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Emergency Regional Support for Post-Avian Influenza Rehabilitation

TCP/RAS/3010(E).

Summary of project results and outcomes

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1. Background.

This regional TCP covered Cambodia, Indonesia, Lao PDR, Thailand and Vietnam. Its main objective was to assist the countries to prepare for a post-avian influenza rehabilitation programme; although – with our present understanding – the challenge has changed to prepare a strategy for poultry production that is not *post*, but *with* Avian Influenza in the short to medium term, at least. The project became operational in April 2004.

The main activities undertaken by the project were socio-economic impact studies in the countries to identify the effect on the poultry producers, especially those most affected and vulnerable and to describe the major poultry production systems as well as to formulate recommendations for both short-term recovery and longer-term rehabilitation.

The purpose of this summary is to produce a cross country synthesis of the data and information generated by the project. These include – apart from the socio-economic impact studies - the outcomes of national workshops in which the studies were presented and discussed and the proceedings of a final Regional Workshop. Some relevant literature was studied.

2. The countries and coverage of the studies.

The countries are located in the same region of the World, but differ in several aspects. Cambodia and Lao PDR are the countries with the smallest human populations and also the lowest densities and per capita incomes. In these countries around 80% of the human population lives in rural areas. Table 1 provides information on some key indicators.

Table 1. Comparison of the five countries involved in the project.

Countries	Human population			
	In million	People/sq km	Per capita income	% in urban areas
Lao PDR	6	24	US\$ 310	20
Cambodia	12	71	US\$ 280	20
Indonesia	212	117	US\$ 710	30
Vietnam	81	247	US\$ 430	25
Thailand	62	121	US\$ 1980	40

Source: World Development Report 2004.

Low per capita incomes and small populations combine to set the context that lead to a small modern poultry sector in the two countries. Thailand is placed at the extreme opposite end with a per capita income that is six times higher, a higher human density and 40% of its people living in urban areas with Bangkok projected to become one of the biggest metropolises of the World. The stronger domestic economy, the Bangkok metropolis and an export led growth have combined to create the conditions for a strong industrial and poultry sector, which was number 4 in the World with regard to export of poultry meat before the Avian Influenza crisis broke out. The Indonesian population density is the same as Thailand's, but its per capita income is less than half of Thailand's, but much higher than that of Lao PDR, Cambodia and Vietnam. The combined effect of a US\$ 710 per capita income in Indonesia as well as 30% of the population living in urban areas and the Jakarta metropolis create the conditions for an industrial and commercial poultry sector with large farms. Vietnam is the country with the highest human population density, a higher per capita

income than Cambodia and Lao PDR and 25% of its population living in urban areas, providing the growth conditions for a commercial poultry sector.

2.1. Poverty and Food Security in the countries.

Thailand is much better off than the other four countries in terms of per capita income and in a category of its own. However, one of the serious limitations of a monetary income measure is that the cash is often controlled by the men, while it is the women, who are responsible for the nutrition of the family. FAO holds that the rate of stunting of children below five is a better proxy for poverty and food insecurity¹ as indirectly it accounts for the women's control of resources in a family. Data provided by WHO² shows that only about 20% of the children in 1995 in Thailand were reported to be stunted and suffer the consequences of endemic poverty and food insecurity. In the other four countries the situation is much worse as approximately 45% of the children are stunted, even with more recent data from the year 2000. In summary, using an alternative measure does not change the fact that Thailand comes out much ahead of the other four countries.

3. The studies.

At the time of preparing this summary, impact studies are completed in Cambodia, Indonesia, Lao PDR and Vietnam, while the study in Thailand is ongoing.

3.1.1. Cambodia.

In Cambodia the study was done by the NGO Vétérinaires Sans Frontières, France (VSF-F). The study covered five provinces. This was the province with the capital Phnom Penh and three neighbouring Kandal, Kampong Cham, Takeo and the fifth was Siem Reap in the North of the country, which is a tourist spot due to the famous Angkor Wat Temple. The sample included 20 commercial farms, which were 16 chicken farms that had had the infection and 4 duck farms that had no visible signs of H5N1. The number of backyard chicken farms was 83 and 15 backyard farms that kept ducks and chicken. The interviews covered 22 middlemen, 22 market retailers and 10 service providers.

3.1.2. Indonesia.

It was the Indonesian Centre for Agricultural Socio-economic Research and the Agency for Agricultural Research and Development that carried out the study in Indonesia. The study included five provinces on the Jawa Island, which were Banten, West Jawa, Central Jawa, Yogyakarta and East Jawa. The total sample incorporated 350 farms, which were divided among 100 integrated, commercial farms; 75 farms that were commercial and judged to have high bio-security, but financially integrated with industrial types of farms; 165 that are commercial, but with low biosecurity and called independent in Indonesia as the farms do not link to a large industrial farm for financing and other inputs. There were only 10 backyard farms included, but 30 middlemen and 30 market sellers as well as 20 veterinary officers serving at province and district levels.

¹ http://www.povertymap.net/mapsgraphics/graphics/Undernutrition_en.jpg -

² http://www.who.int/nutgrowthdb/p-child_pdf/

3.1.3. Lao PDR.

The study in Lao PDR was conducted by the Department of Planning in the Ministry of Agriculture and Forestry. It was carried out in three provinces that had experienced outbreaks of H5N1. These were in the regions of the capital Vientiane that border Thailand; in Savannakhet Province with the study areas bordering both Thailand and Vietnam and in Champasack Province that borders Thailand. At district level this allowed sampling in infected as well as non-infected areas. In Lao PDR only commercial with low biosecurity and the village or backyard production system were evident. The number of households interviewed representing the village and backyard system was 255 or five percent of the households in the concerned villages, 145 of the households were from non-infected areas. From the commercial sector, the number interviewed in infected districts in Vientiane was thirty percent of all broiler farms, thirty-five percent of the layer farms and fifteen percent of the quail farms, while their small number allowed hundred percent of farms in Savannakhet and Champasack to be surveyed, except for the Quail farms which were fifty percent for the broilers and hundred percent for layers, but anyway a small number of two and three farms, respectively. The study covered 60 middlemen servicing the first-stage markets; 60 market sellers working out of the first-stage markets and 30 service providers.

3.1.4. Vietnam.

In Vietnam it was the General Statistics Office of the Ministry of Agriculture, Forestry and Fisheries, which conducted the study. It was conducted in three provinces that were estimated to have suffered the most from the H5N1. The provinces were Ha Tay in the North, Thua Thien Hue in central Vietnam and Tien Giang in the South. The study covered 808 households of which 67 or 8% belonged to the Industrial category, 476 or 60% to the commercial system with minimal biosecurity, 112 or 14% belonged to the small commercial system with low biosecurity, 109 or 13% were village or backyard poultry keepers and 44 households or 5% of the sample kept no poultry at all. Traders and service providers were not included.

4. Systems of production

Several production systems exist in the five countries, but two broad distinctions can be made between the traditional village and backyard system and the modern commercial system.

In rural areas, far from cities and markets, the predominant system is one of scavenging with very few inputs provided by the owner, who will typically be a woman. At the opposite end of a continuum with several types of sub-systems; poultry production may constitute a complex, integrated system with thousands of birds, highly dependent on the World Market for inputs and outputs. The owner will typically be a man. The situation in Thailand illustrates the point. The large, industrial scale producers focus on export, the country being the World's fourth largest exporter of poultry meat before the H5N1 outbreak. However, these exporters depend on import of grand parent or parent stock and other inputs. On the other hand in Thailand it is still more than 90% of those who keep poultry that are categorized as small farmers with native chickens, ducks, fighting cocks and quails and 36% of the chicken population is classified as "native" and kept by small farmers. For analytical purposes four main production systems were used in the studies. The different systems and their characteristics are set out in table 2.

Table 2. Characteristics of four different poultry production systems.

Characteristics	Systems			
	Industrial and integrated	Commercial poultry production		Village or backyard
		Bio-security		
		High	Low	
	System 1	System 2	System 3	System 4
Biosecurity	High	Mod-High	Low	Low
Market outputs	Export and urban	Urban/rural	Live urban/rural	Rural/urban
Dependence on market for inputs	High	High	High	Low
Dependence on goods roads	High	High	High	Low
Location	Near capital and major cities	Near capital and major cities	Smaller towns and rural areas	Everywhere. Dominates in remote areas
Birds kept	Indoors	Indoors	Indoors/Part-time outdoors	Out most of the day
Shed	Closed	Closed	Closed/Open	Open
Contact with other chicken	None	None	Yes	Yes
Contact with ducks	None	None	Yes	Yes
Contact with other domestic birds	None	None	Yes	Yes
Contact with wildlife	None	None	Yes	Yes
Veterinary service	Own Veterinarian	Pays for veterinary service	Pays for veterinary service	Irregular, depends on govt vet service
Source of medicine and vaccine	Market	Market	Market	Government and market
Source of technical information	Company and associates	Sellers of inputs	Sellers of inputs	Government extension service
Source of finance	Banks and own	Banks and own	Banks and private ³	Private and banks
Breed of poultry	Commercial	Commercial	Commercial	Native
Food security of owner	High	Ok	Ok	From ok to bad

³ This may be informal money lenders, relatives and friends.

4.1. System 1. Industrial Integrated System.

The Industrial Integrated System is typically located close to good roads and market outlets such as large cities, harbours or airports, which allow export of products out of the country and import of breeding material, feed, expertise and other inputs. It may keep broilers or layers and breeding stock. Especially the exporting companies will maintain a high level of biosecurity and their farms are typically part of an integrated broiler production enterprise with clearly defined and implemented standard operating procedures for biosecurity. It typically employs its own veterinary staff.

The country studies used the categories, but applied different sizes of farms. In Vietnam the study classified farms with more than 2001 birds as industrial, while the Indonesian study used the interval of from 20 000 to 500 000 birds. Farms of this category are not found in Cambodia and Lao PDR, whereas in Thailand the situation is characterized by the presence of very large farms according to Nipon Poapongsakorn (2004):

“Although there are still large numbers of contract broiler farms, more and more chicken are now produced by the very large modern farms owned by 28 large – scale vertically integrated agri-business companies. It is estimated by the industrial experts that the production share of the integrators is about 80%. Chicken exports are totally controlled by the integrators, particularly the top ten largest integrators who operate the export slaughterhouses near Bangkok. There are only three export slaughterhouses which are more than 300 kilometers from Bangkok. The other 34 slaughterhouses are in Bangkok and surrounding provinces.”⁴

4.2. System 2. Commercial Production System.

This system is a commercial poultry production system that may produce boilers or layers with moderate to high biosecurity. The products are sold commercially in urban and rural areas. The farms keep their birds indoors continuously, strictly preventing contact with other poultry or wildlife. In Vietnam the farms included in this category had 151 to 2,000 birds, while they had from 5 000 to 10 000 in Indonesia.

4.3. System 3. Small-Scale Commercial Production System.

This production system has many similarities to system 2, but the units are smaller and the biosecurity is lower. It may be a caged layer farm with birds in open sheds; a farm with poultry spending time outside the shed or a farm producing chickens and waterfowls. The products are sold in live markets in urban and rural areas. In Vietnam the size of the farms included in the study had from 51 to 150 birds, while the number was from 500 to 10 000 in Indonesia. The commercial farms in Lao PDR and Cambodia tend to fall in this category.

⁴ Nipon Poapongsakorn (2004). Dynamics of South East Asian Livestock Markets and Their Sanitary and Technical Standards. Paper presented to the FAO Expert Consultation on “Dynamics of Sanitary and Technical Requirements in Domestic Livestock Markets: Assisting the Poor to Cope”. FAO, June 2004.

4.4. System 4. The village or backyard system.

This production system is the most widespread and it is undertaken by millions of households in all the five countries. Many of the household belong to the poorest in the countries. It is women, predominantly, who are responsible for the daily management of the poultry and they are also frequently the owners and decision-makers.

The exact number of women and their families who rely on poultry as a component of their farming system is difficult to find, but it can plausibly, probably a bit conservative, be assumed that 60 % to 80 % (the figure for Thailand according to Haitook et al., 2003) of the rural households keep poultry, which makes it possible to make an estimate of the number of people who deal with poultry one way or another as set out in table 3.

Table 3. Estimation of the number of involved with poultry in the village and backyard system.

Countries	Human Population			Rural people (million) dealing with poultry under two assumptions	
	In million	Living in rural areas		60 %	80 %
		%	Numbers in million		
Lao PDR	6	80	4.8	2.9	3.8
Cambodia	12	80	9.6	5.8	7.7
Indonesia	212	70	148.4	89.0	119.0
Vietnam	81	75	60.8	36.5	48.6
Thailand	62	60	37.2	22.3	29.7
Total	373		260.8	136.5	208.8

Source of data on population and people living in rural areas: World Development Report 2004.

On the basis of the data and estimates presented in table 3, there are between 136 and 209 million people that deal with poultry in the village and backyard system in the five countries. To this should be added the people in urban areas that keep poultry in a scavenging or semi-scavenging manner.

It is largely within the same category of people whether they live in rural or urban areas, that the poor are found⁵. The UNDP Human Development Report (UNDP, 2003) informs on the percentage of people, who live below an income poverty line of less than US\$ 1 or US\$ 2 a day. The figures are for Lao PDR 26.3 and 73.2%; for Cambodia no figures are reported, but the percentage of people below the National poverty line is reported to be 36.1%; for Indonesia it is 7.2% that live below US\$ 1 a day and 55.4% that live below US\$ 2 a day, for Vietnam the figures are 17.7 and 63.7% and for Thailand they are 2.0 and 32.5%, respectively.

The poultry and their women managers can be viewed as a sub-system within a larger production system common to many villages, which is known as an integrated or mixed farming system and often praised for its efficiency in coping as the several types of animal and plant productions help to minimize risk, while enhancing resource utilization. However, the frequent and often close contact between the various species of animals and humans living on the same farm provide a very

⁵ Examples are provided in Dolberg (2003) although from different countries.

conducive environment for the spread of H5N1 and possible reassortment⁶ of the virus and it is likely that some adjustments of the system will be required to contain, not to speak of eradication the Avian Influenza.

It was mentioned in the introduction to this section that Thailand is a large exporter of poultry meat, but that more than 90% of the poultry keepers fall in the backyard or smallholder category. According to a recent review of the poultry sector in Thailand by FAO (Costales, 2004) the composition of the 217 million poultry population (2001 data) is 41% broilers, 36% native chicken, 10% layers and 13% ducks of all types. In Vietnam 94% of the poultry keeping households fall in the category of a scavenging backyard system with 55% or 64.9 million birds, while the industrial farms are less than 1% of the total number of farms, but they keep 28.3 million of the birds or 24%. In Lao PDR and Cambodia, the commercial sector is still very small, while there are very large, exporting companies in Indonesia, but still an estimated 30 million, mainly rural households that rely on native breeds. Many households consume themselves the meat and eggs produced, but particularly the poorest households tend to sell eggs and animals to buy lower priced and more bulky food items like rice and vegetables. In fact the system does not produce many eggs for sale. Due to a high mortality mainly due to poor management and nutrition in the very young chicken in the period from they are hatched till they are 6 – 8 weeks old, most eggs go for reproduction and not human consumption or sale.

4.4.1. Duck systems.

Parallel with the socio-economic impact studies undertaken under the present project, FAO works on epidemiology and ecology of Avian Influenza and the reports coming out of this work (Gilbert et al., 2004 and Gilbert and Slingenbergh, 2004) so far strongly suggest that ducks have an important role as silent carriers and conveyers of H5N1. Some of the work was reported in the final Regional Workshop October 14-15, 2004 in Thailand.

Ducks in terms of numbers represent 10 – 15% of the chicken in the village and backyard system. Gilbert and Slingenbergh (2004) report the figure to be 13% for Thailand, while the duck accounts for a disproportionate 28% of the H5N1 outbreaks in that country. The duck production systems in the five countries can be divided into two broad systems. One is the few ducks that mix with the chicken and other animals year round on the small farms, but data on the exact number of farms that keep ducks in this manner are not available. The other system with much larger herds that may run into thousands of ducks is typically found around larger water bodies and rice paddies in low laying areas such as the Mekong Delta of Vietnam. One sub-system of these larger flocks is cyclical and very mobile as ducks are herded after the rice harvest to clean the fields for lost grain. In contrast with the village and backyard poultry system around the homestead which is controlled by women, the specialised and mobile system with large numbers of ducks is controlled by men. These systems have received scant research attention, whether economic, social or biological.

4.5. Integrated can have two meanings.

The expression ‘integrated’ can take on two meanings in the context of the production systems. In one case, it is applied to large commercial farms that under the umbrella of the same enterprise

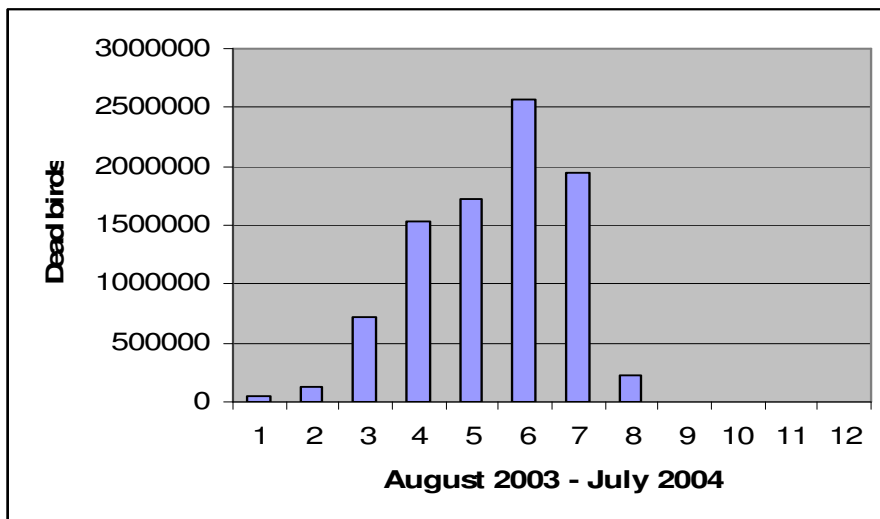
⁶ Presentation by WHO representative at the final Regional Workshop of the present project in Thailand, October 14-15, 2004.

undertake various production and processing tasks such as feed processing, production of day-old chicks, broiler production, slaughtering and sales. In the other case (predominantly systems 3 and 4) it is applied to a situation where chicken is kept together with other animal species such as ducks, fish, pigs, cattle and buffaloes. There may be regular contact between birds and people as the poultry frequently scavenge and move in and out of the farmers' houses.

5. Outbreaks.

The first wave of outbreaks was officially reported to be in *January 2004* in all the five countries: 23rd in Cambodia, 25th in Indonesia, 14th in Lao PDR, 23rd, 2004 in Thailand and 8th in Vietnam.

Figure 1. Pattern in monitored poultry mortality in Indonesia due to Avian Influenza



Source: Presentation to the Indonesian National Workshop by the Director of Animal Health

There were outbreaks in the countries earlier, but proper diagnosis as well as decisions on official reporting took time. One example is Indonesia (figure 1), where the first unofficial outbreak was noted in August 2003 according to the Director of Animal Health⁷ and monitored outbreak data according to the same source showed a pattern of increased outbreaks through September, October, November, December, 2003 to peak in January 2004 and then subside (figure 1).

In figure 1, August 2003 is the first month and July 2004 the 12th month. January 2004, the peak month is month number 6.

Reports of a second wave of outbreaks⁸ began to appear in May, 2004 from Vietnam and Thailand and at the time of writing it is only Lao PDR, which has not reported a second outbreak. The source of the virus causing the first outbreaks is not officially reported although it is openly mentioned in Cambodia that it was introduced by a consignment of chicken by a private company from Thailand

⁷ Presentation to the National Workshop in Indonesia.

⁸ More details are available from FAO's website: http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/avian_update.html

– and private companies are mentioned as the original source in the other countries as well. However, the evidence is anecdotal.

5. 1. Distribution pattern of the outbreaks.

The most detailed analysis of the distribution pattern of the outbreaks is based on the second wave of outbreaks in Thailand (Gilbert and Slingenbergh, 2004). The analysis found that it is difficult to show a pattern of occurrence as far as the individual farms are concerned, but there was a strong association between free grazing ducks in wet land rice production areas and Avian Influenza. Suphanburi Province north of Bangkok with 43% of the duck outbreaks was identified to be the epi centre for ducks, while the distribution over the country was more even for chicken. One implication noted by the study was that ducks may play a role in generating chicken outbreaks, but not chicken in generating duck outbreaks.

In all the countries the initial outbreaks have been in densely (human) populated areas such as the Mekong and Red River Deltas in Vietnam; close to urban areas, i.e. in locations with high demand for poultry meat typical of tourist destinations such as Siem Riep in Cambodia. In Indonesia, the initial outbreaks were on farms in Central Jawa and the disease spread, when the owners of sick birds sold them to the adjacent islands Sumatra, Bali and Kalimantan. In Lao PDR it was in and around the capital Vientiane and in Thailand it was in Supanburi Province a little more than 100 km north of Bangkok. By January 7, 2005, OIE reports the number of outbreaks to be 1 in Lao PDR, 13 in Cambodia, 169 in Indonesia, 1046 in Thailand and 1764 in Vietnam. These figures are no doubt linked to the diagnostic capacity in the countries. Information is updated regularly by OIE at: http://www.oie.int/download/AVIAN%20INFLUENZA/A_AI-Asia.htm.

5.2. Stamping out, culling and trade during the outbreaks.

Following the official recognition of the outbreaks, the governments decided on stamping out and culling of all birds in a radius of 1 km (Indonesia) to 3 km (Lao PDR, Vietnam) from the site of the outbreak. However, the studies show that these measures were never 100% efficient as a residue of birds were left on several farms and some degree of trade continued in all infected areas.

In all the five countries in normal times there is a high level of poultry movement and transport and village farmers in all the countries have a tradition to sell birds, when they appear to be sick. Markets practically always play a role in the spread of a virus⁹ and the experience this time is no exception. Around urban areas this movement is fairly constant, but in rural areas the volume of birds moved tends to be seasonal and related to festivals. Those involved in the market are sellers of day-old chicks and traders that buy live birds from producers and trade them in the market. The movements are typically by pick-ups, motorbikes, tuk-tuks¹⁰, cycles, busses and by foot.

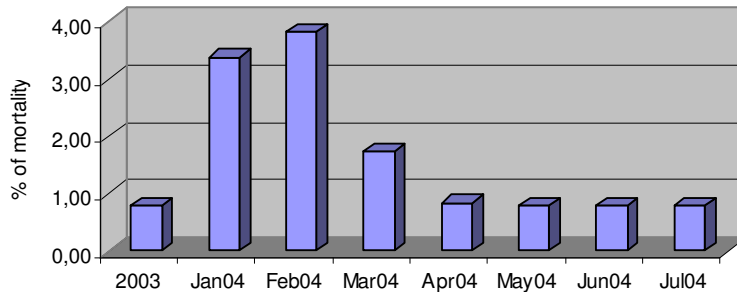
The movement bans imposed by the governments did reduce the volume of birds moved, but trade continued to some degree in all the countries throughout the crisis, although at lower prices due to the consumers' fear of eating poultry meat. Lao PDR was an exception. The supply of broilers to the market went down due to stamping out on the commercial farms, but the volume was not enough to influence the prices. In Cambodia, 5 out of 21 traders interviewed continued their business during the ban. According to the Cambodian study, the traders consider a mortality rate of

⁹ M. B.A. Oldstone (1998). *Viruses, Plagues & History*. Oxford University Press.

¹⁰ Motor-rickshaw

around 1% of the purchased stock to be normal, but this went up to 3.5% during the first wave of outbreak (figure 2), indicating an increase in the number of sick animals that reached the market.

Figure 2. Mortality of traded animals in Cambodia



Source: The Cambodia study undertaken by VSF

In Vietnam the survey found that among the farms that culled, 80% culled the entire flock, while 20% culled only part of it. Sale of infected poultry in the market was reported by 12% of the interviewees. In Lao PDR, the study observes that:

'...profit from poultry trade increased in Vientiane and Champasack and only slightly decreased in Savannakhet province. This was due to the decrease in expenses and continued activity throughout the outbreak.'

The Lao PDR study also found it to be likely that major poultry markets in the urban areas of Chantabouly, Saysetha and Sisattanak districts, caused a channelling of infection into the villages of these three districts as village level mortality was found unusually high during the period of the Avian Influenza outbreak.

In Indonesia trade was reported during the first wave of outbreak although prices fell from a live broiler price of around Rupia¹¹ 8 000 per kg in early January 2004 to as low as Rupia 2 000 on February 26, 2004 during the outbreak.

There is little doubt that the markets through trade with infected animals have contributed to the spread of the virus in the countries. The delayed official declaration of the outbreak means that much of this trade was actually legal (see figure 1, but also 2 and 3). Illegal trade has continued after the outbreak¹², In fact a study in Vietnam¹³ showed that women as a deliberate strategy keep poultry in more than one home, in the event they fall out with their husband or due to some other misfortune. The challenge is within an appropriate legal framework to identify possible and easy

¹¹ One US\$ = 9 160 Rupia (15th January 2005).

¹² Illegal trade of animals also play a role in the case of Severe Acute Respiratory Syndrome (SARS): One example is provided by Diana Bell, Scot Robertson and Paul R. Hunter (2004). Animal Origins of SARS coronavirus: possible links with the international trade in small carnivores. Published online 3rd June 2004, The Royal Society.

¹³ Lea Joensen (2002). Intra-household Decision-making and Livestock Investment Patterns in Thanh Hoa Province. The Danish Veterinary and Agricultural University. An Abstract is found at <http://www.juf.kvl.dk/stireports/abstracts/LeaJoensen.htm>

ways of breaking the contamination chain, through interventions such as increased public awareness, cleaning of equipment and market holidays that may have the traders as a special target group.

6. Impact.

The conventional definition of impact refers both to the intended and unintended negative as well as positive effects of an event.

6.1. Direct.

The direct impact was due to death of sick animals on the farms, stamping out, cleaning of the farms etc and the associated costs and other implications for the farmers, their families and workers.

In Vietnam 58 out of 64 provinces were affected and 17% or about 44 million of the total national poultry flock of 261,864,070 was destroyed. The National direct loss was estimated to be more than US\$ 200 million¹⁴. Due to the crisis the poultry sector has decreased in size. Poultry production in the surveyed households before the outbreak was the main economic activity for 68% of male-headed poultry farms and for 32% of female-headed, while in July 2004 the survey found these rates to be 30% and 12%, respectively. To compensate for the income losses, many farms have switched to other activities, mainly pig production. The Vétérinaires Sans Frontières in Vietnam conducted a case study (Delquigny et al., 2004) of a village in the highlands of North Vietnam and estimated on the basis of the study that a smallholder lost between US\$ 69 and US\$ 108, when the values are included in the estimate of lost birds, loss of the average 2.3 months with no activities, and loss of no income and consumption during the period of no activities. Viewed from the perspective that – as shown in section 4.4 - in Vietnam 17.7% of the households earn less than US\$ one per capita a day and 63.7% of the households less than US\$ two per capita per day these losses are serious for the households that experience them.

In Indonesia, the study reports that there was infection in 15 out of 30 provinces and 16, 2 million birds died either because they were sick or stamped out. The estimates built on a price range of typically US\$ 1 to 2 per bird, subject to its weight or being broiler or layer. The number of birds killed is much lower in Lao PDR, where it is estimated that 150 000 birds died or were culled in the three affected provinces of which 120 000 were in the capital Vientiane alone. In relative terms this was not a large number, estimated to be 1.1 % of the total national flock and 14 % of the commercial flock. The figure was also low in Cambodia, where 18 818 chicken, ducks and other species were stamped out and culled¹⁵, which is less than 1% of the national herd of poultry. There are probably three reasons for these lower numbers in Lao PDR and Cambodia: (i) the two countries have smaller human populations and (ii) they are poorer with a proportionally smaller commercial poultry sector and (iii) they are the countries with the lowest human and associated poultry population densities, providing less favourable conditions for the H5N1 virus to establish itself and spread.

¹⁴ DSO Report to this project, p. 25.

¹⁵ Information provided by National Consultant Dr. Tum Sothyra.

The total direct loss in Indonesia is estimated to be US\$ 170, 9 million and the demand for day-old chicks in the infected areas decreased by 58% for broilers and 40% for layers. The demand for feed was estimated to be reduced by 45%.

The degree of commercialisation and industrialisation determine employment in the sector and thereby the loss of employment. The countries with less commercialisation and industrialisation like Lao PDR and Cambodia have therefore a small loss of jobs, the figure being as low as 52 in Lao PDR, where a total stamping out of all poultry was undertaken on 42 intensive commercial enterprises, 39 in Vientiane capital and 3 in the provinces¹⁶.

By comparison it affected many more people in Indonesia, where the survey reports that 23% of the permanent workers on the industrial and commercial farms lost their jobs and more than 40% of family members were unable to continue to work with poultry as the farms closed. The Cambodian study noted that the direct losses were very limited compared to the indirect losses, but it makes no mention of National estimates. The Cambodian study estimates “lack of profit” in the first semester of 2004 and finds this to be highest *per farm* for commercial broiler chicken farms. However, due to their much larger number, the small holder sector has the greatest accumulated lack of profit, when the estimate is done on a Provincial level and that would apply at National level as well, if figures were available.

In Lao PDR it was the commercial broiler farmers and predominantly the commercial producers located in Vientiane Capital and Savannakhet province that were affected by the Avian Influenza.

The industrial and commercial systems are the most specialised. However, although the systems are specialised and vulnerable to disease outbreaks like in the case of Avian Influenza, there were no reports of drastic reductions in food consumption by the affected families due to Avian Influenza, although the study from Vietnam reported on reduced food consumption among the village and backyard farmers.

In Vietnam and Indonesia, the study reports mention that the families have reduced expenditures on children’s education as a consequence of the Avian Influenza.

6.2. Indirect.

When the Indonesian Poultry Information Centre includes the indirect losses and adds these to the loss to the broiler and layer breeders and producers the loss goes up from US\$ 170, 9 million to US\$ 387 million or a factor of two. Neither the survey report of the present project, nor the Indonesian Poultry Information Centre’s estimate account for the loss incurred by the village and backyard farmers whose number is estimated to be 30 million households keeping 200 million native chickens.

The indirect impact is illustrated well by data presented to the workshop in Indonesia by the Indonesian Poultry information Centre¹⁷ (figure 3). From a live broiler price of around Rupia¹⁸ 8 000 per kg in January 2004, the price fell to as low as Rupia 4 000 in some locations on February 26, 2004 to move back to pre-outbreak levels of Rupia 8 000 per kg by the beginning of May, 2004.

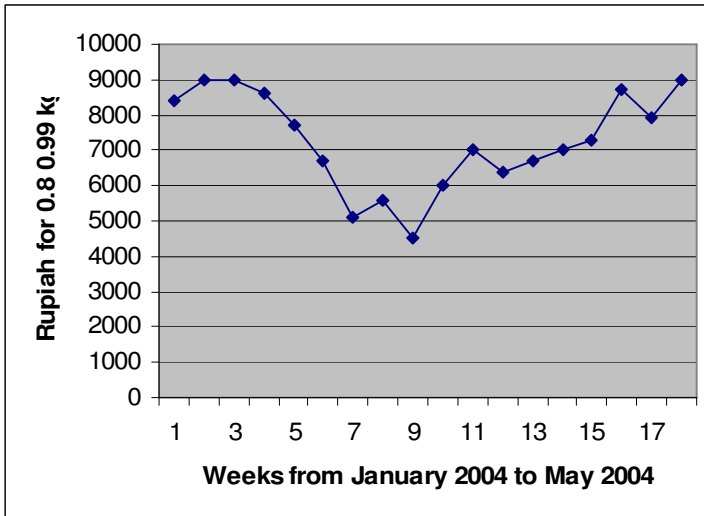
¹⁶ Consultancy Report to FAO by R. Webb, July 2004.

¹⁷ Att : hartonosinta@yahoo.com

¹⁸ One US\$ = 9 160 Rupia (15th January 2005).

The point is that this fall in prices hits all producers, irrespective of their birds being healthy or infected by Avian Influenza.

Figure 3. Broiler prices in and around Jakarta January – May 2004



Source: Dr. Hartono, Indonesian Poultry Information Centre

However, such a drastic fall in demand and prices has consequences throughout the industry for the producers of hatching eggs and day-old chicken, which in January and February was around 21 million per week for broilers, but fell to 14 million per week in March, 2004 and the price fell from Rupia 2200 per day-old chick to as low as Rupia 200 per chick. In turn, this impacts on the producers of hatching eggs and parent stock.

Another type of indirect loss depends on the period that the farmers stayed out of production after the crisis was over.

FAO's Guiding Principles¹⁹ state that restocking should not take place till a minimum of 3 weeks after the premises have been cleaned and disinfected. In Vietnam the farms that have restocked, did so mostly between 1 and 3 months after the end of the crisis, while the period for commercial farms was reported to be between 2 to 8 months in Lao PDR. In the villages in Lao PDR, the government did not set out any restrictions on the time to restock and farmers were allowed to do so according to their preferences. In Indonesia, the survey found restocking to be very fast and within one months in the commercial farms integrated with large farms, while it took from one to three months in the commercial farms that had no such linkages to large farms, but 42% of the commercial farms did not restock.

That a farm restocks is not the same as it is back to production at the same scale as before the outbreak (see also section 6.4 on restocking).

6.3. Coping mechanisms.

¹⁹ To be found on the right hand menu at http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/special_avian.html

The surveys found that the industrial and commercial systems are highly dependent on poultry for income as they are specialised systems with few other income opportunities and from 60 to 100% of their income is derived from poultry production.

In Cambodia, the Avian Influenza outbreak caused a change among the farmers towards pig production as prices of pigs and other animal products went up after the crisis. This can be illustrated by the relative importance of poultry activities in the private CP Company's turnover: before the crisis, the sale of poultry products and of pig products represented 70% and 30%, respectively. In August 2004, each represented 50% and the aim for 2005 is a clear shift with 70% from pig products and only 30% from poultry.

In Indonesia, 59% of layer farmers and 91% of broiler farmers drew on their savings and some went into trade, the type of trade not being specified in the report. Assets were sold and the poultry farming scale reduced.

In Lao PDR the surveyed farms in 2003 derived 63% of their monthly income from poultry and this fell to 43% in 2004. The alternatives entered into were predominantly fish farming, followed by cattle and pig production – and the study in 2004 also saw a substantial increase in the purchase of ducklings suggesting an increase in duck production to come.

The coping strategy applied by the farmers in Vietnam was for the industrial and commercial farms to go into pig production, draw on savings and sell assets and labour, while smaller farms with land increased rice production.

One adjustment in Thailand by the exporting companies is to enter into export of cooked meat.

7. Institutional support.

The question to examine in this section is the type of support that the poultry producers received to help them overcome the crisis – and – equally relevant, the degree to which such support was absent. The section discusses compensation, veterinary and animal production services and credit.

7.1. Compensation.

Compensation payments, except for Thailand, have been modest, if at all. In all the countries the farmers mention compensation much less frequently than their preference for credit without interest.

The Animal Epidemic Act of Thailand lists HPAI as a highly contagious disease and allows the Department of Livestock to compensate the farmers at the rate of 75% of market value²⁰. For the first outbreak, the cabinet approved 100% compensation of the market value of the birds and a total of 407,338 farmers were compensated for 60,634,000 heads of poultry. In addition a special loan program has been arranged for the farmers for restocking.

The Lao PDR survey report makes no mention of compensation payment by the government although the national workshop indicated that the government had drawn up compensation plans. In Cambodia it is the Government's policy not to compensate, but to use its limited resources to

²⁰ From the first report to the project by the Thailand National Consultant.

provide the farmers with technical, veterinary and financial services, an area where much remains to be done, although the country has a wide coverage of paravets.

In Indonesia compensation was given to smallholder farmers defined as having a layer population with less than 10,000 and broilers less than 15,000 per cycle or native chicken or ducks with a minimum of 50 birds, while for quails the minimum was 500. The birds should have been culled after the official declaration of Avian Influenza. However, the coverage was limited during the first phase of compensation from February to August 2004, when a total of Rupia 3.5 billions (US\$ 388,889) was paid to 1,068 farmers in 15 districts of 8 provinces. In the second phase of compensation from September till November 2004 a total of Rupia 4.4 billions (US\$ 488,889) is estimated to be paid to 1,756 farmers in 14 districts of 4 provinces. A guide to apply for compensation has been prepared by The Directorate General of Livestock Services. The Indonesian study estimates that the compensation, when it happens covers only from 10 to 20% of the value of the bird and like in Lao PDR and Cambodia, the farmers, when asked during the survey, ranks compensation low and have access to credit and veterinary services much higher on their list of priorities as well as credit on soft terms.

In Vietnam at the time of the study there was little compensation implemented and almost none for the small holders, which were 57% of the farms that culled birds. The bigger farms received fairer treatment. However, like in Indonesia, the amount per bird was inadequate at an average of 18% of the value. The Vietnam study makes an interesting comparison by stating:

“... the costs of total losses (200 million \$) with an estimation of 13,2 million \$ for the budget allocated to compensation²¹, it emerges how a more proactive and generous compensation strategy that would have encouraged more prompt reporting (Delquigny T, 2004), enabled a better surveillance and a faster control would, in turn, have saved finances to the national budget.”²²

Even though other subsidies in Vietnam were supposed to be provided for the purchase of new day-old-chicks none of the farms report to have received such support.

7.2. Credit.

In Vietnam the government and the State Bank of Vietnam decided on the special conditions for the Vietnam Bank for Agriculture and Rural Development to apply to farmers affected by Avian Influenza. Short terms loans were rescheduled to 12 months and medium and long term loans extended by a period comparable to half of their terms. The amount of loan accessible without collaterals increased from the equivalent of approximately US \$ 2000 to US \$ 3300. However, the survey revealed a gap between these decisions and what the farmers actually experienced as the reduction in access to loans was quite marked. The survey showed that the ability to secure a new loan was proportional to farm size as 38% of the bigger farms obtained loans compared to 31% commercial and 12% small commercial. The village and backyard system was left with a big credit need and the survey found that this category of farmers was pushed to use private money lenders to a greater degree than before the crisis. Actually, all categories of farms had to resort to private lending to some degree. The survey found the loan needs on average per farm to be 4.2 million

²¹ 44 million dead birds multiplied by 5,000 Vietnam Dong (the applied compensation rate per bird).

²² P. 31 in the Vietnam Study.

Vietnam Dong²³ for the village and backyard, 2.9 million for the small commercial, 11.9 million for the big commercial and 41.3 million Vietnam Dong for the industrial one.

Credit through a modern banking system is scarce in Cambodia. The survey found that as many as 88% of the village and backyard farmers and 42% of the commercial farmers did not use credit for poultry production. For those who did obtain credit, the neighbors and relatives were important sources for the village and backyard farmers. The neighbors were also important for the commercial farmers, but even more important were relatives, NGOs, farmer associations and banks.

In Indonesia the government prepared two credit schemes, namely the Food Security Credit for poultry farmers, up to Rupia 15,000,000 (UD\$ 1,667) and the Credit for Micro and Business Enterprises, up to Rupia 50,000,000 (US\$ 5,556). The interest rates are 10 and 15 percents, respectively²⁴.

In Lao PDR, the survey does not report on credit for poultry production in the villages, but for the commercial farms the credit sources are banks, neighbors and companies. However, the report concludes that due to debts, it will be difficult for many broiler farms to start production up after the Avian Influenza. In other words, the report implies that the government did not apply any debt cancellation policy.

The studies report a strong demand for credit on subsidized interest rates. A second point that emerges from the studies is that the Avian Influenza has driven more poultry farmers to rely on private sources of loans. The implications are likely to be that the crisis without support from the government, the banks and the international community will support a process of polarization, where those who manage to continue production will gain and those relying on the private money market or with no access to finance at all, will lose.

7.3. Veterinary and technical services.

According to the studies, the veterinary and technical services come in several institutional forms. In the village and backyard system, the government is the provider, but has limited capacity to reach out. This applies across the countries. All the countries have some form of para veterinary worker arrangement in an attempt to reach out to people in the villages, yet 80% of the smallholder poultry owners in Cambodia had never exposed their poultry to a trained veterinarian or para veterinary worker. In fact the studies and discussions during the workshops leave the impression that the need is not for more para veterinary workers. The need is to make those function efficiently that are in place through training, incentives, provision of the necessary drugs whether through private or public channels.

Thus, while the government veterinary and technical services reach out to village and backyard farmers to a very limited degree, the government service seems to be linked much closer to the various types of semi-commercial or commercial production systems. This is noted in the studies from Indonesia, Vietnam and Cambodia. A feature to note here is that the veterinary service in many cases works in competition with services provided by private veterinarians, who may serve as private individuals (79% in Vietnam) or be staff of companies. Only in Lao PDR does the service predominantly come from the public veterinary service, but while the service may be free there is

²³ 1 US\$ = 15 790 Vietnam Dong on January 25, 2005.

²⁴ Presentation by Mr. E.S. Thohari to the workshop in Indonesia.

still cost of medicine to be paid for by the producers. The general picture is that salaried government veterinarians top up their salaries by working for a fee for the commercial sector, but reaches the village and backyard system to a very limited degree, if at all.

According to the studies it is the vertically integrated commercial farms that have the best service and which has been able to resume production the fastest. This applies to all the countries where the system is in place. In Lao PDR, the producers, comparatively, depend to a greater degree on government initiating the restocking process.

The village and backyard system has largely been left to fend for itself in all the five countries with little support from the veterinary or extension services on the one hand and little tradition by the poultry keepers to use the veterinary or extension services on the other hand. The surveys show that although there is a tradition to use veterinary and extension services *on the same farm* for other types of animals like cattle, buffaloes and pigs, this tradition does not exist for poultry. The studies did, unfortunately, not explore deeper the reason such as whether this is due to a gender dimension, because in this system the poultry is controlled by the women and the larger animals like cattle and buffaloes by the men. The system may comprise a variable number of other animals like ducks, pigs, goats, cattle or buffaloes, subject to the human and material resources of the household. However, poor and landless people tend to specialise and in any case keep few animals. In broad terms, the pre-dominant production system found in the villages is commonly known as an integrated or mixed farming system and often praised for its efficiency in resource utilization. The farming systems literature has long recognized that in such systems of production the best way to develop solutions will be in a participatory mode with the involvement of farmers (Collinson, 2000²⁵). The same literature has many examples to show that technologies from the industrial systems of production may be applied in the backyard or mixed systems with limited success. The problem is exacerbated by the lacking linkage between the veterinary and livestock extension services and the smallholder poultry farmers as the surveys in all the countries demonstrated.

7.3.1. Vaccination in Indonesia.

Proportionally, poultry export from Indonesia is not important. The Indonesian study reports an export of 6 95 655 broiler and 72 000 layer day-old chicks in 2003, which dropped to nil in 2004. On this background the Government of Indonesia chose as part of its control strategy to vaccinate²⁶ in infected and high risk areas. Vaccination is free of charge to backyard and small-scale farmers of any types of bird and species (layer, broiler, indigenous chicken, duck, quail etc.) and it focuses on breeder and layer farms. The larger farms have to pay.

Experience in Asia and in other regions shows that vaccines can be employed successfully to assist in eliminating HPAI viruses, including H5N1 (in Hong Kong SAR). Apart from Indonesia, only China is currently using vaccine to control H5N1 infection in Asia. Other countries in the region have banned the use of vaccine (Thailand) or are still considering vaccination as a potential future option (Viet Nam, Cambodia).

²⁵ M. Collinson (2000). A History of Farming Systems Research. FAO and CABI publishing.

²⁶ Presentation to the National Workshop of the present project by Dr. Tri Satya Putri Naipospos, Director of Animal Health, Directorate General of Livestock Services, Ministry of Agriculture.

FAO has established recommended approaches to avian influenza prevention, control and management, which may include the use of OIE approved killed vaccines²⁷. Several such vaccines are commercially available. Used in accordance with FAO recommendations, these vaccines provide protection against clinical disease in chickens, reducing mortalities and the effect of the disease on production. Vaccination reduces the total amount of virus contaminating the environment and therefore reduces the risk of infection to poultry and humans. According to current OIE recommendations, the use of vaccine does not preclude involvement in export trade, although specific technical guidelines must be followed to ensure that the vaccine is being applied and results monitored effectively.

The effectiveness of currently available OIE approved vaccines in waterfowl and quail has not been established by the OIE. While preliminary studies in China suggest that some vaccines may be effective in ducks, this urgently needs formal scientific evaluation. The vaccines used against avian influenza also warrant scientific research and development, as the need to inoculate birds (in some cases, on two occasions) is a practical limitation. In future, it is expected to see combined avian influenza and Newcastle disease formulations that can be administered more cheaply and easily (for instance in drinking water).

Notwithstanding the potential value of vaccination as part of the overall response to avian influenza, the Indonesian study listed some difficulties in implementing vaccination, viz. (i) village birds are many, widely distributed and not in captivity (ii) some farmers express scepticism concerning the free vaccination and ask who will be responsible if inappropriate vaccine is used and as a result there were farmers, who refused to use vaccine offered by the government and they decided not to vaccinate their chickens.

The Government of Indonesia used a number of different vaccines from known manufacturers²⁸, but during the outbreak some traders sold vaccines whose sources of origin were not clear. Other problems were the farmers' ignorance of the symptoms of Avian Influenza and the lack of veterinary field staff and laboratory facilities.

Finally, a serious question comes from Mexico concerning the effectiveness of the protection. Mexico has had the presence of H5 influenza for eight years and poultry was vaccinated during most of that time. However a recent summary (Lee et al., 2004) of the Mexican experience documented antigenic drift, i.e. changes in the virus and consequently poor protection. The study concluded that avian influenza vaccines should be re-examined every year for possible updates in order to achieve optimal protection.

Nevertheless, in case decisions are made to vaccinate there should be experiences to use from the work of the Australian Centre for International Agricultural Research's work on Newcastle Disease in village poultry²⁹ concerning organisation, outreach and training.

²⁷ FAO Recommendations on the Prevention, Control and Eradication of highly pathogenic avian influenza in Asia at <http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/27septrecomm.pdf>

²⁸ According to the Government of Indonesia²⁸ the following vaccines are used: (a) inactivated AI VAC Oil Emulsion (H5N1 subtype)–produced by Qilu Animal Health Products Factory, China; (b) Nobilis Influenza H5 (H5N2 subtype) – produced by Intervet International BV, Mexico; (c) Optimune AI KV (H5N2 subtype) – produced by Biomune de Mexico, SA de CV, Mexico; (d) AI Killed Virus Vaccine (H5N2 subtype) – produced by Laboratorium Avi-Mex, SA de CV, Mexico; (e) Volvac AI (H5N2 subtype) – produced by Boehringer Ingelheim Vetmedica, SA de CV, Mexico.

²⁹ <http://www.aciar.gov.au/web.nsf/doc/ACIA-5LG4X5>

7.4. Restocking.

Restocking is best analysed, when a distinction is made between restocking in the village and backyard farming system and restocking in the commercial and industrial systems.

7.4.1. Restocking in the village and backyard system.

With regard to the village system in all the countries there is still a strong presence of indigenous breeds. The presence of broody hens among the indigenous breeds makes the village and backyard system autonomous with regard to reproduction – and restocking in the medium to long term. The situation described for this system in Cambodia will therefore apply in all the countries. The Cambodia report notes:

“Poultry numbers in small scale poultry decreased by 50% between January & July 2004. It is likely that small scale farms will restock progressively through the eggs produced by the remaining hens rather than through buying day old chicks.”

The report goes on to state that restocking in this sector will be assisted by the dissemination of technical information that advise on methods to improve hatching rates, to limit mortality of chicks, etc. In the interviews the farmers listed training as the most frequent support they needed together with credit, which could be in the shape of animals from a source of supply free of diseases.

In Lao PDR the study noted that a dramatic shift was observed in the purchases away from chicks to ducklings. In normal times three to four times more chicks than ducks are purchased, but this changed to almost twice the number of ducklings being bought in comparison to chicks. The explanation seems to be a steep increase in prices for chicks, going up from 3000 kip³⁰ 5000 kip, while the average price of ducklings remained constant at 4000 kip per head.

7.4.1.1. Indigenous breeds.

Birds of indigenous breeds are still the birds of preference in the smallholder system. The studies were not designed to explore the question of breed in any depth, but they did show that in the village and backyard system, it is overwhelmingly birds of indigenous breeds that are kept.

- Lao PDR: When the poultry production sector is broken down by species, it is clear to see that locally raised chickens dominate the sector; accounting for 70 % of all poultry produced, followed by ducks at 21 % and commercially raised chickens accounting for only 6 % of the total flock. An estimated 6 00 000 households may be involved.
- Cambodia: This group of producers own more than 90% of the poultry in Cambodia and concerns up to 2,000,000 households. In other words, almost every single household in Cambodia (except most of urban households) is involved in poultry production with indigenous breeds.

³⁰ 1 US\$= 10 570 Kips on January 25, 2005.

- Indonesia: According to the Directorate General of Livestock Production's data, the poultry population in 2003 was 1,290 million which consisted of 71.1 percent broilers, 22.2 percent native chicken and 6.6 percent of layers. Native chickens can be obtained in all provinces in the country and are estimated to be kept by 30 million households, 70.9 percent broiler chickens can be found in Java, 17.9 percent in Sumatra and the rest was distributed in Kalimantan, Sulawesi, Bali and West Nusatenggara provinces. In Java, broilers can mostly be obtained in West Java (43.6 %), East Java (22.3 %) and Central Java (13.8 %), while the rest can be found in Banten and Yogyakarta provinces.
- In Vietnam 94% of the poultry keeping households fall in the category of a village and scavenging backyard system with 55% or 64.9 million birds. They are not all of indigenous breed, but the study showed that 60% of the village and backyard farms sourced their day-old-chicks within the village and only 10% outside the district, with the remaining 30% sourcing from a mix of sources within the village and district. An estimated 8-9 million households may have native chicken, but the figure could well be higher.
- In Thailand, an estimated 36% of the chicken population is indigenous. This figure does not include the share of the 28 million ducks of indigenous breeds. Surveys have found (Haitook et al., 2003) that about 80% of the rural households or some 6 million households in Thailand keep native chicken.

These birds receive very little modern veterinary care and from other studies it is known that mortality is very high in the very young chicks from day-old to 8 weeks in particular, mainly due to malnutrition, which leads to weak birds that cannot cope, when they are attacked by predators or diseases. This point has been well illustrated by research undertaken in Asia and summarised by Roberts³¹. However, recent research undertaken under the umbrella of the Danish Smallholder Poultry Network has demonstrated the potential for much increase in survival rates through management and nutrition interventions. In Bangladesh and Malawi studies show large benefits by supplementation with vitamin A³² when chicks are kept in the smallholder system - or confined and provided a supplement in the first eight weeks of life³³. The studies also show that protection against Newcastle disease is not enough although it is commonly held to be an important killer. The nutrition and management interventions must also be improved. The studies show the direction in which work needs to be undertaken in the future in order to enhance the exploitation of indigenous breeds to the benefit of smallholder farmers and their families.

7.4.2. Restocking in the commercial and industrial systems.

With regard to the commercial and industrial systems of production FAO's Guiding Principles³⁴ state that restocking should not take place till a minimum of 3 weeks after the premises have been cleaned and disinfected. The Vietnam study reports on this aspect. Farms that have restocked, did so mostly between 1 and 3 months after the end of the crisis: 38% of farms less than 1 month after the crisis, 61% between 1 to 3 months and 1% of the farms took more than 3 months to begin restocking.

³¹ <http://www.husdyr.kvl.dk/htm/php/tune99/28-Roberts.htm>

³² <http://www.cipav.org.co/lrrd/lrrd16/10/bhui16083.htm>

³³ <http://www.cipav.org.co/lrrd/lrrd16/11/wesr16089.htm>

³⁴ To be found on the right hand menu at http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/special_avian.html

A beginning of restocking is, however, not the same as complete restocking. In Vietnam, the study notes that restocking proceeds slowly as bigger farms have repopulated less than half of their capacity. At the time of the survey complete restocking ranged between 23% of backyard farms to 5% of industrial ones and by mid July, 2004, 72% of the farms had done some degree of restocking with industrial farms having a slightly higher rate. The main problems that the farms reported in continuing with poultry raising were high prices of inputs, difficulties in procuring day-old chicks and fear of resurgence of the Avian Influenza.

In Vietnam as well as in Cambodia it is noted that the farms contracting with the Thailand CP-group have all restocked fast – as soon as 1.3 months after the crisis in Vietnam. In Indonesia, the situation is also reported to be better with regard to restocking for the commercial farms that have contracts with the Industrial farms for supply of inputs and purchase of outputs.

With no constraints to restocking (day-old chicks and other inputs available) the time taken to complete restocking in Vietnam is estimated to be 12 months for the backyard system and 5 to 8 months for the industrial and commercial systems.

In Lao PDR, FAO consultant R. Webb in his report from July 2004 note from a visit to Champasack province that farms that had been infected had since restocked from Thailand in the case of a chicken farm although imports were not allowed. Yet, in the capital Vientiane restocking took place later and the government has only recently been able to assist with restocking, supported by FAO.

8. Public awareness.

The Lao PDR report mentions in its section on recommendations the need for public awareness to be improved to make people understand that there is no risk to human health from consumption of properly cooked or processed products, including eggs. Another recommendation is that awareness needs to be raised concerning precautionary measures to prevent human infection for persons working with poultry in infected areas.

In Indonesia, the report makes limited references to public awareness, but from what is mentioned there transpires a need for information of both poultry producers and consumers concerning control and prevention. The report states that farmers and the public should be informed about that Avian Influenza can cause severe economic loss and that the disease can be transmitted to people. The Japanese Government, through FAO, has supported the production of posters, a film, and programs for the radio. A market survey conducted by the office of livestock services was not completed at the time the present survey was undertaken.

The awareness of Avian Influenza in Vietnam was reported to be quite high and widespread among the farmers as illustrated by the disposal of carcasses that was largely done as requested by the veterinary services, but limitations were noted as several farms did not cull their entire flock and consumed or sold part of it or used some birds to restock. In Cambodia a video has been prepared and presented to the National Workshop.

In his presentation to the Regional Workshop of the present project, October 14-15, 2004 in Ayutthaya, Thailand, Dr. Patrice Gautier, VSF, documented how proper knowledge of the symptoms of Avian Influenza allowed the Animal Health Workers and the farmers to react fast and limit the stamping out to a radius of 500 meters, killing 2838 birds, which were substantially less than in neighboring locations where one or two months were allowed to pass between the first outbreak and the stamping out.

9. Conclusion

9.1. Avian influenza will take time to eradicate.

It is realistic to expect that it will take time to eradicate the HPAI H5N1 virus. The reasons are that the surveillance systems are still falling short of what is needed to report disease from all geographical locations of a country and there are shortages of trained manpower and budgets. In this situation it is likely that there are unreported outbreaks. Other causes are dealt with by Gilbert et al (2004).

Data from the socio-economic impact study from Lao PDR illustrate this. Although no outbreaks were officially reported or diagnosed in the smallholder sector of Lao PDR in the first wave of outbreaks it does appear from the chicken mortality data presented in the socio-economic survey report that HPAI virus did enter the smallholder poultry flocks of Chanthabouly, Saysetha, Sisatanak and Hadsaifong in Vientiane Capital and Khanthabouly district in Savannakhet province. This calls for a much stronger effort to include the smallholders in the control of Avian Influenza.

9.2. Most affected and vulnerable groups.

The socio-economic surveys document that the Avian Influenza with the associated activities like stamping out of birds and restriction of bird movements have had a negative effect on the poorest families due to loss of birds and markets, low prices and lack of compensation, even when the governments promised to compensate (references to data and fact?). There has been a tendency for prices of other meats to go up as the supply of poultry came down and prices of alternatives like pigs and fish have gone up, but for a farmer to benefit from these price increases presupposes that he or she does raise pigs or fish. Households with few assets and no other animals than poultry have experienced Avian Influenza as a shock, leading to reduction of assets. This is seen in the data of the impact study from Cambodia, where between July 2003 and July 2004, the mean number of birds fell 44% from 43 to 24 and the number of households having between zero and 10 birds is up from 5% to 25%. The Lao PDR data are also very clear on this point and the Vietnam survey record a greater use of private money lenders by the small farmers.

9.3. The poultry sector is a private sector and decentralised.

The poultry sector is a private sector. This point needs emphasis in the context of future project planning in order to avoid any misunderstanding about what can be controlled or regulated from a national capital or an international organisation. The modern commercial sector is of course depending on a country's policies and to varying degrees the veterinary services. A large section of the smallholder poultry keepers are not in contact with any veterinary or animal extension services. There is therefore a real danger that plans and strategies that are designed and implemented by

National Governments as well as by International Organisations like FAO will be ineffective, one example being the importance that some of the governments like those in Vietnam and Lao PDR still allocate to government run poultry farms. Adding to the private sector nature of the poultry sector and the decentralised nature of decision-making is the *political and administrative decentralisation* that is promoted in all the participating countries. The assumption behind decentralisation is that problems cannot be solved via a top-down approach dominated by the ministries in the capital, but that solutions must be found on the basis of local knowledge and from a local perspective and that the same solution to solve all problems will not work. In short, it is assumed that political and administrative decentralisation will add flexibility to implementation and greater attention to local needs and priorities. However, the outbreak of avian influenza demonstrates that containment and eradication of diseases call for standardisation and guidelines that cut across international, national or administrative boundaries and they need to be applied top-down as a virus does not respect political and administrative boundaries. Yet, the socio-economic studies demonstrated that even at the height of the first wave of outbreaks with government restrictions and stamping out activities at its peak, some 10 – 12 % of the households still continued to move poultry. This situation points at the importance of promoting public awareness, based on sound knowledge as that will enable people to make informed decisions. The situation calls for a careful analysis of the tasks that the veterinary services do not have to fill along the lines of what Ahuja (2004) recently did for India. In Ahuja's analysis a distinction was made between public and private goods and the appropriate delivery channels for livestock services. Public goods were allocated disease surveillance, prevention, control and eradication of highly contagious disease with serious socio-economic, trade and public health consequences, emergency responses, wildlife disease monitoring, food safety tasks and compliance monitoring while research, extension and training were classified as having both public and private good characteristics. Disease investigation, production and distribution of drugs and vaccines were some of the activities placed in the private good category. A much stronger emphasis on increasing the efficiency of paravets and group and producer associations is also warranted.

9.4. Credit and not compensation.

The suggestions that arise from the socio-economic studies are for timely credit availability and not free cash compensation. The assumption behind compensation is that if poultry farmers are compensated then they will more freely provide information about outbreaks of disease. However, the surveys do not support that. What is mentioned in several cases is the need for timely credit and that it is provided at a subsidised interest rate. There are countries like Cambodia which are straightforward in declaring that the country can not afford compensation, but that money is better spent in building up human and institutional capacity to provide management, credit, production and veterinary services for smallholder producers.

9.5. Working with smallholders.

Rural people that are members of households with some land or are landless frequently experience at least seasonal food shortage and they are therefore at the core of FAO's mandate to achieve food security for all³⁵. It is, unfortunately, still pertinent to pursue this goal as reflected in the recently

³⁵ http://www.fao.org/UNFAO/about/mandate_en.html

formulated Millennium Development Goals³⁶, where goal number 1 is to eradicate extreme hunger and poverty and before 2015 reduce by half the proportion of people who suffer from hunger³⁷.

The surveys document that the experience and institutional capacity of doing participatory research and development with smallholder poultry farmers in the five countries is very limited, and unless the efforts are drastically stepped up it is very likely that the Avian Influenza will spread among them. In practically all cases the dominating modes of technology generation and transfer is from the industrial and commercial types of farms, private or public, to the village and backyard system farms, which is a method that the farming systems literature (Collinson, 2000³⁸) documents to be inefficient. There is much work to do to enhance the capacity in the countries in private companies, NGOs, farmer organisations or government departments and research institutions to develop the village and backyard system of poultry production. In some countries this may go as far as to allow for the organisational freedom that is required to work with small farmers.

Good documentation based on field based research and development is scarce, but in recent years the smallholder system has got attention by the International Network for Family Poultry Development, hosted by FAO³⁹, the Australian Centre for International Agricultural Research's work on Newcastle Disease in village poultry⁴⁰, the Danish Network for Smallholder Poultry Development⁴¹ and the Veterinarians without Frontiers (VSF) in various countries. The VSF Hanoi office has played an active role in the present project and conducted the socio-economic survey in Cambodia and all the networks were represented in the concluding Regional Workshop in Thailand. Clearly the knowledge and experiences present in these networks should be used and built on in any future work for this system.

10. Recommendations.

The following recommendations are based on the outcome of the concluding Regional Workshop, October 14-15, 2004 in Thailand. The process leading up to the workshop was the national surveys in Lao PDR, Cambodia, Vietnam and Indonesia and the national workshops in these countries as well as Thailand.

10. 1. Assumptions.

The concluding Regional Workshop laid down four basic assumptions for its recommendations:

- Avian Influenza will take time to eradicate.
- Policies will comprise all sectors and be drafted in close collaboration with all stakeholders, i.e. the private sector, producer organisations etc.
- However, to the extent governments are prepared to put financial and human resources into rehabilitation of the poultry sector, such resources should be allocated to sectors 3 and 4, i.e.

³⁶ <http://www.un.org/millenniumgoals/>

³⁷ <http://www.un.org/millenniumgoals/>

³⁸ M. Collinson (2000). A History of Farming Systems Research. FAO and CABI publishing.

³⁹ <http://www.fao.org/ag/aga/agap/lpa/fampo1/fampo.htm>

⁴⁰ <http://www.aciar.gov.au/web.nsf/doc/ACIA-5LG4X5>

⁴¹ <http://www.poultry.kvl.dk>

the small enterprises with no backing from large companies or the public, private or NGO extension service for the smallholders, residing mainly in rural areas.

- Generation of relevant information and formulation of strategies to contain the Avian Influenza will be faster with a firmly established collaboration with the human health authorities. Such collaboration must therefore be firmly established at all administrative levels nationally and internationally.

10.2. Capacity building

There is a strong need for recognition of the importance of capacity building in a manner that uses all available resources from local and international organizations. Particular emphasis has to be placed on:

- Best husbandry practices at producers level
- Paravets and community leader capacity building/livestock production and animal disease preventions
- Building of analytical capability
- Creation of databases that contain reliable data
- Trainees and trainers should be selected according to criteria that ensure they have appropriate technical knowledge and field experience
- Harmonization of training curriculum for paravets.
- Increased cooperation between the countries in the region. The countries that have the capacity for analysis and expertise on Avian Influenza should provide assistance to the countries with less capacity.

10.3. Public awareness

There is a strong and unfulfilled need for public awareness about Avian Influenza. While regulations, laws and standards have a role to play, they all suffer from incomplete outreach or circumvention. Public awareness is an important complement to the other initiatives and a properly informed public will be able to make its own choices on actions to follow in their own best interest. There are data to show (see section 8) that there is a much reduced need for stamping out of poultry when information on Avian Influenza is provided fast to veterinary workers and poultry owners, demonstrating a clear economic advantage.

The need for awareness and information is at all levels from decision-makers, administrators, veterinary officers, paravets and poultry keepers, small and large. There is a special need for:

- Development of government media management plans
- Timely, short, concise and targeted information
- Pre-testing of information before it is used on a large scale.

10.4. Decentralization

Decentralisation is promoted in all the participating countries on the assumption that it will add flexibility to implementation and greater attention to local needs and priorities. However, the

outbreak of Avian Influenza has demonstrated – once again – that containment and eradication of diseases call for standardisation and guidelines that cut across national or administrative boundaries.

There is a need:

- To prepare harmonized and formalized national guidelines for the process of containing and eradicating Avian Influenza to be used by all authorities at all administrative levels.
- To mobilize village smallholders into community farmer associations to prepare them for a participatory involvement in formulation of service requirements and implementation.
- To match the suggested interventions with resources.

10.5. Special support for smallholders.

In table 3 it was estimated that this sector comprises 136 to 209 million people in the five countries and that this is the sector where most of the poor people in the region can be found. Section 7 documented how this group continues to be neglected in terms of veterinary and other services.

Small holders have been the most vulnerable group during the Highly Pathogenic Avian Influenza outbreaks in most countries, and they are hardly recovering; support to this poorest group will help to secure their incomes as well as having them on board for surveillance and reporting systems. The following options will contribute to improve poultry production in this sector:

- Improving Animal Health Services at village level needs to include support for Animal Health Workers (paravets), including reporting systems and access to information and training. Government extension staff cannot bring the appropriate support in all villages and other types of organisations should be encouraged to enter the field.
- Improving the farmers' general awareness through appropriate and simple biosecurity guidelines on Avian Influenza in local languages.
- Use of credit or microfinance as a tool for rehabilitation and as an alternative to direct compensation for countries that can not afford to compensate.
- Access to appropriate long term credit.
- Development of farmer groups and associations will help to strength the farmers activities and the dissemination of information

10.6. Biosecurity

Humans, fomites⁴² and animals should be considered major vehicles for the spread of Avian Influenza and understanding of what biosecurity is should be improved at the level of all stakeholders.

It is recommended that the following principles are used:

- Biosecurity measures for the village and backyard system need to be developed with people's participation.
- The level of biosecurity should be applied according to level of risk or threat.

⁴² Any inanimate object that can carry disease causing organisms.

- The cost-effectiveness of biosecurity measures are considered

Concrete steps to follow are:

- Reduction of movement in and out
- Redesign of housing for commercial systems with inappropriate housing and fencing (especially in high risk areas and when possible or at least at night in the village and backyard system.
- Separation between animal species and between animals and humans should be encouraged.
- Correct disposal of sick and dead animals and infected materials and cleaning and disinfection.
- Review of the whole marketing system for identification of spots of contamination.
- To advise that children should not handle sick poultry.

11. References.

The list of references is divided between the country studies undertaken with the support of the project and other material consulted for this summary. A third category is the presentations to national workshops and the concluding regional workshop. All this material will be placed on a CD-rom that can be obtained from FAO. The CD-rom will also contain the studies.

11.1. The country studies

Department of Planning (2004). Socio-Economic Impact Assessment of Highly Pathogenic Avian Influenza on the Poultry Sector of the Lao PDR. Ministry of Agriculture and Forestry.

General Statistics Office (2004). Socio-Economic Impact of Avian Influenza. Department for Agriculture, Forestry and Fisheries Statistics. Vietnam.

Yusdja, Y. and Basuno, E. (2004). Socio-economic Impact Assessment of Avian Influenza Crisis on Poultry, with particular focus on Independent Smallholders. Indonesian Center for Agricultural Socio-economic Research and Agency for Agricultural Research and Development in collaboration with Directorate of Animal Health, Directorate General of Livestock services and Food and Agriculture Organization.

Vétérinaires Sans Frontières (2004). Review of the poultry production and assessment of the socio-economic impact of the highly pathogenic influenza epidemic in Cambodia. FAO.

11.2. Other material

Ahuja, V. (2004). The economic rationale of public and private sector roles in the provision of animal health services. *Rev.sci.tech.Off.int.Epiz.* 2004, 23 (1), 33-45:
http://www.oie.int/eng/publicat/RT/2301/A_R2312.htm

Bell, D., Roberton, S and Hunter, P.H. (2004). Animal Origins of SARS coronavirus: possible links with the international trade in small carnivores. Published online 3rd June 2004, The Royal Society. <http://www.iucn.org/themes/ssc/sgs/mvpsg/pdf/SARS.pdf> - Accessed January 28, 2005.

Bhuiyan A R, Lauridsen C, Howlider A R and Jakobsen K. (2004). Importance of vitamin A supplementation for performance of Sonali chickens under smallholder farm conditions in a tropical climate. *Livestock Research for Rural Development. Vol. 16, Art. #83.* Retrieved January 26, 2005, from
<http://www.cipav.org.co/lrrd/lrrd16/10/bhui16083.htm>

Collinson, M. (2000). A History of Farming Systems Research. FAO and CABI publishing.

Delquigny, T., Edan, M., Hoan, N.D., Kien, P. and Gautier, P. (2004). Evolution et impact de l'épidémie d'Influenza Aviaire et description de la filière avicole au Vietnam. Rapport Final. Vétérinaires Sans Frontières, Hanoi, Vietnam.

- Dolberg, F. (2003). Review of Household Poultry Production as a Tool in Poverty Reduction with Focus on Bangladesh and India. FAO, PPLPI Working Paper No. 6.:
http://www.fao.org/ag/againfo/projects/en/ppipi/project_docs.html
- FAO (2004). FAO Recommendations on the Prevention, Control and Eradication of Highly Pathogenic Avian Influenza (HPAI) in Asia. FAO Position Paper, September 2004, FAO, Rome, Italy, 59 pages:
http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/special_avian.html - to be found on the right hand menu of this link.
- FAO 2005. Social and Economic Impacts of Avian Influenza Control. Proceedings of workshop held in Bangkok, 8-9 December, 2004. FAO, Rome, Italy. 45 pages:
http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/special_avian.html - to be found on the right hand menu of this link.
- Gilbert, M. and Slingenbergh, J. (2004). Highly Pathogenic Avian Influenza in Thailand: an analysis of the distribution of outbreaks in the 2nd wave, identification of risk factors, and prospects for real-time monitoring. FAO, Rome and Department of Livestock, Ministry of Agriculture and Cooperatives, Bangkok, Thailand.
- Gilbert, M., Wint W. and Slingenbergh, J (2004). The Ecology of Highly Pathogenic Avian Influenza in East and Southeast Asia: outbreaks distribution, risk factors and policy implications. FAO, August 2004.
- Haitook, T., Tawfik, E. and Zöbisch, M. (2003). Options for Native Chicken (*Gallus domesticus*) Production in Northeastern Thailand. Paper presented to the Conference on International Agricultural Research. Göttingen, Germany, October 8 – 10, 2003:
<http://www.tropentag.de/2003/abstracts/full/166.pdf>
- Joensen, L. (2002). Intra-household Decision-making and Livestock Investment Patterns in Thanh Hoa Province. The Danish Veterinary and Agricultural University. An Abstract is found at <http://www.juf.kvl.dk/stireports/abstracts/LeaJoensen.htm> - Accessed January 28, 2005
- Lee, C.W., Senne, D.A., Suarez, D.L. 2004. Effect of Vaccine Use In The Evolution Of Mexican-Lineage H5n2 Avian Influenza Virus. Journal of Virology. Aug. 2004, P 8372-8381
- Lwesya H, Phoya R K D, Safalaoh A C L and Gondwe T N P 2004: Rearing chicks in enclosures under village conditions: effect on chick growth and reproductive performance of mother hens. *Livestock Research for Rural Development*. Vol. 16, Art. #89. Retrieved January 26, 2005, from <http://www.cipav.org.co/lrrd/lrrd16/11/wesr16089.htm>
- Oldstone, M.B.A. (1998). Viruses, Plagues & History. Oxford University Press.
- Poapongsakorn, N. (2004). Dynamics of South East Asian Livestock Markets and Their Sanitary and Technical Standards. Paper presented to the FAO Expert Consultation on “Dynamics of Sanitary and Technical Requirements in Domestic Livestock Markets: Assisting the Poor to Cope”. FAO, June 2004.

Roberts, J.A. (1999). Utilization of Poultry Feed Resources by Smallholders in the Villages of Developing Countries. In: F. Dolberg and P.H. Petersen (eds.) Poultry as a Tool in Poverty Eradication and Promotion of Gender Equality. Proceedings of a workshop: <http://www.husdyr.kvl.dk/htm/php/tune99/28-Roberts.htm>

UNDP (2003). Human Development Report 2003. Oxford University Press.

Webb, R.F. (2004). Emergency Assistance for Control of Highly Pathogenic Avian Influenza in Lao PDR. Consultancy Report 27th April – 31st July, 2004. FAO

World Bank (2003). World Development Report 2004. Oxford University Press and the World Bank.

11.2.1. Links.

Australian Centre for International Agricultural Research's work on Newcastle Disease in Village Poultry: <http://www.aciar.gov.au/web.nsf/doc/ACIA-5LG4X5>

Danish Smallholder Poultry Network: <http://www.poultry.kvl.dk>

FAO's Animal Health Special Reports on Avian Influenza: http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/avian_update.html

FAO's Guiding Principles for Highly Pathogenic Avian Influenza Surveillance and Diagnostic Networks in Asia: http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/special_avian.html - to be found on the right hand menu of this link.

FAO's Mandate: http://www.fao.org/UNFAO/about/mandate_en.html

FAO's Map of Chronic undernutrition among Children: http://www.povertymap.net/mapsgraphics/graphics/Undernutrition_en.jpg -

FAOSTAT 2004. <http://apps.fao.org>

International Network for Family Poultry Development (INFPD): <http://www.fao.org/ag/aga/agap/lpa/fampo1/fampo.htm>

UN Millennium Goals: <http://www.un.org/millenniumgoals/>

WHO Global Database on Child Growth and Malnutrition: http://www.who.int/nutgrowthdb/p-child_pdf/

World Organisation for Animal Health's Update on Avian Influenza in Asia (Type H5): http://www.oie.int/download/AVIAN%20INFLUENZA/A_AI-Asia.htm .