Pro-Poor Livestock Policy Initiative
A Living from Livestock
Research Report

August 2007

The Poultry Sector in Viet Nam: Prospects for Smallholder Producers in the Aftermath of the HPAI Crisis

P.T. Hong Hanh, S. Burgos, and D. Roland-Holst

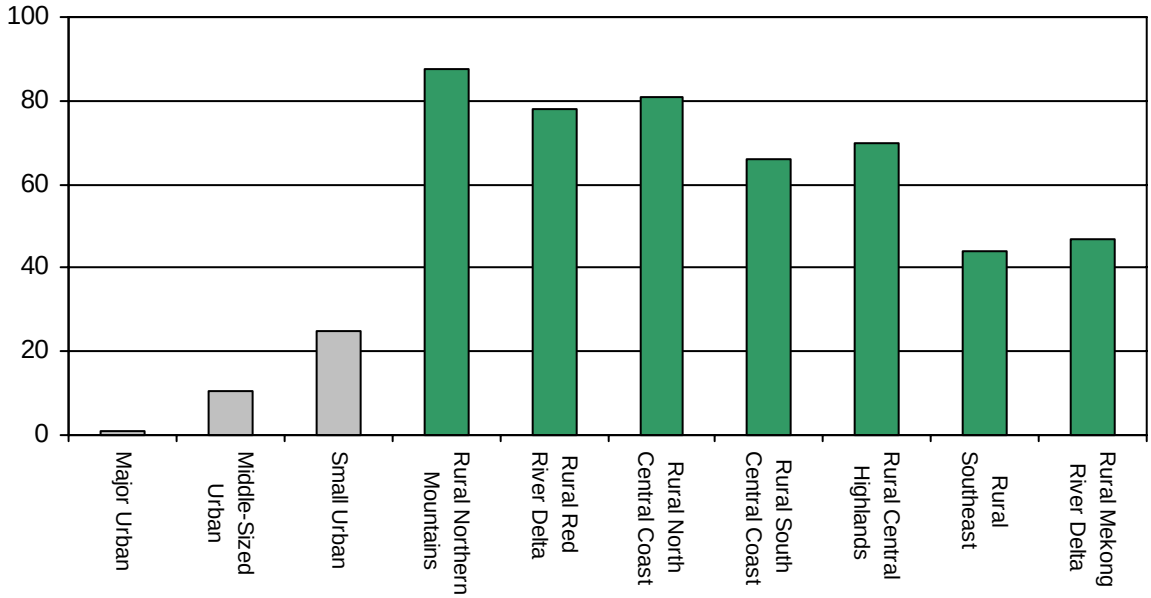
1. Summary

Highly Pathogenic Avian Influenza Type A H5N1 subtype is a viral zoonotic disease that has infected and killed birds and humans in SE Asia, Africa and Europe since late 2003. In 2006, a total of 47 countries reported HPAI outbreaks: 24 in Europe, 15 in Asia and 8 in Africa. From November 2003 to July 25, 2007 there have been a total of 319 confirmed cases in humans resulting in 192 deaths (60.2 percent mortality rate). National governments and international agencies are intensively studying measures to control disease spread, and among these, a restructuring of the poultry industry in a way, which threatens livelihoods of smallholder poultry producers. Unsubstantiated and reactive governmental measures against this disease can prove detrimental to the contribution of poultry farming to family livelihoods and national food security, be it either directly through loss of income-generating poultry outputs or indirectly through disincentives against traditional backyard farming, and in favour of intensive commercial production systems. These livestock policy decisions are framed under the assumption that commercially-oriented, mechanized, intensive farming with high stocking densities, high turnover and high investments are more biosecure, yet this has not been fully supported scientifically. Inclusive evidence-based policies to combat avian influenza need to consider these socio-economic issues to promote diversity, avoid disruptions, and soften social transitions. This report aims to briefly review Viet Nam's poultry sectors and comment on governmental policy approaches in response to HPAI outbreaks. Additionally, it elaborates further on the challenges and opportunities now faced by smallholding poultry producers, particularly after the HPAI crisis and policy implementations.

2. Introduction

Poultry production is a traditional occupation associated with rice cultivation in Viet Nam. Joint crop and animal production, especially with poultry such as chickens and ducks are common components of mixed farming systems in rural areas, forming an integral part of village life with important social functions. According to the perception of farmers, poultry production entails low investment, low input and labor requirements, short production cycles, high marketability and low exclusion risk (i.e., their poultry products are not easily replaced by others). Poultry is an important source of cash income for village families and provides a cheap source of protein for rural dwellers. In Viet Nam almost 80% of rural households participate in poultry production through backyard and garden raising. Figure 1 shows patterns of chicken ownership by geographic regions in Viet Nam by 1998, five years prior to the incursion of HPAI. Poultry rearing is especially important to the country's rural poor majority (Epprecht, 2005).

Figure 1: Proportion (%) of households keeping poultry by region in Viet Nam (1998).



Source: VHLSS, 1998.

3. Poultry Production Systems in Viet Nam

While there are various classifications of poultry production systems based primarily on scale, official classification criteria have not been established by the Vietnamese Ministry of Agriculture and Rural Development (MARD). This paper draws on the fourfold production system classification adopted by the Food and Agriculture Organization of the United Nations (FAO) for

the poultry sector (Figure 2), but combines FAO Sectors 3 and 2 and considers three systems of poultry production: (i) traditional extensive backyard poultry production (Sector 4); (ii) semi-intensive, small to medium scale, market-oriented, commercial poultry production (Sectors 3 and 2), and (iii) intensive, large scale, industrial poultry production.

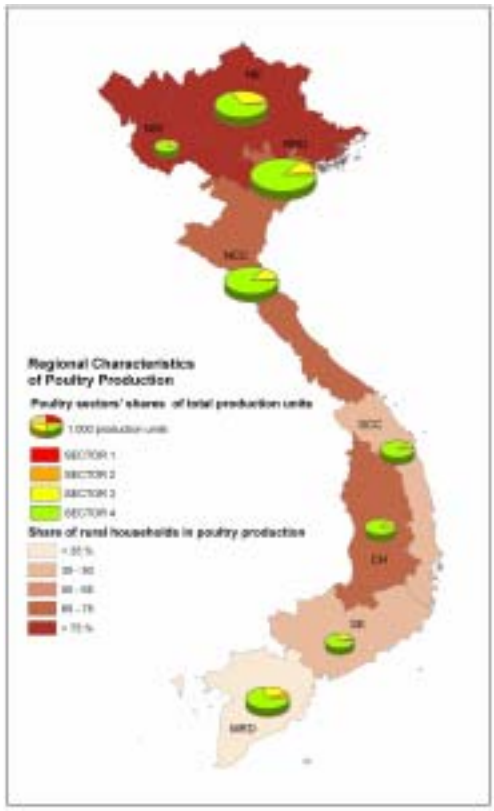
Figure 2: FAO classification of poultry production systems.

Sector 4: **'**Village or backyard production with minimal bio-security and birds/products consumed locally.'

Sector 3: **'**Semi-commercial poultry production with low to minimal bio-security and birds/products usually entering live bird markets (e.g. a caged layer farm with birds in open sheds; a farm with poultry spending time outside the shed; a farm producing chickens and waterfowl)'.

Sector 2: **'**Commercial poultry production system with moderate to high bio-security and birds/products usually marketed commercially (e.g. farms with birds kept indoors continuously; preventing contact with other poultry or wildlife).'

Sector 1: **'**Industrial integrated system with high level bio-security and birds/products marketed commercially (e.g. farms that are part of an integrated broiler production enterprise with clearly defined and implemented standard operating procedures for bio-security)'.



Source: FAO, 2004.

Traditional Extensive Household Poultry Production

Traditional extensive household poultry production (Sector 4) is by far the most common production system in the country, where poultry is raised in backyards, gardens, and often free to range on neighbouring land. This system is considered to be small scale, with flock size of less than 50 birds which derive a large part of their diet from free range scavenging. Birds are also given some locally available feeds and supplemented with limited amounts of home produced grains such as paddy rice or maize, and kitchen waste. The amount of feed given to birds does not focus on production efficiency but depends heavily on the availability of grains that farmers have in storage for personal use and eating needs of their birds. Chick replacements are generally hatched from own-stock eggs, but sometimes farmers buy replacements from local markets or traders to complement their flock. Most farmers keep poultry all year round. In 2005,

more than 7.9 million households engaged in traditional extensive poultry production, with an average flock size of 32 birds, representing about 94 percent of all poultry producers (DLP, 2006). In 2005, according to DLP (2006), 70 to 75 percent of the country's total chicken population was raised under this production system, while in 2006 this share had declined to slightly above 60 percent.

Since it is considered a side-line activity, attention to bird safety and health is limited and mortalities can be high, in bad weather conditions as high as 40 to 50%. The most popular local breeds Ri, Mia, Dong Tao, and Ho are raised in the North, and Ta Vang or Tau Vang in the South. These local breeds are of low productivity in comparison to foreign imported breeds but have characteristic yellow feathers and skin colour features that are favoured by consumers in both rural and urban areas, particularly for traditional festivals and for family offerings.

At the present time, and in the context of recent experiences with HPAI, the government has not established revised production practices for this sector, but instead plans to encourage farmers to reduce their production levels over time and allow this sector to slowly shrink as a share of national production.

Semi-intensive / Semi-industrial Commercial Poultry Production

Semi-intensive production systems (Sector 3 and 2) have larger scales and higher rates of commercialization than the previously described system, and can follow some practices of the agricultural sectors of industrialized countries. This system combines traditional practices with improved technology. Poultry are both kept in enclosures and/or free to range backyards and gardens. Breeds used in this system are either specialized or a mixture of local and exotic imported breeds, with flock size ranging from 51 to 150 birds (Sector 3) and 151 to 2,000 birds (Sector 2). This mode of production has developed since the onset of the economic reform period and the so-called "open door" policy, especially in the late 1990's.

This production system represents a transition stage between traditional and more market-integrated commercial poultry production. Farmers who are involved in this system mainly represent former government employees, current local officers, or wealthy farmers who have permanent income and skills, especially knowledge of market conditions. Based on casual observation, it can be inferred that know-how and capital are important factors for development of semi-intensive commercial poultry production.

Chicks of imported breeds are bought at local hatcheries and local chicks are obtained at local markets. The majority of semi-intensive farmers also keep a certain number of laying hens to produce chicks for fattening. From hatching to one month of age, chicks brood with hens. Older

birds are allowed to scavenge in backyards or gardens during the day and brought back to their housing in the evening. The cages vary from permanent to makeshift enclosures, made mainly from local primary building materials, such as brick or bamboo, or tree branches. Gardens are fenced with netting or bamboo material or walled with brick. Measures for disease prevention, treatment and management are given more attention compared to traditional household production. Besides reliance on naturally available feed resources such as worms, insects, pests, vegetables, and grass that the birds can scavenge, they are also fed with grains and/or commercial feeds bought from local feed outlets. This system has production cycles for meat birds of about 70 to 90 days, with intermediate mortality rates and efficiency levels.

As in traditional household poultry production, commercial production outputs consist of poultry meat (breast and drums), eggs (white and brown), live birds including chicks, broilers, laying hens, cocks and other poultry species like ducks and geese. These outputs are sold to different buyers such as assemblers, wholesalers, and various consumers. Because local poultry varieties still form an important share of the stock of these producers, quality of meat and eggs are seen as similar to that of household/subsistence producers. Thus they are still suitable for both urban and rural consumers, and for marketing into festivals or traditional events.

Although these farmers have the financial capacity to buy some concentrated feeds, this system is usually a part-time or supplemental activity, depending on income status of individual producer households. Household members are also engaged in other farming activities like cropping, raising other livestock or off-farm employment. According to Man (2006) and DLP (2006), about 15 to 20 percent of farm households are currently engaged in this mode of poultry production and by 2006 produced around 28 percent of the Viet Nam's chicken; up from approximately 20 percent in 2005.

Intensive Industrial Poultry Production

Intensive poultry production (Sector 1) in Viet Nam is modeled after modern industrial poultry systems found in OECD countries. Poultry is kept indoors. Facilities are well equipped and relatively mechanized, including both semi-automatic and automatic equipment. In-house cage systems are designed to accommodate internal feed systems, water supply, controls for humidity, air, and waste management. Some systems have more extensive automation, including remote monitoring and control.

This production system has emerged over the last 10 years in Viet Nam. Initially the industrial model was established jointly with large scale foreign direct investment (FDI) and structural enlargements as multinational agro-food enterprises expanded their networks through contract farming with more established local agricultural interests. Local studies explain that larger

domestic farms are the primary recipients of genetic material, technology, health services, and marketing support by FDI companies. Because of large initial costs, as well as economies of scale, foreign partners have shown a strong preference for established, larger scale enterprises (i.e., flock sizes of more than 2,000 and up to 100,000 birds). Farms with automatic equipment have sizes in the 8,000 to 15,000 bird range and above, and partnership is limited to the more experienced and higher income local farming interests. This mode of production is intensive with higher levels of investment in animal health standards, house maintenance and flock productivity. The main products are eggs, meat, and breeding stock, which are sold to different buyers like assemblers or wholesalers and consumers. This sector currently produces about ten percent of Viet Nam's chicken.

In 2006, according to the Department of Livestock Production (DLP), 2,837 intensive industrial poultry production farms operated in Viet Nam. Of these, 1,950 were chicken farms (mainly broilers but also layers), 668 were duck and/or geese farms, and 219 were breeding farms. These industrial farms are mainly located in the Red River Delta (900 farms or 31.7%), the North-South Region (522 farms or 18.4%), the Mekong River Delta (499 farms or 17.6%), and the South Central Coastal Region (414 farms or 14.6%), with the remainder in the North Central Coast, the Central Highlands, the North East, and the North West with 9.0%, 4.5%, 2.7%, and 1.5% respectively (Table 1). Some provinces in proximity to major urban areas have large numbers of industrial poultry farms, including Ha Tay (392), Binh Dinh (315), Binh Duong (235), Kien Giang (179), and Ha Nam (134).

Table 1: Number and location of industrial poultry farms (flock size >2,000 birds).

	Region	Chicken farms	Duck and Geese farms	Breeding farms	Total
A	**Northern**	**859**	**242**	**173**	**1,274**
	%	*44.1*	*36.2*	*79.0*	*44.9*
I	North East	**72**	**2**	**2**	**76**
	%	*3.7*	*0.3*	*0.9*	*2.7*
II	North West	**42**	**0**	**1**	**43**
	%	*2.2*	*0.0*	*0.5*	*1.5*
III	Red River Delta	**590**	**141**	**169**	**900**
	%	*30.3*	*21.1*	*77.2*	*31.7*
IV	North Central Coast	**155**	**99**	**1**	**255**
	%	*8.0*	*14.8*	*0.5*	*9.0*
B	**South**	**1,091**	**426**	**46**	**1,563**
	%	*55.9*	*63.8*	*21.0*	*55.1*
V	South Central Coast	**263**	**141**	**10**	**414**
	%	*13.5*	*21.1*	*4.6*	*14.6*
VI	Central Highlands	**99**	**29**	**0**	**128**
	%	*5.1*	*4.3*	*0.00*	*4.5*
VII	South East Region	**479**	**18**	**25**	**522**
	%	*24.6*	*2.7*	*11.4*	*18.4*
VIII	Mekong River Delta	**250**	**238**	**11**	**499**
	%	*12.8*	*35.6*	*5.0*	*17.6*
	National Total	**1,950**	**668**	**219**	**2,837**

Source: Department of Livestock Production, 2006.

Within the industrial poultry sector, flock sizes in the range of 2,000 to 5,000 birds account for 69% of chicken operations, 98% of duck and geese operations, and 73% of poultry breeding operations, while operations with more than 11,000 birds only account for around 6% of the industrial operations[1]. Farms under contract with foreign investors or large domestic companies more commonly have flock sizes in the range of 4,000 to 5,000 birds.

Breeds raised in industrial-scale farms are mainly imported. In the case of broilers, production cycles are between 42 and 45 days and birds weighing about 2.2 to 2.4 kg when finished, while layers produce 270 to 280 eggs per year. Marketing is based on three main channels: through assemblers, company abattoirs (both foreign partners and domestic companies) and marketing cooperatives. Marketing through foreign-owned abattoirs represents about 45 to 50 percent of industrial poultry market flows. Marketing poultry products through marketing cooperatives has recently been established by farm owners in several provinces such as Hai Duong, Ha Tay, Bac Ninh, Hung Yen, Thanh Hoa, Ho Chi Minh city, and Tien Giang. Profit per broiler is between 1,000 and 4,000 VND/kg (0.06-0.25 USD/Kg), whereas profit per egg is between 50 and 150 VND/egg (0.003-0.009 USD/egg).

Average investment in an industrial chicken farm is about 50 to 60 million VND (3,058 – 3,670 USD) per 1,000 birds. To meet this entry requirement, chicken farm owners have to mobilize capital from different sources such as commercial banks, credit institutions, savings and relatives. As in Sector 2/3, there are different types of entrepreneurs establishing industrial poultry enterprises such as wealthy farmers, retired government officials, ex-army officers and consummate professionals. Family members, neighbours and local dwellers are mobilized to operate farms and represent about 70 to 80 percent of the labour force in the industrial sector. Production costs are contained through the use of family labour. About 30 percent of the industrial farms recruit part-time labour from outside. The scale of this outside employment depends on flock size, and normally a farm hires from 2 to 8 labourers. Overall, about 14 to 20 percent of industrial farms hired 2 to 3 labourers, 6 to 7 percent hired 5 to 8 labourers, while the number of hired labourers for the largest farms is about 15 to 20 persons (DLP, 2006).

Since the majority of employment in these industrial farms still stems from family or neighbour sources, labour costs are not very different from those of other poultry production systems in Viet Nam, although the concentration of these facilities in peri-urban areas may imply higher labour costs. Family member workers in operations of this scale are more likely to be engaged full time in poultry work, rather than dividing their attention between poultry and other farming activities. The main dividing line between 'workers' in these three systems described is thus not family or

[1] In industrialized countries, poultry operations with flock sizes between 2,000 and 5,000 birds may still be considered small and managed by farm households.

village affiliation, but probably education and training. Industrial systems may employ fewer workers per unit of output, but these workers acquire specific human capital by working with more advanced hard and soft technology, increasing their future productivity and earning capacity.

Figure 3 (a-c) provides a summary display of the proportion of chicken kept in the three production systems in Viet Nam in 2006.

Figure 3a Proportion of chicken for meat by production system

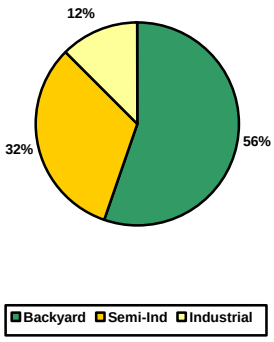


Figure 3b Proportion of chicken for eggs by production system

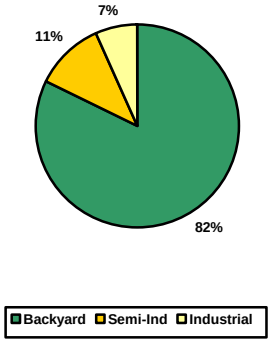
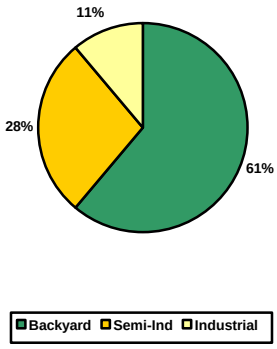


Figure 3c Proportion of total chicken by production system



4. Developments in Poultry Production in Viet Nam

Between 2001 and 2005, livestock production in Viet Nam grew at a rate of 8.9 percent annually (production of poultry meat and eggs grew at the same rate). In 2001, the number of poultry in the whole country was estimated at 218 million birds, rising to 254 million birds in 2003, shortly before the advent of HPAI in Viet Nam later that year. By 2005 the bird population had declined to about 220 million or 15-16 percent less than the peak of 2003 (Table 2).

The 10 provinces with the largest bird populations serve the country's two major urban areas, Hanoi and Ho Chi Minh city. These provinces are Nghe An (10.9 million), Ha Tay (10.8 million), Thai Binh (8.2 million), Hung Yen (6.5 million), Phu Tho (7.9 million), Dong Nai (5.2 million), Ha Tinh (4.9 million), Thai Nguyen, Hai Phong and Vinh Long (4.6 million); totaling 59 million.

Table 2: Poultry populations, meat and egg production in Viet Nam (2001-2005).

	2000	2001	2002	2003	2004	2005
Poultry (million)	196.2	218.1	233.3	254.1	218.2	219.9
Chicken (million)	145.2	160.2	169.7	184.7	159.3	159.9
Ducks and Geese (million)	51.0	57.9	63.6	69.4	58.9	60.0
Meat (kilotons)	292.9	322.6	362.3	372.7	316.4	321.9
Eggs (million)	3,771	4,161	4,722	4,852	3,939	3,948

Source: Department of Livestock Production, 2006.

Table 3: Growth rates (%) of poultry population, meat and egg production (2001-2005).

	2001-2005	2001-2003 (before HPAI)	2003-2005 (during HPAI)
Chicken	2.7	9.0	-6.7
Ducks and Geese	3.5	10.8	-6.6
Poultry meat	2.4	8.4	-6.7
Eggs	1.6	8.9	-9.3

Source: Department of Livestock Production, 2006.

Figure 4 (a-c) provides a summary display of the estimated proportions of chicken kept in the three production systems in Viet Nam for 2009 as envisaged by the government (the total number of chicken in 2009 is expected to be around 233 million).

Figure 4a Proportion of chicken for meat by production system

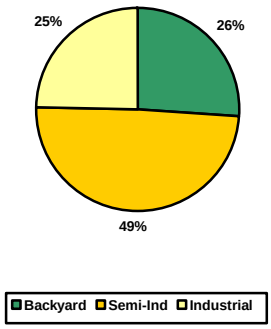


Figure 4b Proportion of chicken for eggs by production system

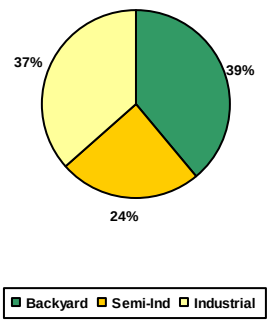
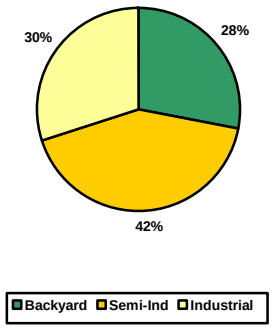


Figure 4c Proportion of total chicken by production system



Supporting Policies

Before the advent of HPAI in Viet Nam, government policy supported all farm types participating in poultry raising and as a consequence bird populations increased rapidly across all production systems. After HPAI crisis however, support to poultry raising in semi-industrial commercial and

industrial systems have received more policy attention by the government than traditional household poultry raising.

Since endorsement of Resolution 03/2000/NQ-CP on incentives for commercial farms, poultry output from this sector has increased significantly and the proportion of birds raised by semi-industrial commercial and industrial farms has increased from less than ten percent in early 1990's to about 40 percent of total bird population in 2006. Thus a significant process of structural adjustments has begun in Vietnamese poultry sectors. The ultimate effect of these policy changes on smallholder farmers will depend on aggregate demand growth, the speed of continued commercial/industrial expansion, and their own adaptability with respect to agricultural diversification.

In terms of local policies, the case of Hai Phong city is instructive. This municipality has initiated policy-based assistance for semi-industrial commercial and industrial poultry farmers through contracting arrangements with a number of large domestic and foreign companies. Analogously, Ha Tay, Dong Thap, Tay Ninh, Vinh Long, and Binh Duong provide some degree of credit support for farmers willing to adjust farming practices and relocate poultry production, usually transitioning to semi-industrial/industrial scale. Hanoi, Ho Chi Minh city and Quang Ninh all have policies encouraging local semi-industrial and industrial poultry production. With respect to these official development priorities, at both central and local government levels, farmers receive credit with preferential interest rates, are partly assisted in breeding techniques, receive technical training in poultry raising, and health and marketing extension services. These scale biases in livestock development policy reinforce the process of structural change in the sector and sharpen the disadvantages of poor rural smallholders.

In large part because of HPAI-induced poultry mortalities and the assumption that smallholder systems have higher disease risk levels, the 2006-2010 plan of the Government of Viet Nam is strongly encouraging an increase of poultry raised under semi-industrial commercial and industrialized production scales over traditional small-scale production, as well as a decrease in the number of ducks raised in small-sized farms and free ranging in the field. However, scientifically it has not yet been clearly established that larger and concentrated poultry production systems are inherently safer than small, decentralized ones, particularly in countries with relatively limited surveillance capacity. Certainly larger enterprises make larger aggregate investments in animal health and hygiene, but intensive production systems are also much more vulnerable to rapid propagation of infectious diseases. Thus, the net contribution of each production system to national HPAI risk remains to be established scientifically.

Private Sector Engagement in Poultry Development

In Viet Nam's poultry industry, governmental policy and entrepreneurial enterprise initiatives have established a dominant role for the private sector. As mentioned before, traditional smallholder production still dominates national poultry output (up to 60% in 2006), but poultry raised under the semi-industrial commercial and industrial system have been rapidly increasing their share of national output in recent years. Most industrial-scale birds are raised in privately owned facilities except for a small percentage being produced in state farms or companies, the latter mainly kept as breeding stock.

Poultry demand is rising sharply with income growth in Viet Nam, and the total bird population is increasing again after HPAI shocks in 2003-2004. Due to the policy of not encouraging smallholder poultry raising, their share of domestic supply is falling while semi-industrial commercial and industrial production are rising faster than demand, thus gaining market share. Despite declining sales, smallholders may still benefit from premium markets if modification of product presentation and product quality enhancement allows them to receive higher prices.

The private sector has strong participation in poultry breeding and genetic development. Viet Nam has 12 state poultry breeding farms, while the number of private poultry breeding farms stood at 106 in 2006. Commercial breeding farms are dominated by a few foreign-owned poultry holdings, and almost all poultry breeding stock is now produced privately.

Changing Consumer Perceptions and Attitudes Toward Poultry Products

Before HPAI outbreaks occurred in Viet Nam, over 95 percent of total poultry output was sold as live birds. Live birds were sold at farm gates, in wet markets, in rural markets, along the road as well as in temporary or makeshift markets in cities. Products were not certified by animal health authorities, were not packaged and were produced under questionable conditions of hygiene. There are many reasons for this situation, including:

- Traditional customs of buying live birds in both rural and urban markets (which are difficult to change and will remain for some time to come);
- Low disposable incomes, which limits the ability and willingness of consumers to pay for value-added processing and hygiene;
- Limited capacity in both central and local governments for the necessary planning, design, and implementation of supply chain modernization, including the development of standards, transition assistance, technology diffusion, and more extensive sanitary and phytosanitary supervision.

These issues will be dealt as an outgrowth of economic reforms, modernization, and development, but the advent of HPAI has accelerated the need for health risk management in the livestock sector. Since the incursion of HPAI in Viet Nam, the reaction to poultry products has diverged between rural and urban consumers; however, almost all are more hesitant to consume poultry products during HPAI outbreaks. Recent studies show that, during an outbreak consumers reduce or completely cease consumption of poultry products, and live birds markets close. As HPAI outbreaks spread more widely in Viet Nam, certified poultry eggs and meat in supermarkets and other retail outlets rose sharply in cities, indicating that consumer awareness and preference for certified food products is growing.

It is important to note that imported poultry products did not exist until recently in Viet Nam. Since 2004, however, chicken meat has been imported into Viet Nam, and these imported products are certified for hygiene and safety. Recently, a number of companies have invested in improving poultry slaughter in order to provide certified products from commercial semi-industrial and industrial farms, where live birds can be health certified by veterinary officers to meet the requirements on quality and safety. For example, in the North, the Phuc Thinh company has improved its capacity for poultry slaughter, for packaging and is now selling safety-certified products through its network and supermarkets (the company sells between 1,000 and 2,000 certified chickens per day, indicating that urban customers are relatively quality-conscious).

5. Conclusions

The transition of part of Viet Nam's poultry sector to larger scale industrial production is inevitable, but the consequences of this process are uncertain and policy dependent. In any case, there are now and will remain many market access opportunities for small and intermediate scale producers who can improve their production, marketing, and efficiency standards. Among other considerations, the following factors will influence the viability of smaller producers to cope with a changing domestic poultry industry:

1. Current government policies do not encourage traditional extensive poultry raising. These policies are based on assumptions of substandard efficiency and biosecurity. As a first stage policy response to HPAI, this approach needs to be based on stronger scientific evidence, and more careful study is needed to facilitate transition of the poultry sector without undesirable effects on rural households, with a concomitant effect on poverty. In particular, it is important to promote higher standards for intermediate scale production, permitting small producers to improve their livelihoods without complete displacement by industrial poultry operations. This can be done though a combination of agricultural extension, entreprenurial funding and support, and facilitation of small and medium scale contracts;

2. The proportion of poultry products coming from commercial farms has increased rapidly in recent years, including intermediate supplies of poultry meat, eggs, chicks, and breeding stock. Commercial farm linkages across the poultry sector can be beneficial if they promote higher quality and efficiency standards. These horizontal linkages need to be more clearly understood, monitored, and regulated, since they are a primary mechanism for transferring disease between poultry production systems;
3. Poultry products from industrial farms are accepted by domestic customers, but the domestic markets still place a premium on special domestic varieties. The former tend to be more cost effective and may be perceived as safer under current production standards, while the latter are identified with special quality and cultural importance. By facilitating technology transfer from industrial to small and medium domestic producers, desirable quality attributes can be combined in specialty poultry products. This will permit long term viability of smaller producers, greater choice for consumers, and a more diverse and robust industry;
4. Wider application of certification and traceability standards will improve product quality and market-determined prices. This can also increase the scope for national product differentiation and industry diversification. Within a more diverse market, small and medium producers can continue to be viable in an industry led by large scale industrial producers.

Higher product quality is essential to sustained income growth for all participants in agro-food supply chains, especially farmers. Without consistent standards, made transparent by credible and inclusive certification systems, farmers large and small will have little incentive to invest in the quality improvements needed to realize the full income potential of their agricultural resources. This dilemma is especially acute for smallholders, who are least likely to be recognized for quality improvements and have the most serious financial constraints on new investments. A more inclusive set of livestock development policies can recognize these needs, sustain diversity in the producer community, and ease this sector's economic and social transition.

6. References

DLP - Department of Livestock Production. (2006). Report on commercial and industrial livestock farm development in the period 2000 - 2005 and orientation of development in the period 2006 - 2010. Ministry of Agriculture and Rural Development, Hanoi.

Epprecht, M. (2005). Geographic dimensions of livestock holdings in Viet Nam: Spatial relationships among poverty, infrastructure and environment. PPLPI Working Paper 24.

Man, L.H. (2006). Renovation mode and solutions for poultry development. Ministry of Agriculture and Rural Development, Hanoi.

FAO (2004). Poultry production sectors. http://www.fao.org/docs/eims/upload//224897/fact sheet_productionsectors_en.pdf

VHLSS (1998). Vietnam Household Living Standards Survey, http://www.wpro.who.int/NR/rdonlyres/6271BB17-91C0-451F-8E78-5F5A1B318652/0/vtn.pdf

7. Disclaimer & Contacts

PPLPI Research Reports have not been subjected to independent peer reviews and constitute the views of authors only. For additional information, please contact:

P.T. Hong Hanh
Ministry of Agriculture and Rural Development
Department of Animal Health
15/78 Giai Phong Road
Phuong Mai, Dong Da, Hanoi, Viet Nam
E-mail: hhanh.htqt@mard.gov.vn

David Roland-Holst
Rural Development Research Consortium
223 Giannini Hall University of California Berkeley, CA 94720 - 3310 USA
E-mail: dwrh@rdrc.net

Sigfrido Burgos
Agriculture and Consumer Protection Department
Animal Production and Health Division
Pro-Poor Livestock Policy Initiative (PPLPI)
Food and Agriculture Organization of the United Nations (FAO), Viale delle Terme di Caracalla, 00153, Rome, Italy
E-mail: sigfrido.burgos@fao.org
PPLPI website: http://www.fao.org/ag/pplpi.html