

Towards food security for a better life

Australian agricultural expertise is helping to improve the knowledge of and management of Bird Flu and Zoonotic diseases, through a suite of Australian Centre for International Agricultural Research Centre projects

The **Australian Centre for International Agricultural Research (ACIAR)** is an Australian Government statutory authority that operates as part of Australia's Development Assistance Program within the portfolio of Foreign Affairs and Trade. It assists and encourages Australia's agricultural scientists to use their skills for the benefit of developing countries as well as Australia to achieve the objectives of Australia's Aid Program of advancing Australia's national interest through poverty alleviation and sustainable development.

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Bird flu and zoonotic diseases



Diseases that can transfer between animals and humans are known as zoonotic diseases. Avian Influenza (Bird Flu) is one such disease that potentially threatens millions of people. Effective detection and improved animal health are important aspects of controlling these diseases and is the subject of several ACIAR projects.

Increasing overpopulation in rural areas is leading to more humans living in closer proximity to livestock and to each other. This proximity can cause problems when diseases occur, creating increased opportunities for transfer from animals to humans and from human to human.

Zoonotic diseases, those that can transfer from animals to humans, are becoming more prevalent due to this proximity. Both livestock and domesticated animals can carry such diseases. Cattle, pigs and poultry, all kept for food and income, along with domesticated cats and dogs are carriers.

There are two risks involved to humans from transfer of zoonotic diseases:

- direct transfer from these animals to their human handlers, and
- human to human resulting from a zoonotic disease infection that has mutated.

Two zoonotic diseases have been the subject of widespread outbreaks, Avian Influenza (bird flu) and Severe Acute Respiratory Syndrome (SARS). Outbreaks of bird flu amongst poultry have been confirmed in Cambodia, China including Hong Kong, Indonesia, Japan, Laos, Pakistan, South Korea, Thailand and Vietnam. Bird flu was recognised as a pandemic in poultry 18 months ago in Southeast Asia and North Asia and has since moved into Central Asia and Russia. (See www.cdc.gov/ncidod/eid/vol11no10/05-0644.htm for more information).

Health authorities have been aware of the presence of bird flu in poultry for more than a century. The most recent outbreaks in Asia of the Highly Pathogenic Avian Influenza virus H5N1 have been responsible for 100 million birds lost from the disease or those forced to be culled to prevent it spreading. (More information can be found at www.cdc.gov/flu/avian/gen-info/facts.htm).

As of September 2005 Bird flu has not spread to the South Pacific nor has the virulent form (H5N1 virus) spread to the Philippines or Myanmar. No virulent outbreaks have occurred in Australia but there have been low pathogenetic bird flu outbreaks in poultry.

By July, 2005 109 human cases have been reported in Vietnam, 17 in Thailand, in Cambodia four and one in Indonesia; resulting in 55 human deaths. There is no evidence of human to human spread of bird flu, with all cases involving animal to human transmission.

Highly pathogenic bird flu virus is present in several livestock species creating the real possibility of further outbreaks. SARS, which began in China and spread to Europe and North and South America, is an example of the potential threat. New evidence has suggested that the H5N1 virus has become more pathogenic since the first outbreak in Hong Kong.

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Current status

Members of the cat family, tigers, leopards and now civets can transmit the disease. The ability of bird flu to infect multi species of livestock makes the possibility of its spread more likely.

There has been considerable international and national activity to diagnose and control outbreaks of bird flu. Agencies such as FAO (www.fao.org/ag/aga/agah/empres), the Animal Production and Health Commission of Asia and the Pacific (www.aphca.org), OIE (www.oie.int/eng/en_index.htm) and WHO (<http://www.who.int/en/>) have addressed recent bird flu outbreaks. A good review of the situation is available from the FAO at www.fao.org/ag/againfo/programmes/en/empres/home.asp.

Helping control Bird flu

The Australian Government, through the involvement of ACIAR and AusAID is working to combat the spread of bird flu.

Accurate surveillance and diagnosis, a major control strategy, is not readily available in many Asian countries. Laos, Cambodia, and Indonesia do not have in-country capacity for confirmation of diagnosis of Avian Influenza. This can be difficult due to the similarity of the clinical symptoms to other diseases affecting poultry. Knowledge of the virus, its spread, if it is highly pathogenic or low pathogenic and improved diagnostic capability will help.

ACIAR has four interrelated projects under development to back up and complement national and international agencies. Determining the role of ducks in the transmission of bird flu is vital. This is particularly important due to the large number of ducks kept in Southeast Asia and the proximities of chickens, allowing potential transmission of bird flu. The recent westward expansion of bird flu in China and Central Asia is thought to be due to migrating ducks.

Another project proposal is for surveillance of bird flu in Indonesia, where there has been considerable epidemiological information gathered. This needs to be analysed to establish effective disease control monitoring and evaluation. In Lao and Cambodia a project will aim to improve the diagnosis and control for bird flu in rural areas. The fourth proposal,

also in Indonesia, is examining the socio economic costs associated with bird flu outbreaks and benefits of control strategies. Australian knowledge and capacity will also be increased through these activities.

ACIAR has also been active in addressing important local and widespread zoonotic diseases. A successful study of leptospirosis in Papua New Guinea and Fiji clearly indicated the widespread nature of active leptospirosis. This disease causes lost productivity and sometimes death in cattle and pigs, in the Markham Valley in PNG. The important role of village dogs in Fiji in the transmission of Leptospirosis was also revealed.

The disease Trichinellosis is a serious issue in many parts of the globe. An ACIAR project was able to identify *Trichenella papuaensis* in the muscle of crocodiles and pigs, determine survival times of the parasite in pig meat, and establish risks to humans and other pigs.

For further information visit:

www.aciar.gov.au

www.fao.org

www.cdc.gov

What is Bird Flu?

There are three types of Influenza virus, categorised as A, B and C types. Bird flu is an A type virus with multiple subtypes, these being defined by combinations of two proteins. These two proteins (HA and NA) exist on the surface of the virus. The HA protein has 15 different subtypes, the NA nine subtypes. The combination formed by one HA and one NA protein is used to name the virus subtype. Bird flu is known as H5N1 virus, being a combination of HA 5 and NA 1 proteins. There is also a H7 type of bird flu.

Avian Influenza viruses are also classified by their level of pathogenicity, or virulence. Highly pathogenic avian influenza (HPAI) has a high mortality rate in poultry; capable of killing between 90 and 100 per cent of infected chickens. Low pathogenic avian influenza (LPAI) causes less severe symptoms; in many cases no illness may occur in infected chickens. But LPAI viruses can evolve into HPAI viruses, requiring that both be monitored should outbreaks occur.