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Trends in Vietnam's Pork Supply and Structural Features of its Pig Sector

by

Clem Tisdell

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Trends in Vietnam's Pork Supply and Structural Features of its Pig Sector

ABSTRACT

Pork is the single most important source of animal protein in Vietnam and its availability has a substantial impact on the well-being of the Vietnamese. Since 1996, the local supply and per capita availability of pork in Vietnam have increased substantially. The trends in and sources of this growth in supply are identified by analysing official statistics. Differences in regional supply of pork are also identified, as well as regional variations in pork yields. Vietnam's pork industry relies on many small-scale household producers for the bulk of its pork supply. The structure of the sector is investigated and found to be altering slowly – a slight increase in scale of production units has been occurring. The rate of growth in Vietnam's supply of pork has slowed and production could decline despite the large increases in productivity in this sector since the mid-1990s. The industry is still not internationally competitive. Hence, imports of pork from Canada and the USA occurred in the last few years, and these may increase after 2012 when Vietnam should become WTO-compliant. This concerns the Government of Vietnam because it could threaten the economic sustainability of its pig industry. The Government believes that by adopting policies to increase the scale of production of individual pig-producing units, this will shore up the competitive position of its pig sector. This policy is discussed.

Keywords: Agricultural development; agricultural economics; agricultural policy; economic performance; pork yields; Vietnam; Vietnam's pig sector.

Trends in Vietnam’s Pork Supply and Structural Features of its Pig Sector

1. Introduction

With rising incomes in Vietnam in recent years, the Vietnamese market for pork has expanded, the pig sector has become more market-oriented and the demand for better quality pork has increased. At the same time, new techniques for pig production, including the introduction of imported breeds of pigs (see for example, Tisdell and Wilson, 2001, 2003; Drucker et al., 2006) have been adopted and this has added substantially to the supply of pork in Vietnam.

Pork is the single most important source of animal protein in Vietnam and virtually all Vietnamese households consume it. This is underlined by the results of a recent survey of meat consumption patterns in Vietnam funded by the Australian Centre for Agricultural Research (ACIAR) and conducted by Vietnam’s Centre for Agricultural Policy (CAP) and the International Livestock Research Institute (ILRI). These results are outlined for example by Phong Anh Nguyen et al. (2009). While per capita consumption of most meats have risen in Vietnam (for instance beef) with growing incomes in Vietnam, pork still retains its premier position nationally as the type of meat most consumed. There are, however, some regional variations in its relative importance. For example, in some coastal provinces per capita consumption of fish outstrips that of pork. Nevertheless, given the relative importance of pork in the budget outlay of Vietnamese households, changes in the availability of pork in Vietnam have significant implications for the economic well-being of Vietnamese and are of national policy interest.

This article uses official Vietnamese statistics (mainly those of the General Statistical Office of Vietnam) in order to specify national trends in the primary supply of pork in Vietnam to provide insights into the structure of its pig sector in terms of variations in the number of pigs held by different suppliers and to analyse differences in supply of pork coming from the different regions of Vietnam. Some current policy issues facing the future of Vietnam’s pig industry are also discussed. While the available statistics have some limitations, they are adequate for establishing broad trends.

In turn, information is provided in this article on trends in the level of Vietnam's pork production, in the number of its pigs, and changes in pork yields, mainly for the period 1996-2006. Sources of the increases in Vietnam's domestic supply of pork are identified in terms of the relative contributions of changes in its stock of pigs and their yields. Information is also provided on the relative importance of supply of pork by households compared to its supply by other than households, that is registered farms. The dominant source of supply of pork in Vietnam continues to be from households that keep five pigs or less – that is, very small-scale producers. Variations in the regional supply of pork, in the regional size of pig populations and in regional pork productivity are also examined.

2. Trends in the Level of Vietnam's Pork Production and in its Per Capita Supplies of Pork

Figure 1 graphs the level of Vietnam's pork production between 1996 and 2006. In this period, Vietnam's production of pork (based on liveweight equivalents) rose by 132%. In other words, it more than doubled. Although the growth rate of the increasing production tended to accelerate between 1996 and 2005, in 2006 this growth rate declined (see Figure 1). This **may** signal the beginning of slower future growth in Vietnam's supply of pork.

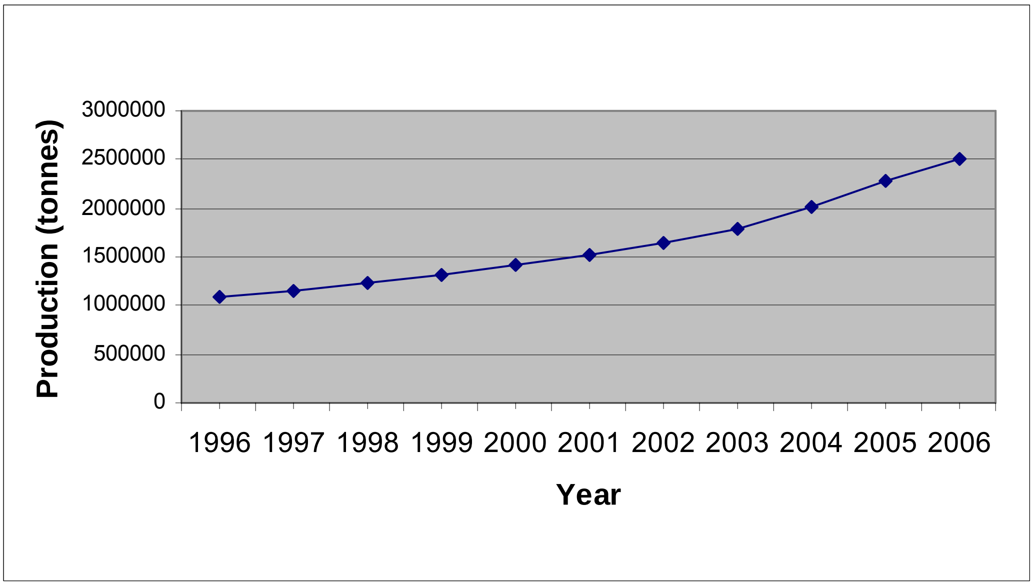

Figure 1: Vietnam's volume of pork production (liveweight), 1996-2006. In this period, the volume of Vietnam's pork production rose by 132% (more than doubled). The growth rate slowed in 2006. (Source: based on Tisdell, 2008, Table A1)

The growth in Vietnam's supply of pork outstripped the increase in its population between 1996 and 2006 and consequently, Vietnam's available supply of pork per capita rose. Figure 2 shows that in this period, Vietnam's per capita supply of pork increased annually but in 2006 its growth rate slowed. Vietnam's supply of pork rose from 14.76 kgs per head of its population in 1996 to 29.77 kgs in 2006. Therefore, it slightly more than doubled.

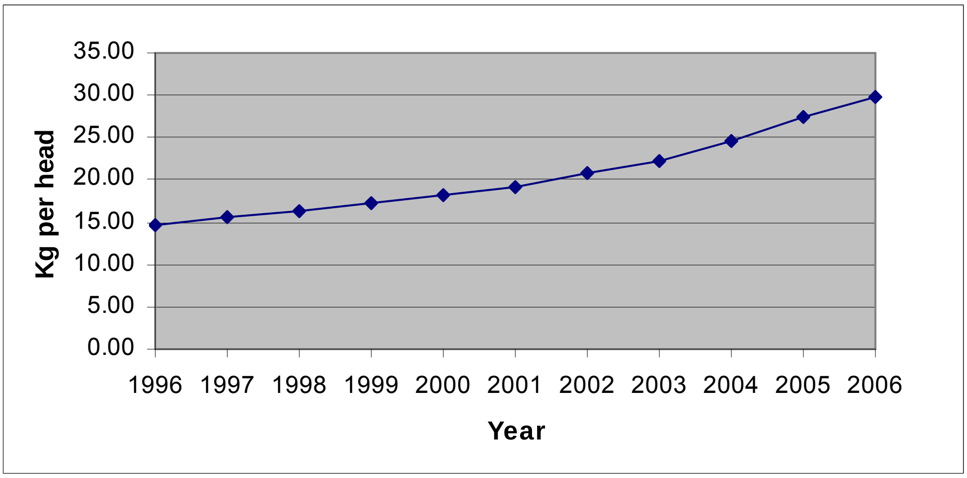

Figure 2: Per capita production of pork in Vietnam, 1996-2006. Per capita production of pork approximately doubled in this period. A slow down in its growth is evident in 2006. (Source: based on Tisdell, 2008, Table A1)

Because, during the period 1996-2006, Vietnam had virtually no imports and no exports of pork, , Figure 2 also shows the level of its per capita consumption of pork (in liveweight equivalents) in this period. However, the situation has now changed and is expected to change further. From 2006 onwards, Vietnam began importation of chilled and frozen pork from Canada and the USA. These nations were able to obtain increased access to the Vietnamese market because Vietnam has joined the WTO and they are able to out-compete Vietnamese producers in supplying some types of pork suitable for processing or for supply to supermarkets. These imports placed some economic pressure on Vietnam's pig industry and resulted in Vietnam raising its tariffs on imported pork in order to provide greater trade protection to its pig industry. This episode signals that Vietnam needs to further increase the economic efficiency of its pig industry if it is to stave off foreign competition in some sectors of this industry. This is needed despite the fact that its yield of pork from its pig stocks has increased by approximately 50% in the last decade.

Let us consider now the basic factors that have contributed to an increase in the supply of pork in Vietnam in the period 1996-2006. The increase in the volume of pork produced in Vietnam is attributable both to a rise in Vietnam's pig stocks and the growth in the meat yield obtained from these stocks. Let us examine these components.

3. The Stock of Pigs in Vietnam

The numbers of pigs in Vietnam during the years 1995 to 2006 are graphed in Figure 3. The number increased in every year between 1995 and 2005 but declined in 2006. The overall increase in pig numbers between 1995 and 2006 was almost 65%. The stocks of pigs in Vietnam increased by more than 10 million in this period.

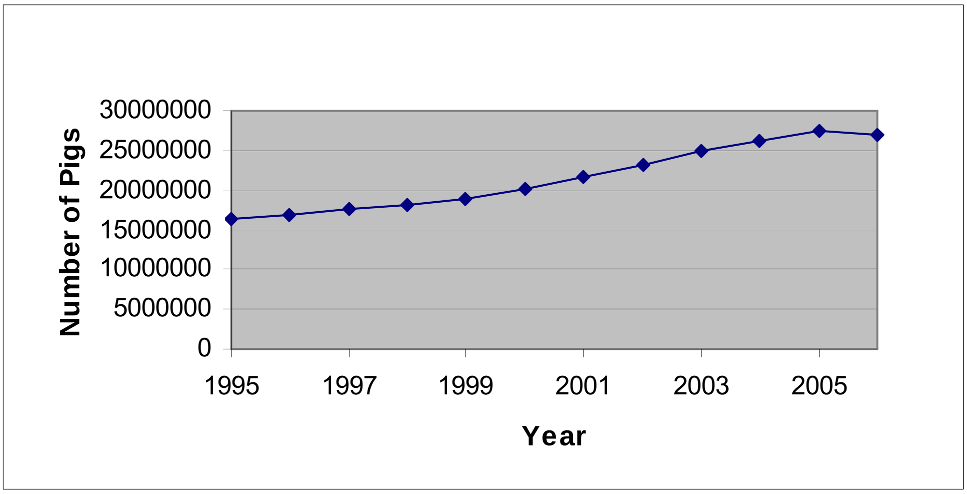

Figure 3: Number of pigs in Vietnam, 1995-2006. The stock of pigs increased substantially in this period and was a major contributor to increased pork supplies. However, the stock declined in 2006. (Source: based on Tisdell, 2008, Table A2)

The genetic composition of Vietnam's stock of pigs has altered significantly. An increasing proportion of Vietnam's pig stock consists of exotic breeds, particularly with local breeds and their crosses. Mixed breeds (crosses of local breeds and exotic breeds) now dominate the stock and now appear to constitute more than 90% of Vietnam's pig stocks. The most popular crosses are crosses between the local Mong Cai breed and exotic breeds. Mong Cai sows tend to have large litters and the offspring of the crosses have superior growth rates compared to local breeds.

4. The Imputed Yield (Productivity) of Vietnam's Stock of Pigs

The yield of pork from Vietnam's stock of pigs rose substantially. It rose from an average of 63.82 kgs per pig in the estimated stock to 93.28 kgs in 2006, that is by 46%. Average national yields for the period 1996-2006 are graphed in Figure 4. This graph indicates how the rate of increase in yields has accelerated in recent years. However, yields have not increased in every year since 1996. They declined slightly in 2000 and again in 2001 before displaying a strong upward trend. This pattern could be a reflection of how long it has taken for a new genetic stocks of pigs to diffuse as well as the lag in the adoption of new techniques for the husbandry of pigs. In addition, learning-by-doing about new production techniques takes time and those raising pigs would have had to familiarize themselves with new production methods and the best way to husband exotic breeds and their crosses with local breeds.

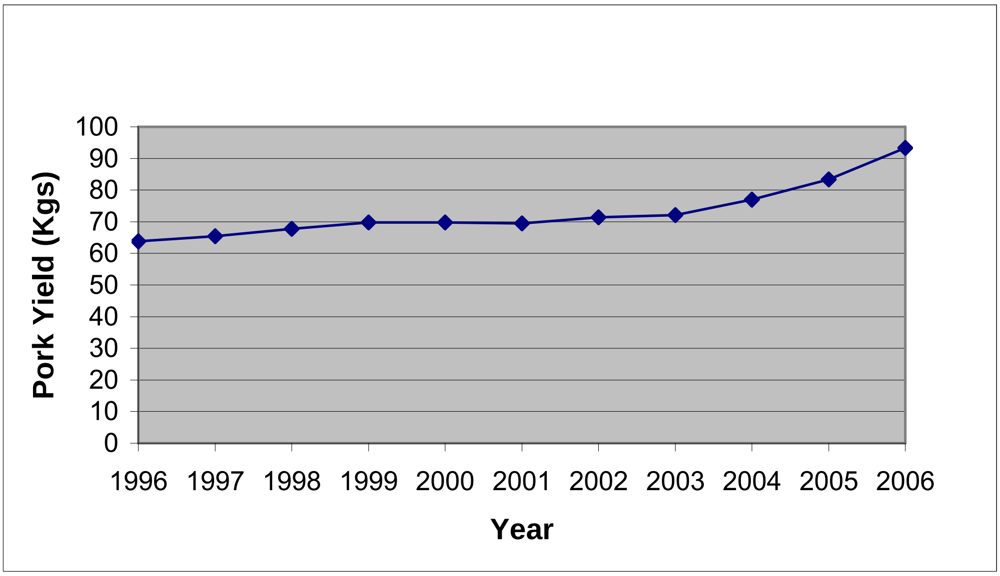

Figure 4: Pork yields in Vietnam, 1996-2006. Pork yields per pig in the stock rose from 63.82 kgs to 93.28 kgs (that is by 46%) in this period and made a significant contribution to increased supplies of pork in Vietnam. Yields have tended to rise at an increasing rate. (Source: based on Tisdell, 2008, Table A3)

Rising pork yields indicate increasing intensification of Vietnam's pork sector and suggests rising dependence of this sector on markets. The productivity of exotic pigs and their crosses is sensitive to their feed requirements and their environmental conditions. Most of their food must be obtained commercially. Much of the food is imported (Landell Mills Ltd, 2007). This increases the vulnerability of Vietnam's pig sector to market fluctuations.

Given the measure of yield (productivity) adopted here, (namely the annual volume of pork produced divided by the number of pigs in the stock), factors that may have contributed increased yield (productivity) include

(1) larger surviving litter sizes;

(2) faster growth rates of pigs which results in their being marketed at a younger age; and

(3) fewer boars due to the greater use of artificial insemination.

In turn each of these factors can be considered further to identify their causes. For example, faster growth rates may be due to genetic improvements, better nutrition, more satisfactory housing of pigs and an increase in their healthiness. It should however, be noted that increased yields from pig production when measured in the way done here *do not* necessarily *imply that pig production has become more profitable*. This would need separate investigation. It requires account to be taken of the extra cost of obtaining the increased productivity and comparing this to the extra revenue obtained.

5. Increased Yield versus Increased Pig Stocks as Sources of the Growth in Vietnam's Supply of Pork

To what extent has of the expanded supply of pork in Vietnam been a result of increased pig numbers compared to higher pork yields? Between 1996 and 2006, Vietnam's pork production rose by 1,425,104 tonnes. This increase can be decomposed into three components:

(A) that due to the increase in the number of pigs;

(B) that due to the rising yield from pigs; and

(C) that due to the multiplicative impact of increased yield and rising pig numbers.

These items are identified in Figure 5 by the areas marked A, B and C respectively. It is found that increased pig numbers accounted for the largest proportion of the increase (49.49%) in pork supply between 1996 and 2006, higher yields contributed

34.98% of the increase and the combination of rising yield and pig numbers comprised 20.53% of the growth. Thus overall in this period, both rising pig numbers and yield were important for the growth in the volume of Vietnam's supply of pork, but the increased stock of pigs made the greater contribution.

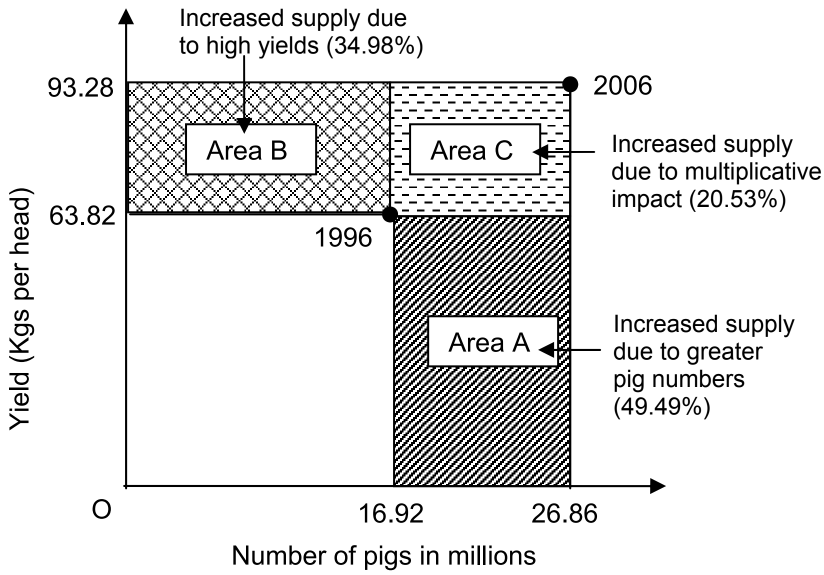

Figure 5: Decomposition of the increase in volume of pork production in Vietnam in 2006 compared to 1996. The main source of the growth in the volume of pork production was due to increased pig numbers (49.49%), increased yields (34.98%) and the combined effect of these factors (20.53%).

While during the period 1996-2003, rising pig numbers made the largest contribution to the growing supply of pork in Vietnam, from 2004 to 2006 yield became the most important contributor to Vietnam's rising supply of pork. This is illustrated by Figure 6. From 2003 onwards, intensification of production in the pig industry in Vietnam rose sharply.

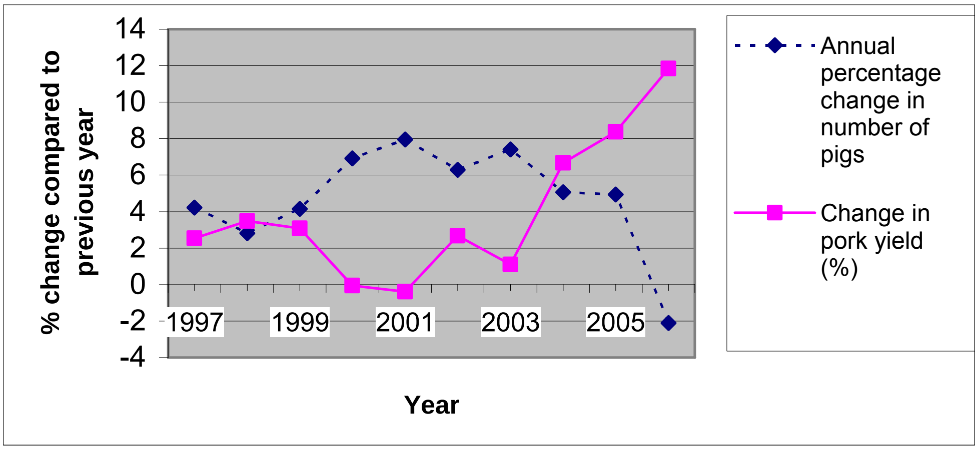

Figure 6: Annual percentage change in pork yields and number of pigs, Vietnam. 1997- 2006. In earlier years, increases in the number of pigs made the largest contribution to increasing Vietnam's output of pork but in later years increased yields have become the major contributor. (Source: based on Tisdell, 2008, Tables A2 & A3)

6. The Distribution of the Size of Pig Holdings by Households and the Relative Importance of Small-scale in Producers Vietnam's Pig Sector

According to Vietnam's Agro-Census 2001, 7,390,875 households kept pigs and this amounted to 56.57% of Vietnam's rural households. However, the average number of pigs kept per household was small, namely 2.73 on average per household. Table 1 provides information on the distribution of pigs by the size of the holdings kept by households in 2001. The most frequently held number of pigs was two. Figure 7 indicates that the relative distribution of pig holdings per household is heavily skewed to the left. Most households had fewer than 6 pigs. The highest number of pigs is accounted for by those households having 3-5 pigs.

Table 1: Distribution of pigs per pig household in Vietnam, 2001.
Holdings of 5 or fewer pigs dominate the distribution of pigs held by households.
(Source: adapted from Agri-Census,2001)

Total rural households =	13,065,756
Total pig producing households =	7390875
Percentage of pig households =	56.57%
Average no. of pigs per household =	2.73

Scale of pig holdings by pig households	Average approximate no. of pigs per household	Number of households	Total number of pigs for each household size (estimated) (a)	% of total pigs accounted for each household size	% of households in each category
1	1	2,172,828	2,172,828	10.18	29.40
2	2	2,764,524	5,529,048	25.91	37.40
3 -- 5	4	1,887,408	7,549,632	35.38	25.54
6 -- 10	8	446,573	3,572,584	16.74	6.04
11 -- 20	16	97,024	1,552,384	7.28	1.31
21--50	36	20,064	722,304	3.39	0.27
51--99	75	1,724	129,300	0.61	0.02
100 & above	150	730	109,500	0.51	0.01
		Total =	**21,337,580**	100.00	100.00

(a) Estimated using mid-points. The total of 21,337,5801 pigs is an over estimate, but the relative distribution is approximately correct.

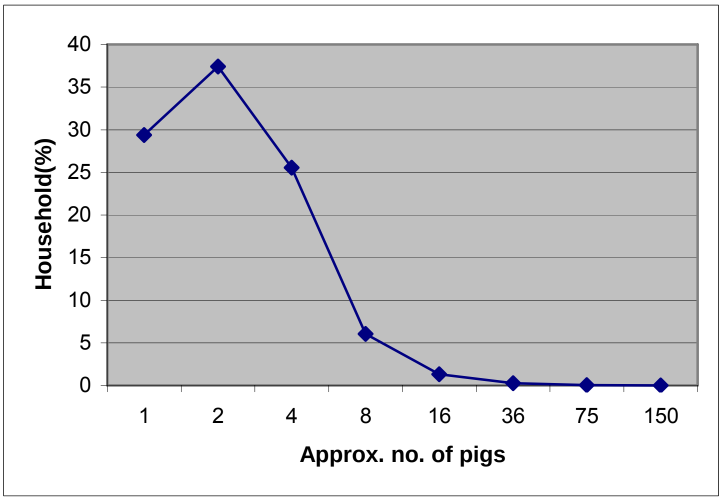

Figure 7 : The distribution of the relative frequency of pig households in Vietnam by approximate number of pigs held in 2001. In 2001, over 90% of pigs in Vietnam were held by households. They were the backbone of Vietnam's supply of pork. Most households held few pigs – the average holding was 2.5 pigs per household.(Source: based on Table 1)

In 2001, results from the Agro-Census demonstrated that households accounted for the majority of pigs in Vietnam. From the fact that it was reported that 7,390,875 households held an average of 2.73 pigs each, it follows that households held 20,177,088 pigs. The total number of pigs present in Vietnam in 2001 was reported to be 21,800,100. This indicates that 1,623,212 pigs were not accounted for by households, that is approximately 7.5% of pigs stocks. These were presumably accounted for by registered farms as opposed to households. Despite shortcomings in these statistics, it seems that around 92.5% of Vietnam's stock of pigs is accounted for by its household sector.

Data in Table 91 (p.217) of the *Results of the 2006 Rural, Agricultural and Fishing Census: Volume 3 – Agriculture, Forestry and Fishing*, General Statistics Office, Hanoi, 2007, indicate that in 2006 more than half of Vietnamese households (55.72%) keeping pigs had 2 pigs or less and only 1.75% had 21 pigs or more. In 2001, the corresponding percentages were 66.8% and 0.3% respectively. It can be concluded that the average scale of pig holdings increased between 2001 and 2007, but not dramatically. Vietnam's pork production is still dominated by small-scale producing units. Whereas in 2001, for example, 92.2% households having pigs had five or fewer pigs in 2006 this percentage was 83.4%. While this was a reduction, small-scale producers still dominated Vietnam's pig industry. As part of its livestock development policy, the Vietnamese Government plans to adopt measures to increase the size of pig producing units (Ministry of Agriculture and Rural Development, Vietnam, 2007). This will probably favour the development of specialized registered pig farms engaged in commercial industrial-style piggeries. Production units vary from being of a subsistence-type, to being semi-commercial, to being completely commercial units. Household pig production is often a sideline activity and a part of farm diversification in Vietnam. Considerable heterogeneity exists in production units although most units have become more involved in market transactions in recent times.

7. Registered Pig Farms in Vietnam

Accurate data on the number of registered pig farms in Vietnam and their attributes, such as their sizes, and changes with the passage of time have proven difficult to obtain. It is, however, known that the size of registered farms varies considerably and their average holding of pigs is substantially higher than that of households. Those who have registered farms obtain some concessions and subsidies but are also more likely to be taxed.

Data for 2006 indicate that there were 10,811 registered pig farms in Vietnam (see Table 2). Their regional distribution was very uneven (see Table 2 and Figure 8) with the Red River Delta accounting for more than half of these farms and with the South East Region and the Mekong Delta being next in importance. This suggests that most pig farms tend to be located not too far away from the major cities of Hanoi and Ho Chi Minh City, which are the main markets for their pigs.

Table 2: Regional distribution of pig farms in Vietnam in 2006
Three regions account for most of these farms.

Region	No. of pig farms	Pig farms (%)
Red River Delta	5902	54.59
South East	1997	18.47
Mekong River Delta	1179	10.91
North East	790	7.31
North Central Coast	452	4.18
Central Highlands	253	2.34
South Central Coast	210	1.94
North West	28	0.26
Total no. of pig farms =	**10,811**	100.00

(Source: based on Table 63, pp. 164-165 results of 2006 Rural Agriculture Fishery Census, Vol 3 Agriculture, Farming and Fishery, GSO Hanoi, 2007)

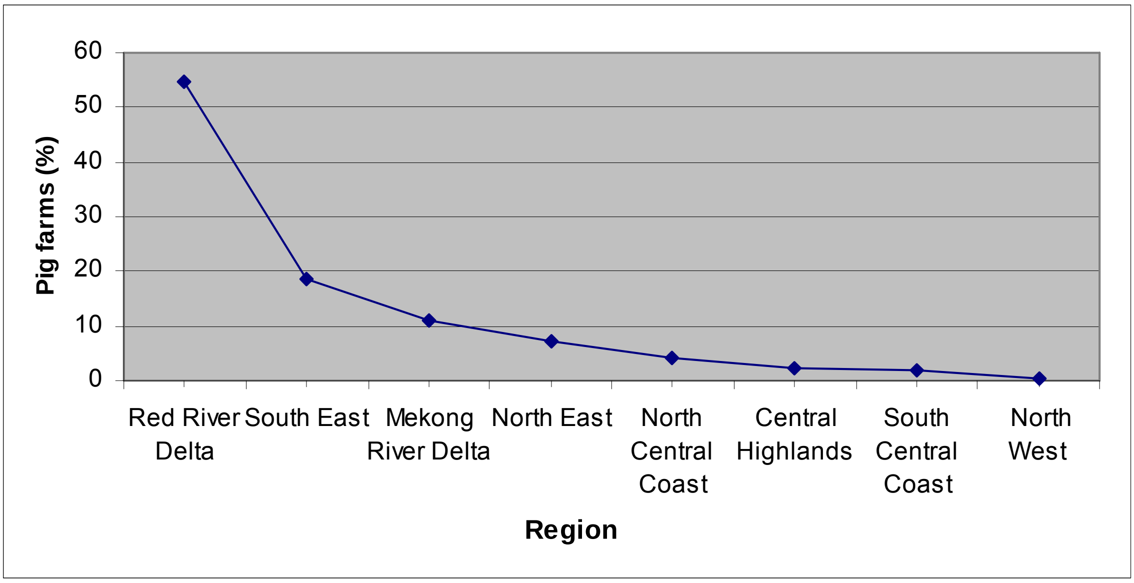

Figure 8 : Regional distribution of pig farms in Vietnam in 2006. Pig farms are not yet the major suppliers of pork in Vietnam. Their regional distribution is uneven. They have a concentration in the regions containing or near Hanoi and Ho Chi Minh City.

8. The Regional Distribution of Pigs and Pork Production in Vietnam

Considerable variation occurs in pig stocks held in the different regions of Vietnam. In 2006, the regions accounting for the largest number of pigs were in declining order: the Red River Delta, the North East Region, The Mekong River Delta and the North Central Coast (see Table 3). While this ordering is similar when the volume of pork production by regions is considered, the percentage shares alter and the South East moves up the scale (see Table 4). Nevertheless, there is a high positive association between the number of pigs in each region and the volume of pork supplied in each as can be seen from Figure 9. Observe that there were some changes in the boundaries of regions between 1995 and 2006. **My data were not adjusted for regional boundary changes, but this adjustment does not make a significant difference to the findings.** Achilles Costales of the FAO reworked the data (see Tisdell, 2008, Appendix II) to take account of regional boundary changes and found that the results remained substantially the same as reported here.

Table 3: Percentage of pig stocks accounted for to the different regions of Vietnam in 2006 and 1995. There is considerable regional inequality in the number of pigs in Vietnam in both years. (Source: Based on Table 4)

YEAR : 2006		
Rank	**Region**	**% Pig stock**
1	Red River Delta	26.69
2	North East	16.75
3	Mekong River Delta	14.83
4	North Central Coast	14.17
5	South East	10.50
6	South Central Coast	7.64
7	Central Highlands	5.16
8	North West	4.26

YEAR : 1995		
Rank	**Region**	**% Pig stock**
1	Red River Delta	26.24
2	North East	17.59
4	Mekong River Delta	14.58
3	North Central Coast	16.17
6	South East	6.94
5	South Central Coast	9.21
7	Central Highlands	4.80
8	North West	4.47

Table 4: Percentage of volume of pork production accounted for by the different regions of Vietnam in 2006 and 1996. There is considerable inequality in the regional supply of pork in both years.

YEAR : 2006		
Rank	**Region**	**%Pork production**
1	Red River Delta	31.72
2	Mekong River Delta	19.57
3	North East	12.42
4	South East	11.79
5	North Central Coast	11.29
6	South Central Coast	6.36
7	Central Highlands	5.06
8	North West	1.79

YEAR : 1996		
Rank	**Region**	**%Pork production**
1	Red River Delta	29.83
2	Mekong River Delta	21.52
4	North East	12.35
5	South East	9.33
3	North Central Coast	13.12
6	South Central Coast	7.96
7	Central Highlands	3.99
8	North West	1.89

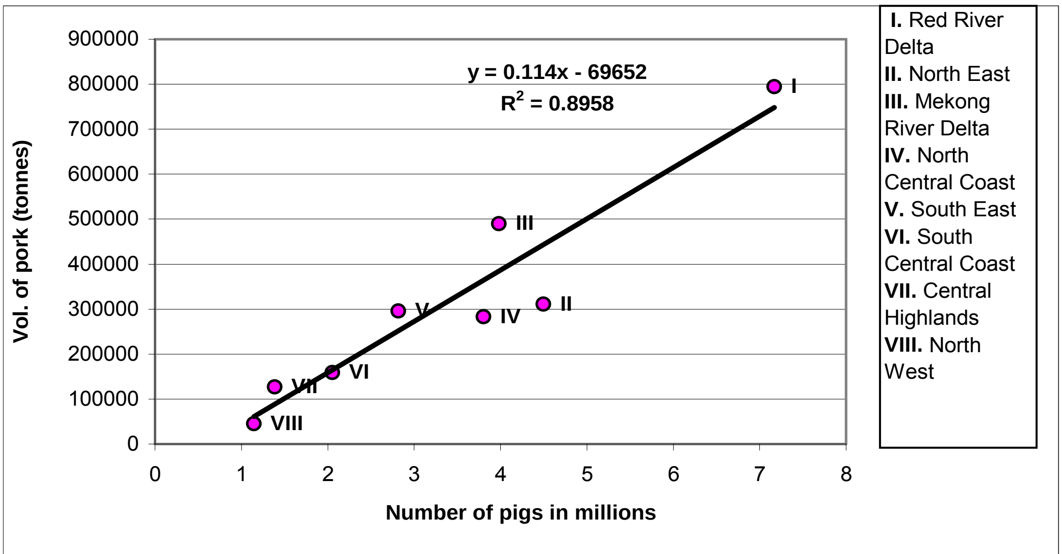

Figure 9: Volume of pork in relation to pig stocks in the different regions of Vietnam in 2006. There is a relatively close association between volume of pork produced in each of the regions and the stock of pigs in each. Note that x in the equation refers to the number of pigs. (Source: based on Tisdell, 2008, Tables A1 and A2)

Table 5 lists the provinces of Vietnam making up the various statistical regions of Vietnam in 2006 as used by the General Statistics Office of Vietnam (2007) to report the results of Vietnam's rural, agricultural and fishery census completed in 2006. The **rough** location of these regions are shown in Figure 10 by numbers on a map of Vietnam. Note that the number of provinces constituting these regions and the size of the regions vary considerably. For example, the North East Region contains nine provinces whereas the North West Region contains only three and the former region is much larger than the latter. There can be considerable geographical heterogeneity within regions. For instance, the North East Region stretches from northeast of Hanoi up to China's border and then to the west of Hanoi. It, therefore, includes Bac Giang (which is close to Hanoi) and Ha Giang which is located in the west and is located far away from Hanoi. The nature of pig production in these two provinces can be expected to be quite different even though for official statistical purposes they are included in the same region. Given such geographical heterogeneity, locational diversity of pig production systems and pork yields can be expected to be even greater than reported here, for example in Figure 13. Nevertheless, even when geographical diversity within regions is ignored, the analysis of the statistical data for Vietnam reported here shows substantial geographical variation in the importance of its pig industry and in its economic performance. This is not surprising given that Vietnam shows a high degree of physical and cultural diversity.

Table 5: A list of the eight statistical regions of Vietnam and their provinces used in reporting results of the 2006 Rural Agricultural and Fishery Census 2006 by the General Statistics Office (2007), Vietnam

1	**Red River Delta**	**5**	**South Central Coast**
	Hà Nội		Đà Nẵng
	Vinh Phúc		Quảng Nam
	Bắc Ninh		Quảng Ngãi
	Hà Tây		Binh Đinh
	Hải Durong		Phú Yên
	Hải Phòng		Khánh Hoa
	Hung Yên	**6**	**Central Highlands**
	Thái Binh		Kon tum
	Hà Nam		Gia Lai
	Nam Đinh		Đắk Lak
	Ninh Binh		Đắk Nồng
2	**North East**		Lam Đồng
	Hà Giang	**7**	**South East**
	Cao Bằng		Ninh Thuân
	Bắc Kan		Binh Thuân
	Tuyên Quang		Binh Phước
	Lào Cai		Tây Ninh
	Yên Bái		Binh Duởng
	Thái Nguyên		Đồng Nai
	Lang Son		Bà Ria – Vũng Tau
	Quảng Ninh		TP. Hồ Chi Minh
	Bắc Giang	**8**	**Mekong River Delta**
	Phú Thọ		Long An
3	**North West**		Tiền Giang
	Điện Biên		Bền Tre
	Lai Châu		Trà Vinh
	Son La		Vinh Long
	Hoà Binh		Dồng Tháp
4	**North Central Coast**		An Giang
	Thanh Hoá		Kiên Giang
	Nghệ An		Cần Tho
	Hà Tinh		Hâu Giang
	Quảng Binh		Sóc Trăng
	Quảng Tri		Bac Liêu
	Thừra Thiên-Huế		Cà Mau

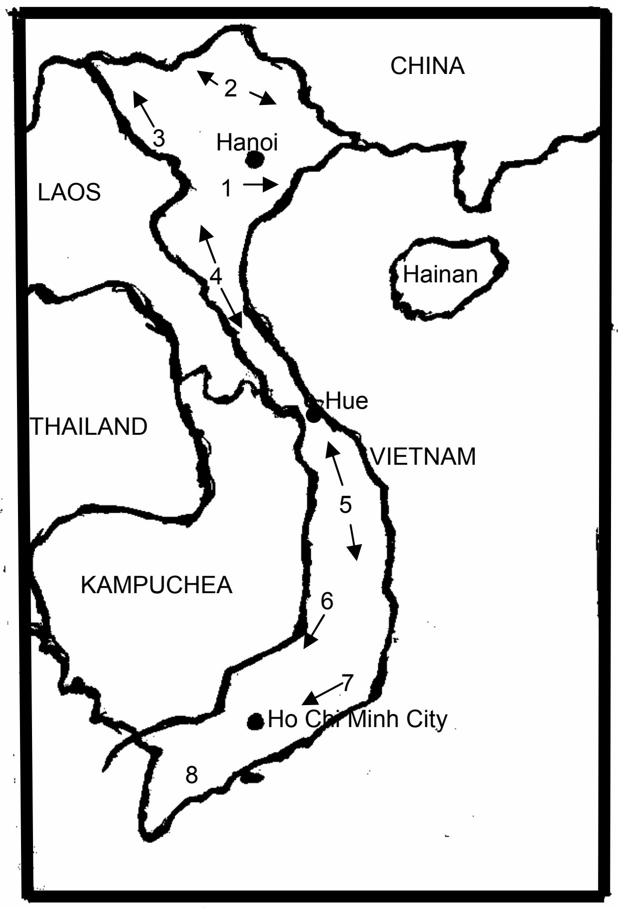

Figure 10: A rough map of Vietnam. The numbers show approximate location of its statistical regions. They are as follows: (1) Red River Delta, (2) North East, (3) North West, (4) North Central Coast, (5) South Central Coast, (6) Central Highlands, (7) South East and (8) the Mekong River Delta.

Figures 11 and 12 graph the distribution of the pig population and the volume of pork supply by the regions of Vietnam for 1996 and 2006. No major change occurred in the regional distribution of pig stocks. However, it can be seen that relative numbers declined on the North Central Coast, increased significantly in the South East and declined in the South Central Coast. In relation to the supply of pork, a noticeable feature is the relative decline in the importance of the South Central Coast and North Central Coast as suppliers of pork. Increases in the relative supply of pork from the South East Region and Red River Delta can be observed. Those regions that are well placed in relation to Hanoi and Ho Chi Min City continue to dominate as sources of pork supply in Vietnam.

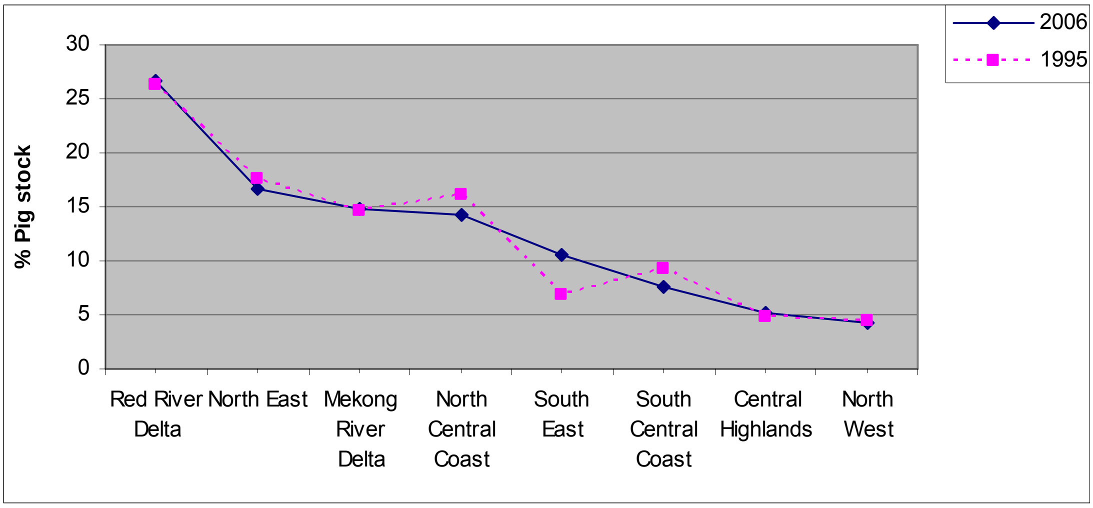

Figure 11: Graph of the percentage of pig stocks accounted for by the different regions of Vietnam in 2006 and 1995. In 1995 and 2006 the general regional distribution of pig stocks were similar, except that the percentage of pigs accounted for by the South East was higher in 2006 than 1996. (Source: based on Table 3)

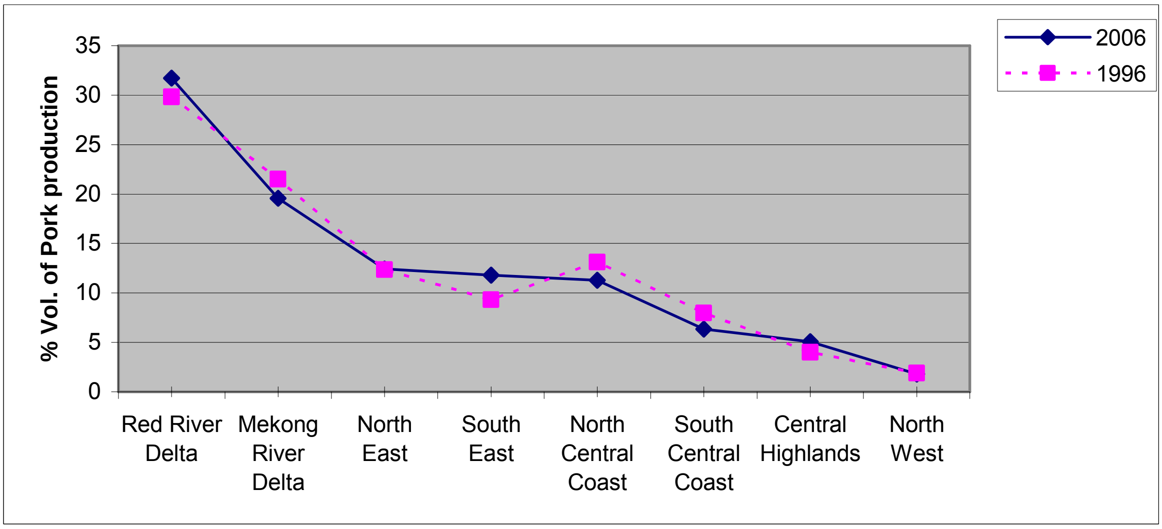

Figure 12: Percentage of volume of pork production accounted for by the different regions of Vietnam in 2006 and 1996. The relative contributions of the regions of Vietnam to its volume of pork production were similar in 1996 and 2006. However, the South East increased its relative contribution. (Source: based on Table 4)

9. Pork Yields in the Different Regions of Vietnam

Between 1996 and 2006, pork yields increased in all regions of Vietnam, as can be seen from Figure 13. Note that regional yields have been estimated by dividing annual volumes of pork supply for each region by pig numbers in each region, as reported by Vietnam's General Statistical Office.

The results indicate that considerable disparity continues to exist in pork yields between Vietnam's regions. For example, in 2006, the region with the highest yields (Mekong River Delta) had a yield of 3.41 times that of the region with the lowest yield (the North West Region). In 1996, this disparity was 3.34. Using this range as a measure, there appears to have been some increase in the disparity of pork yields between regions in Vietnam in 2006 compared to 1996 (see Table 5). Nevertheless, the calculations shown in the last column of Table 5 indicate that there has on average been some reduction in the **relative** deviation of regional yields away from the average national yield. This ratio fell from 0.29 in 1966 to 0.23 in 2006. Despite this, the average **absolute** deviation rose away from the average national yield from 18.27 kgs to 21.83 kgs.

Table 6: Yields of pork in relation to pig stocks in the different regions of Vietnam in 2006 and 1996. (Based on Tisdell, 2008, Tables A4 and A5). The absolute regional disparity of yields has increased and the relative disparity is virtually unchanged.

YEAR : 2006					
Region	**Rank**	**Pig yield (Kgs)**	**Rank**	**Pig stock (Numbers)**	**Deviation of regional from national avg. yield of 93.28 kgs.**
Mekong River Delta	**1**	123.11	**3**	3,982,000	29.83
Red River Delta	**2**	110.83	**1**	7,168,800	17.55
South East	**3**	104.81	**5**	2,819,000	11.53
Central Highlands	**4**	91.47	**7**	1,386,200	-1.81
South Central Coast	**5**	77.59	**6**	2,052,000	-15.69
North Central Coast	**6**	74.36	**4**	3,804,600	-18.92
North East	**7**	68.10	**2**	4,498,300	-25.18
North West	**8**	39.18	**8**	1,144,400	-54.10
				Average absolute deviation in yield=	21.83
				divided by national average=	0.23
YEAR : 1996					
Region	**Rank**	**Pig yield (kgs)**	**Rank**	**Pig stock (Numbers)**	**Deviation of regional from national avg. yield of 63.82 kgs**
Mekong River Delta	**1**	91.42	**4**	2,542,100	**27.60**
South East	**2**	81.62	**6**	1,235,000	**17.80**
Red River Delta	**3**	74.30	**1**	4,336,200	**10.48**
South Central Coast	**4**	54.95	**5**	1,565,200	**-8.87**
North Central Coast	**5**	52.77	**3**	2,685,300	**-11.05**
Central Highlands	**6**	49.37	**7**	873,000	**-14.45**
North East	**7**	45.39	**2**	2,939,100	**-18.43**
North West	**8**	27.35	**8**	745,800	**-36.47**
				Average absolute deviation in yield=	18.27
				divided by national average=	0.29

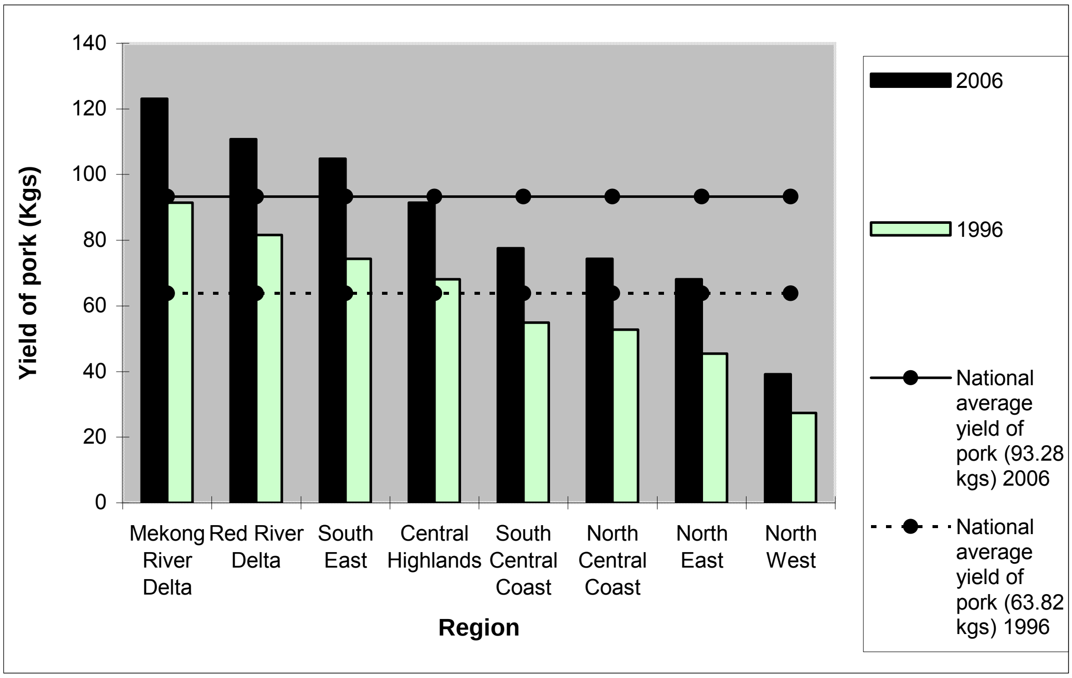

Figure 13: Pork yields in the different regions of Vietnam in 1996 and 2006. Pork yields increased in all regions but remained very unequal. A number of measures indicate that the absolute inequality of regional yields has risen but there has been some reduction in their relative inequality. However, some regional inequality is likely to be economic. (Source: based on Table 5)

Disparity in the levels of pork productivity by regions in Vietnam may occur due to several factors. Differences could, for example reflect differences in the genetic composition of the pig stocks, and also could be a result of variations in nutrition and in husbandry techniques. However, variations in yield by regions cannot necessarily be said to demonstrate low economic efficiency in regions with low yields. Economic conditions can vary considerably by regions, and a high level of productivity (yield) in some areas may not be profitable.

Note that the three regions of Vietnam (the Mekong River Delta, the Red River Delta and the South West) had the highest levels of pork productivity (yields) in Vietnam in both 1996 and 2006 and the North West had the lowest yield in both years. Some changes in rankings occurred. For example, the Central Highlands moved from a ranking of 7th place to 4th place amongst the 8 regions and yields in this region rose from 49.37 kgs. to 91.47 kgs.

From Table 5, it appears that regions that surround or are close to Vietnam's major cities (namely Hanoi and Ho Chi Minh City) have the highest yield of pork in relation to pig stocks. This is probably because they have the most rapid adoption of new techniques for raising pork yields. They are more likely to switch to improved breeds and have less costly access to processed food on which these breeds thrive, have better living conditions for their pigs and easier access to and other support services.

Only a weak positive association ($R^2 < 0.25$) was found between the number of pigs in each region and yields of pork, as is evident from Figure 14. This figure further highlights the extent of regional disparities in the pork yields in Vietnam.

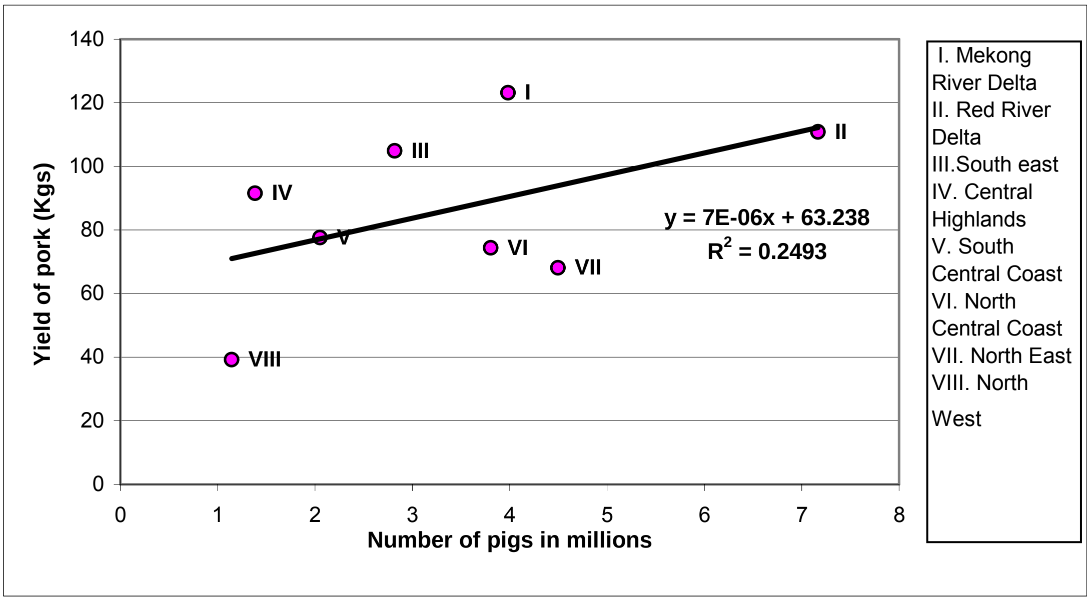

Figure 14: Yield of pork in relation to pig stocks in the different regions of Vietnam in 2006. There is only a very weak positive relationship between the number of pigs in the region of Vietnam and pork yields. Note that x in the equation is the number of pigs.

10. Discussion of Current Policy Issues in Vietnam of Direct Relevance to the Structure of this Pig Sector

As observed above the supply of pork in Vietnam is obtained to a large extent from many very small-scale household producers. Despite considerable increases in productivity in Vietnam's pig sector since the mid-1990s, its cost of production if pork is still high in comparison to that in Canada and the USA. For example, a senior Vietnamese agricultural researcher stated at a meeting in Hanoi or 7 April, 2009 that the average cost of a kilogram of pork at the farm gate in the United States is USD 1.67 compared to USD 2.20 in Vietnam and Drucker et al., (2006) provides evidence to demonstrate the lack of international competitiveness of Vietnam's pork production. Vietnam's Government believes that the structure of its pig sector must be radically altered if the cost of its pork production is to be reduced (see for example, Landall Mills Ltd, 2007). As part of its long-term plan for the development of its livestock industry up to 2020, the Government of Vietnam intends to adopt policy measures to increase the scale of production by its individual pig-producing units (Ministry of Agriculture and Rural Development, 2007). Its proposed new plan is similar to one adopted by China (Ministry of Agriculture of China, 2000, p. 167). It is believed that large-scale industrial production will reduce the cost of production of pork in Vietnam.

Some urgency is felt by Vietnam's Government in the need to reduce production costs in its pig sector because Vietnam is required to be compliant with the regulations of the World Trade Organisation (WTO) by 2012 and will need to reduce the extent of economic protection of its pig industry. A subsidiary consideration is the Government's belief that larger pig-producing units will reduce the incidence of pig diseases, improve the hygiene of pig production and generally improve the quality of Vietnam's pork production. It is not possible to assess these hypotheses here. However, it is worth noting that cultural (social habits) factors help to shield Vietnam's pig sector against imports. Vietnamese have a strong preference for fresh pork and have a relative dislike of chilled, frozen and processed pork which is mostly retailed in supermarkets.

The development of supermarkets in Vietnam have been slow (Chen et al., 2005) and most Vietnamese prefer to buy (and do purchase) their pork fresh from traditional market-outlets, mainly permanent local markets (Nguyen and Wade, 2006; Lapar et al., 2009). As long as this preference continues, the opening in Vietnam for imported pork is relatively small because it is of necessity not fresh and its main retail outlet is through supermarkets. These characteristics of this market may alter in the longer term but are unlikely to do so in the short-term. Change is likely to depend on further rises in income in Vietnamese and alterations in lifestyle. For the time being, the nature of demand for pork in Vietnam provides a degree of natural economic protection to its domestic pig sector. That however, does not mean that efforts should not be made to reduce the cost of pork production in Vietnam, lower Vietnam's incidence of pig disease and improve the quality of its pork.

11. Concluding Observations

The volume of pork production, the number of pigs and the average yield of pork per pig in Vietnam's stock of pigs have risen greatly since 1996. Vietnam's increased supply of pork since 1996 has been a result of increasing pig numbers and growing pork yields. While increased pig numbers accounted for the largest percentage of increased pork production between 1996 and 2006, increased yield was also important. In recent years, increased pork yield has become the major source of the growth in Vietnam's supply of pork. But the rate of growth in Vietnam's volume of pork supplies was not sustained in 2006. This could be an indication that the rate of growth in Vietnam's supply of pork is permanently slowing.

From the 2001 data, it was found that pig households account for over 90% of Vietnam's pig stocks. The average number of pigs held by households was quite small: 2.73 head. There has only been a slight increase in the average scale of pig-producing household unit since 2001. Registered pig farms account for less than 10% of Vietnam's pig stock and appear to vary significantly in size but usually operate on a larger scale than households. Registered pig farms seem to be concentrated in the regions surrounding or near Hanoi and Ho Chi Minh City.

The number of pigs in the various regions of Vietnam differs considerably as does the volume of regional pork production. The Red River Delta, the Mekong River Delta, the North East and the South East were the most important sources of pork supply in 2006. Some regional changes in supply occurred between 1996 and 2006 but no major change is apparent. Regional variations in pork yields are very considerable. Yields appear to be highest in regions containing Vietnam's two major cities or nearby. Although all regions of Vietnam have recorded increased pork yields since 1996, there appears to have been no reduction in the disparity of the regional yields.

It is apparent that intensification of Vietnam's pig sector has increased since 1996 and that pork production has become more market dependent. Therefore, the economic future of Vietnam's pig sector depends more than ever on changing market conditions. This probably means that the economic vulnerability of Vietnam's pig sector to external and (non-controlled) market forces has increased.

Despite positive indicators of its improved economic performance in the period 1996-2006, Vietnam's pig industry has yet to achieve a strong competitive position internationally (Drucker et al., 2006). This is reflected in its meagre level of exports of pork and since 2006, its rising imports of chilled and frozen pork from North America. These developments are likely to accelerate structural change in Vietnam's pork industry which so far has been slow to alter its structure. Unfortunately, increased pork yields and better quality pork produced in Vietnam are not certain to prevent further penetration of Vietnam's pork market by imports. However, the fact that Vietnamese have a strong preference for fresh pork and a relative dislike of chilled frozen and processed pork provides some natural economic protection to Vietnam's pig sector. The slow development of supermarkets in Vietnam combined with the preference of Vietnamese for buying pork from traditional retail outlets further reinforces this natural protection of the local industry.

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