

# Relation between the poultry production systems and the Highly Pathogenic Avian Influenza (HPAI) in Vietnam

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## Summary

In 2003, the poultry population was about 254.6 millions heads. The poultry herd is mainly concentrated in the Red River Delta and in the Mekong Delta with about 50% of poultry population. The Highly Pathogenic Avian Influenza caused by H5N1 virus was removed in almost of provinces in Vietnam from 2004 until now but millions of birds were culled to reach this situation and it had large economical and sociological impacts. A question emerge: how can we limit this epidemic? A research on the relation between poultry production systems and the HPAI had been carried out in two provinces: Ha Tay (Red River Delta) and Long An (Mekong Delta) from March to August 2007. The results showed that there are three principal poultry production systems which are commercial poultry production systems with good breeding facilities (system 1); commercial poultry production systems without good breeding facilities (system 2), and small scale poultry production system (system 3). The number of birds reared in the commercial systems was more important than that of the small system, conversely the number of species rising in the system 2 and 3 was more important than in the system 1. The proportion of households having poultry herd with HPAI in the period of 2003-2005 in the system 2 and 3 were more important than that of the system 1 (21-59% compare with 33-36%). The study had also showed that all poultry belonging to the system 1 were vaccinated; when the proportion of vaccinated animals were about 87-90% for the system 2, and 58% for the system 3.

**Key words:** poultry production systems, avian influenza, poultry production, transhumant ducks, vaccination

## 1. INTRODUCTION

In 2003, the quantity of poultry flock in Vietnam has reached about 254.6 millions of heads (*General Statistics Office, 2006*), and the household income from poultry breeding occupied about 19% of the total income. The Red River delta and Mekong delta are the two regions having the most quantity of poultry flock in the whole country, occupied about 50% of total flock. However, the *highly pathogenic avian influenza* caused by H5N1 virus appeared in the beginning of 2004 and the poultry flock was reduced about 15% compared with 2003. In this way, the Southern provinces reduced the herd about 25.7% and the Northern provinces reduced about 6.4%, with millions birds culled. This had large economical and sociological impacts (*M. Peyre et al., 2007*). An estimation of the loss caused by H5N1 virus was about 3,000 billions of Vietnam donges (*Department of livestock production, 2005*). The risk of avian influenza on the poultry flock was large, particularly on the backyard poultry production systems (*FAO, 2006*). In 2006, the quantity of poultry flock of the whole country was only about 215 millions of heads (*GSO, 2006*), and the annual rate of growth of the poultry flock was reduced from 14% to 16% during the period from 2004 to 2006.

The research on the poultry production systems according to approaching methods of system is yet limited, particularly the relation between the poultry production systems with the epidemic diseases in Vietnam. Thus, this research aim to identify the poultry production systems with the major risk of epidemic disease caused by H5N1 virus, the response of breeders when having the epidemic disease by the approaching method of system so that maybe looking for the measures to prevention of avian influenza on the poultry flock.

## 2. RAW MATERIALS AND METHODOLOGY OF RESEARCH

Household farms having poultry production at different scales from Ha Tay province in the Red River delta and Long An province in Mekong delta which represents the two main poultry production zones in the whole country, were selecting for this research. The duck breeding is strongly developed at Long An and the chicken breeding is strongly developed in Ha Tay province. On each province, we select 3 districts and on each district we select from 2 to 3 communes according to the ecological conditions of the regions. This research is leaded from March to August, 2007.

The research began by the collection of official data concerning the poultry production from the reports of the Department of livestock production, the FAO, the GSO, the Services of veterinary, the stations of veterinary and communes of this research.

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Then we identify the number of poultry production systems in research regions and we use the stratified sampling method to carry out a choice in poultry household farms used for the investigation. 127 poultry household farms were finely investigated by the question of closed structure. These retail researches allow characterizing the poultry production systems, the scale of breeding, the source of day old chick supply, the alimentary source and the relation between these poultry production systems with the avian influenza caused by H5N1 virus.

### 3. RESULTS AND DISCUSSION

#### 3.1. Typology of poultry production systems

The scale of poultry breeding and the type of poultry races are really diversified in each ecological region in the whole of Ha Tay and Long An provinces. Investigation results allow us to characterized three main poultry production systems according to the type of production and the level of risk with epidemic disease which are presented in the table 1.

Table 1: Typology of the poultry production systems in Ha Tay and Long An provinces

Poultry production systems	Under-systems	Number of households	Structure (%)
<b>Commercial breeding with good facilities (system 1)</b>	<i>Hen layers</i>	14	11
	<i>Chicken production</i>	9	7
<b>Commercial breeding without good facilities (system 2)</b>	<i>Duck, Muscovy production on fields and gardens</i>	23	18
	<i>Mixed poultry production</i>	19	15
	<i>Duck transhumant production</i>	29	23
<b>Backyard poultry breeding system (system 3)</b>		33	26
<b>Total</b>		<b>127</b>	<b>100</b>

Source: The result of research, 2007

+ **System 1:** commercial poultry production with good facilities

This group keeps regularly chicken layers or meat chickens in large scale using industrial food and poultry are confined in good facilities or they can have good facilities and a good surface in fields and gardens. This system has two under-systems below:

+ **Chicken layers:** with breeds ISA White, ISA Brown, Luong Phuong, Ai Cap,... bought from enterprises, centers of poultry research and good facilities.

+ **Meat chickens in industrial or semi-industrial systems:** with breeds ISA White, Sasso, AA, Kabir, Luong Phuong... chickens are confined or both confined and grazed on personal fields or gardens, many packs per year with industrial foods.

+ **System 2:** commercial poultry production without good facilities

This entire group keeps integrating many chickens and ducks. The poultry are freely grazed in a large surface of personal fields and gardens or transhumant on rice fields. The hen-houses are limited or inexistent, especially transhumant ducks. This system has three under-systems below:

+ **Duck, Muscovy on personal fields and gardens:** this group is popular in Ha Tay province in communes with agricultural production transformations from rice crop to aquatic farms integrated with duck production. Duck super layers are mainly kept and integrated Muscovy production or super meat ducks using industrial foods.

+ **Mixed poultry production:** find in the two provinces. Super meat duck layers, Muscovy layers are mainly kept. Industrial meat poultries are also kept and different breeds are represented like Luong Phuong, local chickens as *Mia, Tau dat*, local ducks, Muscovy, super meat ducks.

+ **Duck transhumant production system:** ducks are grazed in rice fields from different owners in different regions and provinces or between ecological regions for taking the paddy on rice fields. Duck layers mainly kept are Khaki Campelle, local breeds (*Tau vang, Hoa Lang, Co*) and concerning meat duck breeds we find *Bau Canh Trang, Hoa Lang and Co*.

+ **System 3:** backyard poultry production system

General characteristics of this farming system are small investment; freely ranged poultry and farmers produces themselves old day chicks and its mostly local breeds. According to the Department of

livestock production (2005), the country count about 90% of household farms from this system which producing about 65% of the entire poultry production.

### **3.2. Technical characteristics of poultry production systems**

The head of farm households in commercial poultry production systems has a large experience in the domain of poultry production and the average breeding experiences is from 11 to 16 years. The age average of household heads is from 40 to 48 years old. In the mean, each household has 2 main active farmers for only keeping the poultry and the time according to this activity is from 3 to 7 hours per day per one labour. This source of worker is especially a familial couple, but they can employ from 2 to 5 labours in additional in duck transhumant farms in Long An during moving periods on rice fields and the time for poultry keeping increase from 10 to 12 hours per day.

However, in the backyard poultry production system, system 3, head of the farm is more than 55 years old and in some young households, they are 30 years old. A part of products is directly consumed in the family during the Tet festival or different celebrations and one important part of poultry are sold giving some monetary income.

System 1, the hen layers and meat chickens are kept in the industrial mode with a high bio-security level and birds are all vaccinated against different chicken disease. The farm households keep usually with a twofold purpose of egg and meat with a short duration. According to the Department of livestock production, this poultry production system is yet limited and outputs are still low.

Ducks, Muscovies are commonly kept in the system 2 with bio-security levels from low to medium. Birds are grazed on rice fields or in fields, gardens and fish ponds but they are not isolated from others domestic animals. The bred duration is short with meat birds such as French Muscovy, super meat ducks and industrial meat chickens or industrial bird layers but local breeds, super egg ducks, Khaki Campelle ducks are usually bred some years.

There are different types of birds in small scale farms in the system 3 specialy in Long An province, while there is only one chicken type per farm in Ha Tay province. This poultry production system is a low bio-security level. The day old chicks are bought in local farms or in the same farm. The bred duration is long and the food came from household food by-products of the farm.

### **3.3. Quantity and poultry flock structure in poultry production systems**

According to result of this research on two provinces, there are 53% of household farms with chickens and ducks on the same surface, whose 80% of farm households keep the chickens and 74% of farm households keep ducks or Muscovy (*T. Phan Dang et al., 2007*). In the under-system of hen layers production, household farms keeping only hen layers occupied 93%. In the under-system of meat chicken production, there are 92% of household farms keeping only meat chickens. There are from 52% to 100% of household farms keeping entire chickens and ducks in the system 2. In the backyard poultry production system, there are 55% of household farms keeping entire the chickens and ducks. Nevertheless, there are 94% of household farms keeping chickens and 61% of household farms keeping ducks or Muscovies.

The scale of reproductive poultry breeding farm is around 1.204 hen layers in the system 1, from 400 to 1.500 duck layers in the system 2 and only 11 hen layers in the system 3. The scale of reproductive duck breeding farm is less than 600 heads per household farms in Ha Tay province, while reproductive duck transhumant breeding flocks in Long An province are more than 1.000 heads per household farms. The meat chicken production in commercial scale is average from 1.006 to 1.350 heads per farm. In the backyard production heads per farm is less than 100. Concerning the French Muscovy farms concentrates in Ha Tay province the average scale is from 325 to 1.540 heads per farm household. The commercial duck production is average from 1.045 to 1.790 heads per household farms, particularly to 10.000 heads per farm in Long An province.

### **3.4. Avian influenza epidemic disease and the peasant response.**

#### **3.4.1 Prevention of diseases by vaccines for the poultry flock**

There is 100% of poultry breeders in the system 1 vaccinated against some birds diseases such as Newcastle, Gumboro and it include the vaccination campaign against avian influenza. Household farm heads and breeders vaccinate initiatively poultry flocks at the reasonable time when the stress of the poultry has decreased and when contact with outsiders is ended.

In the systems 2 and 3 the poultry production systems are keeping several breeds in the same farm. But most of them don't vaccinate even ducks or Muscovies during the layer period or before one month. However the feeding cycle of meat ducks is usually short term, only about 60 days. Besides, system 3 present few household farms vaccinating against diseases, less than 20%. The ratio of preventive vaccination against H5N1 virus occupied about 90% in system 2 and only about 58% in system 3.

During the period of the research, the Government has organized two vaccination campaigns against H5N1 virus, one per year, but this activity is still inflexible, thus a large of poultry flock aren't still vaccinated. However the Long An province has organized complementary vaccination campaigns aims to give away the avian influenza risk in the province. But complementary campaigns are usually applied to duck layer flocks, particularly duck transhumant flocks. However, there are only from 11% to 24% of household farms in the system 2 who has vaccinated duck layer flocks.

### ***3.4.2 Avian influenza epidemic disease***

There is from 30% to 60% of household farms in different systems contaminated by avian influenza in the period of 2003-2005. Bird flocks are mostly infected by H5N1 virus before the first campaign; however there is many poultry who is even infected by H5N1 virus after vaccination campaigns against avian influenza, some household farms were infected by H5N1 virus 2 to 3 times. From 10% to 30% of household farms have lost a lot of poultry but they don't know the cause.

Farming systems 2 and 3 are the most frequently infected the diseases caused by the intensive farming systems, not to the free and sanitary duration and the ducks are freely ranged on the fields. After vaccination campaigns aim to fight against avian influenza during the period of 2006 – 2007, there are still from 7% to 18% of household farms in systems 2 and 3 in witch poultry flocks were dead by unknown reason. However, there are 100% of these poultry flocks who haven't ever vaccinated against avian influenza. These poultry flocks are most frequently below the age of one month or it concern young flocks bought from other regions.

The large of household farms keep poultry in good sanitary conditions when they belong to the systems of large scale (occupied from 33% to 57%). There are only from 3% to 12% of household farms in backyard ducks and transhumant poultry farming systems with good sanitary conditions. Therefore the risk of epidemic diseases in the poultry flock is still high in the all two provinces and especially for bird flocks who haven't ever vaccinated against avian influenza or the control policy of epidemic disease is still limited.

### ***3.4.3 Response of peasant to epidemic disease on the poultry flock***

The knowledge of the breeders is still limited in the entire two provinces, particularly in systems 2 and 3. For treating sick poultry flocks, there are from 40% to 65% of household farmers from systems 1 and 2 to buy themselves medicines to treat their birds with a average duration from 3 to 5 days. If the birds don't survive to an illness after this duration, they are quickly sacrificed to intermediary collectors with very bad price (there are only equal from 15% to 25% of the normal price).

The propaganda information by the powerful medium in information for the people has strongly been impact to consumers with the products of poultry while there is information of the epidemic diseases. Before appropriate authorities proclaim avian influenza caused by H5N1 virus, the most of breeders don't know the danger with this epidemic disease. There are from 40% to 60% of household farms who have still killed or got dead animals or sick poultry. But after the propaganda information of the Government, there are from 30% to 40% of farm households have culled all the birds because they can't sell their poultry. However, there are from 5% to 20% of household farms have long kept them poultry with a good isolation and they have got high prices after the end of epidemic disease. In the backyard farming system, the value of poultry flock isn't important, a part of birds is consumed in the family or is sacrificed on the local market when the Government proclaims the epidemic disease (with 42% of household farms having sacrificed and the 52% another were killed). They destroyed only the birds when the local authorities oblige (about 42% of farm households). Therefore, breeder's habitation in commercial farming systems were sacrificed the birds with the bad prices when the authorities proclaim the avian influenza. A part of birds is killed or sacrificed in the backyard farming systems.

## **4. CONCLUSION**

The system 1 has a high bio-security level; there is no contact between birds and other animals in the same household farm. The technical knowledge of the breeders is higher than in other systems. Breeders

vaccinate completely during vaccination campaigns against H5N1 virus. That's why, the risk of epidemic disease happen in the system 1 is limited.

The farming systems 2 and 3 are the systems with the low bio-security level, several birds are kept in the same farm household with a small surface. The raising is very intensive but the technical and epidemic sanitary knowledge of the breeders are still limited. It is a cause of epidemic diseases to the poultry breeding.

The poultry sacrifice to bad prices is still popular when proclaiming the epidemic disease. However, information campaigns of the Government have played an important role for giving limits to the epidemic diseases.

At the time of research, the measure of vaccination against avian influenza caused by H5N1 virus has contributed to prevent with the vaccinated poultry flocks, however the organization of two vaccination campaigns per year isn't still suitable with the very intensive poultry farming systems such as the systems 1 and 2.

### **BIBLIOGRAPHY**

1. Department of livestock production, Ministry of Agriculture and Rural Development. The project of renovation of poultry production systems. Hanoi, 4/2005.
2. F. Dolberg, E. GuEmergency, A. McLeod. Regional Support for Post-Avian Influenza Rehabilitation. TCP/RAS/3010(E). February 2005, FAO.
3. M. Peyre, S. Desvaux, T. Phan Dang, J-F. Renard, T. Vu Dinh, F. Roger. Conceptual Framework for a Cost-benefit Analysis of Avian Influenza Vaccination in Small Scale Production Systems: The Case of Vietnam. OIE/FAO/IZSVe conference on AI vaccination, Verona, 2007.
4. General statistics office of Vietnam. Statistical yearbook of Vietnam. Statistical publishing house, Hanoi, 2006.
5. T. Vu Dinh et al., The relation between poultry production systems and HPAI in Vietnam. The presentation for the Social and Ecological factors in Emerging Infectious Diseases: Toward an Ecosystem Approach to Research and Control of Avian Influenza (H5N1) and Dengue. September 12-13, 2007. Hanoi, Vietnam.
6. T. Phan Dang, S. Desvaux, J-F. Renard, T. Vu Dinh, F. Roger, M. Peyre. Cost-benefit Analysis of Mass Vaccination Campaign against H5N1 in Small Scale Production Systems in Vietnam. The 12th International Conference of AITVM, Montpellier, France, Aug 2007.