading in quality as reported by the department of livestock, Hung Yen province, due to the cross-breeding within pig populations over time. In addition, farming practices in pig production were not strictly regulated and compliance with prescribed breeding and hygienic standards were not strictly enforced. Vaccine utilization was not widely applied by all farmers; about two-thirds of farmers treated their sick pigs by themselves, although many of them did not feel confident in doing this. Farmers (especially in Hung Yen) reported that they lacked the knowledge and skills to diagnose and cure diseases in a timely and effective manner. About 8% of farmers sold sick pigs or slaughtered them for home consumption, and about 8% of farmers threw away dead or sick pigs. These practices might facilitate disease spread.

3.3. Income from pig production and food safety

Food safety in pork supply has become of much concern recently with widespread use of antibiotic substances and Beta-agonist, resulting in levels of residues exceeding the allowed quantities that are believed to have negative effects on human health. At present, there are no formal linkages in the pig value chains from producers to retailer, therefore, pork sold in markets could not be traced directly to their sources. Almost all farmers did not know where their pigs go to outside their districts/provinces. Similarly, most consumers did not know the origin of the pork they bought, especially from open markets in urban areas. However, consumers were willing to pay for pork with good quality (i.e., perceived to be safe, no risk to human health), with a price premium

of about 20% higher than prevailing prices. This presents an attractive market opportunity for pig farmers who could supply pork that satisfies this desired attribute.

Results of the survey showed that the income of different groups of farmers with different levels of understanding about food safety was not significantly different (Table 6). This suggests that food safety concerns still have not made inroads as a clear driver of income among pig producers, despite the apparent opportunities presented in emerging consumer demands. Future work could thus explore this in more detail, particularly in identifying clear market incentives recognized and appreciated by farmers that could drive behavior changes leading to food safety outcomes.

Table 6. Pig income and farmer perception on food safety (unit:1000 vnd)

Items	Income per 100 kg live pig weight			Household income from pigs		
	Nghe An	Hung Yen	T-test	Nghe An	Hung Yen	T-test
Understand food safety (1)	881.4	632.1	249.3**	831.5	11677.3	-10845.7***
Don't understand food safety (2)	755.3	734.2	21.1ns	1267.8	11545.9	-10277.9***
Have no ideas (3)	941.3	675.5	165.9ns	1070.8	12699.1	-11628.3***
Testing						
(1) - (2)	126.1ns	-70.6ns		-436.3 ns	2341.3ns	
(1) - (3)	-60.0ns	-38.8ns		-239.2ns	-1506.8ns	
(2) - (3)	-186.1ns	31.8ns		197.1ns	-3848.2ns	

Source: Computing from survey data by ILRI - VNUA
*Note: *** and *: Significance at 1% and 10%, respectively. ns: non-significant;*
The means have been tested between provinces and items

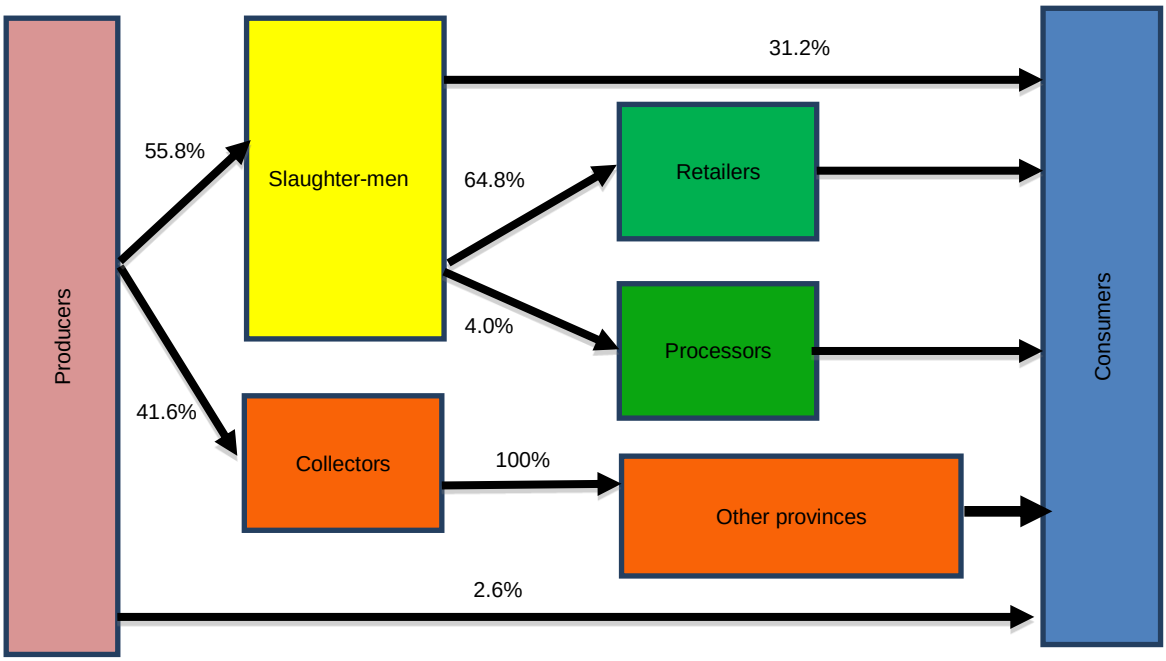

Figure 1. Map of pig value chain in Hung Yen and Nghe An

Source: survey of ILRI-VNUA and group discussion

3.4. Mapping the pig value chain

The generic pig value chain, which included input traders (feed and veterinary), pig producers, slaughters, retailers, processors, and consumers, was observed at the research sites. The longest marketing channel included all of these actors, while the shortest one had no intermediate actors between producers and consumers. Many actors performed several functions, for example, a farm household could produce pigs, buy pigs from other farmers to slaughter, process and sell raw meat, and process meat to local consumers. The results of the group discussion showed that about 60% of pigs were consumed locally (within districts and communes); only a very small part was sold directly to consumers (3% of total products) (Figure 1). More than half of finished pigs were sold to slaughterhouses (mostly slaughter men locally), and about two-fifths of produced pigs were sold to pig collectors/traders who then moved to other provinces. Few farmers (17% of total pig producers) slaughtered their pigs at home to sell directly to local consumers (in the same village) (see Figure 1). Therefore, pig traders and slaughterhouses were observed to be the most important buyers of pigs produced by smallholders in the study sites.

4. CONCLUSIONS AND IMPLICATIONS

A basic description of pig production and value chains in Hung Yen and Nghe An provinces was presented. Pig production in terms of scale, length of production time per cycle, monthly weight gain, total output, costs, and income of households were observed to vary by locations. Our estimates showed that income from pig production in Nghe An was lower than that in Hung Yen. The varying traditions of pig raising and conditions in these two provinces seemed to be the main reasons. On average, a farm household in the two provinces under study earned about VND 765 thousand for 100 kg of live pig weight. Pig diseases and their protection measures, and pig production systems (buying piglets and feeds or not) were factors affecting the income of households. Training about pig diseases and protection could be improved. The perception of farmers on food safety was limited. Farmers did not seem to have an incentive to produce safe pork. There is thus room for interventions that could lead to the improvement of farmers' understanding about animal health risks, food safety, and market demand. This remains a rich area for further research given the important implications both for peoples' well-being as well as the income and livelihoods of smallholder pig raisers.

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