

Avian Flu and SARS: The Policy and Legal Challenges of Zoonotic Diseases

by

Prof Koh Kheng-Lian

**Faculty of Law, National University of Singapore;
Director, Asia- Pacific Centre for Environmental Law; IUCN CEL
Regional Vice Chair for East Asia,
and member of its Steering Committee
13 Law Link, Singapore 117590 Tel: (65) 6874 6246
Fax: (65) 68721937/ 67790979
E-mail: lawkohkl@nus.edu.sg**

1. Avian Flu

A. Introduction

B. Policy and Legal Challenges

(a) Policy Challenges on Culling: Conservation Issues

- Extent of Culling as at 18 January 2004**
- Precautionary Principle**

(b) Legal Challenges

(i) MEAs on Biodiversity

(ii) National Laws Dealing with Avian Flu

C. FAO – OIE Guidelines to Prevent and Control Avian Flu: Policies and Strategies

D. Conclusion (Avian Flu)

2. SARS

A. Introduction

B. Policy and Legal Challenges

(a) Culling and Conservation: Policy Challenges

(b) Legal Challenges: Biodiversity Conservation

- **Issues Relating to Protection of Wildlife and Domesticated Animals**
- **CITES and Application of the Precautionary Principle to control SARS**

C. Singapore Experience: Legal Measures to Control SARS

- **Infectious Disease Act – Amendments**

D. Policies and Strategies to Control and Prevent SARS: Regional & International Responses

(a) ASEAN + 3

(b) APEC

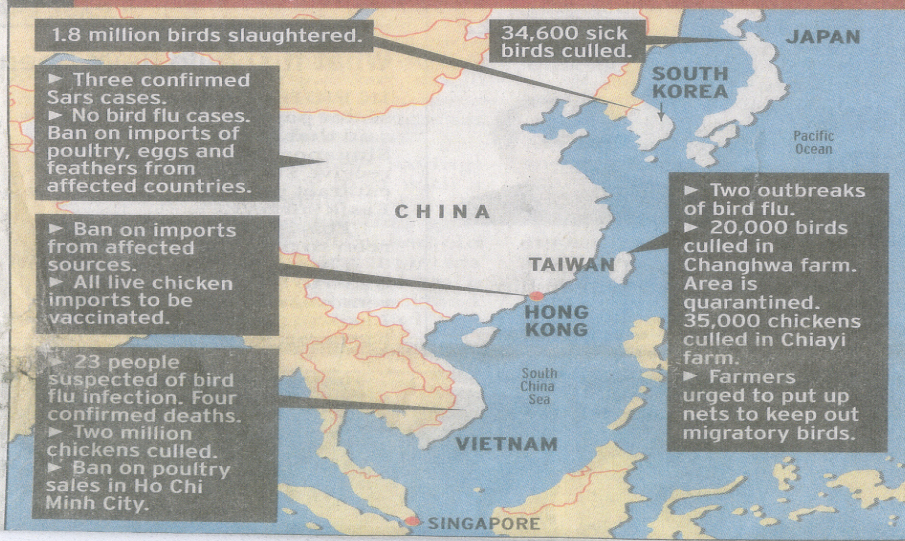
(c) WHO

E. Conclusion (SARS)

TOP OF THE NEWS

Region sees more bird flu and Sars cases

▶ The hot spots



Thailand battles fresh outbreak of virus amid fears of resurgence gathering pace

Bird flu spreads to 18 Thai provinces

BANGKOK – Bird flu outbreaks have spread to three more Thai provinces, health officials said yesterday in the latest sign that a resurgence of the disease that killed 24 people in Asia this year is gathering pace.

At least 18 Thai provinces are battling renewed outbreaks of avian influenza which swept through 10 Asian countries early this year, killing 16 people in Vietnam and eight in Thailand, and decimating poultry stocks.

New cases have been reported in recent weeks in China, Vietnam and Thailand, raising concerns that the virus may be staging a comeback in the region.

“Lab results show the latest province affected by bird flu is Khon Kaen in Thailand’s north-east,” a livestock development department official, who asked not to be identified, said.

“Now we can confirm that we have found bird flu in 18 provinces.”

Earlier this month, Prime Minister Thaksin Shinawatra sought to play down the crisis, saying outbreaks were appearing only sporadically across the country’s 76 provinces.

He told reporters that the government ordered prompt culls when suspected cases were identified, but ruled out any vaccination programme because of fears that the virus could mutate.

Only a few thousand birds reportedly have been culled this time around, compared with tens of millions that were killed in the earlier outbreaks this year. – AFP

Bird flu outbreak: 'Worst yet to come'

The WHO says that the world risks facing a bird flu pandemic if more is not done to detect and eradicate the disease

SHANGHAI — Asia faces a bird flu outbreak of unprecedented proportions, according to the World Health Organisation (WHO).

It warned that avian influenza could develop into a global pandemic if more was not done to detect and eradicate it.

"This outbreak is historically unprecedented. Its infectious agents don't respect international boundaries," Dr Shigeru Omi, the organisation's director for the Western Pacific, told some 300 member-state delegates here.

Health officials from across Asia raised alarm bells yesterday over the outbreak.

Since last November, 39 cases of the H5N1 strain of avian flu has been detected among humans in the region, with 28 people killed in Thailand and Vietnam.

The delegates stressed that increased collaboration between nations and more study was needed to combat the virus, which resurfaced in July in Thailand, Malaysia, Indonesia, Vietnam and China after an earlier crisis ended.

The WHO has said the vir-

ulent virus was circulating more widely in the region than originally believed.

A huge flow of people, goods and foods around Asia and lax animal husbandry practices are prime concerns.

But most worrisome is the fact that humans lack immunity to the virus.

WHO Director-General Lee Jong Wook said the ultimate goal was to contain the virus' spread before it developed the ability to jump from human to human.

Currently, the avian flu is very infectious among birds, but does not spread as easily from animals to humans.

To prevent the virus from mixing with a human one and forming a new disease, Dr Lee said, "will require a sustained effort of investment". The WHO is pushing for a 12-percent increase in its budget, partly to deal with avian flu.

The organisation also warned that new diseases similar to the avian flu and Sars originating in animals — known as zoonotic diseases — are almost certain to keep appearing. "We must be ready for them," Dr Omi said.



REUTERS

Malaysian health officers catching chicken in Tumpat, Kelantan. A bird flu outbreak began in the state last month.

To deal with the threat, he said the WHO must work more closely with the United Nations' Food and Agriculture Organisation, which deals with livestock.

WHO official Hitoshi Oshitani, the regional adviser for surveillance and response, said the region "still had a long way to go in terms of preparedness" in dealing with bird flu.

Malaysia, which detected three possible human bird flu

cases last weekend, said it had strengthened infectious disease surveillance and drawn up a rapid-response plan.

A Malaysian representative suggested countries around the region adopt a common framework to prepare for a potential national pandemic.

Singapore proposed wider use of vaccinations.

"The outbreak of Avian influenza in the region is potentially more dangerous than Sars and we should not ignore

a pandemic arising from this," a Singapore representative said. "We cannot wait for a pandemic to appear. Rapid vaccine development is necessary and needed urgently."

Thailand, the world's fourth-largest chicken exporter until the disease halted its exports to Europe and Japan, could decide this week whether to vaccinate fowl.

Thousands of chicken farmers oppose such a move. They say Europeans would

WHAT'S ALARMING

◆ Humans lack immunity to the H5N1 strain. It is crucial to contain the virus before it develops the ability to jump from human to human.

◆ Reports that the H5N1 virus has been found in pigs in China raise fears that they could make it easier for the virus to mutate.

WHAT CAN BE DONE

◆ More countries need to enact preventive measures and boost preparedness for a possible renewed outbreak;

◆ Early detection and reporting of outbreaks to minimise their social and economic impact;

◆ Increased collaboration between countries and more study to combat the virus;

◆ Wider use of vaccination proposed but chicken farmers fear customers would balk at eating vaccinated birds.

balk at eating vaccinated chickens because of sensitivities about chemical residues in food.

Delegates to the regional meeting are also looking into threats to food safety. They are expected to propose regulations on the sale of live animals for food.

— AP, REUTERS

[Kelantan bird flu jumps outside quarantine area. Page A7]

The Sunday Times, 12 September 2004
Global pandemic warning from WHO

More bird flu cases in Kelantan villages

► KUALA LUMPUR

MALAYSIA yesterday announced new bird flu cases and said a veterinary worker had been hospitalised with a fever and cough.

Officials said eight birds had died from the H5 strain of avian flu in three villages near the border with Thailand, which is also battling the disease.

"Culling of poultry in the infected area will begin later today," said Mr Hawari Hussein, director-general of the Veterinary Department.

More tests are needed to determine whether the virus is of the H5N1 strain, he added. This lethal strain has killed 28 people in Asia this year, including nine in Thailand.

Meanwhile, a top World Health Organisation official, Dr Shigeru Omi, warned yesterday of a likely global pandemic unless tougher efforts are made to combat the spread of the virus and improve sanitation in the poultry industry.

No humans have been infected by H5N1 in Malaysia since the first outbreak was recorded last month. The new cases were discovered in Kebakat, Paloh

Hilir and Cabang Tiga villages — all within a 10-km radius of a quarantine area set up last week in Kelantan, the AP reported.

The Federation of Lifestock Farmers Associations said the poultry industry is losing RM10 million (S\$4.5 million) daily after Singapore and other countries slapped import bans.

In Singapore, the authorities are monitoring the situation.

Second Minister for National Development Lim Swee Say told reporters last night that officials from the Agri-Food and Veterinary Authority had visited Malaysia to check if its proposed bio-security measures were adequate for Johor and Malacca to be declared free of bird flu. The officials have returned and Mr Lim will be meeting them tomorrow to hear their report.

Said Mr Lim: "At this moment, I'm unable to say whether we are able to lift the import ban earlier, because we have to give our technical experts enough time to go through the proper evaluation and assessment."

"We have one consideration — that the lifting of the ban will not mean unnecessary risks," he added.

Bird flu checks now cover all of Kelantan

As the virus is found in a sixth village, poultry smugglers are threatened with detention under the Internal Security Act

KUALA LUMPUR — Malaysia expanded its intensive surveillance for bird flu yesterday, to cover the entire state of Kelantan, after the virus was discovered in a sixth village.

State veterinary authorities said clinical checks would be conducted in high-risk areas like wet markets, pet shops and bird sanctuaries.

Until now, intensive monitoring had been confined to a 10km radius of the village where bird flu was first discovered on Aug 17, in fighting

cocks believed to have been smuggled from Thailand.

The virus has since been discovered in five locations within the zone, despite the efforts of hundreds of veterinary and health workers to cull thousands of birds and screen residents to contain it.

Yesterday, veterinary officials said they had found the H5 virus in quail in a village in the 10km quarantine area. In previous cases, tests have shown the H5 virus to be the deadly H5N1 variety.

The H5N1 strain, which has left 28 people dead in Thailand and Vietnam, is not confirmed to have infected anyone in Malaysia, although a 10-year-old girl was under hospital observation yesterday.

The stepped-up surveillance comes amid warnings from the World Health Organisation that it is more worried about bird flu than Sars.

Dr Shigeru Omi, director of WHO's regional office for the Western Pacific, said ahead of a meeting in Shanghai yesterday that avian flu was circulating far more widely than predicted — a huge concern as humans had not built up an immunity, and in view of the massive movement of people, goods and foods

around the region.

He said member states must strengthen reporting systems and improve animal husbandry practices before it develops into an infectious disease among humans. "Unless we intensify efforts made to halt the virus, a pandemic is very likely," he warned.

WHO sounded the alarm after a sudden return of the H5N1 virus in China, Thailand, Vietnam, Indonesia and Malaysia, putting an end to aull of several months.

Malaysian Agriculture Minister Muhyiddin Yassin warned yesterday that detention under the Internal Security Act may be used to show poultry smugglers how serious the Government was about

'UNLESS WE INTENSIFY EFFORTS MADE TO HALT THE VIRUS, A PANDEMIC IS VERY LIKELY TO OCCUR.'

— WHO's Dr. Shigeru Omi, WHO has said that it is more worried about bird flu than Sars, as it is circulating far more widely than predicted.

containing the virus, the New Straits Times reported.

"If there is a need to use the ISA to overcome this problem, we will do it," he said, noting the current RM1,000 (S\$447) maximum fine for smuggling animals into the country was not enough of a deterrent.

Kelantan state authorities yesterday also urged residents who frequently went to Thailand for cockfights to stop.

Culling of birds in the state has raised friction with some villagers. One threatened veterinary workers with a spear and sword on Sunday as they

took away his peacocks.

Meanwhile, thousands of Thai chicken farmers demonstrated in Bangkok yesterday against a proposed bird flu vaccination programme.

They say European consumers would balk at eating vaccinated chickens, because of sensitivities about chemical residues in their food.

Malaysia also expressed concerns about vaccination during a meeting with Thai officials in Bangkok yesterday.

International health authorities question the effectiveness of vaccines and say culling is the best weapon against bird flu.

— AP, REUTERS
[See also HOME: H2]

Bird flu can spread among cats

Findings of a Dutch study highlight need to probe role of animals in spreading the virus among poultry and to humans

WASHINGTON — The bird flu virus that has spread widely in South-east Asia and infected some people there has also crossed another species barrier to infect cats, and can be spread among them as well, say Dutch scientists.

The finding is “extraordinary because domestic cats are generally considered to be resistant to disease from influenza A virus infection” like that of the avian strain, the researchers report in the latest issue of the journal *Science*.

In the Dutch study, some cats with the infection died of it while others survived.

A few did not even show any symptoms that they were carrying the disease.

Whether cats can transmit the virus strain A(H5N1) to humans is not known.

The World Health Organisation has received no reports that cats played a role in afflicting the 35 people who have developed A(H5N1) infection, all in Thailand and Vietnam, said Mr Dick Thompson, a spokesman for the agency in Geneva. Those cases were traced chiefly to direct contact with sick birds.

Even so, the Dutch study has important implications for human and animal health, said senior animal health officer Juan Lubroth at the Food and Agriculture Organisation.

According to the officer and the study’s authors, the

findings underscore a need to investigate the possible role of cats and an array of other animals in the spread of avian influenza among poultry and to humans.

An estimated 200 million birds have either died of A(H5N1) or been slaughtered to control the outbreak since last winter, when the strain simultaneously appeared in eight Asian countries.

UN officials have described the scale of the epidemic — geographically and economically — as unprecedented for an avian flu outbreak.

The strain has also been particularly lethal for humans, killing 25 of the 35 people infected.

Many influenza experts and health officials fear a worst-case occurrence in which a person becomes infected with both an avian influenza virus and a human one.

Under such a circumstance, the viruses might swap genes, creating a new virus that could cause an epidemic all over the planet much like that of the so-called Spanish flu of 1918-19 which killed 675,000 people in the United States alone and more than 20 million around the world.

The laboratory in Rotterdam that reported the new findings has conducted research on A(H5N1) since 1997, when its scientists de-

tected the strain in a child who had died of the disease in Hong Kong.

The Hong Kong case was a scientific bombshell because it was the first in which a new avian influenza virus had been transmitted from birds to humans without first mixing with mammalian influenza strains in pigs.

Since then, the A(H5N1) virus has mutated to become more virulent. Last January, a clouded leopard died, apparently of avian influenza, at a zoo in Thailand after eating virus-infected chickens. Thai health officials recalled in recent interviews in Bangkok.

A month later, scientists identified the A(H5N1) virus in three dead cats and in a white tiger that recovered after becoming ill in the same zoo where the leopard died.

The cats belonged to a Thai woman who had 15 in all, 14 of which apparently died of avian flu, although the remains of only those three could be found for testing. The woman did not develop bird flu.

Tests showed that the molecular makeup of the viruses isolated from the cats and the tiger was the same as that of the virus found in chickens.

After learning about those infections, the Rotterdam team, led by Dr Thijs Kuiken, conducted three laboratory experiments by using the A(H5N1) virus isolated from a Vietnamese patient who had died of it. The findings confirmed what had been observed in the cats in Thailand.

— NEW YORK TIMES



It is not known whether cats can transmit the virus strain A(H5N1) to humans. Before the Dutch study was conducted, it was believed that cats were resistant to the virus.

AP

THE DUTCH EXPERIMENT

Dutch researchers led by Dr Thijs Kuiken conducted the following laboratory experiments on cats infected deliberately with the A(H5N1) virus:

◆ **First, the team introduced the virus into the airways of three European short-hair cats, the breed generally used in animal experiments.**

All three became sick the following day, and one died on the sixth day of illness. In comparison, none of three cats infected with the most common type of human influenza virus became ill.

◆ **In the second experiment, three cats were fed infected chicken. Examination of their tissues under a microscope showed that all three developed severe lung damage similar to that seen among birds and humans.**

People are not vulnerable to infection by eating chicken that is cooked, but the person who cooks it may be at risk from handling it, health officials say.

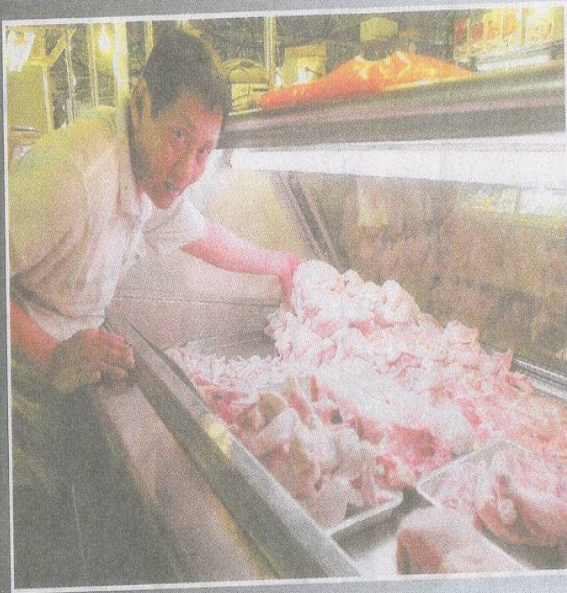

◆ **In the third experiment, the researchers put two healthy cats in the same cage two days after infecting a third cat. The healthy cats also became ill.**

Dr Kuiken said he did not know whether these two cats had caught the infection by licking, through droplets or through the air. His study, he said, was not devised to determine how the cats spread the virus.

- NEW YORK TIMES

A2

BIRD FLU CRISIS



THE STRAITS TIMES : Thursday, January 29, 2004

SINGAPORE'S BATTLE PLAN

'A quick response is crucial. Even if Malaysia hasn't declared it has bird flu yet, we will declare a ban the minute we get one case. Those chickens already here will all be destroyed.'

- Dr Chua Sin Bin, AVA's deputy chief executive officer, on being vigilant against chicken imports

BIRD FLU CRISIS

Fears over what virus could mutate into

Experts dare not rule out the possibility that the H5N1 virus strain could turn into the dreaded 'Big One' - a global pandemic

By **KAREN JACKMAN**

THE measured uneasiness this week among the United Nations' medical experts tracking the deadly H5N1 avian virus strain revealed one thing.

They are not ruling out that it could become even deadlier.

Less than a century ago, the Spanish Flu became recorded history's most devastating pandemic. From 1918 to 1919, it claimed between 20 and 40 million lives. A similar scourge could happen again.

The fears are not over the H5N1 in particular, although it has killed 18 people and made lots of Asian chickens

sick. The disquiet is over what this nasty strain could mutate into and what havoc it could unleash.

Agencies like the World Health Organisation (WHO) get jumpy just thinking about what would happen if the H5N1 mutated by mixing with the regular human flu to become transmissible between humans.

Because these avian viruses usually do not infect humans, says the WHO, there is little or no immune protection against them in the human population.

But does avian flu, on its own, pose a serious threat to human health? A report in this week's Economist maga-

zine concludes that the answer is "no" for now.

Those who have been infected so far caught the disease directly from birds.

Yet flu viruses which do pass between people ultimately came from animals - probably chickens or ducks, though pigs could be involved too.

Usually, the avian flu virus that occurs in wild birds is weak, and does not usually make them sick.

The chances of the virus infecting new hosts are limited. In order for it to survive, its host must, too. If hosts become abundant, bird flu is free to kill and thus becomes more deadly. This happens in crowded conditions such as modern poultry farming.

Thus far, in the 10 Asian nations affected, the H5N1 strain has killed only people who came in direct contact with the sick fowl.

But human transmission could happen if someone who caught it from a chicken was also suffering from or incubating normal human flu, said Professor Alan Smith, a specialist in influenza viruses at the University of Natal in South Africa.

"Then you could get a hybrid, which could be very, very deadly," he said. "The human flu virus is perfectly suited to being spread by an 'innocent' sneeze or speech."

While the WHO downplays its fears to avoid panic, it remains candid.

WHO spokesman Christine McNab told The Straits Times: "Everybody expects there will be another flu epidemic, but the reason we are concerned is there is the potential for it to mutate into something extremely virulent."

For years, health authorities have been waiting for the

"Big One" - a new virus perfectly adapted to the environment of global living, able to spread among continent-hopping humans with the ease of influenza but with a devastatingly high rate of mortality.

Mr Robin Weiss, a professor of virology at University College in London, has already declared the H5N1 flu more dangerous than Sars, "in the sense that people become infectious before they start feeling too ill to travel or mix with others in confined spaces".

"With Sars this wasn't the case," he said. "The difference makes the (avian) flu nastier."

Given the right conditions, the flu can emerge anywhere, but experts say Asia has long been its cradle.

It has all the ingredients for spawning it, WHO chief influenza scientist Klaus Stohr told the Associated Press earlier this week.

"In Asia, we have a huge animal population, a huge bird population and two-thirds of the world's people living there," he said.

The Asian tradition of peasant farmers keeping ducks, chickens and pigs together with the family has long created opportunities for influenza to jump the species barrier.

Industrial-scale chicken farming is exacerbating the problem.

"Many scientists believe a major bird migratory pathway from Siberia across Asia could keep the continent's poultry seeded with the flu virus, which lives naturally in the gut of waterfowl."

Scientists are convinced that the 1957 Asian flu and 1968 Hong Kong flu pandemics originated in Asia.

While the WHO said that testing indicates the strain so far has not been very success-

ful at jumping to humans, Mr John Oxford, a flu expert from the Queen Mary School of Medicine in London, said flu strains may take a year before they really take off.

How such a pandemic could play out in a fast-moving, modern society - which has modern drugs - is difficult to predict, but the medical experts offer some clues.

Prof Weiss noted that the flu agents could cross the world as fast as air travel.

"Singapore, being small, developed and somewhat authoritarian in comparison to Western liberal democracies or less developed Asian countries, might do better than most nations."

"It could also attempt to protect its own population by vaccination."

"(But) being a major hub for international air travel, Singapore could be in the front line."

FIVE-PHASE PLAN: WHO swings into action

THE World Health Organisation's five-phase influenza-pandemic preparedness plan has already swung into action.

At present, the agency is at phase zero, level two. This means a new influenza strain has appeared and human infection has occurred.

The plan moves to phase zero, level three when there is clear evidence of the virus spreading from human to human.

Phase one confirms the onset of a pandemic in at least one country and phase two means that the outbreak of the new virus is spreading round the world.

Experts say pandemics usually run their course in waves and are likely to wind down after two to three years. Phase three is declared at the end of the first wave and four at the second or later waves. Phase five marks the end of the pandemic.

HK CASE: Virus jumped from birds to humans

DOCUMENTED infection of humans with an avian influenza virus occurred in Hong Kong in 1997. That year, the H5N1 strain caused severe respiratory disease in 18 people. Six of them died.

The infection of humans coincided with an epidemic of deadly bird flu, caused by the same strain, in Hong Kong's poultry population.

Investigations of that outbreak determined

The Spanish Flu outbreak of 1918-19 occurred before laboratory diagnosis and characterisation of viruses was possible.

In contrast, today:

◆ There are four WHO Collaborating Centres for Reference and Research on Influenza in Australia, Japan, Britain and the US;

◆ Among the countries which have joined the international surveillance programme, China is an active participant;

◆ Methods of identifying new viruses include rapid genome (an organism's genetic material) sequencing;

◆ Communication about events and transportation of laboratory samples can be achieved rapidly and

◆ Considerable knowledge exists about animal-influenza viruses.

that close contact with live infected poultry was the source of human infection. Further studies determined that the virus had jumped directly from birds to humans.

Hong Kong's entire poultry population of around 1.5 million birds was killed in three days.

That reduced opportunities for further direct transmission to humans and may have averted a pandemic.



FIERY END: Chickens trying to flee as the people of Bolongan village burn alive hundreds of them to halt the spread of bird flu in Indonesia's Bali island. Jakarta's welfare minister has said about 10 million chickens in the country will have to be culled to check the deadly avian influenza.

The Straits Times, 3 February 2004

Thaksin slams WHO bird flu speculation

Thai PM hits out at suggestion bird flu is transmitted between humans; WHO says there is no evidence yet to confirm this

By **NIRMAL GHOSH**
THAILAND CORRESPONDENT

THAI Prime Minister Thaksin Shinawatra yesterday slammed the World Health Organisation (WHO) for speculating that the bird flu virus had been transmitted between humans in Vietnam.

"Normally the ethics of researchers is such that if there is only a slight possibility of something happening, then they will discuss it among themselves, they will not say anything to the public to raise concern," Mr Thaksin told reporters.

The Thai premier, who is trying to contain public panic and prop up sagging faith in the poultry industry, added: "If the possibility is higher than 5 per cent they should say something, but if it is under 5 per cent they should not say anything."

"The possibility of human-to-human transmission is

0.00001 per cent," the prime minister said to emphasise the remote possibility of such transmission. He did not say how he arrived at the figure.

His remarks came as two more people died yesterday after contracting bird flu, raising the death toll to 12.

The deaths of a 58-year-old woman in Thailand and an 18-year-old boy in Vietnam came a day after the WHO said two sisters who died of bird flu in

If the possibility is higher than 5 per cent they should say something, but if it is under 5 per cent they should not say anything.

— **Thai PM Thaksin, on the ethics of researchers**

Vietnam last month may have caught it from their brother, who also died.

Yesterday, the WHO appeared to moderate its earlier statement, saying there was "no evidence of efficient human-to-human transmission of H5N1 occurring in Vietnam or elsewhere".

"It doesn't seem that we have crossed the threshold into the scenario of general human-to-human transmission in the population," the WHO's Vietnam spokesman Bob Dietz said.

"This case remains an anomaly but one that has to be fully understood before we can draw any greater conclusions about the course of infections."

The WHO has been warning that the bird flu virus might mutate into one that can spread from person to person.

So far, it has drawn a distinction between a general transmission of the disease among humans and a more "limited transmission", which is limited to a short chain of people with the virus apparently "vanishing" after causing the cluster of infections.

In the wake of the new deaths in Thailand and Viet-



XINHUA

Touring areas hit by bird flu, Premier Wen meets a farmer at his home in Hubei province.

nam, avian flu experts are due to meet today at Food and Agricultural Organisation headquarters in Rome to discuss responses to the current crisis.

Key individuals from South-East Asian countries will also attend or take part through teleconferencing, an FAO official told The Straits Times.

The latest Thai victim was a woman who raised chickens in Suphanburi province, northwest of Bangkok.

Mr Thaksin's spokesman, Mr Jakrapob Penkair, told reporters nine people were suspected of being infected with bird flu — one a young boy who doctors said had only a 30 per cent chance of survival.

The Vietnamese death was the second from the south of the country, other cases being from the north.

The WHO representative in Thailand, Mr Bjorn Melgaard, said yesterday he did not think the virus would spread widely in humans.

"The initial information we have about the current virus is it is a purely avian virus. It's not a very efficient virus in terms of infecting humans," he said.

"The risk is the creation of a new virus through the combination of the current avian virus with the human virus."

Health experts are concerned that another aggressive human influenza virus from the Northern Hemisphere may reach South-East Asia and combine with the bird flu virus.

"We are getting some reports of human influenza here but it is difficult to say how widespread it is," Mr Dietz said yesterday in Hanoi.

More bird flu deaths likely, WHO warns

Not enough is being done to contain the spread of lethal virus, which is endemic to region: Experts

BANGKOK — The World Health Organisation (WHO) warned yesterday that more people are likely to die from bird flu after a man who raised fighting cocks became Thailand's ninth victim this year.

The country's latest death shows not enough is being done to contain the spread of the deadly disease, said Mr Kumara Rai, the WHO representative in Bangkok.

"If control among poultry is good, there wouldn't be human cases," Mr Rai said, adding that despite efforts by the Ministry of Agriculture to improve surveillance of poultry, there were still undetected outbreaks.

"The FAO and OIE will be looking into control mechanisms and propose recommendations," he said, referring to the Food and Agricultural Organisation and a Paris-based international animal disease control body.

"Tragically, the broad picture is, we think cases will continue to pop up in humans, as well as in poultry," said Mr Peter Cordingley, spokesman for the WHO's Western Pacific Office in Manila.

"The virus is still there and we don't think any real progress has been made in fully eradicating it," he noted, adding that handlers of fighting

cocks were particularly at risk because training the birds required extensive handling.

The Thai Health Ministry says three more people are being tested for the H5N1 virus.

Thai Prime Minister Thaksin Shinawatra has also appealed for calm in his country. He told reporters: "Don't worry, there's no need to panic." The government is in a much better position now to handle the situation than in the past, he said, adding: "Now we have enough experience...I think we can handle this well enough."

The Thai man who died on Wednesday — 18-year-old Komsan Fuchom — is from eastern Thailand's Prachin Buri province. He is the 28th Asian fatality from the lethal strain of the virus that has swept the region this year.

He was stricken with the H5N1 form of the virus late last month after his 30 fighting cocks died, but initially refused hospital treatment, Thai officials said. He was eventually admitted on Saturday.

A 16-year-old was placed under surveillance by health officials as he was close to the man who died and was known to have handled the fighting cocks.

The latest death in Thailand is unlikely to be

the last as the virus is endemic in Asia, Mr Cordingley said.

Thailand, Vietnam, Indonesia, China and Malaysia have all reported cases since July, after the worst of the outbreaks of H5N1 left eight dead in Thailand and 16 deaths in Vietnam. Poultry industries have also been crippled. — AFP, REUTERS

More culling as Malaysia reports new bird flu cases

KUALA LUMPUR — Malaysia launched a new wave of poultry culling yesterday after bird flu cases were detected for the second time in less than a week.

“We are continuing with our efforts to cull chickens, ducks and birds in the affected areas,” said Veterinary Department director-general Hawari Hussein.

Malaysia announced new

bird flu cases for the second time in five days on Saturday and said a veterinary worker had been hospitalised with a fever and cough.

Officials said eight birds had died from the H5 strain of avian flu in three villages near the border with Thailand — which is also battling the disease — and just kilometres from Malaysia’s previous outbreaks.

Mr Hawari said there was a ban on imports of birds from Thailand and no birds could be taken out of the infected state, Kelantan.

All birds and eggs sold in the market were safe for consumption, he said.

More tests were needed to determine whether the virus was of the H5N1 strain, which has killed 28 people in Asia this year.

In Thailand, four children were hospitalised with avian flu symptoms yesterday, according to a health official.

Two boys, aged six and eight, and a three-year-old girl were hospitalised in the Krabin Buri district of Prachinburi province. A two-year-old girl in Bangkok’s Minburi district was also hospitalised.

China, Vietnam and Indo-

nesia have also reported bird flu outbreaks since July after an earlier crisis this year.

The World Health Organisation has said it is more worried about bird flu than Sars, warning a pandemic is likely to occur unless effective measures are taken.

After the most recent outbreak on Sept 6, about 1,200 birds, chickens and ducks within a 1km radius of Belian

village were killed to curb the spread of the disease.

Belian is near Pasir Pekan, where the H5N1 strain was discovered for the first time in Malaysia last month.

The Federation of Livestock Farmers Associations said the poultry industry was losing RM10 million (S\$4.5 million) daily after Singapore and other countries imposed import bans.

— AFP

KEEPING SINGAPORE SAFE

To keep bird flu out of Singapore, all live chickens imported here are put through stricter checks. SHARMILPAL KAUR follows a chicken from the Tuas checkpoint to AVA's laboratory for a behind-the-scenes look at how the birds are tested.

1 Every day, between 50 and 60 trucks trundle into Singapore, bringing 120,000 live chickens from Malaysia. Each consignment is visually inspected at the Tuas checkpoint for signs of infection, including chickens with purple necks, combs and legs or swollen heads and legs.

Documents detailing each chicken's journey from farm to market are also verified. This is a form of contact tracing: If a bird is found with the virus, the entire consignment can be traced and destroyed immediately.



5 If all is clear, the ground tissue is then used to test eggs. It is injected into five eggs produced by hens kept by AVA officers. The eggs are between nine and 11 days old, and are free of specific viruses.

The eggs are then monitored for five days. If bird flu is present, the virus will kill the healthy egg within one to three days. If there is no virus, the egg will continue developing normally.

Researchers look for blood vessels in the egg and signs of movement in the embryo to show that it is still alive and healthy. A dead egg is an immediate warning sign. If the eggs are still healthy after five days, they are disposed of as medical waste and carefully incinerated.

The checks for ornamental birds are stricter. The liquid injected into ornamental bird eggs is re-harvested and re-introduced into another five eggs. This is because it may take longer for the virus to present itself in such birds. If there is still no sign of the virus after this, the eggs are destroyed and the all-clear for the batch is given.



4 The tissue samples are carefully placed and capped into a small bottle.

To detect bird flu, researchers need to see if the samples contain the virus. This means any virus present has to survive the testing. So, the tissue samples are ground up, and nutrition is added to the mix to help keep the virus alive and "grow" it, thus confirming its presence. This process takes about two hours.



2 At the lab, the randomly picked chickens are gassed with carbon monoxide. A necropsy is then done - each chicken is cut open and its breast bone removed so the organs are exposed.



3 AVA's virology branch, which has 13 staff, look out for obvious signs of bird flu, such as lesions on the lungs. If the organs look healthy, then tissue samples from the lung and trachea are taken since bird flu is a respiratory illness. The carcass is then disposed of.

INSIDE

◆ Big impact on Asian agriculture
Page A2

◆ Latest China Sars case raises concerns
Page A3



World poultry market jolted

With import bans on Asian chicken, other exporters around the world such as Brazil and the US are struggling to fill orders

By LING CHANG HONG

WHEN a chicken in Asia sneezes, the whole world catches a cold.

The deadly avian flu virus, which has killed at least 10 people and led to the culling of millions of birds in 10 Asian hot spots, has dealt a devastating blow to the region's multi-billion-dollar poultry industry.

And the rest of the world is feeling the jolt.

Import bans slapped on Asian poultry have sparked a frantic search for alternative sources, highlighting a growing dependence on the developing world for chicken supplies.

"The outbreak is having a tremendous impact on the world poultry market," said Mr James Sumner, president of the USA Poultry & Egg Export Council.

He told The Straits Times there was a worldwide short-

age of poultry for export.

The world's top exporter is the United States, followed by Brazil, the European Union and Thailand.

Last year, Thailand shipped about 500,000 tonnes of chicken worth US\$1.2 billion (S\$2 billion).

The European Union, despite being the world's No. 3 exporter, bought 166,000 tonnes of chicken from Thailand last year, making it the kingdom's second-largest customer after Japan.

While cash registers have been ringing for poultry exporters in Brazil and the US as countries turn to them for supplies, they are finding it difficult to meet the demand.

"We cannot fill all of the orders," said Mr Sumner.

He said in a telephone interview that the US, facing a shortage of hatching eggs, had little left for export.

"We can expect poultry products to get more expensive throughout the world, as we can already see," he said.

Demand for chicken from countries unaffected by bird flu is surging, causing worldwide supply problems.

According to a Dow Jones report, the wholesale price of frozen dark chicken meat imported to Japan from Brazil, for example, has jumped 44.7 per cent since Jan 23.

Said Mr Luiz Monrat, chief financial officer of Sadia, one of Brazil's top three chicken companies: "Every day, the in-

ternation cause eve is imposi counterin

The n the huge poultry in Thaila H5N1 str

STUDIES ON SPANISH FLU VIRUS

The Straits Times
7 February 2004

1918 epidemic sheds light on current outbreak

WASHINGTON — The Spanish Flu that killed 20 million people in 1918 seems more birdlike than previously thought — like the current H5N1 strain, it had a bird-based protein that was deadly, say researchers.

Their work — published in the journal *Science* — has no direct implications for the current outbreak in Asia.

But it highlights how important it is to monitor flu in poultry, since the study suggests it might take fewer genetic adaptations than believed for a bird virus to spread from person to person.

In separate studies at the Scripps Institute in La Jolla, California, and at Britain's Medical Research Council, scientists used preserved lung samples from the 1918 flu victims to reconstruct a protein crucial to their infection.

As with the current flu, the 1918 flu seemed to have jumped from birds to people with little change, they said.

However, the H5N1 strain has not — so far — developed the mutation that allowed the Spanish flu to decimate human populations 80 years ago.

“What this study says is this transmission between birds and humans seems to be able to happen in more than one way,” said Mr John Skehel, one of

those who led the study in Britain.

Two teams analysed samples of the 1918 virus and said it bore the clear hallmarks of a bird virus that mutated very little before jumping to people.

When the H5N1 strain appeared in Hong Kong in 1997, it was contained quickly because it spread from birds to people and not human to human.

The teams scrutinised a part of the 1918 virus called hemagglutinin, a protein the virus uses to infect cells.

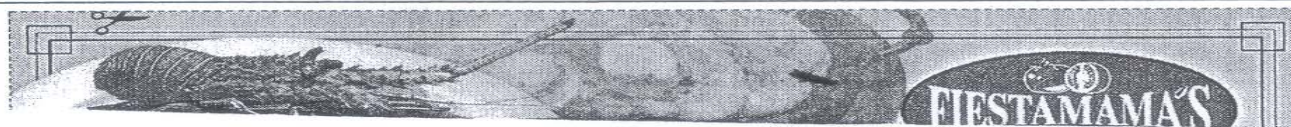
Each virus strain has a unique hemagglutinin structure. Scientists believe small mutations of the protein are what allows the virus to infect new species.

The 1918 virus was an H1 virus — different from H5N1.

The researchers say it had unique structures that may have given it “novel mechanisms” for infecting people.

This may explain why the epidemic killed so many young, healthy adults.

And this explains why the current avian flu outbreak has, so far, not lived up to fears, said Mr Skehel, adding: “Presumably, what’s blocking this current flu from spreading person-to-person is that its hemagglutinin structure has not yet evolved so that it can efficiently infect humans.” — AP, REUTERS



1. Avian Flu

A. Introduction

- Zoonotic diseases - diseases of animals transmitted to humans.**
- Interface between animal and human health, and the conservation of biodiversity.**

- **Avian flu - infectious disease of birds caused by type A – H5N1 strains of the influenza.**
- **Disease affects “domesticated” and wild species (eg chickens, turkeys, ducks and wild migratory birds).**
- **Other “natural reservoirs”. Recently, expanded to include pigs, cats, dogs, mice, sheep, ferrets, horses, tigers, leopards, etc.**
- **Direct or indirect contact with “natural reservoirs.”**

- **Some of the viruses produce a highly contagious and rapidly fatal disease, leading to severe epidemics. These virulent viruses are known as "highly pathogenic avian influenza (HPAI)."**
- **Humans - avian flu causes flu- like symptoms: fever, cough, sore throat, muscle aches, conjunctivitis; severe cases can cause severe breathing problems and pneumonia - fatal.**

• Migratory Birds to Blame ?

- Swallows
- Plovers
- Sandpipers
- Egrets
- Terns



The Straits Times,
29 January 2004

BIRD FLU CRISIS: THAI GOVT ADMITS...

'We screwed up'

Officials made mistakes and were not trying to cover up outbreak, government says in response to criticism, vowing to punish those involved

By **NIRMAL GHOSH**
THAILAND CORRESPONDENT

BANGKOK — It was a screw-up, not a cover-up.

This was the message dished out by Thai officials yesterday as critics continued to blame the government for concealing the country's latest outbreak of bird flu.

"The most appropriate word is screw-up. Some agencies screwed up in Thailand," government spokesman Jakrapob Penkair told journalists halfway through a regional ministerial conference on avian flu in Bangkok yesterday.

Laying the blame on the agencies, he said there had also been a "misinterpretation of procedures" and inadequate information relayed.

"Thailand has now been accused of covering up the outbreak of bird flu. The Prime Minister denied this," said Mr Jakrapob.

"He made a distinction between a cover-up...and inefficiency."

A contrite Prime Minister Thaksin Shinawatra told the conference yesterday the situation made him realise that no matter how much the government was mindful of past lessons, mistakes and human errors were always possible.

He assured delegates from 10 countries that his government's top priority was to get the situation "well under control".

He spoke even as two places in Bangkok — including the world famous Chatuchak weekend market — tested positive for the virus and poultry culling continued.

The cull was estimated to have destroyed 10.7 million chickens in

affected areas by Tuesday night.

Mr Jakrapob said the people responsible for the "screw-up" would be punished, but declined to identify how many would be affected.

"It depends on how grand a scale this mess goes up to," he said.

Earlier on Tuesday, several senators said they could impeach ministers responsible for the inaccurate information that had delayed Thailand's eventual admission about the bird-flu outbreak.

Despite Thailand's strenuous denials of a cover-up, more doubts have been cast over the kingdom's credibility.

Only last week, the European Union (EU) lauded Thailand for its defence against a possible bird-flu outbreak. Now, the EU — sounding visibly stung by Thai denials — said the kingdom's word was not enough for it to lift a ban on Thai chicken imposed last week.

"In these circumstances in which we have seen non-transparency, only a complete reliance on Thai assurances does not seem to be the best way to go forward," an EU spokesman was reported as saying by the Associated Press.

Japan — which together with the EU are the biggest markets for Thai poultry — has also not lifted a similar ban on Thai chicken.

Meanwhile, Thailand's Cabinet has approved 3 billion baht (\$130 million) in compensation for farmers hit by the outbreak. Earlier this week, two Thai children were confirmed to have died of bird flu.

Thailand's change of fortune is ironic, given that it had earlier declared this year to be the year of food safety.



REUTERS

MORE REPORTS INSIDE

- ◆ Singapore bans imports of Chinese poultry: **Page A2**
- ◆ Tan Tock Seng Hospital to handle any S'pore cases: **Page A2**
- ◆ Asia could lose billions if virus mutates: **Page A3**
- ◆ Reactions to outbreak don't inspire confidence: **Page A3**

A4

BIRD FLU CRISIS



THE CAUSES

'Don't feed wild birds, don't go near them, don't touch them.'

- Mr Ronel Avila, quarantine chief at the Philippines Agriculture Department

Migratory birds to blame?

- **Spread of Avian Flu**

- **Wild migratory birds – these birds are also the most resistant to infections**

- **Live bird markets (eg in Thailand) have also played an important role in the spread of Avian flu**

- **Illegal smuggling of infected chickens and birds**

- **Outbreaks in Asia and other Parts of the World**
 - **1997 and 2003 - Hong Kong**
 - **October 2003 – 26 May 2004: Cambodia, China, Hong Kong, Indonesia, Japan, Laos, Pakistan, South Korea, Taiwan, Thailand and Vietnam**
 - **Spread to Europe, Netherlands, Belgium, Germany, France, UK and Iberia. At risk – Canada and USA**
 - **July, August 2004, recurrence in China, Thailand (18 provinces), Vietnam and Malaysia (Kelantan)**

B. Policy and Legal Challenges

(a) Policy Challenges on Culling: Conservation Issues

- **Extent of Culling as at 18 January 2004**
 - **China: culled many migratory birds in Taizhou City and Jiangsu Province. Also 35,000 chickens culled in Chiayi farm.**
 - **Taiwan: 20,000 birds culled in Changhwa farm.**
 - **Japan: 34,600 sick birds culled.**
 - **South Korea: 1.8m birds slaughtered.**
 - **Vietnam: 2m chickens culled.**

•Precautionary Principle: Crucial to Sustainable Development and Policy

- **Principle 15 Rio Declaration: “where there are threats of serious and irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost effective measures to prevent environmental degradation.”**

➤ **PP is an approach to risk management that has been developed in circumstances of scientific uncertainty, reflecting the need to take prudent action in the face of potentially serious risk without having to await the completion of further scientific research.**

➤ **Role of Precautionary Principle (PP) in Determining Culling Policy**

- **PP unclear in setting standards – it stipulates that the absence of scientific certainty should not be used as a reason for taking action**
- **It is a practical means of responding to risk management in wildlife conservation and can be used for other serious threats (eg, in Avian Flu context - to animal and human health, food security, economy)**
- **Urgency in culling risk of endemicity?**

- **Is culling justified? If so, to what extent justified -precautionary principle.**

- **Should there be a threshold to culling?**
 - **Estimated more than 100 million birds culled (perhaps 200 million died or destroyed). As at January 2004.**

- **How does PP apply to this situation where there is culling of migratory birds, which may affect ecosystems. The ‘victims’ of avian flu (chickens, etc) are also culled (sustainable?)**
- **Adaptive management – taken together with the PP approach – better as continuous.**

- **Does culling solve the problem?**
 - **FAO: “Eliminating wild birds is not an appropriate way to control the spread of avian flu virus... killing wild birds will not help to prevent future bird flu outbreaks...”**
 - **How to prevent: good animal husbandry; control, surveillance and monitoring, vaccination of chickens (?), see below**

(b) Legal Challenges

(i) MEAs on Biodiversity

- **Convention on Migratory Species of Wild Animals 1979 (Bonn Convention):**
 - **Protection of migratory birds from threats including deliberate killing and destruction of their habitats. Effect of culling of birds, etc on nature conservation and impact on ecosystems.**
 - **Parties must endeavor to conserve habitats for migratory species and to prevent reduce or control factors that endanger or are likely to endanger these species**
 - **Migratory birds - shared resources of Range States - responsibility**

- **Ramsar 1971 Migratory species:**

- **Management and wise use of wetlands. What if their habitats are destroyed as a means of culling wild waterfowl?**

- **Convention on Biological Diversity (CBD):**
 - **“Sustainable Use” of Genetic Resources**
 - **Are poultry, pigs, etc (farmed for exports) “domesticated species” of genetic resources under CBD? If so, concept of “sustainable use” applies.**
 - **What constitutes “sustainable use” (Article 10, CBD) in this context? Term still being developed. Uses can be sustainable or unsustainable depending on eg. questions relating to good/bad animal husbandry.**

- **Article 10 (b) calls for adoption of measures to minimise adverse impacts on biological diversity and ecosystems.**
- **Production of poultry for export (they are reared in cramped cages and the chickens are stressed). Also, they are crowded together with thousands of birds where disease can be spread easily(eg in Thailand).**
- **Adopt ecosystem approach in production.**

(ii) National Laws dealing with Avian Flu

- **Singapore: Animals and Birds Act**
 - **Article 20 Director General may require isolation or destruction of any animal or bird if it is affected with disease; or has reasonably cause for believing that the animal or bird is infected with disease**
- **Other countries in the region – Japan, Hong Kong, Thailand, Vietnam, etc have similar laws**

C. FAO – OIE Guidelines to Prevent and Control Avian Flu: Policies and Strategies

- **ASEAN and SAARC to coordinate regional policies for animal health**
- **The preliminary FAO- OIE assessment of needs defined in the Bangkok Conference (26 – 28 Feb, 2004 – Emergency Regional Meeting on Avian Influenza Control in Animals in Asia) to be guide for bilateral and regional arrangements**
- **Regional avian influenza coordination group to be formed to facilitate joint decision making, information sharing and training**
- **Strengthen national capacity of national animal and public health service surveillance, response, control and prevention activities**
- **Zoning approach to place animals into small pockets for facility of control**

- **Establish a regional laboratory network close to other neighboring ones so as to facilitate cooperation**
- **Research into the disease**
- **Emergency preparedness**
- **Reporting**
- **OIE standards (quality of vaccines , diagnostic methods and quality and evaluation of veterinary services) to be used in the definition of new policies on animal health and zoonosis to be implemented through national and regional programmes**
- **National surveillance and notification procedures of animal disease to OIE**
- **WHO guidelines for occupational human health and safety to be followed**
- **Infected animals to be disposed within 24 hours**
- **Regular inspection of susceptible animals and suspect premises for over 2 or more incubation periods of the disease**

- **Biosecurity procedures to prevent the spread of avian influenza to be implemented within 24 hours of the identification of the first presumptive positive premises**
- **Development of common educational materials for biosecurity and public health**
- **Establish Veterinary Task Force for emergency control**
- **Public awareness to focus on health hazards of handling infected or diseased birds, etc**
- **Introduce good hygienic practices in food preparation**
- **Diseased or culled animals should not enter the food chain**
- **Strategic vaccination of birds . Vaccine must be produced in accordance with OIE guidelines**
- **Wild birds should not be depopulated in an attempt to control avian influenza but separation as much as possible should be attempted**
- **Reduce contact rates between wild birds and large commercial poultry operations to prevent wild waterfowl from direct or indirect contact**
- **Village poultry health care programmes (surveillance operations)**

- **Reduce trafficking of wild birds, and ban the mixing of domestic and wild animals in live markets**
- **Integrate health monitoring programs into natural resource management efforts**
- **Reestablishment of poultry industry in a more biosecure position and protect livelihoods**

(Source:

http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/avian_recomm.html)

D. Conclusion (Avian Flu)

- **Multi-disciplinary experts – scientists, veterinarians, lawyers, wildlife conservationists, health, food and agriculture experts, etc should cooperate to find solutions.**
- **Adopt preventive approach.**
- **Establish policy on threshold for culling of wildlife /domesticated species based on sound science.**
- **Cooperation among countries, international regional, national organizations and other stakeholders in taking preventive measures.**

- **To build capacity on zoonotic diseases and conservation issues. The Vth IUCN World Congress, 2003, identified “Disease and Protected Area Management” as a Key Emerging Issue:
“....improvements in the health of domestic and wild animals and their productivity can lead to dramatic improvements in human livelihoods and the reduction of poverty. Alien invasive pathogens should be addressed with vigor equal to that devoted to addressing more ‘visible’ alien invasive species. The role of disease in protected areas and the land-use matrix within which they are embedded must be recognised and addressed within the contact of protected area and landscape-level planning and management....”**

2. SARS

2 Oct 2003

A3

ESTIMATE BY ECONOMISTS

Sars 'cost world trade at least \$69b'

WASHINGTON — The Sars epidemic is believed to have cost the world's economies between US\$40 billion (S\$69 billion) and US\$140 billion, according to one estimate by Australian economists.

Sars, or severe acute respiratory syndrome, sickened about 8,000 people and caused 774 reported deaths when it broke out early this year.

But in a world in which news coverage is intense and international trade vital to most economies, the impact of the disease was magnified, said Mr Warwick McKibbin, an economist at the Australian National University in Canberra.

"Had it been a larger epidemic, the cost would have been astronomical.

"It would have produced a major disruption of the international trading system," he said on Tuesday.

He spoke at a conference called by the National Academy of Science's Institute

of Medicine for health officials to discuss how the lessons from this year's epidemic could be applied to another Sars outbreak — or some future outbreak of an unknown disease.

Mr McKibbin cautioned that his calculations were "coarse", based on estimates of the cost in terms of empty hotels, unused airline seats and other expenses associated with the disease in China, Hong Kong and Singapore.

These costs were extrapolated to other countries where the disease appeared, he said.

Such calculations, attempting to reckon on the cost of trade and economic activity of an epidemic, are new.

Normally, cost estimates of an epidemic have consisted of health care expenditures, loss of productivity and loss-of-life calculations involving those who die of the disease. — NEW YORK TIMES

SARS

A4

CHINA

THE STRAITS TIMES : Monday, January 19, 2004

How HK scientist blew the lid on Sars and wildlife

Virologist Guan Yi takes samples from different wildlife markets in Guangdong and proves conclusive link to Sars virus

GUANGZHOU — For the past year, Hong Kong-based virologist Guan Yi has been making weekly trips up north to collect samples from wildlife markets in the Chinese cities of Shenzhen and Guangzhou.

Despite doubts cast by other scientists, Dr Guan, a microbiology associate professor at the University of Hong Kong, believed the Sars coronavirus lurked in the wildlife markets of Guangdong province, where the two cities are located, and was determined to prove his claims.

His persistence and hard work have more than paid off.

His extensive research — as well as the extraordinary measures he took to make government officials aware of his work — prompted the Guangdong government to cull all civet cats, a move which may have averted another disastrous Sars outbreak, *Time* magazine has reported in its latest issue.

The 42-year-old virologist has made his mark as a leading

expert on Sars after establishing the link between the deadly virus and exotic animals sold in Guangdong's wildlife markets in the wake of the last outbreak, the report said.

It was Dr Guan, along with the Shenzhen Centres for Disease Control (CDC), who in May took samples from Shenzhen's Dongmen market and made the discovery that the masked palm civet, as well as the raccoon dog and hog badger, carry a virus remarkably similar to the coronavirus that causes Sars.

His findings, however, were later challenged by a mainland Chinese team which found no evidence of the Sars coronavirus in civet cats. Other scientists also voiced doubts, claiming that his data was based on too narrow a range of samples drawn from just one market.

But what bothered Dr Guan most was China's decision last August to lift the ban on sales of civet cats, the magazine said. In October, he began returning to the Guangdong

wild animal markets every week to collect samples.

Working with the Guangzhou CDC and the Shenzhen CDC, he conducted tests on wild animals from Shenzhen's Dongmen market and Guangzhou's Xinyuan market.

When he brought those samples back to Hong Kong, a frightening picture started to emerge.

Not only did he find the Sars coronavirus again in a host of rodent species in addition to the civet cat, he also detected the virus in hog badgers, Eurasian badgers, raccoon badgers and ferret badgers, according to the magazine.

Genomic sequencing found that these coronaviruses had mutated to become more similar to the Sars coronavirus samples taken from humans during the first outbreak.

To Dr Guan, the finding confirmed one thing: The deadly disease had made a comeback.

His worst fear was soon confirmed when a suspected Sars case was reported in Guangdong last month.

He did what he thought was the fastest way to alert the Chinese authorities to a possible new outbreak: He framed a

simple letter to Beijing's Hong Kong and Macau Affairs Office, which he copied to the Ministry of Health and the China CDC.

"With winter coming, the wildlife markets have reopened, providing the perfect conditions for another outbreak of Sars," he wrote.

He went on to list his findings that the civet is the major carrier of the Sars coronavirus and that the virus exists in different animals from different regions. The "transmitting mechanism for the resurgence of Sars is in place", he warned.

He enclosed four pages of genetic sequences taken from civets and had the letter hand-delivered on Jan 2.

Within hours, the Ministry of Health in Beijing passed the letter to the Guangdong Department of Health.

The next day, he was invited to Guangzhou to present his case to some of the province's highest health officials, including China's authority on Sars, Dr Zhong Nanshan, director of the Guangzhou Institute of Respiratory Disease.

Dr Guan's hosts were sceptical of this notoriously impetuous virologist, remembering that in the early days of the first epidemic, he had kept on

insisting, incorrectly, that Sars was a novel form of avian influenza.

But any doubts they had were soon dispelled.

A detailed analysis of the genetic sequences for the new Sars case in Guangdong, when compared to that of wild animals presented by Dr Guan, revealed that the two viruses were almost identical.

The next day, Dr Zhong made a call to the Guangdong governor. The order was given later that day to the relevant departments to launch a campaign to wipe out civet cats.

Dr Guan's mentor, Dr Rob Webster of St Jude's Hospital in Memphis and a pioneer in establishing the zoonotic origins of many influenzas, said: "The research is solid but, still, Guan Yi has certainly stuck his neck way out there on this one."

Dr Guan, as usual, is dismissive of any doubts and is confident that culling civets "will break the chain of infection".

"I felt like I had to do something," he told the magazine.

"I mean, why do you do science? To write papers? Or to make a difference in the real world?"



Sticking his neck way out?

The research is solid but, still, Guan Yi has certainly stuck his neck way out there on this one.'

— Dr Guan's mentor Dr Rob Webster of St Jude's Hospital in Memphis and a pioneer in establishing the zoonotic origins of many influenzas

Making a difference in real world

'I felt like I had to do something. I mean, why do you do science? To write papers? Or to make a difference in the real world?'

— Dr Guan

The Straits Times

asia

Saturday, January 10, 2004

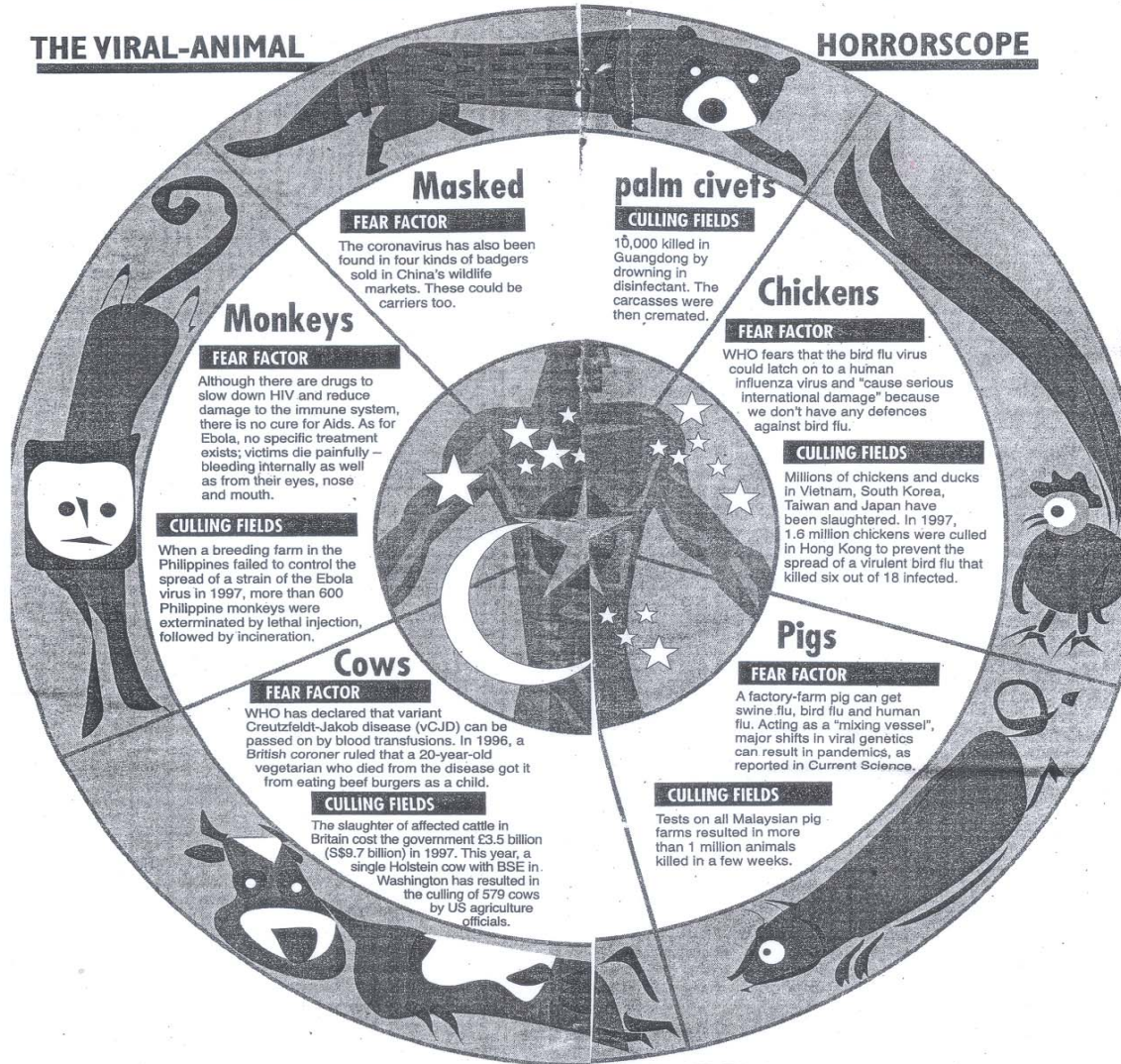


AFP

A CHINESE researcher checking a civet cat which was recently destroyed to see if it carries the Sars virus. Merchants in southern Guangdong province face fines of up to US\$12,000 (S\$20,300) if they are found hiding civet cats after the deadline to slaughter the animals expires today. A "carpet-style investigation" would be carried out to root out hidden animals, the Guangzhou Daily reported. SEE PAGE A2

THE VIRAL-ANIMAL

HORRORSCOPE



Masked palm civets

FEAR FACTOR
The coronavirus has also been found in four kinds of badgers sold in China's wildlife markets. These could be carriers too.

Chickens

CULLING FIELDS
10,000 killed in Guangdong by drowning in disinfectant. The carcasses were then cremated.

Chickens

FEAR FACTOR
WHO fears that the bird flu virus could latch on to a human influenza virus and "cause serious international damage" because we don't have any defences against bird flu.

CULLING FIELDS

Millions of chickens and ducks in Vietnam, South Korea, Taiwan and Japan have been slaughtered. In 1997, 1.6 million chickens were culled in Hong Kong to prevent the spread of a virulent bird flu that killed six out of 18 infected.

Monkeys

FEAR FACTOR
Although there are drugs to slow down HIV and reduce damage to the immune system, there is no cure for Aids. As for Ebola, no specific treatment exists; victims die painfully - bleeding internally as well as from their eyes, nose and mouth.

CULLING FIELDS

When a breeding farm in the Philippines failed to control the spread of a strain of the Ebola virus in 1997, more than 600 Philippine monkeys were exterminated by lethal injection, followed by incineration.

Cows

FEAR FACTOR
WHO has declared that variant Creutzfeldt-Jakob disease (vCJD) can be passed on by blood transfusions. In 1996, a British coroner ruled that a 20-year-old vegetarian who died from the disease got it from eating beef burgers as a child.

CULLING FIELDS

The slaughter of affected cattle in Britain cost the government £3.5 billion (\$59.7 billion) in 1997. This year, a single Holstein cow with BSE in Washington has resulted in the culling of 579 cows by US agriculture officials.

Pigs

FEAR FACTOR
A factory-farm pig can get swine flu, bird flu and human flu. Acting as a "mixing vessel", major shifts in viral genetics can result in pandemics, as reported in *Current Science*.

CULLING FIELDS

Tests on all Malaysian pig farms resulted in more than 1 million animals killed in a few weeks.

[NEWS]



Masked palm civet

Hong Kong virologists have found in civet cats a virus that has mutated to become more similar to Sars coronavirus samples found in infected humans. The sequence of infection is still unclear.

Chicken

Human infections of bird flu appear to be from contact with droppings of sick birds. The virus could have originated from migrating birds. It's also possible for the bird flu virus to spread from chickens to pigs before jumping to humans.

Pig

Pigs harbour the Nipah virus, which is named after the Negri Sembilan village where it was first detected. Mosquitoes can pass it on to humans. In 1999, 105 Malaysian pig farmers were killed by a Nipah viral outbreak, which had led to encephalitis (inflammation of the brain).

Cow

Humans can get variant Creutzfeldt-Jakob disease (vCJD), a fatal brain-wasting disease, by eating meat from cattle with bovine spongiform encephalopathy (BSE) or mad cow disease. Scientists think it's caused by cattle feed that's contaminated with nervous tissue and bone marrow of diseased animals.

Monkey

The Ebola virus and HIV are thought to have originated from human contact with wild primates, which were then passed on between humans. As of 2002, more than 13 million people have died of Aids. Ebola haemorrhagic fever has a high mortality rate - between 50 and 90 per cent.

Other options

DR Paolo Martelli thinks there are more public relations

Graphics/ CEL GULAPA

The New Paper on Sunday, 18 January 2004

By TEH JEN LEE
jenlee@sph.com.sg

PEOPLE are killing the animals that are thought to be killing people. Civet cats, chickens, cows... The culling continues as panic-stricken countries strive to contain the spread of deadly viruses (See graphic).

Bird flu, Sars, mad cow disease, and a few years ago, the Nipah virus, which mosquitoes can transmit from pigs to humans, have all led to the culling of animals.

Even migrating birds are suspect.

But are the animals really to blame?

No. The fault, say experts, lies with people, their eating and breeding habits.

Culling provides only temporary relief. People's habits must change.

There are many reasons why animals can make us ill with what is known as zoonotic diseases, said Associate Professor Vincent Chow, head of the National University of Singapore's microbiology department.

First, we are making

the animals sick by our rearing methods.

■ "Animals are huddled closely together in cramped conditions, thus allowing infections to spread rapidly.

■ "In areas such as southern China, it is common for farmers to rear chickens, ducks and pigs simultaneously, allowing viruses specific to different animals and humans to exchange their genes, resulting in new virulent strains," said Prof Chow.

■ This has happened with the influenza virus, as new strains rise from areas where large numbers of humans and animals are in close contact.

■ He also listed other factors:
■ Feeding cows with the re-

mains of other animals, leading to variant Creutzfeldt-Jakob Disease (vCJD), the human form of mad-cow disease;
■ Demand for exotic meat from animals like palm civets;

■ Human encroachment into jungles, resulting in contact with wild animals.

Similarly, wildlife veterinarian Dr Paolo Martelli believes that the bush meat and wildlife trade has exposed us to diseases that we, as a species, had no history of contact with previously.

■ "The problem here is not the wildlife, it's our vandalistic attitude towards them. Through habitat destruction and mindless criminal com-

mercialism, often marketed as progress, we force nature into contact with us, harming us and the animals in the process," said Dr Martelli.

MEAT THE PROBLEM?

Some think the problem lies with the eating of meat.

While Vegetarian Society (Singapore) president George Jacobs acknowledged that many factors besides food affect our health, he said: "Evidence does suggest that meat can be bad for us and that increasing our consumption of plant foods can be good for us."

■ Prof Chow wants to see less crowded and more hygienic livestock rearing prac-

tices, reduced transfer of animals across large distances to avoid transporting diseases, and constant monitoring for infections on farms.

He also thinks animal feed made with bonemeal and other animal remains, and the rearing and consumption of exotic animals with unknown microbes, should be banned.

And culling, he said, is only a short-term solution to zoonotic outbreaks.

■ So what do we do? It looks like we have to take stock of our relationship with animals while we wage war on these deadly outbreaks.

■ Otherwise, we will end up being our own worst enemy.

Beans excreted by the animals still popular

JAKARTA – The fear of Sars may have stopped the Chinese from eating civet cats.

But that hasn't turned off others from sipping the strangest of brews – one they insist is made from coffee beans eaten, partly digested and then excreted by the weasel-like animals.

The story goes like this: Civets live in the foliage of plantations across South-east Asia. These fussy foragers pick the best and ripest coffee berries.

Enzymes in their digestive system then break down the flesh of the fruit before the animals expel the bean.

Workers later collect the beans from the plantation floor, wash away the dung and roast them to produce a unique drink that devotees might say is good to the last dropping.

Sceptics, though, dismiss it all as a weird and unverifiable marketing gimmick.

Still in Indonesia's capital Jakarta, the owner of three fashionable cafes, Mr Agus Susanto, sells what he claims is a mix of regular beans and those that have passed through civets.

The blend and the cafes are both called "kopi luwak" – in English, "civet coffee".

"Our coffee has a strong taste and an even stronger aroma," Mr Susanto said.

In Vietnam, now the world's second-largest regular coffee grower, a blend supposedly

Sars fails to scare civet poo coffee fans

containing some civet beans is produced by the Trung Nguyen company under the Weasel Coffee brand.

In the Philippines, the Old Manila Coffee House used to sell a civet brew, but supplies have dwindled over the years, said Ms Ellen Tuason, its finance officer.

"Some of our guests said it was an aphrodisiac. It has a strong coffee smell, but different. There is a distinct odour and flavor," she said.

Several US-Internet based coffee traders claim to offer them for up to US\$325 a kg (S\$552), making kopi luwak among the world's most expensive beverages.

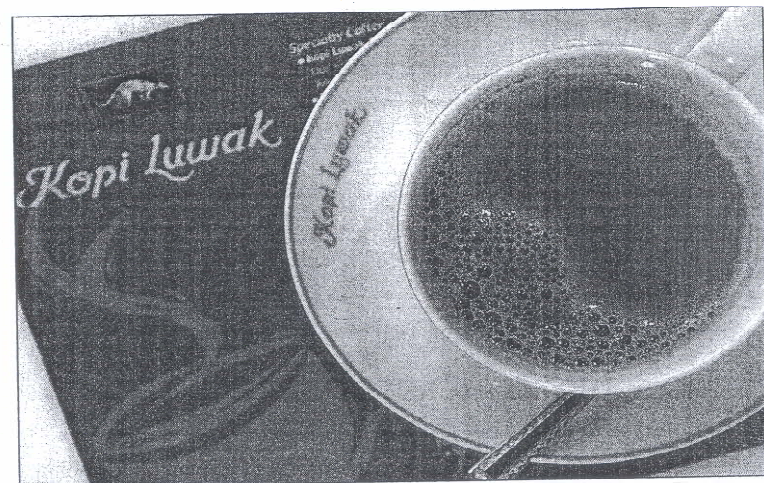
And although the World

Health Organisation and health authorities in southern China see a potential relationship between civet cats and the disease that killed 774 people worldwide last year, Mr Susanto isn't worried.

He expects to keep selling what he claims is 100 tonnes of civet coffee a month.

"There are many different kinds of civets in this world. The Indonesian ones are different from those in China," he said.

The coffee-chomping civets are known as common or brown palm civets (*Paradoxurus hermaphroditus*), whereas the ones that are at the centre of the Sars scare are the masked palm civets (*Paguma larvata*). – AP



AP

A. Introduction

- **SARS (severe acute respiratory syndrome is caused by corona virus).**
- **The illness usually begins with a high fever including headache and body aches. After a few days, a dry cough may develop followed by low oxygen levels in the blood. It is a new form of pneumonia-like disease with symptoms that are similar to those of common flu. It is highly contagious and potentially fatal.**
- **Outbreak of SARS – 2003: Global Hot Spots: Hong Kong, China, Singapore, Taiwan, Toronto, Vietnam**
- **Deaths from SARS – Known Deaths Tolls – BBC News (5 July 2003)**
- **China 348; Hongkong 298; Taiwan; 84; Singapore 32; Canada 38**

Bustling Guangzhou wildlife market now quiet

Stench of faeces gone and cages empty as new Sars threat and mass culling of civet cats spook customers of wild game meat

By CHUA CHIN HON
THE STRAITS TIMES
CHINA BUREAU

GUANGZHOU — The cages are mostly empty, many stalls are closed and the infamous stench of animal faeces is almost gone.

The Xinyuan wildlife trading market on the outskirts of southern Guangzhou city is now a pale shadow of its former bustling self.

Vendors spend their time playing pool, knitting or complaining to visiting journalists how bad business is.

"I don't even have enough money for the trip back to my parents' home in Hunan," said a stall helper.

Officials have seized thousands of civet cats and other exotic animals from markets such as Xinyuan, restaurants and breeding farms since China confirmed its first Sars case in six months last Monday.

Across town, in the northern outskirts of Guangzhou, the rows of up-market wild game restaurants have removed all signboards hawking exotic animals, or *ye wei*, as it is known here.

Restaurant managers such as Mr Tan Weidong, who runs the Mao-themed *ye wei* joint, the Ziqing No. 1 Village, com-

plained that their business had plunged by as much as 90 per cent since last Monday.

"Business was still okay when the patient was just classified as a suspected Sars case," said Mr Tan. "The minute he became a confirmed case, business plunged."

It is *deja vu*, said local journalists and residents, pointing out that this was the same scenario which played out last May when the Sars outbreak in China was at its peak.

Indeed, when The Straits Times visited Guangzhou last May, vendors and restaurant owners had the same worries and complaints.

So what has changed since?

"Not much," said taxi driver Li Chengdong. "The restaurants don't advertise *ye wei* openly anymore, but the old customers always know where to go to get what they want. People went back to eating *ye wei* once Sars was forgotten."

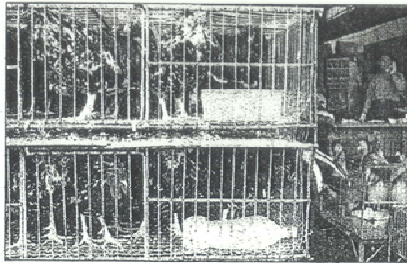
Vendors, restaurant owners and chefs dealing with *ye wei* said business began picking up in September and October, only to be hit again when the new Sars case and the mass culling of civet cats spooked their customers.

But this time round, some of them are worried that the



The market on the outskirts of southern Guangzhou city is now a pale shadow of its former bustling self.

PHOTOS: CHUA CHIN HON



The cages at Xinyuan wildlife market are mostly empty, with only chickens remaining to be sold.

business may never recover.

Vendor He Xiaoli said: "With all this bad publicity and daily raids happening every couple of months, how are we going to do any real business? Who would want to buy or eat anything from here?"

But Guangzhou resident Huang Qiuyan reckoned that the vendors and restaurant

owners protest too much.

She said: "If they don't complain loudly enough, their business might just close down for real."

"We know many of them have influential backers and ways and means of getting around the difficulty by using the back door. They are not going to disappear so easily."

WILD CUISINE: Facts and myths

GUANGZHOU — In 20 years of specialising in wild cuisine, chef He Dazhong said he has prepared at least 300 different types of exotic animals for the dining table.

He gave a brief recipe for the most common way of preparing civet cat: After the animal is killed and gutted, it is dipped into boiling water. The meat is fried in 200 deg C oil before stir-frying it with a special fragrant *ye wei* sauce which tastes slightly salty. If done right, civet cat has a unique fragrance and a "dry, crunchy, fresh and sweet" taste, he said.

Customers are charged by the weight of the meat they order. At the Huang Pu Jiang Hotel, where chef He works, the dish can go for about 400 yuan (\$82) for 1kg of civet cat meat.

Other popular ways of preparing wild cuisine include stewing or boiling the exotic animals for soup. Guangdong residents, especially in the rural areas, also prepare wild cuisine in their own homes.

Construction supervisor Chen Ming said he had his first taste of *ye wei* when he was seven years old.

He said game in general tastes best when caught in the wild, preferably boiled for soup. He has tucked into rodents, owls, even a cobra, though not civet cats.

Experts and ordinary residents alike say *ye wei* is rarely eaten, except during the winter months, when the exotic animals are thought to give a person's health a much-needed boost.

Chef He disagrees. He said: "I don't think *ye wei* has any health benefits at all. The taste is unusual, but the effect, if any, is only psychological."

Then why has he been in the trade for two decades? He answered: "Because there is a demand." — CHUA CHIN HON

WHO scours patient's apartment building

BEIJING — International medical investigators scoured the apartment building yesterday where China's only confirmed new Sars case lives, looking for clues as to how the 32-year-old man caught the virus.

"We're talking to the building management, looking at the ventilation systems, the sewerage systems and things like that," World Health Organisation spokesman Roy Wadia said in Guangzhou.

Meanwhile, the WHO was no closer to determining if a suspected Sars case, a waitress who worked in an exotic food restaurant, actually had the disease.

China confirmed last Monday its first case of severe acute respiratory syndrome since a world outbreak was declared over last July. The patient, a Guangzhou television producer, has recovered and left hospital last Thursday.

Health officials said a gene sample from the man matched that of a coronavirus found in civets, a weasel-like animal eaten as a delicacy in southern China and sold in crowded markets.

Experts suspect the virus jumped from civets to humans, though the last patient denied any contact with civets.

WHO investigators on Saturday searched the restaurant in Guangzhou where the waitress suspected of having Sars worked. Civets was found on the menu.

The 20-year-old has been in stable condition without fever for more than a week.

State media said a Guangdong provincial panel would make the final diagnosis of the woman and would not take as long as for the man's diagnosis, which dragged on for more than a week after he was first declared a suspect, state media said.

— REUTERS, AP, AFP

B. Policy and Challenges

(a) Culling and Conservation: Policy Challenges

- Similar to Avian Flu Policy Challenges, see above**

(b) Legal Challenges: Biodiversity Conservation

- **Issues Relating to Protection of Wildlife and Domesticated Animals**
 - **Impact of the culinary delights of exotic species among the Chinese in China and other places – consumption of civet cats, porcupines, squirrels and raccoon dogs, Chinese ferret badger and peacocks.**

- **Civet cats from the wild (endangered species under Appendix 1 of CITES);**

- **Farmed civet cats – “domesticated” species under CBD? Question of “sustainable use” (Art 10(b) CBD)**
 - **Unhygienic conditions where animals are kept – many interested with worms and other parasites.**

- **CITES and Application of the Precautionary Principle to control SARS**
 - **Civet cats raccoon dogs and other animals might spread SARS.**
 - **Scope of CITES to be widened to prevent trade in CITES species which might spread zoonotic disease such as SARS?**
 - **Domestic laws permitting the expansion of imports of threatened and endangered species for wild life conservation should be prohibited**

- **Evaluation of the Precautionary Principle (PP) in CITES restricting trade in CITES species that might cause SARS or its spread. Lack of clear guidelines in operationalizing.**
- **PP precludes sustainable exploitation or trade. Banning trade can also pose serious threat to conservation when it reduces incentives to conserve species.**
- **Call to minimize threat of serious or irreversible harm by using precaution to ban trade under PP.**

- **Sustainable exploitation and trade – justified by application of PP?**
- **Query: Should a country like US expand imports of animals under CITES under a substantive conservation programme for species if some of the species may cause a spread of SARS or other zoonotic diseases?**

C. Singapore experience: Legal Measures to Control SARS

- **Infectious Diseases Act – Amendments:**

(1) Notification of infectious diseases. For example, every medical practitioner who has reason to believe or suspect that any person attended or treated by him is suffering from an infectious disease or is a carrier of that disease shall notify the Director within the prescribed time and in such form or manner as the Director may require having medical examination and treatment.

The Director may require any person who is, or is suspected to be, a case or carrier or contact of an infectious disease to submit to medical examination or medical treatment at such times and at such hospital or other place as the Director may determine.

(2) If any person fails to comply with the requirements of the Director under this section –

(a) that person shall be guilty of an offence; and

(b) the Director may order the removal of that person to any hospital or other place where the person may be detained and (if necessary) isolated until he has been medically examined or treated.

(3) Other amendments include post mortem examination treated of premises or vessels isolation of persons, surveillance, isolation area, closure of food establishment.

D. Policies and Strategies to control and Prevent SARS: Regional & International Responses

(a) ASEAN + 3

ASEAN Health Ministers meeting including the Peoples Republic of China, Japan, Republic of Korea, Canada, Mongolia and WHO:

- Regional cooperation to control and prevent SARS**
- Measures include quarantine, surveillance exchange of information- Action Plan on Prevention of SARS and other infectious diseases. The following are priority areas:**

- **Guidelines for International Travel**
- **ASEAN SARS Containment Network**
- **Capacity Building for Outbreak Alert and Response**
- **Public Education and Information**
- **The Ministers reaffirmed that a multi-sectoral response was the only effective way to deal with SARS. The collective efforts paid off as the last SARS case was on 11 May 2003.**

**Joint Resolution: ASEAN +3 (China, Japan, Korea)
Aviation Forum on the Prevention and Containment of
SARS 15-16 April 2003**

- **Screening for departing passengers**
 - **Standardised Health Declaration Card (passengers' name**
 - **Nationality and passport no, flight information, questions recommended by WHO, signature of passenger)**
 - **Temperature screening for departing passengers**
 - **Screening for arrival passengers**

- **Customs Procedures for Medical Equipment and Supplies Related to SARS**
- **Managing SARS Suspect or Probable Cases**
- **Sharing of Records for Contact Tracing Purposes**

Recommend that the International Civil Aviation Organisation (ICAO) as the supervising body over airports, be informed of the common procedures reached in this Joint Resolution.

(b) APEC

- **APEC also launched a strategy to combat infectious diseases – meeting in Shanghai in 2002**
- **Initiative - Infectious Diseases in the Asia Pacific Region:**
- **Electronic networking**
- **Surveillance**
- **Outbreak response**
- **Capacity building**
- **Partnering across sectors, including business and NGOs**
- **Political and economic leadership**

(c) WHO

- **WHO, at its 56th Assembly passed a Resolution on SARS urging Member States, *inter alia*, to collaborate and provide assistance to WHO's Global Outbreak Alert and Response Network as an operational arm of the global response.**

E. Conclusion (SARS)

- **Enact local laws to deal with all aspects and follow international guidelines. Impose heavier punishments, in fines, imprisonment, etc**
- **International and regional cooperation**
- **Research, surveillance and monitoring**
- **Exchange of information**
- **Exploring alternatives to culling of animals in both Avian flu and SARs diseases**
- **Examine the application of precautionary principle in culling of animals**
- **Amendment of CITES, IATA in regard to transportation of animals**
- **CITES legislation – increase fines for consumption of civet cats, etc**
- **Capacity building, public awareness**
- **Ecosystem approach**

The New Paper on Sunday, 18 January 2004

**Are virus-spreading animals the enemy?
No, say experts. It's our dirty habits...**

**People,
you are
the
problem**

Good communication helped S'pore beat Sars: WHO adviser

Expert praises Govt's strategy of telling people what to expect, responding to their fears and yet not being overly reassuring

By **LEE HUI CHIEH**

GOOD logistical planning and medical science were not the only reasons Singapore beat Sars quickly.

Effective communication was also crucial in controlling last year's outbreak of the deadly respiratory disease.

During Sars, the Singapore authorities "came as close as many risk communicators have seen" to the best outbreak communication practices, said Dr

Jody Lanard, a risk communication adviser to the World Health Organisation (WHO).

Among the things she felt were done right: Telling people what to expect, not overly reassuring them, responding to their fears and involving them in decision-making.

Dr Lanard was among 110 epidemiologists, health officials and communication experts from around the world gathered here for a three-day meeting, which began yesterday, to help develop guidelines for

good communication in fighting outbreaks.

Knowing the importance of the task, and fearing a possible influenza pandemic, the WHO will publish the guidelines to help governments by the end of this year.

In a videotaped statement to open the conference, WHO director-general Lee Jong-wook said that communication is "as critical to outbreak control as laboratory analyses or epidemiology", noting that "poor outbreak communications can undermine good decisions".

WHO communications officer Dick Thompson later told reporters: "Often, an expert technical person might not view the risk the same way the rest of the public

does, but those concerns have to be addressed.

"If the public can work cooperatively with technical experts, then you bring an end to outbreaks more quickly."

This was what Singapore managed to achieve, said Dr Lanard at yesterday's meeting.

For example, when the Government warned Singaporeans to be prepared for the long haul and closed schools in reaction to parents' fears, it might have raised public anxiety, but also boosted public confidence that the leaders would be honest and would listen, she said.

This belief that they could communicate with their government made Singaporeans comply with Sars precautions, she said, citing a study pub-

lished this year in the United States Centres for Disease Control and Prevention's Journal of Emerging Infectious Diseases.

Nobody in Singapore had any experience in outbreak communications when Sars emerged, confessed Senior Minister of State for Information, Communications and the Arts and Health, Dr Balaji Sadasivan, when opening the conference.

But even as the authorities shaped the communication strategies, they were committed to telling it like it was.

He said: "Honesty, accuracy and transparency must be the bedrock of any communication strategy, and our Sars experience has reinforced our belief in this."

S'pore team uncovers new Sars clue

The way the virus is attracted to white blood cells could explain why some patients become 'super-spreaders'

By **CHANG AI-LIEN**
SCIENCE CORRESPONDENT

RESEARCHERS here have uncovered an affinity the Sars virus has for white blood cells, particularly in some patients, and they say this could go some way towards explaining the emergence of "super-spreaders" of the disease, and point the way towards better treatments.

While the virus has been known to invade various cells in such organs as the lungs and intestines, the white blood cells are the first places it has been seen thriving and multiplying, said the study's principal investigator, Associate Professor Ren Ee Chee.

"Most viruses are picky," said the deputy director of the Genome Institute of Singapore. "They have a very specific host range."

"For the Sars virus to be replicating within 48 hours of entry into a white blood cell indicates that this is a very important site for the virus."

"When it reproduces very rapidly in some people, coupled with a wet cough, this could be what it takes to create a super-spreader."

At the same time, a patient whose white blood cells form the ideal nurturing environment for Sars is likely to have a harder time recovering, he pointed out.

Once infected, the white blood cells in the lungs — the first organ where the virus takes hold — call for reinforcements via chemical messages called chemokines, which in turn attract even more white blood cells to the attack site, explained Prof Ren.

Rather than helping, this excessive immune response clogs up the lungs, and that leads to inflammation and other complications.

The congestion that results is so severe in some patients that it shows up as dense white patches on X-rays, which doctors initially thought was scar tissue, he added.

The virus also causes the body to produce proteins that encourage the blood to clot, which can be fatal in the lungs.

By understanding how Sars wreaks havoc in the body, doctors can develop more effective treatments, said Prof Ren.

"There are known drugs which can dampen the damaging effects of this virus, such as by preventing the patient's blood from clotting."

Dr Ooi Eng Eong, a research clinician at Singapore General Hospital who was also part of the group, said that the anti-malarial drug chloroquine, for example, had shown in lab studies that it could potentially knock out the virus.

More research will show if stopping the virus growth in this way will also stop the excessive chemokine production.

"Those in high-risk groups, such as doctors and nurses, could conceivably take it as a preventive measure during an outbreak," said Dr Ooi.

The work was done by infecting blood taken from healthy donors with the virus, and looking at the genes which were turned on or off by the infection.

The work of the group from GIS, the National University of Singapore and the Environmental Health Institute has been published in the online journal *BioMed Central*.

The findings are seen in medical circles as particularly significant in the wake of a recent World Health Organisation warning of a possible re-emergence of Sars, which infected more than 8,400 people and killed about 800 worldwide last year.

Researchers worldwide have been working on solutions. Hong Kong scientists have announced a new way to identify chemicals that can counter new and dangerous viruses like Sars, by using chemicals to thwart viruses from replicating.



"Most viruses are picky; they have a very specific host range. For the Sars virus to be replicating within 48 hours of entry into a white blood cell indicates that this is a very important site for the virus."

— Associate Professor Ren Ee Chee (above)



GENOME INSTITUTE OF SINGAPORE
The Sars virus (arrowed) begins to penetrate into a human white blood cell in this electron micrograph.

EXCESSIVE IMMUNE RESPONSE THAT CAN BE FATAL

ONCE infected with the Sars virus, the white blood cells in the lungs — the first organ where the virus takes hold — call for reinforcements via chemical messages called chemokines, which in turn attract even more white blood cells to the attack site.

This excessive immune response clogs up the lungs, and that leads to inflammation and other complications.

The virus also causes the body to produce proteins that encourage the blood to clot, which can be fatal in the lungs.

The End

Thank you

22 September 2004