

Animal Health Surveillance

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QUARTERLY REPORT

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Preface

The national foot-and-mouth disease simulation, 'Exercise Minotaur', dominated activity during the quarter and a summary of the exercise is given in this issue. Recommendations and actions as a result of the exercise will be reported in future issues of *AHSQ*.

Other topics include highlights of disease surveillance activities, items of interest from States and Territories, and summaries of disease monitoring and surveillance programs reported to Australia's National Animal Health

Information System (NAHIS). Only summary information is recorded in NAHIS, with detailed data being maintained by the source organisation. The information included in this report is accurate at the time of publication but, because of the short reporting and production time, minor discrepancies may occur. *AHSQ* is available on the Animal Health Australia website (at www.aahc.com.au/nahis).

Gardner Murray
Australian Chief Veterinary Officer

Exercise Minotaur

The request by the Council of Australian Governments (COAG) in mid-2001 for a national foot-and-mouth disease (FMD) simulation exercise came to fruition with 'Exercise Minotaur', held from 9–13 September 2002. This article outlines the scenario used in the simulation, the specific areas that were tested, and some of the outcomes from the exercise. A final report on the exercise based on debriefings and on the reports of the exercise evaluators and observers, and will go to COAG in November.

THE SCENARIO

The scenario used in Exercise Minotaur provided detailed information on both the disease situation and its social and economic impacts, from the first detection of FMD until day 84. In the scenario, the (simulated) outbreak of FMD began on a mixed pig and beef cattle farm at Beaudesert, in south-east Queensland in early September. Movement of infected animals from the

property then spread the disease over the border to Burringbar and Murwillumbah in the north-east corner of New South Wales (NSW). A contaminated stock crate introduced the disease to Victoria where it spread extensively to involve much of that State. Livestock standstills and movement controls were immediately imposed following the discovery of the disease and a slaughter-out approach adopted.

By day 84 of the simulated outbreak (day four of the exercise), there were 344 infected premises in the three States, with 566 911 animals slaughtered from 1127 premises. The estimated eradication costs were \$455 million, of which about one-third was compensation payable to farmers.

The social and economic aspects of the scenario included local effects such as disruption to Beaudesert Agricultural Show, and broader effects including milk shortages and price rises, a 50% drop in domestic meat prices, and the loss of

export markets for livestock and a range of livestock products. Other issues addressed included media coverage, animal welfare issues, the environmental impact of carcase disposal, social support for farmers and rural communities, mental health issues for rural communities and disease controllers, and the impact of a reduced number of tourists visiting Australia.

PARTICIPANTS

The exercise involved more than 1000 participants from governments (Commonwealth, State and Territory, and local) and from peak industry groups. About 100 facilitators and independent evaluators helped to keep the scenario on track and assessed the response to the exercise. A small number of key international observers assisted in providing a broad overview of the outcomes. Comprehensive debriefings of participants were conducted around Australia in September and October to capture both positive and negative outcomes from the exercise.

PURPOSE

The objectives of the exercise were to test national consultative arrangements, communication systems, disease control policies, trade management arrangements, and some aspects of relief and recovery. It was not designed to test some areas such as field operations, information management systems, national livestock tracing systems, and overseas communications. However, such areas could be tested in future exercises.

OUTCOMES

Exercise Minotaur itself was a success, with high level engagement of government and industry ensuring that

AUSVETPLAN

Two AUSVETPLAN manuals — the foot-and-mouth disease (FMD) strategy and the AUSVETPLAN Summary Document — were subject to 'interim revision' to assist with Exercise Minotaur. These manuals will be further revised after Exercise Minotaur has been evaluated to capture such matters as new whole-of-government arrangements, revised policies on issues such as a national stock standstill, vaccination, FMD zoning, and recovery measures.

A new version of the manual for highly pathogenic avian influenza was finalised during the quarter and,

the objectives set were met. A final report is being compiled based on debriefings and on the reports of the exercise evaluators and observers. Key findings are expected to focus on the areas of communications and information management, the national coordination framework, cross-border issues, vaccination policy, the EAD Response Agreement, and national stock standstill arrangements.

Although the exercise identified gaps in some areas, the training aspect of the simulation means Australia has never been better prepared to combat a major outbreak of an emergency animal disease. Specific weaknesses that were identified either before or during the exercise will be addressed as part of Australia's continual improvement process to prepare for emergency animal diseases like FMD.

As a result of Exercise Minotaur people involved in outbreaks of emergency animal diseases now have a better idea of their respective roles and responsibilities. Animal health relationships and networks have been strengthened throughout Australia, with flow-on benefits expected for the future protection of Australia's livestock industries. More emergency animal disease exercises are planned. One possibility is that a large-scale exercise be held every three or four years (albeit at a smaller scale than that of Exercise Minotaur), with smaller annual exercises to test individual system components.

A summary of the final report on the exercise, which will go to COAG in November, will be included in next issue of *AHSQ*. Details will be on the AFFA website (at <http://www.affa.gov.au>).

Contact: Tim Roseby, FMD Task Force, AFFA.

like all AUSVETPLAN manuals, is available on the internet (at <http://www.aahc.com.au/ausvetplan>).

A number of other manuals were revised and are undergoing further consultation and editing. These included the Control Centres Management Manual, Dairy Enterprise Manual, Wild Animal Management Manual, Disposal Manual, and manuals for the diseases BSE, anthrax, and contagious equine metritis.

Contact: Peter Thornber, Manager, Animal Health and Emergency Services, Animal Health Australia.

Disease Watch Hotline — 1800 675 888

The Disease Watch Hotline is a toll-free telephone number that connects callers to the relevant State or Territory officer to report concerns about potential exotic or other emergency disease situations. Anyone suspecting an exotic disease outbreak should use this number to get immediate advice and assistance.

For information about the Disease Watch Hotline, contact Jamie Penrose, Animal Health Australia.

Australian field trial of BSE test

Australia continues to be recognised by its trading partners as free of transmissible spongiform encephalopathies (TSEs) affecting animals including bovine spongiform encephalopathy (BSE) in cattle and scrapie in sheep. Continuing recognition will depend on the ongoing operation of contemporary surveillance systems.

The current National TSE Surveillance Program has been designed specifically to meet the requirements of the International Animal Health Code of the Office International des Epizooties (OIE). It is possible that the existing program might need to increase sample numbers to maintain future market access, if Australia's major trading partners modify their existing TSE monitoring and surveillance requirements.

Three BSE rapid post mortem tests were approved by the European Commission (EC) in July 1999 for large-scale screening programs in Europe. The three available tests were the Prionics® 'Check' Immunoblot; the Biorad® sandwich immunoassay and the Enfer® enzyme-linked immunosorbent assay (ELISA). Although the tests have extremely high sensitivity and specificity for BSE, the possibility of false positive results could not be entirely excluded under Australian conditions. For example, *Bos indicus* breeds might give unpredicted aberrant test results. Accordingly, it was decided to conduct a trial to validate one of the three EC-approved tests for use in various subpopulations of Australia's sheep and cattle. The Prionics test was selected to be fully tested under Australian field conditions. The trial (using industry research and development funds) evaluated the test in a range of cattle breeds, ages and management types to ensure that overseas estimates for specificity were applicable to Australian field conditions.

Following formal training of scientific personnel at the Prionics AG laboratories in Switzerland, the test was established at the Australian Animal Health Laboratory (AAHL) and included the provision of a restricted access laboratory dedicated to the trial to comply with recommended biocontainment guidelines and to assist in maintenance of confidentiality. Agriculture, Fisheries and Forestry — Australia (AFFA) veterinary staff at abattoirs and field officers from the Victorian Department of Natural Resources and Environment (DNRE) were trained in brainstem collection using a modified spoon. For convenience, the test was performed as a two-day test, although it can be conducted as a single-day test with results available within 10 hours of the laboratory receiving the sample.

The field trial was conducted in two parts. The first part focused on training and test validation in young, clinically normal cattle. The second part targeted subpopulations in which overseas observations suggest there is a higher likelihood of BSE, such as on-farm dead (knackery) cattle, suspect or emergency slaughter cattle, and aged dairy cattle. Other animals tested included adult *Bos indicus* cattle, merino sheep and British sheep breeds. A total of 2400 tests were performed in the trial, all of which gave a negative result. The test is now considered validated for use under Australian conditions and will be a valuable addition to the range of tests for animal TSEs available at AAHL. The results demonstrated the high specificity of the test under Australian conditions and by targeting potentially higher-risk groups, provided additional evidence demonstrating Australia's freedom from BSE and scrapie.

*Contributed by: Andrew Cupit,
Office of the Chief Veterinary Officer, AFFA.*

Feline spongiform encephalopathy

A presumptive diagnosis of feline spongiform encephalopathy (FSE) was made in an imported male Asiatic golden cat that died suddenly at Melbourne Zoo in August. This animal had been imported in 1998 from Europe, and enquiries have been initiated in the two European countries in which the animal was previously held with a view to establishing possible sources of exposure to the causative agent.

A post mortem examination conducted by veterinarians at Melbourne Zoo indicated pancreatic disease and peritonitis as the cause of death. Subsequent histopathological examination confirmed spongiform changes in various parts of the brain as an incidental finding. Tissues were referred to the

Australian Animal Health Laboratory (AAHL) for further examination, which indicated a presumptive diagnosis of FSE. Samples of brain tissue from the affected animal have been sent to an overseas reference laboratory to confirm this diagnosis. If confirmed, this will be the second case of FSE diagnosed in Australia in an imported zoo felid: the first occurred in 1992 in a cheetah, imported from England to a zoological park in Western Australia.

National surveillance systems for transmissible spongiform encephalopathies continue to confirm the absence of this group of diseases in Australia.

*Contributed by: Andrew Cupit,
Office of the Chief Veterinary Officer, AFFA.*

Update on Newcastle disease in Victoria

Quarantine restrictions were imposed on a poultry layer farm 75 km west of Melbourne in May because of Newcastle disease due to virulent virus of Australian origin (AHSQ, Vol. 7, No. 2). These restrictions, including all local movement controls, were lifted on 2 September 2002.

Active surveillance for the virus in the surrounding area has found no evidence of the virulent Newcastle

disease virus. Furthermore, the absence of the virus has been confirmed by negative results after testing sentinel birds put on the farm after the destruction and disposal of the birds, and the cleaning and disinfection of the premises. Restocking of grower birds on the premises has commenced and it is expected that the facility will be back in full production by mid-November.

Aquatic animal health

AQUATIC ANIMAL HEALTH COMMITTEE

In September, the Primary Industries Standing Committee (PISC) endorsed the establishment of the Aquatic Animal Health Committee (AAHC). Replacing the interim Fish Health Management Committee, AAHC will commence operations in January 2003. Its membership will include representatives of each State/Territory government, the Commonwealth Government and major aquaculture, fishing and recreational fishing industries. AAHC will take a lead role in developing and reviewing national aquatic animal health policies and programs, and provide advice and submit recommendations to PISC and other stakeholders on those issues.

AAHC will take responsibility for AQUAPLAN — Australia's national strategic plan for aquatic animal health. AAHC is the logical body to oversee its continuing implementation and improvement. AAHC will also guide the future management of aquatic animal health to ensure:

- integration of the State and Territory governments' aquatic animal health responsibilities with the Commonwealth Government's role of maintaining quarantine, meeting international requirements for disease reporting, developing trade relationships and negotiating market access;
- avoidance of duplication between States, and addressing cross-border issues consistently;
- provision of an avenue for input by the private sector; and
- use of expertise that may only be available in aggregate.

AUSTRALIAN AQUATIC ANIMAL HEALTH INFORMATION SYSTEM

One of the first tasks for AAHC is to establish the Australian Aquatic Animal Health Information System (AAAHIS). Designed on the basis of the existing National Animal Health Information System, AAAHIS is to provide a central information facility

focusing on diseases of aquatic animals. The development of AAAHIS has received strong industry support and it will be funded directly by the National Aquaculture Council.

VIRAL HAEMORRHAGIC SEPTICAEMIA

Australia's tuna aquaculture industry relies heavily on imported pilchards and mackerel as a major component of the diet of the southern bluefin tuna. Imported pilchards are also used as bait for rock lobster pots and as bait in the recreational fishing industry. Recent scientific publications reported the discovery of viral haemorrhagic septicaemia virus (VHSV) in pilchards and mackerel caught off the Californian coast, an area that has been a major source of imported pilchards and mackerel. As a result, all species of *Sardinops* and *Scomber* (pilchards, mackerel and closely related fish) are classified as *specified species* with attendant Australian Quarantine and Inspection Service (AQIS) import controls. Imports of whole round fish of these species from all countries (other than New Zealand) are restricted, except where the importer has made a case that the use of the product in Australia can be controlled with a high degree of certainty, and that the use of the product does not pose an unacceptable quarantine risk.

These new restrictions are temporary, pending completion of a detailed policy review by Biosecurity Australia, taking into account that several thousand tonnes of these species have already been imported for direct introduction into the aquatic environment without the introduction of the disease.

NORTHERN PRAWN FISHERY SURVEILLANCE

In late 2000, polymerase chain reaction (PCR) signals indicative of possible infection with white spot virus (WSV) were detected in crabs within the Darwin Aquaculture Centre and prawns within the Aquaculture School of the Northern Territory University (see AHSQ Vol. 5 No. 4). The possible infections were thought to have arisen from the inadvertent use of imported green prawns as feed. In 2001, as a result of this finding,

AQIS introduced mandatory testing of consignments of whole and unpeeled headless imported green prawns for the presence of WSV. Infected consignments must be destroyed, re-exported or cooked before release onto the Australian market. WSV, the major disease threat to prawn aquaculture, has devastated the industry in both South-East Asia and Central America.

With the cooperation of AQIS and the fishing companies involved, valuable information on the viral status of prawn populations in the Gulf of Papua and the Arafura Sea is being collected. This monitoring provides a potent early warning system to detect any spread of WSV into Australian waters. To date, 51 consignments of prawns from the Arafura Sea and 29 from the Gulf of Papua all tested negative for WSV.

TRAINING FOR AQUATIC CCEAD MEMBERS

Better education about Consultative Committee on Emergency Animal Diseases (CCEAD) processes was one recommendation of the review of the national response to the WSV alert in Darwin (see *AHSQ* Vol. 7 No. 1). To implement this, OCVO is developing a two-day training course on CCEAD operations and procedures. It will be given at three locations this financial year to maximise participation of both government members and industry representatives of CCEAD.

*Contributed by: Eva-Maria Bernoth,
Office of the Chief Veterinary Officer, AFFA.*

Australian Wildlife Health Network

The Australian Wildlife Health Network (AWHN) was launched in August. The Zoological Parks Board of New South Wales (NSW) and NSW Agriculture hosts the network, which is managed by an advisory group, chaired by Agriculture, Fisheries and Forestry — Australia (AFFA).

Three years ago, a national workshop (*AHSQ* Vol. 4, No. 4) identified the need for a centre to coordinate the many people and organisations involved in wildlife disease investigations and their likely effect on Australia's trade, public health, biodiversity, and domestic animals. AFFA provided funding from the Wildlife and Exotic Disease Preparedness Program for NSW Agriculture to examine alternative models for the network, prepare a business plan, and identify potential sources of funding.

The network has appointed a national coordinator, Dr Rupert Woods, who has worked as a private veterinarian, as a curator and veterinarian for the Zoological Parks Board of NSW at Western Plains and Taronga Zoos, and as a research officer for the Australian Antarctic Division.

In late September, the advisory group held its first face-to-face meeting at CSIRO Gungahlin in Canberra. The meeting developed a strategic plan covering five main areas — surveillance; emergency management; research; education and training; and communications and marketing. An electronic mailing list is being developed and the network is keen to hear from anyone who would like to join, who would like further information, or who has ideas for prioritising work in these key areas. Contact

*Dr Rupert Woods
Australian Wildlife Health Network
PO Box 20
Mosman NSW 2088
Phone: 02 9978 4749
Fax : 02 9978 4516
E-mail: rwoods@zoo.nsw.gov.au*

AWHN will be a regular contributor to both *AHSQ* and the National Animal Health Information System.

*Contributed by: Chris Bunn,
Office of the Chief Veterinary Officer, AFFA.*

Ovine Johne's disease protected zone status

New Protected Zones for ovine Johne's disease (OJD) came into force at the end of the quarter, on 1 October, with large parts of the current Control Zone moving to the lower risk Protected Zone.

The new Protected Zone comprises Queensland, parts of NSW (large areas in the north, north-west and south-west), Victoria, Tasmania (other than Flinders Island, which remains a Residual Zone) and South Australia (except for part of Kangaroo Island that is a Control Zone). Western Australia is a Free Zone.

The changes have the biggest impact in New South Wales, which is divided into three zones (Residual, Control and Protected), with more than 50% of NSW flocks now in the Protected Zone. Producers in other States, trading outside their local areas also need to discuss the changes with their State authorities to ensure they are fully informed about the possible impact on trading.

*Contributed by: David Kennedy, Animal Health
Australia's JD coordinator.*

State and Territory reports

New South Wales

Contributed by:
Barbara Moloney
NSW Agriculture



ANTHRAX

Five of 150 four-month-old lambs died in mid-September and were confirmed positive for *Bacillus anthracis* by polychrome methylene blue staining of blood smears. The property, near Rankin Springs, had a history of anthrax and vaccination had been practised regularly. These lambs had been vaccinated within the previous 10 days, and drought conditions may have increased the exposure to spores with animals grazing a failed crop close to the ground. The carcasses of the affected animals were burned on site and temporary movement restrictions were imposed on stock from the property.

Four investigations of mortalities of cattle for anthrax during the quarter were negative. Rock fern (*Cheilanthes* sp.) poisoning was found to be the cause of death in one of the investigations.

EQUINE HERPESVIRUS ABORTIONS

There were 13 reported instances of abortions caused by equine herpesvirus (EHV1) in NSW during August and September. Most reports were single cases, with no abortion storms reported. Some of the cases related to movement of mares from Victoria, but most were apparently precipitated by the movement of heavily pregnant carrier mares. It has been suggested that vaccination may be assisting in the suppression of secondary abortions.

STRANGLES

Twenty-three cases of strangles (*Streptococcus equi* subsp. *equi*) were reported. This is more than usual, although the reason for the increase is not known at this stage. In one case, a large abscess caused a sudden death due to asphyxiation by tracheal compression.

POST-ARRIVAL QUARANTINE

Two potential exotic disease incidents occurred in post-arrival quarantine during the quarter. An imported stallion developed a high temperature while in post-arrival quarantine, and showed nervous signs including muscle tremors and incoordination about five days after arrival. However, over the next seven days its condition stabilised and the horse gradually returned to health. Tests at AAHL showed a rising antibody titre to flavivirus, which was confirmed by AAHL and other reference laboratories as due to West Nile Virus. Tests for other arboviral diseases were negative.

Horses and humans are 'dead end' hosts for this virus — they do not spread the virus by contact and are not capable of infecting mosquitoes. Thus this horse was not a risk for other horses or for humans. State and Commonwealth chief veterinary officers and horse industry representatives agreed with quarantine authorities that all the horses held in quarantine could be released without risk of transmitting the disease.

The second incident involved a dog imported from the United States in August. While in post-arrival quarantine, it was diagnosed as being infected with *Coccidioides immitis*. This soil-borne fungus is exotic to Australia, and transmission is only known to occur in endemic areas of the south-western United States.

Northern Territory

Contributed by:
Diana Pinch
DBIRD



VESICULAR DISEASE INVESTIGATION

The Department responded to a report on the Emergency Disease Hotline of lesions suspected of being an exotic vesicular disease. A field investigation was carried out in feral pigs near Ramingining, about 390 km east of Darwin, on the north coast of Arnhem Land. Post mortem examination of 45 pigs in the vicinity of the reported disease cases showed no clinical signs or gross lesions consistent with vesicular diseases of pigs. Serology conducted at the Australian Animal Health Laboratory was negative for foot-and-mouth disease virus serotypes O, A and Asia 1. The investigation demonstrated the very high cost of disease investigation in feral animals in a remote locality. The local network of contacts developed by the Northern Australia Quarantine Strategy in Arnhem Land was valuable in facilitating the investigation.

PASTEURELLA PNEUMONIA

Over a three-day period, 10 of 67 bullocks died on a station in the Alice Springs region. The primary lesions were a fibrinous pneumonia, with evidence of septicaemia. A virus affecting the respiratory system has not been isolated, but is strongly suspected as the primary cause, compounded by secondary bacterial infection, stress and dusty yards. *Pasteurella multocida* was isolated from pleural fluid.

PLANT POISONING

Mortalities in weaner cattle were investigated in the Douglas Daly region. Sudden deaths were occurring in

weaners in reasonable condition. Examination of one fresh carcase showed extensive petechial haemorrhages throughout the subcutaneous fat, in the mesentery, epicardium, lymph nodes of the head, larynx and intercostal muscles. The liver was yellow, and on histopathology showed fibrosis, cholangiolar cell hyperplasia and biliary hyperplasia, and changes to the hepatocytes. The lesions suggest a liver toxin such as pyrrolizidine alkaloids. *Crotalaria* plants (rattle-pod), which have been associated with hepatic toxicity throughout Australia, were in the area.

BOVINE JOHNE'S DISEASE

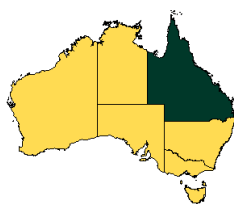
There have been many follow-up investigations because of the two positive cases of bovine Johne's disease (BJD) (see *AHSQ*, Vol. 7, No. 2), with 35 properties that received cattle from the same source being placed in quarantine. Quarantine restrictions have been lifted from 12 of those properties, since the owners chose to do post mortem examinations on the cattle from the original infected property, and to test any other in-contact cattle. These investigations have not revealed any evidence of infection. There are 17 properties awaiting final test results. Owners of four of the quarantined properties have decided to have their stock undertake a testing program to ensure freedom from BJD, which will take up to five years. There are two properties where action still has to be taken. Twenty of the properties are in the Katherine region, thirteen in the Darwin region, and two in the Tennant Creek region.

BOTULISM

Mortality in wild birds was reported near Katherine. At least 20 ducks and one pelican were found dead or dying around or in sewage ponds. Botulinum toxin type C was detected.

Queensland

Contributed by:
Janet Berry
QDPI



BLUETONGUE MONITORING IN CATTLE

An increased appraisal of bluetongue viral activity in north Queensland has begun. A seroprevalence survey of 18-month-old cattle is being conducted in and adjacent to the current surveillance zone to reflect the southern and western extent of bluetongue viral activity in cattle. This will give additional assurance of the precision of existing bluetongue zone boundaries that are determined under the National Arbovirus Monitoring Program (NAMP) using sentinel herds and computer analysis of weather and other data. Five herds were sampled during the quarter and ten more

will be sampled before the end of the year. Bluetongue zoning is based on the OIE International Animal Health Code and assists with the selection of suitable cattle for export to markets requiring certification in relation to bluetongue status.

BOVINE JOHNE'S DISEASE

Two breeding cattle being exported tested positive for bovine Johne's disease (BJD) by ELISA. They were excluded from export and investigated further by faecal sampling and tissue culture. No lesions suggestive of *Mycobacteria paratuberculosis* were seen in haematoxylin and eosin stained sections and no acid-fast bacilli were seen in Ziehl-Neelsen (ZN) stained sections. All tissue cultures were negative.

OVINE JOHNE'S DISEASE

Ovine Johne's disease (OJD) was detected by a stock inspector during visual surveillance for OJD at a Queensland abattoir. The disease was detected in a line of apparently healthy sheep from a known infected property in NSW. Samples were tested by ZN staining and culture and proved positive. Queensland is a protected zone for OJD but movements direct to abattoirs from interstate are approved.

PLANT POISONINGS

The extremely dry conditions in most parts of Queensland have seriously reduced pasture availability, and livestock seek a wider range of local herbage for fodder. Movements of large numbers of livestock for pasture agistment to distant parts of the State where they are unfamiliar with the local range of plants sometimes results in their exposure to unfamiliar and potentially poisonous plants. This has resulted in many reports of stock dying from plant poisonings.

Bryophyllum (mother of millions) flowers were found in the rumen at post mortem examination when 15 yearling heifers from a group of 60 died on a property in southern Queensland. A droving herd of Brahman steers in the same area had 14 deaths and 30 more affected out of 1200 head after having access to this plant one week earlier.

Lantana poisoning caused occasional deaths and clinical signs of photosensitisation among cattle from the coastal areas. A history of access to the shrub, clinical signs, and biochemistry results indicative of severe liver disease allowed diagnosis of this disease.

Zamia staggers (caused by *Macrozamia moorei*) occurred in three cattle when moved to a property in Bauhinia Shire.

Cattle recently introduced to 100% *Brachiaria* pastures on a property in north Queensland showed jaundice, skin peeling, nasal discharge, loss of condition and decreased appetite. A few deaths occurred.

Sarcostemma viminalis subsp. *australe* (caustic vine) has been responsible for deaths in western Queensland. On one property, about 40 young cattle died after having recently been moved to a new grazing area.

BOVINE EPHEMERAL FEVER

Cases of bovine ephemeral fever (BEF) have been reported in areas that received rain during August. BEF was confirmed by PCR testing on a property in Fitzroy Shire, where ten of 1000 cattle were affected. In Eacham Shire in north Queensland, two cattle died and three more were affected in a mob of 100 animals, and again, the PCR test was positive for BEF virus.

BLACKLEG

Blackleg was diagnosed as the cause of death on several properties around the State. On a property near Roma, 100 of 400 unvaccinated weaners aged 5–6 months and several six-tooth bullocks and cows died. *Clostridium chauvoei* was isolated. Another Roma district beef property lost two unvaccinated yearling heifers from a mob of 80. A Warwick dairy farm with unvaccinated stock had eight deaths and a further eight early stage cases of blackleg out of 70 Friesian heifers aged 5–7 months. There were lesions in the neck and brisket muscles, and samples were fluorescent antibody positive. Blackleg was also suspected as the cause of sudden death in six cows with histological lesions in the heart muscle consistent with blackleg on a property with 500 cows in Emerald Shire.

1080 BAIT POISONING

A property in Ayr Shire reported 12 deaths in a herd of 500 cattle. Tests ruled out anthrax, tick fevers and botulism. Liver levels of arsenic and lead were normal. Histopathology showed focal disseminated areas of myocardial necrosis and mononuclear cell infiltration of the pericardium, consistent with fluoroacetate (1080) poisoning. Follow-up investigations found that rock melons were laced with 1080 for feral pigs in the previous months and not all had been removed before cattle had access to the paddock.

EHV1 ABORTIONS

Two Darling Downs thoroughbred studs had late-term abortions in thoroughbred mares. Equine herpesvirus 1 (EHV1) was detected on viral isolation at the DPI Veterinary Laboratories. Due to prompt action in quarantining and isolating the infected mares, no further abortions due to EHV1 occurred on either stud.

OXALATE NEPHROSIS AND SALMONELLOSIS

Black diarrhoea was the main clinical sign in 15 10–12-month-old merino lambs that died on a property near Cunnamulla. A further 70 from a mob of 700 were listless, scouring and anaemic. Post mortem examination showed the carcass was pale and small

lesions were present in the abomasum and kidneys. Histological examination found multifocal suppurative abomasitis and moderate oxalate nephrosis. *Salmonella saint-paul* was isolated from the intestinal tract on primary culture. There had been no access to the normal oxalate-containing plants but the lambs were fed mouldy sorghum forage, which is being tested for oxalate. Oxalate is reported to accumulate in forages spoiled with *Aspergillus* spp. fungi.

PESTIVIRUS-LIKE SYNDROME

A detailed investigation of cattle on a property in Bauhinia Shire failed to find the reason for drooling, mucosal ulceration and chronic weight loss in young cattle. Post mortem examination of one steer found no significant pathological changes apart from obvious ulcers in the oral cavity. Tests on repeated blood samples from the cattle ruled out bluetongue virus, foot-and-mouth disease virus, and bovine pestivirus. This syndrome has been seen in a large number of herds in central and southern Queensland over the past ten years but the cause is yet to be determined. Affected animals resemble young cattle with the chronic wasting form of mucosal disease due to pestivirus. Exhaustive testing has demonstrated that pestivirus is not present in these animals, nor is it actively cycling in the herds from which they originate.

SALMONELLOSIS AND SWINE DYSENTERY

Two southern Queensland piggeries had similar dual infections in pigs. Five finisher pigs on a property with 1200 pigs had blood-stained yellow diarrhoea. There were no mortalities. *Salmonella give* and *Brachyspira hyodysenteriae* were isolated from faecal samples. On another large piggery there were 35 deaths and 300 of 3000 pigs were ill. The pigs, 16–20 weeks old, showed vomiting and a yellow or black blood-stained diarrhoea. *S. mbandaka* and *B. hyodysenteriae* were isolated from faecal samples.

South Australia

Contributed by:

John Weaver

PISA



VEROTOXIGENIC E. COLI

The Health Commission requested assistance to help establish the possible source of a verotoxigenic *E. coli* O26 considered the cause of severe bloody diarrhoea in a small number of children. The common link between the children was that all had attended the local agricultural show and its petting zoo. The animals involved were traced to their farm of origin, and the organism was isolated from a pig on a small hobby farm.

TOXICITY/POISONING REPORTS

Sporadic outbreaks of photosensitisation continued to be reported, mainly from the south-east of the State. Most were associated with biochemical evidence of liver damage, although in one outbreak in a group of young animals, muscle enzymes were dramatically increased as well. No specific cause has been determined.

Phalaris toxicity was suspected on two beef cattle properties where animals presented with staggers and paresis. On one farm, the pigment associated with this toxicity was seen on histological examination of the brain but nothing abnormal was seen in specimens submitted from the other farm.

In a group of young dairy cows, one was found dead and another found to be blind. There was access to an old car battery, and blood lead levels were 3.3 micromoles/litre, suggesting lead poisoning.

ACTINOBACILLUS AND CONJUNCTIVITIS

Approximately 50% of the cows in a dairy herd presented with a mild conjunctivitis. Cultures from conjunctival sacs produced an almost pure growth of an organism identified as an *Actinobacillus* sp. but it was not typed further and the significance of the finding is uncertain.

POULTRY

The growing number of free-range and barn layer establishments is, as expected, seeing a return to diseases that were thought to be a thing of the past. Intestinal worms are frequently being seen at levels that affect productivity. Blackhead (*Histomonas meleagridis*) also causing problems as the effective medications are becoming harder to obtain and sanitisation of facilities is almost impossible.

Infectious laryngotracheitis, usually effectively controlled in layer birds by preventive vaccination, was not seen this quarter. However, there may be problems in the future as the vaccine has been almost unobtainable. The concern stems from the many unvaccinated replacement flocks now going onto previously vaccinated multi-age farms. It is known that the vaccine virus, which can be held in a carrier state, can re-emerge and cause disease in unvaccinated birds.

STREPTOCOCCUS UBERIS PNEUMONIA

A group of hand-reared calves being fed on 'cultured' milk presented with diarrhoea, respiratory signs and some deaths. Histology indicated pneumonia with bacteria resembling streptococci visible in the lung tissue. *Streptococcus uberis* was cultured from the lungs, the milk and the vat from which the milk had come.

Tasmania

Contributed by:
John Elliott
DPIWE, Tasmania



PREGNANCY TOXAEMIA IN CATTLE

Six of 200 Angus heavily-pregnant fat cows died within six hours after being 'hard driven' over a considerable distance. Creatinine kinase and aspartate aminotransferase (AST) levels were high. The values were more consistent with forced exercise than with a myopathy. Extreme fatty liver suggested pregnancy toxemia as the primary cause. A low selenium status could indicate involvement of a trace element deficiency.

LEUCOENCEPHALOPATHY

Although rehabilitation was tried on a Tasmanian devil that was ataxic when found, the animal became completely paralysed. The carcass was in good condition, with all organs appearing normal. Microscopically, there were severe spongiform changes in the white matter of the brain and spinal cord. Samples were sent to the Australian Animal Health Laboratory for TSE exclusion. No prion protein antigen was detected with the immunoperoxidase test. Degenerative leucoencephalopathy of carnivorous marsupials has been reported in Tasmanian devils, quolls and thylacines. The cause is unknown.

CAMPYLOBACTER ABORTIONS IN SHEEP

Over 48 hours, 12 lambs were aborted in a flock of 4000 ewes about two weeks before lambing was due. The ewes were of mixed ages, and appeared healthy, although most of the abortions were suspected to involve younger ewes. *Campylobacter jejuni* was isolated from all four lambs submitted. Examination of the foetuses showed a necrotising placentitis that was consistent with the isolation of *Campylobacter jejuni*. Unusually, other lesions were more conspicuous in lung and brain than in the liver.

MAPLE SYRUP URINE DISEASE

Four of 40 Hereford calves were normal at birth but developed nystagmus and opisthotonus within a few days. Similar cases occurred in the herd in 2001. There was extreme spongiform encephalopathy, particularly in the cerebellum and medulla but also in the cerebrum. One calf examined also had severe diffuse eosinophilic meningitis, possibly due to dehydration. This history is typical of branched-chain ketoacid decarboxylase deficiency, known as inherited maple syrup urine disease. The diagnosis was confirmed by DNA examination of hair samples. The disease, is an autosomal recessive condition occurring in Herefords, Poll Herefords and Poll Shorthorns, and lesions are similar to those in comparable aminoacidurias in humans.

YERSINIA INFECTION IN CATTLE

In a group of 300 two-year-old Jersey heifers, three died and 30 were ill. There was no association with pregnancy or parturition. Signs included salivation, a tucked-up appearance and variable diarrhoea. Affected animals died within a few days if they were not treated with antibiotics. Post mortem examination found severe fibrinopurulent peritonitis and focal enteritis. This was consistent with the isolation of *Yersinia pseudotuberculosis* from the intestinal contents.

MENINGITIS IN CALVES

In a mob of 200 dairy calves, approximately 30 presented with lethargy, head-pressing and fever. The condition spread rapidly through the mob and affected a second farm. Most of the affected calves responded well to antibiotics but six died. When the skull was opened, suppuration of the meninges around most of the brain was found. *Pasteurella multocida* was isolated from the liver and lungs of two of the three calves examined and from the brains of all three.

LABORATORY ACCESSIONS

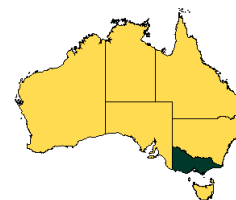
During the quarter, there were 137 aquaculture accessions, 668 livestock accessions, 58 companion animal accessions, 44 wildlife accessions and 16 accessions from other sources. Investigations into possible cases of notifiable diseases were:

Disease	Investigations	
	Positive	Total
Anthrax	0	1
Avian psittacosis	1	2
Bluetongue Virus	0	4
Bovine tuberculosis (<i>M. bovis</i>)	0	30
<i>Brucella abortus</i> (bovine brucellosis)	0	14
<i>Brucella ovis</i>	0	9
Enzootic bovine leucosis	0	1
Johne's disease	23	87
<i>Leptospira hardjo</i>	4	13
<i>Leptospira pomona</i>	1	14
Listeria	2	3
Pullorum (<i>Salmonella pullorum</i>)	0	3
Q Fever	0	1
Salmonella	18	99
<i>Salmonella abortus ovis</i>	0	1
Salmonid and other fish disease#	0	58
Iridovirus, nocardiosis and perkinsosis of shellfish	0	6
Verotoxic <i>E. coli</i>	0	87

Aeromonas salmonicida ssp. *salmonicida*, bacterial kidney disease, epizootic haematopoietic necrosis, epizootic ulcerative syndrome, goldfish ulcer disease (*Aeromonas salmonicida*), infectious haematopoietic necrosis, *Lactococcus garvieae* of salmonids, *Oncorhynchus masou* virus disease, piscirickettsiosis, spring viraemia of carp, viral encephalopathy and retinopathy, and viral haemorrhagic septicaemia

Victoria

Contributed by:
Tristan Jubb
DNRE, Victoria



GLASSER'S DISEASE IN PIGS

A number of outbreaks of Glasser's disease (*Haemophilus parasuis*) with characteristic polyserositis, arthritis and death in weaner pigs occurred in the quarter, highlighting the emergence of this once rare disease. It is now the most important disease of weaners in many Victorian piggeries, having surpassed colibacillosis. Both diseases are triggered by stress occurring around weaning. Colibacillosis is now controlled effectively with vaccines but the stressors still exist. The emergence of Glasser's disease is not unique to Australia — the same has occurred in the northern hemisphere, where its reappearance has been attributed to concomitant infections such as porcine reproductive and respiratory disease (PRRS) and postweaning multisystemic wasting syndrome (PMWS), neither of which occurs in Australia.

TETANUS IN LAMBS

At least 30 prime lambs out of 400 died from tetanus after tail-docking, vaccination with 5 in 1 clostridial vaccine and castration (marking) with rubber rings was done in dusty yards on a property in the southern Mallee. The three-months-old lambs were well grown. Deaths started three days after marking and continued for 10 days with the lambs showing the characteristic limb and neck rigidity of tetanus. The owner was concerned that the vaccine had failed. However, using the same batch of vaccine, but releasing the marked lambs into a paddock immediately off the marking cradle, resulted in only two deaths in the 10-day post-marking period from another 800 lambs.

DEFORMITIES IN CALVES

Six of 13 newborn Angus-cross calves had deformities — disproportionate dwarfism, abducted forelimbs, and domed foreheads. One calf had severe ankylosis, arthrogryposis, and difficulty breathing but was able to stand within two to three days. All calves were sired by the same Angus bull (in its first season of use) but the dams of affected calves were not closely related. Large amounts of capeweed and onion grass dominated the native pastures available for grazing. Four of the calves are still alive and doing well. Sera from the dams were negative for antibodies to Akabane virus. The aetiology remains undetermined.

INTESTINAL VOLVULUS IN LAMBS

'Red gut' — the lay term for intestinal volvulus — has been a common diagnosis in lambs in central Victorian

dryland areas during the quarter. 'Red gut' is often mistaken by farmers for enterotoxaemia. The typical history involves hungry sheep overeating when released into stands of lush lucerne. The dry season has forced many farmers to feed hungry stock on lucerne.

ILL-THRIFT IN LAMBS

In one of a number of similar ill-thrift investigations, severe enteritis and focal granulomatous hepatitis were found in dead and dying lambs in a flock where 60 of 450 12–16-week-old lambs had died. Although culture failed to prove conclusively the presence of *Yersinia* organisms, the histopathology was typical of yersiniosis. There were high numbers of *Nematodirus* organisms, possible caused by the very short pasture which afforded no chance of dilution of worm larvae, a relatively moist microenvironment at ground level allowing survival of worm larvae, and low immunity of the lambs. Drench resistance is not suspected.

STILLBIRTHS AND NEONATAL MORTALITY

A small piggery in north-western Victoria experienced losses of whole litters due to a combination of stillbirths and neonatal deaths. Some piglets had fully aerated lungs and milk in the stomach; others had partially aerated lungs consistent with survival for no more than an hour; and others had not breathed at all. The disease occurred after the introduction of new gilts, only one of which lost a litter. Serological tests for parvovirus and leptospirosis were negative in both affected sows and the stillborn pigs. The sow diet was found to be adequate, with adequate vitamins and mineral supplements. Histopathology on the stillborn piglets did not demonstrate any evidence of an infectious agent. The aetiology remains undetermined.

BABESIOSIS IN DOGS

Serological evidence of *Babesia gibsoni* has recently been detected in a pit bull terrier in western Victoria. This is the result of surveillance activities conducted in Victoria following the first case identified in Australia in February 2001. It is suspected that the sero-positive animal is a carrier of *B. gibsoni*, as it has no history of illness consistent with *B. gibsoni* infection. Affected animals often present with fever, lethargy, splenomegaly and an acute haemolytic anaemia. Some animals may become asymptomatic chronic carriers that may serve as sources for further spread of the disease. Transmission by ticks is a possibility in the Victorian cases. The ticks *Haemophysalis bispinosa* and *H. longicornis* are capable of transmitting the disease, and others including *Rhipicephalus sanguineus* and *Dermacentor* spp. are suspected. *H. longicornis* occurs in Victoria and other parts of eastern Australia and is quite common in certain localities. Transmission *in utero* and through bleeding

wounds during fighting may play a role. There is no known effective treatment or commercial vaccine available at this time. Investigations are continuing to determine the extent of the disease within Victoria.

EHV1 ABORTIONS

Several properties around Victoria had multiple cases of equine abortion due to equine herpesvirus 1 (EHV1). Aborted foals were typically late-term and live when parturition commenced. Eleven of 40 abortions investigated this season were attributed to EHV1. Some of the affected mares had recently been transported. The presence or absence of intranuclear inclusion bodies was a more sensitive and a more specific test than the initial result of PCR testing.

POST-DRENCHING SALMONELLOSIS

A group of weanling horses put in a fresh paddock lost weight and one animal was found dead. The surviving horses were drenched but three more animals died. *Salmonella typhimurium* phage type 9 was isolated from a range of tissues in the one animal examined. The presence of three factors — severe crateriform colitis, intact and degenerate small strongyles (*Cylicocyclus insignis*), and the history of recent drenching — suggested that the synchronous emergence of previously inhibited larvae and/or the host response to dying late-stage larvae may have allowed salmonella to flourish. Salmonella was isolated from the water trough in the paddock with the sick horses but not from feed samples, the primary water supply, or faeces from clinically normal horses on the property.

PASTEURELLA MULTOCIDA IN TURKEYS

Massive mortalities occurred in a turkey flock due to *Pasteurella multocida* Heddleston serotype 1. The outbreak occurred in one of five sheds, with 500 of the 4500 birds dying in the first week. Ten of 100 birds introduced into the shed at this time died within 48 hours. All affected turkeys were 10 or 14 weeks old and were found dead without overt clinical signs. On post mortem examination there was hyperaemia of the head and neck, 1–2 mm white foci throughout the liver, and splenomegaly. Histopathology confirmed marked hepatic and splenic necrosis with intralesional bacterial colonies. 80% of the birds eventually died, despite the fact that 50% had been vaccinated 10 days before the outbreak with an autogenous vaccine, and despite antibacterial treatment selected on the basis of *in vitro* sensitivity. The remaining 20% of birds were moved outside to a paddock and the deaths stopped. Pelicans on a nearby watercourse also died, after the outbreak was well established in the turkeys. Losses in the younger birds in the four other sheds have been minimal to date, with all birds now vaccinated.

ERYSIPELOTHRIX SEPTICAEMIA

A spike in mortality in a flock of free-range layers prompted further investigation. Approximately 50 of the 5000 birds were lost each day over five days, in week 54 of lay. Splenomegaly, flaccid ovules and numerous *Erysipelothrix rhusiopathiae* organisms were present in the birds examined. The outbreak of disease ceased after five days and did not recur.

CHLAMYDIA ABORTION IN GOATS

An outbreak of abortions in Boer goats in which more than 50% of the pregnant does aborted was attributed to *Chlamydia psittaci* when the organism was cultured from aborted foetal and placental tissues.

NERVOUS DISEASE IN MERINO SHEEP

A neurological condition that annually affects a small number (three or four sheep older than four years) in a flock of 6000 fine-wool merinos on a property in north-eastern Victoria was investigated. The condition progresses over a two to three month period to a complete loss of coordination and finally recumbency. The histopathological diagnosis in 2001 of cerebellar abiotrophy was thought to be explain the syndrome. However, in July 2002, a brain was collected for NTSESP from a three-year-old wether showing ataxia, but with different signs to those seen in previous cases. A histological diagnosis of axonal dystrophy was made. The epidemiological and histopathological features suggest two separate hereditary conditions in the same flock may be occurring. Both conditions have been described in fine-wool merinos.

BOVINE BRUCELLOSIS REACTOR

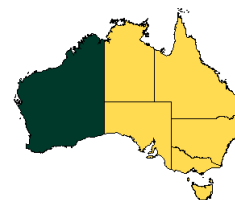
A 14-month-old Ayrshire bull that was tested twice with a compliment fixation test (CFT) for *Brucella abortus* (for entry into an artificial breeding centre and again 10 days later) showed a titre of 1:8 at both tests. The bull was bred on a small Ayrshire stud on which no abortions were observed this year. The herd had been kept closed for a number of years with no movements on or off the farm and no foreign visitors or known exposure to foreign animal products.

However, the bull was bred by artificial insemination from semen imported from the United Kingdom (UK) two years previously. It was the last semen imported from the UK before a ban was introduced because of BSE. Because brucellosis has been eradicated in the UK (with the last case in 1993) it was considered unlikely that the semen was the source.

The bull was slaughtered and a full range of samples was cultured, with negative results. A further 38 heifers and cows in the herd were tested (by CFT), all with negative results. The titre is likely to have been the result of a cross-reaction.

Western Australia

Contributed by:
Richard Norris
WA Department of
Agriculture



Laboratory testing was conducted on 480 investigations of animal disease. Of these, 145 were cost-recovery (private benefit) cases and 335 were charge-exempt (public benefit and therefore funded directly by the Government). There were six notifiable diseases reported and six exotic disease alerts.

NOTIFIABLE DISEASES

There were five category C (discretionary quarantine) notifiable diseases reported — four cases of echinococcosis in sheep and one case of annual ryegrass toxicity in sheep. A repeat detection of cattle tick in the Pilbara was the only category B (mandatory quarantine) report.

EXOTIC DISEASE ALERTS

All six cases were category 1 alerts (low index of suspicion). There was one alert for Australian bat lyssavirus in free-living bats from Broome. Exclusion tests for vesicular diseases and swine fever were conducted on feral pigs trapped at Rocky Gully. Other exclusions were swine fever from pigs at Kojonup, contagious bovine pleuropneumonia from cattle at Geraldton, and porcine reproductive and respiratory syndrome from pigs at Narrogin. All tested negative at AAHL. Anthrax was eliminated as a diagnostic possibility after a cow died at Brunswick

BOVINE PHOTSENSITISATION

A syndrome of photosensitisation caused deaths and illness in Friesian cows at Northcliffe. An episode of photosensitisation had occurred two months earlier in cows in the same paddock (see *AHSQ* Vol. 7 No. 2). There was acute liver necrosis and the concentrations of some liver enzymes in blood were raised. Rough dogstail (*Cynosurus echinatus*) was found in pasture specimens submitted to the laboratory. The case had some similarities with acute bovine liver disease as reported in Victoria, South Australia and Tasmania, although the liver lesion was not as severe. The Plant Pathology Laboratory identified a small amount of *Drechslera* sp. on the green material from the affected paddock.

OVINE PHOTSENSITISATION

Biserrula cv Casbah is a new legume pasture species released in WA in the late 1990s. Previous instances of photosensitisation in sheep grazing this pasture occurred in 1999 (one case) and 2001 (four cases). In early September 2002, two instances occurred in the

same week in the Geraldton area. One affected 50% of a mob of 300 mixed aged merino ewes and lambs that had been on the pasture for two weeks, and the other affected 25% of a mob of 200 mixed-age Merino crossbred ewes and lambs that had been on the pasture for five weeks. There were no deaths. Preliminary investigations indicate that this is a primary photosensitisation. It would seem that this problem is most likely to occur when *Biserrula* cv Casbah is the predominant pasture species, a high stocking rate is being used, the plant is rapidly growing, and the plant is about to flower or is already in flower.

PORCINE CONGENITAL TREMOR

An outbreak of congenital tremors was seen in a boar-breeding unit at Kojonup. Some litters had been mildly affected in previous months, but then five litters were moderately to severely affected. Although all piglets were of normal size, severely affected litters had some stillbirths and all survivors displayed the tremor syndrome. Lesions were present in the cerebellar white matter, which was attenuated and had multiple vacuoles (myelin splitting) and immature glia, with occasional dead cells. Tests for pestivirus antigen, haemagglutinating encephalomyelitis virus, Menangle virus and Aujeszky's disease virus were all negative. PCR tests for porcine circovirus type 2 (PCV2) were positive. Congenital tremors in piglets is either hereditary (described in several breeds) or associated with *in utero* viral infections (notably classical swine fever), or cause unknown, and microscopic lesions are

usually absent. A tremor syndrome associated with PCV2 infection has recently been described in piglets in the United States but the disease has not yet been reproduced using this virus. Although positive PCV2 tests have been common in Australian pigs, it has not been consistently associated with disease. Postweaning multisystemic wasting syndrome (PMWS) has not been seen in Australia, and cases clinically and pathologically similar to dermatitis nephropathy syndrome (DNS) in Australia have not been associated with PCR-detectable PCV2. Because the PCR test is exquisitely sensitive, it is thought that PCV2 positivity may represent either strains with low pathogenicity or extremely low dose infections. Its role in this outbreak is unknown, and further study is warranted.

UNSEASONAL DISEASES

Poor rainfall and drought-like conditions through much of the eastern wheat belt and in other areas of the south-west land division have resulted in a number of diseases occurring 'out-of-season'. Coccidiosis was seen in lambs being hand-fed in July and August. Lupinosis was seen as late as July this year, with producers opting to risk grazing sheep on stubbles they would normally ignore. A number of cases of kidney necrosis were seen in September in sheep grazing poor quality pastures and presumably searching the fence lines for alternative green feed. The suspected causes have included lesser loosestrife (*Lythrum hyssopifolia*) and lamb poison (*Isotropis* sp.).

Quarterly Disease Statistics

Quarterly disease statistics — laboratory testing

The results of serological testing for a range of viral diseases from routine laboratory submissions for the quarter are shown in Table 1.

Table 1: Serological testing from routine submissions to State and Territory laboratories

	Akabane		Bluetongue		Bovine ephemeral fever		Enzootic bovine leucosis		Equine infectious anaemia		Equine viral arteritis	
	Tests	+ve	Tests	+ve	Tests	+ve	Tests	+ve	Tests	+ve	Tests	+ve
Jul-Sep 01	1971	318	7853	303	2130	300	10268	0	1268	27	370	5
Oct-Dec 01	7827	352	8138	242	2564	361	7298	2	1167	11	547	16
Jan-Mar 02	2732	410	4826	140	1896	318	3640	2	755	0	414	22
Apr-Jun 02	14469	123	15133	594	2219	532	9918	5	920	5	473	2
Jul-Sep 02	12945	530	21771	265	1196	273	11428	7	1142	5	432	22
NSW	35	0	2979	4	16	0	4227	0	260	0	95	3
NT	705	184	774	125	739	180	857	3	48	0	0	0
QLD	355	136	587	40	233	63	217	0	371	0	10	0
SA	7	0	141	0	7	0	1	0	9	0	1	0
TAS	20	0	20	0	0	0	2	0	0	0	0	0
VIC	35	0	153	0	76	0	865	1	371	0	273	8
WA	11788	210	17117	96	125	30	5259	3	83	5	53	11

Quarterly disease statistics — control activities

BOVINE BRUCELLOSIS

Although bovine brucellosis is now exotic to Australia, surveillance is maintained through abortion investigations and miscellaneous testing of cattle for export or other reasons. A total of 182 abortion investigations were performed during the reporting period — all with negative results for bovine brucellosis. The results of recent brucellosis surveillance are shown in Table 2.

Table 2: Surveillance for bovine brucellosis

	Abortion investigations		Test for other reasons	
	Tests	+ve	Tests	+ve
Jul–Sep 01	181	0	11995	0
Oct–Dec 01	128	0	7008	0
Jan–Mar 02	146	0	5125	0
Apr–Jun 02	275	0	7082	0
Jul–Sep 02	182	0	2336	0
NSW	1	0	76	0
NT	0	0	390	0
QLD	106	0	1486	0
SA	27	0	44	0
TAS	5	0	6	0
VIC	43	0	191	0
WA	0	0	143	0

TUBERCULOSIS

Australia was declared a Free Area for bovine tuberculosis (TB) on 31 December 1997. The National Granuloma Submission Program is the major surveillance tool for TB. Table 3 summarises results from the program.

Table 3: Results of the National Granuloma Submission Program

	Granulomas submitted TB +ve	
	Tests	+ve
Jul–Sep 01	1533	0
Oct–Dec 01	1508	0
Jan–Mar 02	1069	2
Apr–Jun 02	1434	0
Jul–Sep 02	1574	0
NSW	322	0
NT	7	0
QLD	936	0
SA	32	0
TAS	29	0
VIC	99	0
WA	149	0

JOHNE'S DISEASE

Johne's disease (JD) occurs primarily in dairy cattle and sheep in Australia and to a lesser extent in beef cattle, goats, deer and camelids. JD occurs in NSW, Victoria, Tasmania and South Australia. Surveillance programs have not identified endemic JD in Queensland, Western Australia and Northern Territory, and active measures are taken to stamp-out any incursions. Table 4 shows the number of herds and flocks known to be infected. A National Ovine Johne's Disease Control and Evaluation Program will be completed in 2003. Programs for bovine JD are currently being developed. Market Assurance Programs (MAPs) are in operation for cattle, sheep, goats and alpaca, with the number of herds or flocks that have reached a status of Monitored Negative 1 (MN1) or higher shown in Table 5.

Table 4: Herds/flocks with JD at 30 September 2002

	Cattle	Sheep	Goats	Deer	Alpaca	Total
NSW	150	1003	12	0	1	1166
NT[#]	1	0	0	0	0	1
QLD[#]	1	0	0	1	0	2
SA	46	51	0	2	0	99
TAS	20	36	6	0	0	62
VIC	1175	52	6	3	4	1240
WA	0	0	0	0	0	0
AUS	1393	1142	24	6	5	2570

[#] The herds in Queensland and the Northern Territory are in quarantine in response to finding an infected animal introduced from an endemic area

Table 5: Herds/flocks with a JDMAP status of at least MN1/TN1 status at 30 September 2002

	Cattle	Sheep	Goats	Alpacas	Total
NSW	944	284	38	123	1389
NT[#]	0	0	0	0	0
QLD[#]	1	10	0	0	11
SA	246	233	17	35	531
TAS	114	35	2	0	151
VIC	335	155	6	38	534
WA[#]	0	0	0	0	0
AUS	1640	717	63	196	2616

[#] Herds/flocks in Free or Protected Zones are equivalent to status of MN1 or better because of the zone's status.

Information about components of the National JD Control Program can be obtained from State coordinators and Animal Health Australia's JD coordinators, David Kennedy 02 6365 6016 or Bruce Allworth 02 6036 9233. Lists of beef, dairy and alpaca herds and sheep flocks assessed in the Market Assurance Programs are available on the internet (at <http://www.aahc.com.au/jdmap>).

ENZOOTIC BOVINE LEUCOSIS

Enzootic bovine leucosis (EBL) accreditation programs have been operating in the dairy industries in Queensland and NSW for several years. Victoria, South Australia, Western Australia and Tasmania are undertaking a program of bulk milk testing of all dairy herds. Table 6 shows the number of dairy herds tested free of EBL at the end of the quarter.

Table 6: Dairy herds tested free of enzootic bovine leucosis at 30 September 2002

	NSW	NT	QLD	SA	TAS	VIC	WA	AUS
Free	1332	0	1214	560	679	7891	360	12 036
Herds	1338	0	1225	560	741	8017	360	12 241

OVINE BRUCELLOSIS

Contagious epididymitis, caused by *Brucella ovis*, is present in commercial flocks at a low level that varies around the country. Voluntary accreditation programs (usually in stud flocks) for ovine brucellosis freedom are operating in all States. Table 7 shows the number of accredited flocks at the end of the quarter.

Table 7: Ovine brucellosis accredited-free flocks at 30 September 2002

NSW	NT	QLD	SA	TAS	VIC	WA	AUS
1274	0	59	482	104	621	86	2626

Quarterly disease statistics — surveillance activities

SALMONELLA SURVEILLANCE

The National Enteric Pathogen Surveillance Scheme (NEPSS) is operated and maintained on behalf of the Commonwealth and States/Territories by the Microbiological Diagnostic Unit at the University of Melbourne. Data on isolates of salmonellae and other pathogens are submitted to NEPSS from participating laboratories around Australia. Quarterly newsletters and annual reports of both human and non-human isolates are published, and detailed data searches are provided on request to NEPSS. Table 8 summarises *Salmonella* isolations from animals notified to NEPSS for the quarter.

Contact: National Enteric Pathogen Surveillance Scheme, Microbiological Diagnostic Unit, University of Melbourne

Table 8: Salmonella notifications, 1 July to 30 September 2002

Serovars	avian	bovine	canine	equine	feline	ovine	porcine	other	Total
S. Bovismorbificans	0	22	0	1	0	0	1	0	24
S. Dublin	0	59	1	0	0	0	0	0	60
S. Infantis	0	3	3	0	0	0	0	0	6
S. Typhimurium	3	106	5	11	1	3	1	2	132
Other	0	59	15	2	3	1	11	20	111
Total	3	249	24	14	4	4	13	22	333

ZOOZOSES

The National Notifiable Diseases Surveillance System (NNDSS) of the Communicable Diseases Network Australia collects statistics about many human diseases. A summary of information about six important zoonoses is submitted to NAHIS each quarter (see Table 9).

The list of human diseases that are reportable to NNDSS has been updated. For zoonoses, data on hydatid disease will no longer be collected. Data on human cases of anthrax, Murray Valley encephalitis (MVE), Kunjin virus infection, cryptosporidiosis, and Australian bat lyssavirus will be added to the NNDSS database.

Contact: Communicable Diseases Intelligence, Australian Department of Health and Ageing
(Internet address: <http://www.health.gov.au/pubhlth/cdi/cdihtml.htm>)

Table 9: Notifications of zoonotic diseases in humans

Disease	Q3-01	Q4-01	Q1-02	Q2-02	Q3-02 AUST	Current quarter							
						ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Brucellosis[#]	5	4	12	6	11	0	1	0	8	0	0	1	1
Hydatidosis	4	6	8	3	4	0	nn	0	3	0	0	0	1
Leptospirosis	59	38	71	55	17	0	5	0	9	0	2	1	0
Listeriosis	11	11	15	18	16	0	1	0	5	1	0	7	2
Ornithosis	35	37	17	52	97	0	78	2	nn	0	0	16	1
Q fever	142	169	183	193	181	0	85	0	44	9	0	40	3

nn disease is not notifiable in these States

[#] *Brucella melitensis* and *Brucella abortus* are exotic to Australia.

NATIONAL TSE SURVEILLANCE PROGRAM

The Office International des Epizooties (OIE) International Animal Health Code requires that countries (such as Australia) claiming to be free of transmissible spongiform encephalopathies (TSEs) have in place a surveillance system to detect bovine spongiform encephalopathy (BSE) and scrapie should they occur. The National TSE Surveillance Program (NTSESP) is an integrated national program jointly funded by industry and governments to demonstrate Australia's ongoing freedom from BSE and scrapie, and to provide early detection of these diseases should they occur. Table 10 summarises the activity of the program over the past five quarters. Specimens from a small number of animals were unsuitable for testing. All specimens tested were negative for TSEs. Information about NTSESP is available on the internet (at <http://www.aahc.com.au/surveillance/ntsesp>).

Contact: Chris Baldock, Animal Health Australia's NTSESP National Coordinator

Table 10: Number of animals tested under NTSESP (All were negative for TSE)

	Jul – Sep 01		Oct – Dec 01		Jan – Mar 02		Apr – Jun 02		Jul – Sep 02	
	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep
NSW	43	64	14	33	15	17	29	32	29	16
NT	14	0	4	0	0	0	8	0	9	0
QLD	85	19	39	14	36	4	40	8	41	15
SA	5	14	1	18	8	28	1	6	6	17
TAS	3	2	3	7	3	0	3	0	2	5
VIC	37	44	6	15	16	28	13	30	13	13
WA	14	31	3	29	4	29	7	40	5	28
AUS	201	174	70	116	82	106	101	116	105	94

AUSTRALIAN MILK RESIDUE ANALYSIS SURVEY

The Australian Milk Residue Analysis (AMRA) Survey is an independent monitoring program for agricultural, veterinary residues and environmental contaminants in raw cow's milk. The AMRA Survey is currently coordinated by Dairy Food Safety Victoria on behalf of the Australian Dairy Authorities Standards Committee (ADASC) and the Australian dairy industry. The AMRA Survey is an integral part of the Australian dairy industry efforts in securing access to major export markets, including the European Union. The samples taken in the Survey are from bulk milk farm pick-up tankers. Table 11 summarises the results for the quarter.

During this quarter a detection of tricloabendazole sulphone and tricloabendazole sulphoxide residues at levels of 0.057mg/kg and 0.018mg/kg, respectively, were reported in a single milk sample. There is no Australian maximum residue limit for tricloabendazole in milk, so that its detection at any level is considered a violation.

Tricloabendazole is the active component in a number of flukicides. However, liver fluke treatments that contain tricloabendazole are not registered for use in lactating dairy cows. The product labels state clearly that the product is not to be used for animals producing milk intended for human consumption.

Traceback investigations revealed misuse of this chemical. The farmer responsible for this contamination was issued with an Infringement Notice under Section 19 (6) of the Agricultural and Veterinary Chemicals (Control of Use) Act 1992.

For further information contact: Kelly Long (AMRA Survey Coordinator), Dairy Food Safety Victoria, phone 03 9426 5999; fax 03 9427 1895; e-mail klong@dairysafe.vic.gov.au

Table 11: Australian Milk Residue Analysis Survey, 1 July to 30 September 2002

Each pair of figures gives the number of samples above the maximum residue limit and the number of samples tested.

	NSW		NT		QLD		SA		TAS		VIC		WA		AUS	
Aflatoxins	0	1	0	0	0	2	0	1	0	1	0	2	0	1	0	8
Antimicrobials	0	15	0	0	0	7	0	6	0	5	0	60	0	3	0	96
Macrocyclic lactones	0	4	0	0	0	0	0	1	0	1	0	8	0	0	0	14
Organochlorines	0	3	0	0	0	2	0	3	0	2	0	15	0	1	0	26
Organophosphates	0	3	0	0	0	2	0	3	0	2	0	15	0	1	0	26
PCBs	0	3	0	0	0	2	0	3	0	2	0	15	0	1	0	26
Synthetic pyrethroids	0	3	0	0	0	2	0	3	0	2	0	15	0	1	0	26
Tricloabendazole	0	15	0	0	0	7	0	6	0	5	1	60	0	3	1	96

NATIONAL RESIDUE SURVEY

Of 3420 samples tested during the quarter for agricultural and veterinary chemicals, there were 12 hormones detections and two detections for macrocyclic lactones above action levels. Table 12 summarises the results.

Detection of 17-alpha 19-nortestosterone was found in five samples of cattle urine and five of sheep urine. Since this hormone metabolite can occur naturally in both cattle and sheep, an action level of 0.01 mg/L is used to initiate a traceback investigation — all ten detections were well below this action level. The other two hormone detections were zeranone/zearalenone in beef liver. In both cases, the zearalenone metabolite was present in the sample indicating exposure to feed infected by *Fusarium* fungus as the source of the residue rather than exogenous administration of zeranone as a hormone growth promotant.

One of two detections of macrocyclic lactone was a moxidectin residue of 0.065 mg/kg in a horse liver sample. This residue resulted from an off-label use of a sheep anthelmintic containing moxidectin, although the owner of the horse claimed to have observed the seven days withholding period stated on the label for sheep. The other macrocyclic lactone detection was for doramectin in a beef liver sample at 0.027 mg/kg. The Australian MRL is 0.01 mg/kg in beef liver. A traceback report on this residue violation is not yet available.

Further results, reports and information on NRS can be found on the internet (at <http://www.affa.gov.au/nrs>).

Contributed by: Peter Miller, National Residue Survey, AFFA

Table 12: National Residue Survey, 1 July to 30 September 2002

Each pair of figures gives the number of samples above the maximum residue limit or the maximum permitted concentration and the number of samples tested.

	NSW	NT	QLD	SA	TAS	VIC	WA	AUS
Anthelmintics								
cattle	0 49	0 1	1 71	0 11	0 1	0 23	0 10	1 166
pigs	0 8	0 0	0 10	0 2	0 0	0 4	0 1	0 25
sheep	0 69	0 0	0 4	0 8	0 0	0 23	0 5	0 109
other	0 13	0 1	0 7	1 8	0 2	0 4	0 0	1 35
Total	0 139	0 2	1 92	1 29	0 3	0 54	0 16	2 335
Antimicrobials								
cattle	0 118	0 1	0 123	0 19	0 15	0 107	0 8	0 391
pigs	0 62	0 0	0 35	0 25	0 0	0 59	0 17	0 198
sheep	0 277	0 0	0 14	0 40	0 4	0 56	0 55	0 446
other	0 11	0 1	0 17	0 3	0 2	0 12	0 4	0 50
Total	0 468	0 2	0 189	0 87	0 21	0 234	0 84	0 1085
Growth promotants								
cattle	3 135	0 3	4 157	0 12	0 8	0 40	0 12	7 367
pigs	0 18	0 0	0 13	0 6	0 0	0 16	0 3	0 56
sheep	3 131	0 0	0 6	0 23	0 4	2 33	0 27	5 224
other	0 7	0 0	0 11	0 4	0 0	0 8	0 4	0 34
Total	6 291	0 3	4 187	0 45	0 12	2 97	0 46	12 681
Insecticides								
cattle	0 143	0 2	0 143	0 16	0 8	0 99	0 13	0 424
pigs	0 13	0 0	0 5	0 4	0 0	0 4	0 5	0 31
sheep	0 135	0 0	0 7	0 19	0 2	0 37	0 29	0 229
other	0 34	0 1	0 25	0 12	0 7	0 3	0 4	0 86
Total	0 325	0 3	0 180	0 51	0 17	0 143	0 51	0 770
Metals								
cattle	0 31	0 0	0 35	0 1	0 1	0 23	0 4	0 95
pigs	0 13	0 0	0 3	0 4	0 0	0 8	0 2	0 30
sheep	0 32	0 0	0 4	0 3	0 0	0 15	0 7	0 61
other	0 17	0 0	0 17	0 2	0 0	0 3	0 3	0 42
Total	0 93	0 0	0 59	0 10	0 1	0 49	0 16	0 228
Miscellaneous								
cattle	0 64	0 3	0 59	0 4	0 3	0 30	0 5	0 168
pigs	0 13	0 0	0 16	0 7	0 0	0 15	0 7	0 58
sheep	0 41	0 0	0 3	0 8	0 0	0 10	0 5	0 67
other	0 13	0 0	0 10	0 1	0 0	0 2	0 2	0 28
Total	0 131	0 3	0 88	0 20	0 3	0 57	0 19	0 321

NORTHERN AUSTRALIA QUARANTINE STRATEGY

In recognition of the special quarantine risks associated with Australia's sparsely populated northern coastline, AQIS conducts an animal disease surveillance program as an integral component of the Northern Australia Quarantine Strategy (NAQS). The NAQS surveillance program provides early warning of disease threats to livestock industries, and in some cases human health. NAQS surveillance activities include both offshore and onshore components. Tables 13 and 14 summarise NAQS activity in Australia over the past five quarters.

Contact: David Banks, Biosecurity Australia

Table 13: Summary of recent NAQS activity in Australia

	Jul – Sep 01		Oct – Dec 01		Jan – Mar 02		Apr – Jun 02		Jul – Sep 02	
	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve
Aujeszky's disease	247	0	86	0	13	0	143	0	21	0
Classical swine fever	243	0	86	0	9	0	143	0	21	0
Japanese encephalitis [#]	47	0	245	0	380	28	38	0	0	0
Nipah virus							143	0	21	0
Porcine reproductive and respiratory syndrome	252	0	86	0	13	0	143	0	21	0
Surra	358	0	118	0	47	0	72	0	8	0

[#] In 1995–97, animals at sentinel sites on islands in the Torres Strait, but not the Australian mainland, seroconverted to Japanese encephalitis during the latter part of the wet season (March–April). In March 1998, seroconversions occurred at a number of sites on islands in the Torres Strait, and for the first time on the mainland at the tip of Cape York Peninsula. Sentinel pigs at Badu Island have seroconverted each wet season since then (except for 1999), and seroconversions have been detected on other central Torres Strait islands in surveys. No further seroconversions have been recorded at the mainland sentinel pig locations.

PORTS SURVEILLANCE PROGRAM

Biosecurity Australia conducts the Ports Surveillance Program for *Culicoides*, screw-worm fly, exotic bees and bee mites. Seaports, particularly those servicing returning livestock vessels and those dealing with high risk deck cargo such as timber, mining equipment and containers, are considered to be high risk locations for incursions of such pests. The program increases the capacity to detect any incursions at an early stage, and this in turn increases the probability of a successful eradication program. The *Culicoides* surveillance also supports the livestock export trade by confirming the continuous or seasonal absence of *Culicoides* vectors at ports from which livestock are loaded. Table 14 shows the number of times that insect trap sites were inspected for the Port Surveillance Program — no exotic insects or mites were detected.

Contact: David Banks, Biosecurity Australia

Table 14: Number of inspections of insect trap sites

	Jul – Sep 01	Oct – Dec 01	Jan – Mar 02	Apr – Jun 02	Jul – Sep 02
Port surveillance					
Asian bees	15	10	5	10	0
Bee mites	30	25	35	22	16
<i>Culicoides</i>	33	32	32	34	35
Screw-worm fly	35	36	35	36	35
NAQS					
Screw-worm fly	48	6	150	39	33

SUSPECT EXOTIC OR EMERGENCY DISEASE INVESTIGATIONS

There were 32 investigations of diseases suspected to be either exotic or a possible emergency reported during the quarter, as shown in Table 15.

Table 15 : Exotic or emergency disease investigations reported during 1 July to 30 September 2002

DISEASE	SPECIES	STATE	DATE	RESPONSE	FINDING
Anthrax (5 reports)	bovine	VIC	Jul – Sep	1	negative
Anthrax	bovine	VIC	Aug	2	negative
Anthrax	bovine	QLD	Sep	2	negative
Anthrax	bovine	QLD	Jul	2	negative
Anthrax	bovine	QLD	Sep	2	1080 poisoning
Anthrax	bovine	WA	Sep	2	negative
Australian bat lyssavirus	feline	TAS	Jul	3	cerebral lymphosarcoma plus nematodiasis
Avian influenza	avian	VIC	Sep	1	salmonellosis
Bovine brucellosis	bovine	VIC	Sep	2	negative
Canine babesiosis	canine	VIC	Jul	6	<i>Babesia gibsoni</i> (see page 11)
Classical swine fever	porcine	WA	Sep	3	negative
Classical swine fever	porcine	WA	Aug	3	negative
Contagious bovine pleuropneumonia	bovine	WA	Aug	3	negative
Epizootic haematopoietic necrosis	piscine	TAS	Jul	3	negative
Equine morbillivirus	equine	QLD	Aug	3	negative
Foot-and-mouth disease	bovine	VIC	Sep	1	negative
Foot-and-mouth disease	bovine	NSW	Aug	3	negative
Foot-and-mouth disease	bovine	QLD	Aug	2	negative
Foot-and-mouth disease	porcine	NT	Jul	2	negative
Newcastle disease	avian	NSW	Aug	2	negative
Newcastle disease	avian	NSW	Aug	2	vitamin A deficiency
Newcastle disease	avian	NSW	Jul	2	negative
Newcastle disease	avian	NSW	Aug	3	negative (chicken anaemia virus)
Newcastle disease	avian	NSW	Jul	2	histomoniasis
Porcine reproductive and respiratory syndrome	porcine	WA	Sep	3	negative
Rabies	canine	NSW	Jul	3	negative
Rabies	other	WA	Jul	3	negative
West Nile virus	equine	VIC	Sep	3	negative

KEY to highest level of response:

- 1 Field investigation by Government Officer
- 2 Investigation by State or Territory government veterinary laboratory
- 3 Specimens sent to the Australian Animal Health Laboratory (or CSIRO Division of Entomology)
- 4 Specimens sent to reference laboratories overseas
- 5 Regulatory action taken (quarantine or police)
- 6 Alert or standby
- 7 Eradication

NAHIS contacts

The National Animal Health Information System (NAHIS) collects summaries of animal health information from many sources. NAHIS is on the internet (at <http://www.aahc.com.au/nahis>). Because NAHIS does not duplicate the data in those systems, the person indicated below should be contacted if further details are required.

Name	Role	Phone	Fax	e-mail
Chris Baldock	National NAHIS Coordinator	07 3255 1712	07 3844 5501	chris@ausvet.com.au
David Banks	Northern Australia Quarantine Strategy	02 6272 5444	02 6272 3399	David.Banks@affa.gov.au
Janet Berry	Qld State Coordinator	07 4658 4414	07 4658 4433	janet.berry@dpi.qld.gov.au
Chris Bunn	Emergency Disease Preparedness, AFFA	02 6272 5540	02 6272 3372	Chris.Bunn@affa.gov.au
John Elliott	Tas. State Coordinator	03 6336 5334	03 6336 5374	John.Elliott@dpiwe.tas.gov.au
Graeme Garner	Commonwealth NAHIS Coordinator	02 6272 5369	02 6272 4533	Graeme.Garner@affa.gov.au
Tristan Jubb	Vic. State Coordinator	03 5430 4545	03 5430 4520	tristan.jubb@nre.vic.gov.au
David Kennedy	Johne's Disease Coordinator	02 6365 6016	02 6365 6088	david@ausvet.com.au
Diane Lightfoot	National Enteric Pathogen Surveillance Scheme	03 9344 5701	03 9344 7833	d.lightfoot@microbiology.unimelb.edu.au
Kelly Long	Australian Milk Residue Analysis Survey	03 9426 5999	03 9427 1895	klong@dairysafe.vic.gov.au
Angela Merianos	Communicable Diseases Intelligence	02 6289 1555	02 6289 7791	http://www.health.gov.au
Peter Miller	National Residue Survey	02 6272 3762	02 6272 4023	peter.miller@affa.gov.au
Barbara Moloney	NSW State Coordinator	02 6391 3687	02 6361 9976	barbara.moloney@agric.nsw.gov.au
Geoff Neumann	CEO Animal Health Australia	02 6203 3999	02 6232 5511	geoff.neumann@aahc.com.au
Richard Norris	WA State Coordinator	08 9368 3637	08 9367 6248	rnorris@agric.wa.gov.au
Diana Pinch	NT Coordinator	08 8999 2354	08 8999 2024	diana.pinch@nt.gov.au
Neville Spencer	National Granuloma Submission Program	02 6271 6650	02 6272 5442	neville.spencer@aqis.gov.au
John Weaver	SA State Coordinator	08 8207 7925	08 8207 7852	weaver.john2@saugov.sa.gov.au
Simon Winter	Animal Health Australia Program Manager	02 6203 3988	02 6232 5511	simon.winter@aahc.com.au
Rupert Woods	Australian Wildlife Health Network	02 9978 4749	02 9978 4516	rwoods@zoo.nsw.gov.au

Animal Health Surveillance

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