

ATTACHMENT VIII

CSIRO Animal Health

CSIRO Australian Animal Health Laboratory (AAHL) is one of the most sophisticated laboratories in the world for the safe handling of exotic livestock diseases. It provides Australia with the highest level of scientific expertise in exotic (foreign) diseases of livestock, as part of Australia's preparedness to prevent or combat outbreaks.

The Division's Mission: to be a national centre for animal health enhancing the international competitiveness of Australia's animal industries, the well-being of Australians, and the quality of their environment through the application of excellent research and quality services.

The CSIRO Australian Animal Health Laboratory (AAHL) opened in 1985 and is funded by the Department of Primary Industries and Energy and CSIRO. It is operated by CSIRO.

AAHL collaborates closely with industry and a number of our research projects are being supported by industry research councils. We also undertake contract investigations from time to time which require our unique facilities and expertise.

CSIRO Australian Animal Health Laboratory's research efforts are based around four research programs:

Diagnostic sciences:

This program provides diagnostic services and sciences relevant to the maintenance and improvement of the health of Australia's livestock, fish and shellfish in support of agricultural production and trade.

They diagnose, monitor and research into exotic diseases and/or diseases of significance to Australia's farmed livestock, fish/shellfish and fauna.

Some recent achievements:

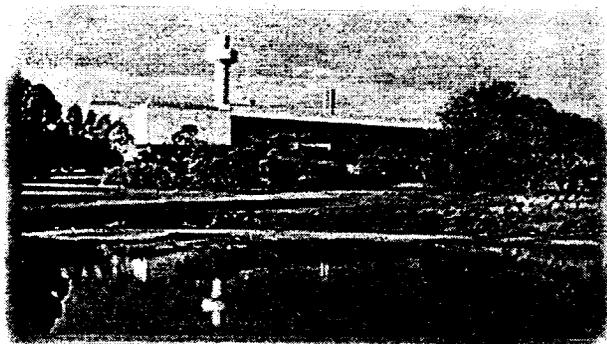
- Determination of the cause of Kangaroo blindness disease
- Investigation of mass pilchard mortality in Australian waters
- Molecular characterisation of equine morbillivirus
- Identification of new lyssavirus (close relative to rabies) in Australian bat populations

Infectious diseases and food safety program:

Research into ways to enhance Australia's disease control capacity by improving our understanding of viral and bacterial disease processes and mechanisms of disease control. Recognition and control of plant poisoning of livestock is also a part of this program.

Some recent achievements:

- Development of a test for bovine and human TB - now commercialised in many countries
- Characterisation of Indonesian topotypes of bluetongue virus in sheep
- Development of a new test for rapid footrot virulence diagnosis in sheep
- Identification and characterisation of variant infectious bronchitis viruses



Vaccines and therapeutics program:

Development of new vaccines and biological therapeutics to combat infectious disease of production and companion animals.

Some recent achievements:

- Construction and testing of live, attenuated pleuropneumonia vaccine for pigs
- Construction and commercial testing of a new vaccine for shipping fever
- Patent of fowl andovirus as a vaccine vector granted in USA

CRC for vaccine technology unit

As a part of the Co-operative Research Centre for Vaccine Technology, CSIRO assists in developing the science and technology needed to improve the efficacy of current vaccines and assists in the design and delivery of the next generation of vaccines.

Some recent achievements:

- Patent positions on a new bacterial vaccine vector and uses of ruminant cytokines
- International recognition of the work via publications and invitations to conferences
- Expression of antigen genes and cytokines in live bacterial vectors

CSIRO Australian Animal Health Laboratory (AAHL)

AAHL and biocontainment

The AAHL facility is recognised internationally as one of the best biocontainment facilities in the world for the safe handling and containment of micro-organisms and for contained experimentation in animals. Exotic and zoonotic micro-organisms can be safely handled at AAHL but not at other Australian laboratories. The facility is often used to contain agents being evaluated for potential biological control programs, and the laboratory has biocontainment level 4 facilities that could be used to handle high risk human pathogens.

AAHL receives samples which may contain exotic disease agents, and in some of the routine tests they must use exotic agents as "positive controls" to prove that the tests are working correctly. Exotic disease agents are also used in trialling vaccines and in training vets to recognise diseases. Some of these exotic diseases pose an economic threat to the nation's animal industries, so they must be kept secure inside the laboratory.

A secure box

AAHL's main building has five levels, of which four are inside the secure barrier, a thick concrete wall that forms an airtight "box" around the secure area. All of this area is held at a lower air pressure than the outside world. This ensures that any airborne infectious agent is kept inside the laboratory.

Within the secure box are a series of smaller secure boxes, each with a drop in air pressure. A guiding principle in the design of AAHL was that biocontainment should never be by a single barrier. If one containment system or barrier fails, then at least one other barrier is in place to protect Australia's livestock. Everything within the secure area is treated before it leaves. The air is routinely filtered (and can be incinerated). All the sewage is heat treated and solid waste is incinerated.

Equipment leaving the secure area is sterilised by autoclave or gas decontamination. Information is transmitted from the secure area to the outside by fax or computer network.

Primary containment barriers - the human factor

Some exotic animal disease agents can also infect people. We must ensure our staff do not carry such zoonotic agents out of the secure area. We can achieve this by minimising contact with these agents. Access to such agents is strictly limited to trained staff who use a range of measures to contain the disease agents.

Special biocontainment cabinets are used for bench work and when working with infected animals that may be excreting zoonotic agents, staff work in special plastic suits that cover the whole body and isolate them from any viruses that could infect them. When working with agents such as Newcastle disease, a fatal disease of poultry that can be carried in the respiratory tract or the eyes, staff wear breathing-air hoods.

The personal containment procedures are backed up by compulsory showering out of each animal's room and out of the secure area. Once outside the secure area, as an added precaution, staff must not have contact with livestock animals for seven days.

For further information please contact:

the Communication Group,

CSIRO AAHL

Private Bag 24,

Geelong Victoria 3220,

You can call us on 03 5227 5426,

or fax 03 5227 5377.

Or visit our website:

<http://www.ah.csiro.au>

Why AAHL?

The exotic disease threat is real

Many diseases such as rabies, avian influenza, scrapie and foot-and-mouth disease are common elsewhere in the world. Australia's freedom from these diseases helps the productivity of our farmers, and gives us the edge in selling our livestock products to the rest of the world. Yet foot-and-mouth disease could be introduced into Australia in a salami or similar livestock product. Just one outbreak of foot-and-mouth could cost Australia many billions of dollars, and tens of thousands of jobs. However the impact can be reduced if the disease is quickly detected and eradicated.

AAHL exists to give Australia's vets and farmers fast and reliable information about any possible exotic (foreign) disease threat.

Diagnosis

If a farmer sees disease signs that could be an exotic disease, he or she should promptly call a government vet. The vet will make an on-the-spot assessment of the disease signs. The trouble is, some exotic diseases look similar to more common, endemic diseases. If an exotic disease can't be ruled out, the property will be quarantined and samples from the animals sent to AAHL for testing. Generally this testing involves looking for the exotic disease agent (usually a virus) that causes the disease. However viruses can't be seen, so a range of complex tests are required to rule out the presence of a disease agent such as foot-and-mouth disease virus.

This testing is the most important part of AAHL's work. Our vets are available twenty-four hours a day to provide rapid and reliable diagnosis for all the main exotic disease threats. Fortunately in most instances our tests are negative. On rare occasions we have to confirm a case of exotic disease.

Other diagnostic work at AAHL is less dramatic. When animals are being brought into Australia, or exported from Australia, testing is often required to prove they are free from disease. We also test some animal products to prove they are free of exotic disease agents.

AAHL is also concerned with fish. Our Fish Disease Laboratory provides import/export testing and other diagnostic services in support of Australia's growing fisheries and aquaculture industries.

New approaches to diagnosis

AAHL's expertise in exotic disease diagnosis is underpinned by our research effort. AAHL's research teams are applying a range of techniques in the search for new diagnostic tests suited to Australian conditions. These tests are needed not only to reduce the time taking in testing, but also to give more information for example: the strain of a disease agent and where it came from.

Many of the tests now in routine use at AAHL and elsewhere in Australia were developed here. Just a few years ago, for example, testing for the bluetongue virus could take months. Now we can detect bluetongue in blood samples from infected sheep in just two days. Our tests can tell us what strain of the virus is present and, where in the world it came from.

Understanding viruses

Before we can develop new tests for the viruses that cause most of the diseases of concern, we need to understand the viruses: their structure and how they infect animals.

Foot-and-mouth disease



Foot-and-mouth disease is widespread in much of Asia, Africa and South America. It is one of many exotic disease threats to Australia's livestock industries

This knowledge can then be applied not only in developing new tests, but also in developing vaccines that could be used to control these diseases, should they appear in Australia.

Training vets and farmers

Having the scientists and their tools waiting for samples is not enough, if the early signs of exotic diseases are missed by farmers and their vets. AAHL helps train Australian vets in the recognition of the possible signs of exotic disease, through training courses at AAHL for vets, and by making video training and awareness programs.

AAHL and biocontainment

The samples we receive from around Australia could be infected with an exotic disease agent and, in developing new tests and vaccines, we sometimes have to use exotic disease agents to prove the tests work. The other side of this sheet explains how we ensure that any exotic disease agents are contained inside the laboratory.

For further information please contact
the Communication Group, CSIRO AAHL
Private Bag 24, Geelong Victoria 3220,
You can call us on (052) 27 5426,
or fax (052) 27 5377.

AAHL and biocontainment

The Australian Animal Health Laboratory is a national facility for diagnosis of exotic disease, research into exotic disease agents, and training in the recognition of exotic disease.

AAHL receives samples which may contain exotic disease agents and in some of our routine tests we must use exotic agents as "positive controls" to prove that the tests are working correctly. Exotic disease agents are also used in trialling vaccines and in training vets to recognise these diseases. Some of these exotic disease agents pose an economic threat to the nation's animal industries, so we must ensure that they are kept inside the laboratory.

AAHL was designed from the ground up for safe containment of exotic animal disease agents. AAHL was opened by the Governor General in 1985, after ten years of planning, five years of construction and two years of commissioning.

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Multiple barriers

A guiding principle in the design of AAHL was that biocontainment should never be by a single barrier. If one containment system or barrier fails, then at least one other barrier is in place to protect Australia's livestock industries. This is illustrated by the "box within a box within a box" structure. Another good illustration is the power supply. AAHL requires a guaranteed power supply. Two power lines supply AAHL from the State power grid, reducing the risk of interruption.

However if the power supply is interrupted, a diesel generator automatically starts and supplies up to 1.5MW, enough to keep AAHL's biocontainment systems operating normally. A second generator is on standby in case the first fails to start. A third generator provides an additional insurance when one generator is undergoing maintenance. This approach to backup equipment is typical of the precautions taken to ensure that AAHL operates safely.

Primary containment barriers - the human factor

Some exotic animal disease agents can also infect people. We must ensure our staff do not carry such zoonotic agents from the secure area. We achieve this by minimising contact with these agents.

Access to such agents is strictly limited to trained staff who use a range of measures to contain the disease agents.

Special biocontainment cabinets are used for bench work with zoonotic agents. When working with infected animals that may be excreting zoonotic agents, staff work in special plastic suits that cover the whole body and isolate them from any viruses that could infect them. When working with agents such as Newcastle disease virus, a fatal disease of poultry which can be carried in the respiratory tract or the eyes, staff wear breathing-air hoods.

The personal containment procedures are backed up by compulsory showering out of each animal room and out of the secure area. Once back in the outside, our staff must not have contact with livestock animals for seven days.

AAHL's biocontainment features are documented in a range of publications. To find out more about the building we recommend a series of videos produced by Film Australia during the construction of AAHL. There are three programs: Concept; Construction; Systems. They are available for loan from the AAHL Library.

AAHL's 1985 Report also contains a good overview of biocontainment.

The AAHL Microbiological Security Manual documents all microbiological security procedures within AAHL. It can be viewed in the AAHL Library as can a range of plans and other documents on the operation of AAHL.

