

HPAI Control Measure Undertaken in Thailand since 2004

January, 2004 was the first time that HPAI outbreak emerged in Thailand. HPAI of H5N1 subtype was detected in a layer farm, Bangplama district, Suphanburi province, central region of Thailand. The emergency response plan for HPAI was launched immediately. Although the emergency response plan for HPAI had been established, it was only a guideline or a framework. The actual implementation and intervention were adjusted to correspond with the real situations of the outbreak. AI Control Operating Center or the “war room” was set up, equipped with computer, maps, GIS, communication devices. Staffs were on duty 24 hours a day 7 days a week. Staffs and administrators have discussion on a regular basis to update information, evaluate situation, monitor the interventions and to adjust the plans. Control measures and interventions include:

1. Stamping-out and pre-emptive culling
2. Disinfection and carcass disposal
3. Surveillance
4. Movement control and quarantine

Details of each operation will be explained as follow.

1. Stamping out and Pre-emptive culling

1.1 Area: Since HPAI is an emerging disease for Thailand the policy is to contain and eradicate the disease as fast as possible. Therefore the most stringent measures were applied. During the initial phase (23 Jan – 10 Feb, 2004) HPAI infected premises were stamped-out and disinfected, as well as preemptive culling of poultry in all premises within the 5 kilometer radius zone. This 5-km-culling area was the maximum limit allowed by law, an also written in the original emergency response plan.

The radius of culling area was reduced during the second phase (11-29 Feb, 2004) because much less cases were detected after mass culling in the initial phase. During this time, infected premises and poultry within 1 kilometer radius were depopulated, followed by disinfection.

From 29 Feb 2004 until present, sporadic cases are found and majority of this cases are small holders or backyard chickens. Therefore, it is justified that only infected premises will be stamped out, and then samples from the neighboring population within 5- km-radius zone will be collected for virus isolation. If HPAI positive premise were detected, that particular premise will be depopulated.

1.2 Method: Earlier of the outbreak, suffocation or dislocation of atlanto-ocipital joint was applied. At present, affected animals are euthanized by carbon monoxide or carbon dioxide gas. This method, a “Gas tent” method, is a simple method developed by the DLD. A small gas chamber is modified from a tent or a ground sheet. Only a few small and simple equipments are required which makes this methods more practical for a rural traditional farms in Thailand.

At present, specially designed trucks with gas chamber and hydraulic lift are in assembly process. The prototype truck will be finished and ready for experiment soon. The truck will be useful for a larger farm, a farm over fishpond or when the bury site is not adjacent to a chicken house.

1.3 Personnel: Cullers are soldiers and/or temporally workers supervised and trained by DLD staffs. They are provided with necessary personal protection equipments (mask, gloves, gown and boots); their names and addresses must be recorded. Influenza vaccine and anti-viral drug are made available for them. Because culling is labor-intensive activity, every one working hour there is 20-minute break; one shift will not work more than 3 hours, and not more than 2 shifts or 6 hours a day. One group shall work in one premise only to prevent spreading of disease.

1.4 Training: Training for cullers is provided by provincial livestock offices and/or regional livestock offices. After recruitment cullers must be trained how to prevent themselves from infection, how to prevent spreading disease, culling procedure, disinfection and disposal procedure and proper behavior during the mission. Training materials such as VDO tape, manual are produced and supplied by DLD headquarter in order to standardize operation methods.

1.5 Expense: All expense in stamping-out and preemptive culling such as labor cost, vehicle expense, training and training materials, are fully supported by the DLD.

2. Disinfection and carcass disposal

2.1 Chemicals: Regular detergent or another cleaning solution is used to remove dirt, debris, fat or organic materials before applying disinfectants. Recommended disinfectant groups are chlorine, quaternary ammonium compound, phenol, glutaraldehyde, potassium monosulfate with sodium-dodecylsulfonate.

2.2 Method: Cleaning and disinfecting all equipments, inside and outside of the chicken house, bury site, vehicle with regular detergent followed by disinfectants. High pressure spray of disinfectant is applied for the floor, the roof, corner or socket and vehicle.

2.3 Disinfection and Disposal: Carcass disposal has been carried out by bury or burn on the site, lime is added into the pit, followed by disinfecting spray on top of the bury site. Additional disinfectant is distributed to farm owners to repeat disinfection of the premise, use for equipments and some areas as necessary. High pressure spraying machine and back-pack spraying apparatus for disinfection were distributed to every district livestock office and some local administrative offices. Special designed truck to euthanize birds, transport and dump carcass into the pit is now in purchasing process.

2.4 Training: Cleaning, disinfection and carcass disposal are incorporated into the content of culler training course. Poster, brochure and sticker on cleaning and disinfecting method were produced and distributed to farmers, communities, schools and provincial livestock offices.

2.5 Expense: All expense for disinfection and carcass disposal are covered by the DLD.

3. Surveillance

3.1 Active Surveillance

3.1.1 First wave of HPAI outbreak (January-June 2004)

3.1.1.a The initial surveillance: Immediately after the first case of HPAI was confirmed the DLD promptly launched the emergency response plan. Nationwide active agent surveillance or agent surveillance was conducted.

- **Methodology:** The initial surveillance was conducted during 24 - 31 January 2004 under the “**Sanitary Chicken**” project. Sample size was calculated to meet 95% confidence interval with the assumption of 10% prevalence. The smallest epidemiological unit, “**a flock**” was defined as a village or a farm. Sample distribution was nationwide. Nature of samples was cloacal swab or feces, transported in antibiotic-containing medium, collected for virus isolation. Virus isolation was carried out by egg inoculation as recommended by the OIE manual for diagnosis. National Institute of Animal Health (NIAH) and 7 Regional Veterinary Research and Development Centers (RVRDC) were official laboratories responsible of HPAI diagnosis during the outbreak.
- **Results:** The total of 75,623 samples from every village in the country was collected for virus isolation; 161 cases in 71 districts, 40 provinces were positive for HPAI.

3.1.1.b The second surveillance: After stamping-out and preemptive culling in the initial phase, the DLD decided to conduct the second round of active agent surveillance during 11 Feb - 4 March 2004 in order to find the possible residual virus, as

instructed by Deputy-Minister of Agriculture Mr. Newin Chidchob.

- **Methodology:** The areas to be examined were the areas expanding the previously surveyed zone to cover up to 10 km-radius. Sample size, epidemiological unit, laboratory procedure were similar to that of the initial surveillance.
- **Results:** Approximately 12,000 samples were collected and examined for the virus. 18 more cases were detected; however, 17 of those cases were found in the same previously positive provinces. Only one case was detected in a new province (Roi-Et province).

3.1.1.c Active Clinical Surveillance: This is the phase following the second round of surveillance and stamping-out. Active clinical surveillance was carried out nationwide. Case definition and criteria for HPAI case were revised based on field information and scientific findings observed in the Thai outbreak. Sporadic cases were detected with small number of affected birds. The total of 11 cases was found, mostly in the same area that had been infected province. The last case of the first wave was detected on 24 May 2004, in Chiangmai. HPAI outbreak subsided for a period of time.

3.1.2 Second wave of the outbreak (July 2004 – present)

After subsiding period, the second wave of HPAI outbreak was considered to be started on July 3rd, 2004. Active clinical surveillance based on the revised case definition was emphasized. A premise that fit the criteria was subjected to be depopulated and disinfected within 24 hours. Then samples were taken for virus isolation from that HPAI suspected premise and farms/flocks in the “**Protection zone**”, 5 km-radius surrounding infected premise.

Most of the detected cases were small holders or backyard farming with small number of affected birds. The revised case definition was proven to be very sensitive and specific.

3.2 Active clinical Surveillance

Active clinical surveillance has been emphasized and must be exercised all through the country all the time. Case definition was developed and improved for higher sensitivity. Manpower constraint has been lessened by resuming of district livestock officers and good cooperation of volunteers in village level to report suspected cases. As seen in the October X-ray mission, more than million people participated in the operation.

3.2.1 Development of Case definition

- **Case definition (Jan - Feb 2004):** Case definition of HPAI was first established in the original emergency response plan in 1997 and had been revised based on new scientific information. These criteria were revised in January 2004 in order for early detection of the disease after the first case was confirmed. Target animals include chicken, duck, quail and other avian species presented with the following clinical signs.

1. Severe respiratory signs with excessively watery eyes and sinusitis, cyanosis of the combs, wattle and shanks, edema of the head, ruffled feathers
2. Diarrhea and nervous signs
3. No noticeable signs but sudden death of almost 100%, or cumulative death approximately 40% within 3 days

If one of the above criteria is observed, the disease control measures must be executed immediately.

- **Evaluation of case definition (1):** The initial case definition was established based on information from text books, publications and reports from other countries which experienced AI outbreak. However, some clinical signs noticed in the Thai outbreak differed from what had been reported. For instance, accumulated mortality rate was approximately 40% while most of the previous outbreak reported 80-100% mortality. Seventy percent of the infected flock experienced sudden death, 20% presented respiratory signs, 20% showed neurological symptom and 20% reported gastro-intestinal symptom. Therefore, case definition and criteria for HPAI case were revised based on field information and scientific findings observed in the Thai outbreak.

- **Current case definition (Since March 2004)**

Current case definition:

1. Sudden death, more than 10% of the flock population in 1 day
2. Respiratory distress
3. Neurological signs
4. Diarrhea, ruffled feather, depress, decrease appetite, decrease egg production, deformity of eggs, dark or purple comb and wattle
5. Accumulate death more than 40% in 3 days
6. Duck and goose: depress, decrease appetite, ruffled feather, swollen head, corneal opacity

Current case criteria: Since March 2004, a suspected flock that fit one of the criteria below was subjected to be depopulated and disinfected within 24 hours. Then samples from suspected and neighboring farms were collected for virus isolation.

- I. Definition 1 (sudden death, more than 10% in 1 day)
- II. Definition 2 and 5 (respiratory distress and 40% accumulate death in 3 days)
- III. Definition 3 and 5 (neurological signs and 40% accumulate death in 3 days)
- IV. Definition 4 and 5 (other signs and 40% accumulate death in 3 days)

Definition 6 (clinical signs observed in duck and goose).
This particular definition needs laboratory confirmation

- **Evaluation of case definition (2):** Since March 2004, the current case definition has been exercised and proven to be reliable. A suspected premise that fit the criteria was subjected to be depopulated and disinfected within 24 hours,

then samples from suspected and neighboring farms within 5 km-radius were collected for virus isolation. By comparison with laboratory results the current definition was evaluated. Results of the evaluation of the current case definition are presented in table 1.

Table 1: Results of the evaluation of case definition (2)*

Clinically Suspected HPAI	H5 confirmed by laboratory	Average percentage
+	+	80%
+	-	20%

*data collected during July 2004-January 2005, exclude data of October x-ray

3.3 Passive surveillance:

Passive surveillance is another crucial activity that must be carried out all the time. Sick or dead animals especially chicken, duck or bird must be investigated and examined for AI along with other possible pathogens. The National Institute of Animal Health (NIAH) and 7 regional laboratory accept poultry cases all year round, conduct postmortem inspection, collect samples for necessary laboratory examination. Currently HPAI isolation is mandatory for all avian cases submitted to the DLD laboratory network.

3.4 Surveillance in wild birds:

Although wild animals are not livestock and not included in direct responsibilities of the DLD; full technical supports and assistance are extended to Ministry of Natural Resource and Environment. Active surveillance in wild birds is a project operated by Ministry of Natural Resource and Environment in collaboration with Veterinary Departments in 6 universities all over Thailand. The DLD provided reagents and protocol to university network in order to standardize diagnostic methods.

However, DLD laboratories usually received some random cases and specimens from wild birds, as well as samples collected from healthy looking birds intended to export. After examination, results will be reported to the Ministry of Natural Resource and Environment; therefore the DLD takes a major part in passive surveillance for HPAI in wild birds.

3.5 Surveillance in other species:

National Institute of Animal Health is conducting a surveillance project for AI in other species, such as swine, dog and cat. The locations to be studied are the area with H5 positive flocks especially area with repeated outbreak. Samples will be analyzed for H5 and other influenza subtypes, as well as molecular analyses to examine genetic shift or drift, or, any genetic assortments. The NIAH has separate facilities for avian virology and swine virology to avoid possible contamination or genetic assortment.

4. Movement control

4.1 Law and Regulations: Animal Epidemic Act B.E.2499 and its revisions authorized DLD to reinforce measures necessary for animal disease control, such as stamping-out, quarantine and movement restriction. The smallest administrative unit to be declared as a suspected or infected area by law is a district. If an HPAI case is detected that particular district will be declared as suspected zone in order for movement control enforcement and intensive surveillance. After the nationwide surveillance in January 2004, every province of Thailand was declared as suspected outbreak area, which was a legal mechanism in order to reinforce movement control of poultry nationwide. During the initial phase of the outbreak it was necessary to alter some legislation to enable poultry movement control in the country. Previously movement control of poultry was limited only for import and export; a Royal Decree was enacted in order to control movement of poultry within the country. In addition, a Ministerial

Regulation was issued in order to instruct movement control between provinces. At present another Royal Decree on slaughterhouse control, addition to the existing regulation, was drafted and has been on process of enactment.

4.2 Area subjected to movement control and quarantined: According to the original emergency response plan, after the first HPAI farm had been identified movement of avian species from the area within 50-kilometer radius is not allowed for at least 30 days as; the radius may be extended to 60 km. depending on geography of the area for example mountain, river or road. In February 2004, the size of movement control zone was re-considered. The area within 5 km-radius around infected premise was a **“Movement control zone”** where movement of poultry was prohibited for 21 days.

At present, once HPAI case is identified the area within 5 km-radius from the infected premise will be established as a **“Protection zone”**. Movement of poultry raised in this area will be prohibited for 30 days. Cloacal swab will be taken for virus detection. If HPAI is detected that particular premise will be depopulated and disinfected and another 5-km surveillance zone will be established. In addition, the area surrounding a surveillance zone, the area expand from 5 km to the 10 km, will be established as a **“Movement Restriction zone”**. Active clinical surveillance will be conducted. Movement of poultry in this area will be prohibited for 30 days.

4.3 Movement permit: Seven to ten days before sending poultry to a slaughterhouse, cloacal swabs must be taken for virus isolation. Movement permit will be issued only to the farms with AI negative results. At present this regulation is applied nationwide all the time.

4.4 Checkpoints: Because some provinces in the central zone are repeated outbreak area the most stringent movement control measures have been implemented. Therefore, currently there are 32 inter-zone checkpoints between central zone and other zones.

For area in general, there are 152 checkpoints, at least 2 checkpoints per province. There are totals of 69 animal quarantine stations in Thailand, among these 43 are international quarantine stations at the airports, seaports and along the country borders. Overall there are 109 veterinary officers and permanent staffs, 353 temporary staffs, as well as 224 contracted veteran assistants (7 veterans in each of 32 inter-zone checkpoints).