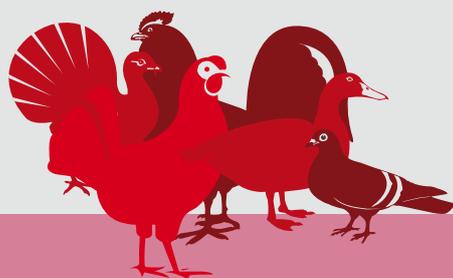


# DUCK FARMING SYSTEMS AND AVIAN INFLUENZA IN THE MEKONG DELTA OF VIET NAM





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## Preface

This paper is part of a series that describes the opportunities and limitations of smallholder poultry production. The major structural changes that have occurred in poultry production and marketing in recent decades have led to a strong and internationally integrated poultry industry. In developing countries, however, the majority of poultry are still kept by smallholders in less intensive systems. The advantages of these systems are the low levels of inputs that they require and the unique products they produce. These systems are practiced by people who have few other options and it is important that they survive as long as they are needed for social reasons, food security and livelihood support.

The paper aims at improving the understanding of how the different systems of duck production in the Mekong Delta operate, and in particular the relationships between the various components of the systems and the spread of avian influenza. Recommendations for modifying the systems in order to reduce the risk of the spread of avian influenza are suggested.

We hope this paper will provide accurate and useful information to its readers and any feedback is welcome by the author and the Animal Production Service (AGAP)<sup>1</sup> of the Food and Agriculture Organization of the United Nations (FAO).

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<sup>1</sup> For more information visit the FAO poultry website at: <http://www.fao.org/ag/againfo/home/en/index.htm> or contact: Olaf Thieme – Livestock Development Officer – Email: [olaf.thieme@fao.org](mailto:olaf.thieme@fao.org)  
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# Duck farming systems and avian influenza in the Mekong Delta of Viet Nam

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## **SUMMARY**

This paper describes and evaluates current duck production systems in the Mekong Delta of Viet Nam and provides information on the potential effects of highly pathogenic avian influenza (HPAI) H5N1 and its control measures on the socio-economic situation of duck producers, and on the epidemiology and ecology of the disease in the region. The number of poultry, especially scavenging ducks, has substantially decreased since the disease broke out in 2003. Ducks have been identified as carriers and conveyers of the HPAI H5N1 virus. The virus originated in wild ducks, increased in virulence and developed into a highly pathogenic strain in domestic ducks. Ducklings hatched, bred and distributed without control and vaccination are a potentially serious risk. In spite of the current risks and problems of raising ducks, only around 20 percent of duck producers have chosen not to restock, or have gone over to rearing other animal species instead. A number of recommendations are suggested, aimed at reducing the risks of future outbreaks and the potential consequences of the disease.

## **1. INTRODUCTION**

Duck production systems have developed in Viet Nam over a long period of time and play an important role in providing income for small farmers, and meat and eggs for the human population (Men and Su, 1991). A total of 219.9 million head of poultry were raised in Viet Nam in 2005, of which around 60 million (27.3 percent of the total) were ducks (General Statistics Office, 2006). Duck production is concentrated in the Mekong Delta, which accounted for 29 percent of the total number of ducks in Viet Nam. Ducks account for 55.7 percent of the poultry in the Delta. In contrast to industrialized countries, duck egg and meat consumption is still expanding in Viet Nam, providing an important source of high-protein food for people in both urban and rural areas, especially poor farmers in the remote regions (Men *et al.*, 2002a).

In recent years, poultry producers have been badly affected by highly pathogenic avian influenza (HPAI) epidemics. A total of 51 million poultry (mainly ducks and chickens) were killed by the disease or culled in the epidemic areas between December 2003 and December 2005. After one year of respite the virus has re-emerged, and recent (late 2006 and early 2007) outbreaks have killed tens of thousands of poultry, in particular scavenging ducks raised in the rural areas of the Mekong Delta.

Several studies on the socio-economic impact, epidemiology and ecology of HPAI have concluded that ducks are silent conveyers of H5N1 (Hulse-Post *et al.*, 2005; Munster *et al.*, 2005; Tracey *et al.*, 2004). The virus infects ducks without producing any symptoms in them. This means that ducks are a serious risk factor in the spread of the disease.

The paper aims to provide a better understanding of how duck production systems in the Mekong Delta operate, highlighting how the virus can spread in practice and outlining possible effects. Recommendations for changing or improving the duck production systems in the region are suggested.

## 2. DUCK PRODUCTION SYSTEMS IN THE MEKONG DELTA

Rice is traditionally the most important staple food crop in Viet Nam and is still the main source of energy and protein in the diets of the Vietnamese people. The Mekong Delta, the southernmost region of the country, is the rice bowl of Viet Nam, with 4 million hectares of land used for cultivating rice. In 2005, Viet Nam produced around 35 million tonnes of rice, of which 19.2 million tonnes were produced in the Mekong Delta (53.7 percent of the total) (Statistical Office of Can Tho City, 2006).

The Animal Production Department of the Ministry of Agriculture and Rural Development reported in 2006 that there were around 8 million households raising poultry in the country, of which 2 million were involved in duck production, mainly raised in scavenging systems, and particularly focused in the Mekong Delta (APD, 2006).

### Free-grazing scavenging systems

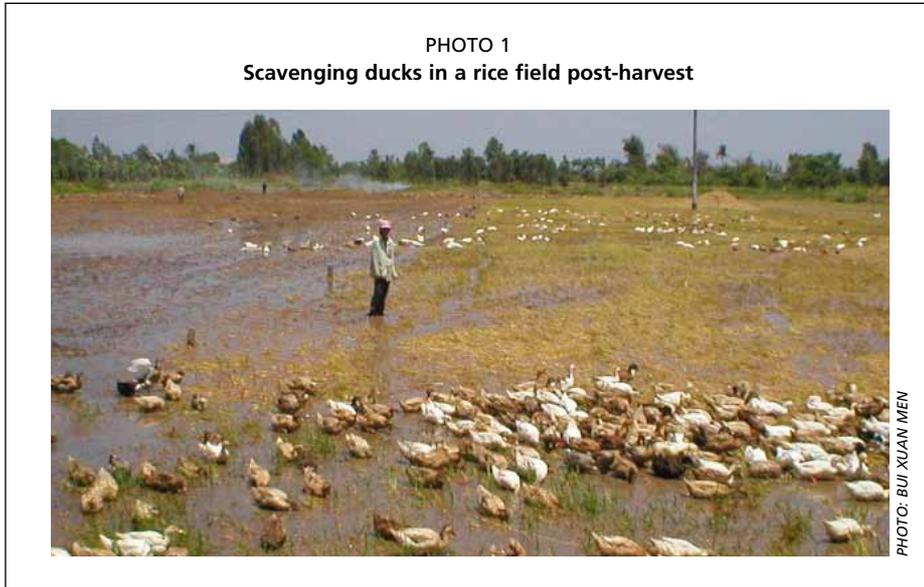
#### *Origins and development of the systems*

In recent years, farmers have been encouraged to increase rice production for both national consumption and export. Various traditional integrated systems for raising ducks exist, of which the simple rice–duck system is still very common in the Mekong Delta. In this system, ducks forage in the growing rice fields until the rice flowering phase. As the ducks control insect pests and weeds, and excrete manure, rice yields are substantially unchanged, and the need for chemical fertilizers and pesticides is reduced or even eliminated. Damage by insect and golden-snail pests is normally a serious problem for the young rice plants. In the traditional duck scavenging system, farmers also commonly release 200–400 ducklings or up to 3 000 laying ducks in the fields after the harvest, to scavenge for leftover rice, insects, snails and weeds (Photo1).

In selected provinces in the Mekong Delta, during early January 2007 when this survey was carried out, only around 10 percent of duck producers kept scavenging ducks, but these accounted for 73 percent of the total number of ducks raised (Statistical Offices of Can Tho and An Giang Provinces, 2006); it is estimated that laying ducks accounted for over 80 percent of the total number of free-grazing ducks in the Delta.

#### *Scavenging duck breeds and breeding systems*

The most important breeds raised in this system are local laying ducks, known as Tau ducks, which have been developed and raised in the country for a long time. The second most numerous breeds are exotics, such as Khaki Campbell and Chinese laying ducks, along



with undefined cross-breeds between the two. The numbers of scavenging ducks raised in the Mekong Delta peaked in 2003, at an estimated 18.6 million head. In 2006, there were around 17.9 million.

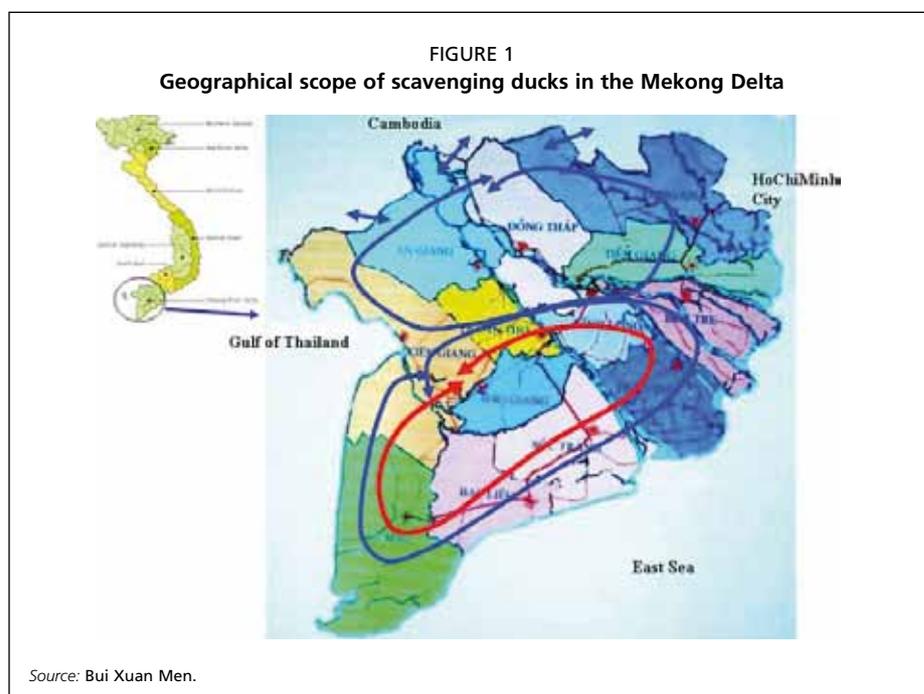
At present, duck breeds and strains are developed in the Mekong Delta by breeders who have long experience of producing ducklings to meet local marketing requirements, but without using specific techniques for planned breeding and control of duckling quality. Applying their traditional experience and knowledge, producers use simple hatcheries to incubate duck eggs in the rural areas, with up to a million eggs hatched annually per hatchery.

However, free incubation of duck eggs without any veterinary inspection or vaccination of ducklings intended for scavenging is a serious risk factor for the spread of the HPAI virus. The outbreaks that marked the re-emergence of the disease in December 2006 and January 2007 originated mainly from scavenging duck flocks that had not been inspected and vaccinated against the virus (Binh, 2007). Incubation of duck eggs in the remote rural areas is a matter of tradition, and has continued uncontrollably in contravention of government restocking regulations implemented to prevent the virus from spreading.

There are three state duck breeding farms in Viet Nam, but none of these is situated in the Mekong Delta, even though 41 percent of the duck population in 2003 was concentrated in the region (APD, 2006).

#### ***Geographical scope and risks associated with scavenging ducks***

The geographical focus of the scavenging system is around the villages where the duck producers live; the ducks are released into the fields when the irrigated rice is harvested. However, when natural feed resources and leftover rice are exhausted in a particular location, the flocks are moved to other districts, or even to other provinces, in the Delta where they again scavenge in the fields feed. During scavenging periods, depending on the avail-



ability of feed in the post-harvest rice fields, the duck flocks can be driven long distances within and between the 13 provinces of the region, and from An Giang, Dong Thap and Long An provinces across the border into Cambodia.

Several varieties of rice are cultivated in the Delta – increasingly high-yielding, fast-maturing varieties – which are cultivated in different ecological areas. As well as being influenced by variety, the time of the harvest depends on natural variables such as weather, altitude, rainfall, soil type, water sources and irrigation. The duck producers use their experience and their networks and contacts to plan the movements of their flocks for optimal exploitation of the feed resources. Flock movements between and within provinces normally take place between November and March, with maximum activity in December. It is no coincidence, therefore, that the recent HPAI outbreaks re-emerged in mid-December, 2006, beginning in Bac Lieu province, where the early rice harvest attracts large numbers of scavenging duck flocks from nearby provinces. Continuing HPAI outbreaks followed in the neighbouring provinces of Ca Mau, Hau Giang and Kien Giang, and then in Soc Trang, Vinh Long, Tra Vinh and Can Tho provinces. Figure 1 shows the geographical range and movements of scavenging ducks (blue arrows); the red circle (inside the lower blue circle) shows where the HPAI virus was spread by scavenging ducks in early 2007.

After the 2003 HPAI epidemic, the number of the ducks raised in the free-grazing system declined dramatically (Statistical office of Can Tho, 2005) – 26.7 percent and 29.9 percent of the 2003 total in 2004 and 2005, respectively. However, in 2006, in several provinces of the Delta the number of scavenging ducks increased, in flocks that had not been inspected by veterinary officers, with producers in most cases illegally hatching ducklings for themselves (personal observation).

**Constraints and problems of the free grazing system**

The main constraints affecting the free-grazing system today include the fact that the time available for the ducks to scavenge the fields between harvests has decreased, or been limited, because the land needs to be prepared as quickly as possible for new early-maturing, high-yielding rice varieties. The cost of transporting ducks from province to province for scavenging has increased because of the high price of petrol and diesel. An additional factor has been the movement restrictions imposed by local governments as measures to control HPAI, which have tightened restrictions on duck flocks coming in from other provinces.

As the flocks are moved, the ducks may come into contact with high pathogen concentrations associated with other flocks or infected wild birds; the virus can also survive and spread in the soil and water that the moving flocks cross. Moreover, the time when the ducks are moved usually coincides with the winter–spring rice season when the weather is rather extreme, with high temperatures (32–35 °C) in the day and low temperatures (19–21 °C) at night. These temperature fluctuations negatively affect the health of the ducks. Furthermore, because it is the dry season, the rice fields have very low water levels, so the duck flocks tend to concentrate in high densities to drink and swim in the shallow water of ditches and canals.

Common diseases such as pasteurellosis, diarrhoea and coccidiosis spread in the polluted environment where large numbers of ducks gather. The ducks are more easily infected at this time due to their weakened immune system and because of fluctuating feed supply and the presence of pesticide residues in the soils which decrease the health of the birds. These flocks of infected ducks are, thus, especially vulnerable, as their resistance is weakened; the pathogens they carry will increase in virulence and induce disease symptoms and possibly kill them.

PHOTO 2  
High concentrations of ducks in shallow water



PHOTO: BUI XUAN MEN

In contrast to the spring–winter season, scavenging ducks raised in the summer–autumn season are at lower risk of contracting the HPAI virus, because from April to July the weather is cooler and temperatures are more stable (average temperature around 28 °C); moreover, at the beginning of the rainy season in the Delta, water levels in the rice fields are higher, so there is less risk of scavenging duck flocks concentrating in high densities and transferring the HPAI virus to each other.

Based on the evidence presented above, the best management practice to reduce the risk of HPAI infection would be to limit the movement of the flocks, so that producers could control the risks of exposure faced by their ducks. However, this also implies that producers must make alternative arrangements to supply the feed needed to meet the nutrient requirements of their birds. Moreover, ducklings must be produced from breeding flocks with a high health status, and must be prevented from coming into contact with other diseases, based on the recommendations of veterinary officials in the region.

Output of both duck meat and eggs was substantially reduced in 2004 and 2005, although consumer demand has remained at a fairly high level. As a result, market prices for these products have remained high, on occasions up to twice as high as in 2003, especially after periods without any outbreaks of HPAI. However, economic losses for the duck producers have been substantial, and consumers have also been affected by the high prices. Because many consumers are still concerned about the risk of contracting HPAI from poultry products, the demand for duck products, particularly in traditional markets in the urban areas, is still rather limited compared to what it was before HPAI first occurred.

#### ***Advantages of free-grazing systems for ducks***

In spite of the constraints, the potential of the free-grazing systems for ducks is still considerable, and there are few viable alternatives available for poor flock owners. The investments needed to raise scavenging ducks are still low compared to those required for other systems of meat or egg production. The raisers only need to brood the ducklings for around three weeks utilizing feeds prepared from local sources, such as broken rice and natural feeds collected or bought in local markets. Some producers purchase commercial feeds for their ducklings in the first two weeks of life, but these are then totally replaced by local feeds. After the brooding period, the ducklings will be driven into the rice fields to scavenging for feed. In the scavenging duck system the producers save money as they do not need to pay for the leftover rice or natural feeds obtained from the fields; they may have to rent the rice fields, but the sums involved are usually small.

#### ***Social and economic impact of changes to the traditional system***

Raising scavenging ducks in the rice fields benefits both duck producers and rice farmers. An important question is, therefore, whether restocking should be banned. The answer is that this is not possible in practice, because the livelihoods of so many producers depend on traditional duck production, with techniques and knowledge passed from generation to generation. Most of these producers would be unable to find alternative employment in the rural areas, as they are generally poor, uneducated and unskilled.

Almost all duck products marketed in both urban and rural areas of the Delta are sold and consumed fresh, and as they are usually sold without inspection or packaging, are

less safe for consumers than the processed products sold in the supermarkets. It would be difficult to change these old habits and traditions in a short period of time, particularly as consumers in the rural areas of the Delta have lower incomes than people in the cities, and would not accept processed duck products with higher prices. A further advantage of raising scavenging ducks is that they are well suited for home consumption and can easily be slaughtered on-farm.

In contrast to backyard duck producers, who are mainly women, free-grazing duck flocks that scavenge in the rice fields are almost all owned by men, although sometimes women follow their husbands with their children in small boats. It is common for poor families without land for rice cultivation and without duck flocks of their own, to work as labourers for wealthier flock owners; these families are thus also dependent on ducks for their livelihoods.

Before and during rice harvesting times, ducks keepers must find and pay rent for rice fields for their scavenging ducks, generally paying US\$12–15 per hectare during harvesting and the period during which the fields are prepared for the next crop. When available feeds are exhausted, the flock owners move their ducks to other districts and provinces, sometimes renting specially constructed boats with several floors for transport. These movements often take place at night, partly because it is cooler, but also in order to avoid veterinary inspections; this is obviously a serious risk factor if the ducks are carrying the HPAI virus.

When scavenging in the rice fields, the ducks can often find sufficient feed to meet production requirements without the need for supplements, except when layer ducks are in peak egg production or when the weather conditions are severe. At these times, producers need to supply supplementary feeds. Post-harvest, the ducks can pick up leftover rice as a carbohydrate source of energy; water plants, insects and snails are good sources of protein, minerals and vitamins. Additionally, ducks are different from other poultry in that they can scavenge for feed at night. Ducks are excellent gleaners of the rice fields, and eliminate the need for herbicides and insecticides (Men *et al.*, 2002b). Eliminating insect pests also reduces the risk of some diseases of rice plants; hoppers, for example, are vectors of rice viral diseases (Reissig, 1985). Rice farmers in the Delta complain that the decline in the number of ducks in the rice fields has resulted in increased damage from golden snails and increased occurrence of viral diseases in the spring–winter crop in 2006, and has therefore lowered net incomes.

### ***Chicken production as an alternative to rearing ducks?***

People have generally not shifted to eating chicken instead of duck meat, because local chickens, with their low performance with respect to both meat and eggs, are more expensive than ducks, and availability is lower than that of duck products. At present, commercial (industrial) chicken meat is cheaper than that from local breeds and production systems, but consumers prefer local products to commercial ones because of the superior taste; changing the eating habits of local consumers will not be easy.

During 2005 and 2006, it was evident that producers in the Delta were losing money when they raised commercial chickens for local markets, because the product prices were too low compared to those of the local breeds. In any case, going over to raising commercial chickens is not easy for duck farmers, because of the large investments required to

obtain exotic chicks, housing, commercial feeds, etc.; in addition the duck farmers lack the relevant marketing knowledge. Prices of commercial feeds in Viet Nam, particularly in the Delta, are rather high, because they are dependent on the prices of ingredients imported from other parts of the world – especially in the case of protein feeds, over 50 percent of which are imported.

#### ***Ducks reared in confinement?***

Another alternative to existing scavenging systems is total confinement. This is certainly possible, but probably of limited interest because of the high and fluctuating price of the commercial duck feeds that would be needed, mainly because many of the ingredients are imported. Another problem is that the feed-conversion efficiency of ducks is usually lower than that of chickens, because of the higher proportion of fat deposited; so duck meat is more expensive to produce. Nonetheless, duck meat and eggs from ducks raised in confinement can be suitable for urban consumers, and for restaurants specializing in duck meat.

Producers can collect naturally occurring feeds, such as water plants and snails, as supplements, but only in small quantities, as collection is time and labour consuming. Most of the feed must, therefore, be purchased, unless producers only keep a small number of birds.

Muscovy ducks are suitable for raising in confinement systems, but one problem is that reproductive efficiency is low. The total number of Muscovy ducks raised in Viet Nam in 2005 was around 7–8 million (APD, 2006), and in several provinces in the Delta only between 1.3 – 5.5 percent of the total poultry raised were Muscovies (Statistical Office of Can Tho City, 2006; Statistical Office of An Giang Province, 2006). Another problem is that there is no vaccine against the HPAI virus available for Muscovy ducks, and so they are considered to be high risk and uncontrolled carriers of H5N1.

#### ***Effects of avian influenza on the marketing of duck eggs***

The marketing and consumption of duck meat and eggs still takes place in line with tradition, especially by medium and low-income people, who often consume duck products directly, as they are cheaper than other poultry products. Duck eggs are still consumed fresh, or partly incubated, both in local and city markets. Before the first HPAI epidemics, salted duck eggs and feathers were exported to China (APD, 2006), but these exports have now ceased, and most of the duck eggs now produced are consumed throughout the year in the Delta or in cities such as Ho Chi Minh and Vung Tau City. Consumption is higher than that of eggs from other poultry species. After the HPAI epidemics of 2004 and 2005, and up to the present time, table duck eggs produced in the Mekong Delta for the regional markets are mainly from scavenging layers, with average distances from production to market of 2–5 km for local markets, and up to 300 km for big city markets (e.g. in Ho Chi Minh and Vung Tau cities). At present, in contrast to the European market, duck eggs are still sold in supermarkets in the cities of the region. Even though the number of consumers purchasing duck eggs has fallen due to concerns over avian influenza, locally produced duck eggs are still the main eggs sold in the Delta; in 2005, for example, they accounted for 93 percent of all poultry eggs sold in Can Tho City (Statistical Office, 2006).

***Epidemiology and ecology of avian influenza in the Mekong Delta***

The epidemiology and ecology of the disease has shown that ducks are major conveyers of the H5N1 virus. APD (2006) reports that the virus increased in virulence in wild flocks and developed into a highly pathogenic strain in domestic ducks. During the first and second HPAI epidemics, the numbers of ducks affected by the disease and the numbers that died were lower than the numbers of chickens. However, in the third and fourth outbreaks, especially when the disease re-emerged in early 2007, the rates of infection and the death were higher in scavenging ducks than in other classes of poultry raised in the region. The APD (2006) report concluded that the free-grazing duck system is the most important cause of the spread of HPAI in the Mekong Delta. In fact, the HPAI epidemics in the region between early 2004 and early 2007 originated mainly from the free-grazing duck flocks moving between the provinces of the region. These movements make it very difficult, if not impossible, for the flock owners to prevent their birds from becoming infected, and then infecting other poultry that they come into contact with.

***Integration of scavenging and confinement systems***

Traditional systems for raising ducks – particularly layer ducks – in partial confinement also exist. This occurs, for example, for the production of table eggs in coastal areas, where shellfish gathered from the seashore or the canals are utilized as mineral and protein sources. Kien Giang is a province where the laying ducks are mainly raised in this system, combined with free-grazing during the period following the rice harvest. In each farm, 500–3 000 laying ducks are raised in confinement on the banks of canals, with access to water. Feeds offered to the layer ducks include rice grains and shellfish gathered from the beach or canals; supplementary commercial feed is provided, especially to the high-producing laying flocks. The laying ducks are confined during this time, without access to scavenging areas on the rice fields, but post-harvest the ducks are driven into the fields

PHOTO 3  
Laying ducks by a canal near a coastal area in the Mekong Delta, 2007



to look for feed. During the scavenging time, feed supplements are not needed, so the producers can save on feeding costs.

Table duck eggs produced from scavenging flocks have dark orange yolks, as a result of the naturally occurring carotenoids in the scavenged feed, and are more attractive to consumers than the commercial eggs from confined flocks. Chinese producers often mix a synthetic dye called Sudan-4 into the diets of their laying ducks to produce deeper orange yolk. However, this practice is potentially dangerous for consumers, and Sudan-4 is banned in Viet Nam.

### **Confinement system**

In the Mekong Delta, this system is common for exotic breeding ducks and for fattening meat-type ducks during the dry season. Exotic and cross-bred ducks for meat are usually fattened in confinement, with flocks of 200–400 ducklings kept in confinement when the fields are dry. This system, however, cannot compete economically with the scavenging system, although around two weeks before slaughter scavenging meat ducks are commonly collected and confined for finishing. Breeding ducks (CV. Super M) imported from the United Kingdom and their cross-breeds are raised in confinement and integrated with fish production – commonly 1 000–4 000 breeders on each farm. Often, producers combine traditional techniques and incubators for hatching the ducklings. The system requires high initial investments and good knowledge for marketing the ducklings. The system is safe for breeders because producers can control and vaccinate against diseases such as AI, duck plague, and pasteurellosis that commonly occur in the Delta. During the last decade, this system has developed rather slowly (APD, 2006).

### **Integrated poultry-based systems**

Mixed flocks of 5–50 common and Muscovy Ducks, kept separately or together with chickens, are commonly raised in households in the rural areas for meat or eggs for home

PHOTO 4  
Fattening ducks in confinement



PHOTO 5  
Breeders for meat in confinement



PHOTO: BUI XUAN MEN

consumption or cash income. Diets are supplemented with various local feeds, such as water plants, kitchen waste and whole rice or rice by-products. This form of duck production makes good use of available labour in the rural areas and increases the income of poor farmers, especially the landless. The number of ducks raised in this system accounts for around 14 percent of the total in the Mekong Delta, but as many as 86 percent of the total number of household-scale producers. The breeds can be cross-breeds for meat (Nong Nghiep Ducks), local ducks (Tau, Ta) or Muscovy ducks. The main features of the system are the use of backyards and gardens, nearby ditches and ponds, and local wastes and agricultural by-products. The ducks raised in this system have low to medium performance, with high levels of associated risks. Products from the system are convenient for home consumption, or are sold locally and provide small amounts of cash income. The APD report (2006) states that the system should continue in the highland areas of the country.

Efforts to maximize the productivity of crop–animal systems need to consider the natural resource base, as well as the socio-economic environment. The objectives in the development of sustainable crop–animal systems are to increase efficiency in the use of natural resources using environmentally sound, low-input farming systems to promote the alleviation of rural poverty, the attainment of food security and to improve economic, ecological and sociological conditions. Despite strenuous efforts, the Mekong Delta still has a long way to go to achieve prosperity. Although a large part of the land is suitable for rice, various rice-based farming systems involving aquaculture, animals, cash crops and fruit trees have proven to be more profitable than rice alone (Xuan, 1999). The Mekong Delta is a lowland area, so as well as rice, pigs and poultry, particularly ducks, are commonly reared in smallholdings.

In common with producers in other Asian countries with experience of raising ducks, the farmers in Viet Nam have integrated ducks in many different combinations with crops. The rice–fish–ducks–pigs system, for example, is still very common (Thien *et al.*, 1999). In

PHOTO 6  
Mixing ducks and Muscovies in a backyard system



this system, poultry or pig wastes, either fresh or after processing, are used to supply nutrients for fish or shrimps in both fresh- and brackish-water aquaculture.

The systems of integration can increase the overall production intensity and economize on land, labour and water requirements for both poultry and fish. The addition of soft, fresh duck droppings in the duck–fish system is known as the carbon-manuring technique, and is a source of nutrients for the fish and zooplankton which in turn are consumed by fish and ducks. The duck–fish system is particularly beneficial (Kiss *et al.*, 1998) because the fish ponds provide the ducks with a good environment that is usually free of parasites and disease (Avault, 1997), and access to water improves the ducks' feather quality (Edwards, 1986). The natural pond feeds are rich in protein, and the digestible protein content in supplementary feeds can be reduced by 3–4 percent compared to feeds for pen-reared ducks.

In the Mekong Delta, the integrated duck–fish system is used by producers who have good knowledge of raising and marketing ducks. The ducks raised in the system are breeders for meat-type ducks or egg layers. To produce meat-type ducks the raisers use cross-breeds – female Cherry Valley ducks crossed with male Super Meat ducks.

### 3. ASSESSMENT

The HPAI H5N1 outbreaks that recently re-emerged all originated from scavenging duck flocks that had been driven to many different locations in the Delta. In spite of government regulations aiming to temporarily prevent restocking, many small-scale producers have continued breeding and hatching ducklings. Because duck production, especially based on scavenging, has traditionally been the basis of the livelihoods of smallholder duck producers in the Delta, the majority are unwilling to abandon the scavenging system, despite the government ban on hatching birds. Many ducks have been hatched illegally without vaccination against H5N1 and without inspection by local veterinary officers. Many producers

and sellers are still subject to a high risk of the HPAI H5N1 virus, but continue marketing live ducks and fresh eggs without cooperation with appropriate authorities and without changing the techniques for raising ducks. This is in spite of the fact that if discovered, illegally restocked ducks can be slaughtered without compensation. At present, only around 20 percent of duck producers have chosen not to restock or have gone over to raising other animal species.

#### 4. RECOMMENDATIONS

During the HPAI epidemic that re-emerged in early 2007, the Prime Minister of Viet Nam emphasized the importance for poultry producers of avoiding the disease and, if possible, continuing production, because traditional rice, pig and poultry production has been the basis of the livelihoods of the majority of small farmers in the Delta. Moreover, according to the recent regulation of the MARD, breeders of water fowl have permission to restock from the first of March 2007. To reduce or eliminate the risk of HPAI H5N1 affecting the poultry population, especially ducks, the following recommendations can be made for producers and local governments to follow:

- (1) Farmers should raise only one species of poultry to prevent the transfer of HPAI H5N1 between species.
- (2) Poultry producers must register with the appropriate authorities in the villages the species and numbers of poultry, especially ducks, that they raise, and undertake to follow the regulations of local officers concerning H5N1.
- (3) Limitation should be imposed on the movements of scavenging ducks, particularly in the early dry season, along with elimination of all unregistered duck flocks, without compensation.
- (4) All ducks must be fully vaccinated against H5N1, and the vaccination recorded on papers that flock owners must be able to show to the local veterinary office when moving the ducks to a new district or province.
- (5) Poultry products must be processed and originate only from flocks that have been vaccinated and inspected by the appropriate offices.
- (6) Poultry producers need to be carefully trained in techniques for preventing HPAI H5N1 in their ducks and preventing its transfer to other animal species and humans.
- (7) Duck breeding farms should be established in the Mekong Delta to produce disease-free ducklings, initially at subsidized prices, for sale to the producers.
- (8) Efforts should be made to replace the free-grazing system by systems in which it is possible to control, or at least reduce, the risks of HPAI outbreaks, such as the duck–fish system or total confinement, using local feeds where possible to reduce feed costs.
- (9) Small slaughterhouses should be constructed for processing poultry in areas with intensive duck and chicken production, in order to reduce the number of birds sold live.

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