AAHL: scientific capability on emergency call

The Australian Animal Health Laboratory (AAHL) was set up to help defend Australia against outbreaks of exotic animal disease. AAHL's diagnostic team maintains a constant readiness to respond immediately, accurately and professionally to emergencies that could threaten Australia's livestock industries.

The mere suspicion of an exotic disease outbreak can halt livestock exports, costing Australia billions in lost trade. For example, a suspected outbreak of foot and mouth disease alone would close Australian access to international meat markets worth $6 billion. Rapid exclusion of the agents of disease outbreaks enables some of the worst fears to be eliminated while identification enables appropriate containment to be initiated.

Increasingly, the threat also extends to human health, such as in the 1994 outbreak of the equine morbillivirus, which led to the death of horse trainer, Vic Rail. The speed with which AAHL's diagnostic team identified the virus following the sudden outbreak underpinned the containment of the disease by the State authorities. Their achievement was recognised by the 1995 CSIRO's Chairman's medal.

AAHL serves as an international reference laboratory for avian influenza, Newcastle disease, bluetongue, brucellosis and epizootic haematopoietic necrosis. The importance of the task assigned to AAHL is reflected in the multi-million dollar investment in AAHL's state-of-the-art laboratories for secure handling of exotic animal disease agents.

The Australian Animal Health Laboratory (AAHL) has won international acclaim for its role in identifying and helping defend Australia against outbreaks of exotic animal disease. AAHL has a unique biocontainment facility that enables it to work safely with infectious and exotic diseases and prepare Australia to manage any disease outbreaks.

But AAHL is more than a well equipped research facility. AAHL's success is, at least, as much due to the training, planning, and dedication of the scientific and support staff charged with this awesome responsibility: their teamwork, expertise and leadership have created not just a world class facility, but a world leading scientific capability.

A clear purpose

The AAHL national facility has a significant research role, but the Deputy Chief of CSIRO's Division of Animal Health which operates AAHL, Dr Keith Murray, makes it very clear that its stakeholders' priority is rapid, accurate diagnosis in emergencies. "The Charter under which AAHL was established is very explicit about our responsibility to respond to possible threats from outbreaks of exotic viruses. These threats are very real: we know they are going to arise regularly. We may not know

when or from where the threats will come, but we know they will. So, we know that we are going to be accountable under very trying circumstances." he said.

As Head of AAHL from 1989 to 1996, Dr Murray made sure that everyone in the diagnostics team was fully aware of why they were at AAHL. "In my first month, I went around and talked to all the staff. I took particular care to ensure that the support staff, such as the engineers and the microbiological security staff were signed on to the fact that the product of AAHL was science, and that all functions were directed at delivering that science. They responded to this very well and we established a culture that had a clearer sense of purpose than I have seen anywhere else in the world. It drove all the plans and work priorities we set, right down to Personal Performance Evaluations."

Delivering a capability

Dr Murray says that the successes of AAHL, such as identifying the equine morbillivirus, had as much to do with the groundwork that went into creating the diagnostic team's scientific capability, as the leadership and management of the emergencies themselves.

"That capability doesn't arise magically on the eve of a crisis. We put in a lot of careful preparation to ensure that we could deliver this capability when the need arose," he said.

Initially, this involved developing a suite of diagnostic procedures that were in constant readiness. These procedures enable the rapid identification of an infectious agent, such as the foot-and-mouth disease virus, which would be a major threat to the livestock industry. Normally, viruses are identified by sampling suspect tissue and encouraging the virus to spread through a specially prepared tissue culture to levels where it can be easily detected. AAHL has developed more direct tests, including the use of specially tagged antibodies that bind to any of the suspect virus that might be present in a tissue sample. If these antibodies are present when all viral material is separated out of the sample, then the suspect virus must be present.

"When I first arrived at AAHL, we had some worrying gaps in our diagnostic capability . One of our immediate tasks was to establish the priority of tests that we needed and put them on-line," recalls Dr Murray.

The identification of required diagnostics proceeded in a very formal and structured way. Firstly, input was obtained from different interest groups around the country, in consultation with scientists in the Commonwealth Department of Primary Industries and Energy. This led to a listing of the various diseases threatening Australia, from which the diagnostics team developed a set of priorities for AAHL. This list was then formally approved by the AAHL Board, which included both scientific and industry representatives.

Within two years, the priority diagnostics had all been put on-line.

The second key element in creating the response capability was to enhance the range of skills in the diagnostics team. "We had a traditional structure, with a team of veterinary diagnosticians who were very skilled in their job," recalls Dr Murray. "But since many of the potential emergencies involved totally new viruses, I put some of the biological scientists into the team."

This was unprecedented in similar facilities elsewhere in the world and wasn't well received at first by either the vets or the scientists. "The vets felt their position was threatened, as if I was saying they weren't up to the job. The scientists didn't see what it had to do with research, since it was essentially the application of established techniques. But I was convinced that the structure made both practical and scientific sense. It meant that when very complex identifications or previously unknown viruses were involved, we had both viral and animal experts on the team. The approach has since proven to be highly successful. As the vets and the scientists worked together and achieved better results for all, the earlier divide faded away, replaced by teamwork based on mutual respect" said Dr Murray.

Team building, crisis procedures and constant learning

Nationally, a three-category emergency system was set up, with level three being the worst-case emergencies. Dr Murray's role was to lead the team in Category 3 situations. When an emergency was declared, members of the team would put aside all other work and concentrate solely on the outbreak.

The lines of communication for each category were well established. The team was constantly trying out procedures and fine-tuning them. When outbreaks occurred, the teams would learn from them.

The first outbreaks AAHL had to deal with were lower level emergencies. Dr Murray: "We were fortunate, I suppose, that the first outbreaks we had were lower-level emergencies. This gave us opportunities to test our procedures and develop strong teamwork. Our team included vets, scientists and support staff including microbiological security staff. All were essential. The science couldn't proceed efficiently if the stores, samples and support work weren't functioning efficiently."

Critical support services

"Our support people are very professional and are absolutely committed. We are totally reliant on them. When the emergencies hit, we don't have time to trouble shoot and double check. The scientists and vets have to be able to concentrate one hundred per cent on their tasks."

Dr Murray said that for this reason, he regards the support staff as contributing some of the core skills of the diagnostics team. "They are constantly available during crises, on week-ends, Saturday nights or whenever, to pick up material or other crucial tasks. Their level of commitment and dedication is exceptional, and they form part of the foundation of our team.

External networks

AAHL was set up to serve animal industries and this demanded not only a good capability, but also effective links to the people who could use the capability. "Leadership doesn't only involve making sure things are running efficiently within the organisation. You also have to look externally. Our role is a national responsibility and I work hard at maintaining an external network – in Australia and overseas – that is essential to our being able to deploy the capability we've established to best effect," said Dr Murray.

The AAHL Board and its successor from 1996, the AAHL Advisory Council, provide a direct accountability to external groups by including representatives from the industry, from Government and from the farming community. The Board was established to provide policy advice, but inevitably the line between policy and the management of the facility became blurred on occasions.

"Initially, the Board seemed a burden, because they sometimes quizzed our management decisions" recalls Dr Murray, "whereas our accountabilities were to CSIRO. But the Board became valuable to us in maintaining support and understanding from the industry and government. If we explained our decisions to them and they supported us, then we could be confident of our position during a crisis. We also listened to them and obtained valuable advice and industry experience."

There was also some overlap between the Board and another key group in the network, the Consultative Committee on Exotic Animal Diseases (CCEAD), a national body comprising the Chief Veterinary Officers (CVO) of each State and relevant Federal officials. Dr Murray is a member of this Committee. They meet regularly and when an outbreak is suspected, the group meets immediately by phone to establish an initial plan of action.

Dr Murray: "These people are our key stakeholders, or customers if you like. By virtue of working with them on a weekly and monthly basis over the years, you really get to know them and build trust. These relationships are critical during an emergency."

International networks

Because the team cannot be an expert in all diseases, networking with other scientific organisations is essential. The domestic networks are maintained through bodies such as CCEAD. But Dr Murray also invests a considerable amount of time in maintaining international networks, so that AAHL can call on the best brains overseas as well.

"I give seminars and lectures regularly and make it a point to visit leading institutions such as Centre for Diseases Control in the United States. We also encourage visits to AAHL from international leaders in specific animal diseases. These relationships are invaluable in times of emergencies. With long standing relationships comes trust and discretion, which are invaluable."

There's a lot at stake. A disease outbreak, even if it's contained, can do immeasurable damage to Australia's overseas trade. Foreign governments can be quick to impose bans on products from areas where an outbreak is merely suspected. With people's livelihood at stake, exotic animal disease is an emotionally charged issue.

The equine morbilivirus outbreak

In 1994, AAHL's diagnostic capability was put to a crucial test. Dr Murray received a call from a worried Queensland CVO. A number of race horses were dying and their trainer was ill in hospital. No-one could identify either the illness of the horses or of the trainer. The worst fears of the CVO and of AAHL was that they might be facing an outbreak of African horse sickness, a highly virulent and deadly disease.

AAHL went to Category 3 alert. Dr Murray led an initial brainstorming session, in which the critical issues were identified and priority actions were agreed upon. These included listing the diseases that would be priorities for initial testing. The samples from Queensland arrived the next day. "Having set the priorities and putting all the tests in place didn't enable us to make an instant diagnosis," recalls Dr Murray. "But it did help us quickly exclude a number of possibilities. Within 24 hours of the contact from the Queensland CVO, we were able to tell the first CCEAD meeting that it wasn't African horse sickness. That was almost as important as being able to say what it was," he said.

Early planning for critical issues

Dr Murray says that planning during the initial brainstorming session also looked at critical issues beyond the need for the first actions. This led to two decisions that proved crucial.

The first was that, because the horse trainer, Vic Rail, was sick, Dr Murray ordered that staff wear air supply hoods. "It seemed highly unlikely at the time that Vic Rail was going to die from the same disease that was infecting the horses. I was a bit anxious about being seen to be overreacting, but thank God I took that decision. We could have lost some staff."

Secondly, Dr Murray ordered that infected tissues be injected immediately into some quarantined horses at AAHL. Under normal procedures, this step would have come later in the process. The first step would have been to isolate the virus or bacteria, followed by a transmission test to prove that it is actually the cause of the disease. But by doing the transmission test even before the disease agent had been isolated, the team saved considerable time. "It would have been easy to think sequentially, focusing entirely on the first step of identification. But thinking in terms of the total task shortened the confirmation time by two weeks," Dr Murray recalled.

Communication with the public

An outbreak of any disease that affects an industry or human health attracts enormous public interest. That interest is manifested in massive media scrutiny. Dr Murray had

been prepared for this scrutiny, by developing a professional communications group within AAHL, which worked closely with CSIRO's corporate public affairs group.

"We are here because of the public interest and so we saw it as a fundamental duty to keep both our stakeholders and the public informed. We kept in close liaison with the authorities responsible for quarantine and active control measures to ensure that we were speaking with one voice. Then we responded as fully as possible to the media and public enquiries. This openness with the media meant that they checked rumours before going to print and avoided the more sensational claims that can occur in a crisis like this," said Dr Murray.

"A proactive approach to keeping politicians and other stakeholders informed also meant that we saved a lot of time in the long run and were able to enjoy their support, rather than be under siege from all quarters," he recalls.

Managing for the long term

Managing a capability like the AAHL diagnostics work presents some unique difficulties. "We can't manage just for short term deliverables. The public good requires a capability to respond to the unforseeable. We've had to deal with four new viruses since the morbillivirus, all unique and previously unknown," says Dr Murray.

The need to maintain the response capability limits the amount of externally funded work that the diagnostics team can undertake. They have to be prepared to drop everything at a moment's notice. Consequently, the diagnosis has a lower funding target from external contracts than other AAHL programs – 30% compared to up to 50% for other programs. External contracts for the group also have an escape clause from delivery schedules, should an outbreak occur during the course of the contract. Dr Murray says that fortunately, most of their customers are in the animal health industry and are sympathetic to this broader responsibility.

"What we have is a highly trained professional deployable resource. It's not expert in every disease, but we can be confident that when confronted with the unknown, it will do a great job and pull in the expertise we need from Australia or from overseas," he said."