Animal Health Surveillance

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QUARTERLY REPORT

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Preface

The recent detection of bovine spongiform encephalopathy (BSE) in Canada reinforces the importance of being able to trace animal movements. This issue includes an article on the implementation of the National Livestock Identification Scheme in Victoria. Also, the effect of drought on animal health is evident, with an increase of plant poisonings being a common theme in State and Territory reports.

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

Implementation of NLIS in Victoria

The National Livestock Identification Scheme (NLIS) is a permanent whole-of-life identification system that enables individual animals to be tracked from property of birth to slaughter for food safety, product integrity and market access purposes (*AHSQ* Vol. 6 No. 4) .

NLIS is managed by Meat and Livestock Australia (MLA) on behalf of the SAFEMEAT partnership, in close cooperation with the Australian Quarantine Inspection Service, State and Territory departments of agriculture, producers, feedlots, meat processors, and livestock saleyard operators. NLIS uses machine-readable radio frequency identification (RFID) devices applied as an ear-tag or rumen bolus and ear-tag combination. Cattle are tagged with NLIS devices only once in their life.

This article focuses on the implementation of NLIS in Victoria. At this stage, NLIS remains voluntary in all jurisdictions except Victoria. In other jurisdictions, various compulsory mechanisms operate to enable animal tracing, e.g. branding, transaction tags and movement documentation. Although these methods are adequate for tracing animal movements, the integration of NLIS with abattoir infrastructure is seen to have considerable benefits for producers. Once fully implemented across the country, NLIS will significantly enhance these existing systems.

BACKGROUND

In 1996, Australia's State and Territory Ministers for agriculture and primary industries agreed in-principle to implement a dual tagging system. The objective was to enhance identification arrangements being used then by permanently identifying cattle on their property of birth with a machine-readable device, complementing traditional transaction tagging methods (e.g. tail-tags) used when cattle are consigned for sale or slaughter.

Animal Health Australia
Australian Animal Health Council Ltd ACN 071 890 956

In early 1998, the Victorian Government, in consultation with MLA and local cattle industry organisations, tendered for the purchase of one million machine-readable permanent cattle identification devices. The device selected from the 50 submitted was the Allflex® ISO-compliant, tamper-resistant ear tag.

NLIS-endorsed breeder tags and post-breeder tags became available to Victorian cattle producers in January 1999. To achieve rapid uptake of NLIS, the Victorian Government initially supplied producers with tags free-of-charge. Interest in NLIS increased rapidly in response to European Union (EU) demands in mid-1999 that cattle destined for EU markets be traceable in a reliable and auditable manner from property of birth through to slaughter. Since the initial free distribution, Victorian producers have been charged a subsidised price of $2.50 per tag. NLIS was voluntary in Victoria until 1 January 2002.

IMPLEMENTATION ADVISORY COMMITTEE

The (Victorian) NLIS Implementation Advisory Committee was formed in August 2001, with representatives from all major Victorian cattle industry organisations, to develop the timetable for the full implementation of the NLIS in Victoria and to have an ongoing advisory role. In late 2001, the Advisory Committee recommended the following timetable:

a) Tagging of cattle born after 1 January 2002 before they leave their property of birth.
b) Reading of NLIS tags in abattoirs from 2003.
c) Tagging of all store cattle and cattle moving between Victorian properties from 1 January 2003. (Untagged cattle must be identified with an orange post-breeder tag within 30 days of their arrival on a Victorian property, including cattle sourced from interstate.)
d) Mandatory recording of all cattle movements on the NLIS database from 1 January 2005.

NLIS TAG ORDERS

Approximately 25 000 Victorian cattle producers have purchased and are using NLIS tags (see table), with approximately 50% of the Victorian beef and dairy herd now NLIS-identified. Victorian beef producers and dairy farmers have ordered three million NLIS tags since 1 January 2002.

INDUSTRY INFRASTRUCTURE

Most of Victoria's domestic and export cattle processing abattoirs now have and are operating NLIS reading equipment and using the links to the NLIS database facilitated through 'Easycheck', the abattoir software package developed by MLA. All Victorian abattoirs (approximately 30) are expected to be on-line by mid-2003, with panel readers typically used in larger abattoirs and wand readers in smaller abattoirs.

NLIS infrastructure is also in place in most Victorian saleyards regularly selling cattle. Several saleyards are now routinely scanning all store/breeding cattle. Most other Victorian saleyards will be routinely scanning such cattle within three to six months after installing additional equipment (in part funded through a recent grant of $500 000 from the Victorian Government).

Multi-scan units with the capacity to scan large numbers of cattle quickly and efficiently have recently been installed in the Warrnambool Livestock Exchange and are likely to be installed in other Victorian saleyards in the near future. Using this equipment, saleyards are able to handle very large yardings (2000 to 3000 head) with minimal disruption to the flow of cattle through the saleyard or additional work associated with scanning cattle for agents and saleyard staff. Standard panel readers are likely to be installed in saleyards handling in the order of 1000 head at a sale.

As a consequence of the rapid progress being made to upgrade NLIS infrastructure in saleyards, the Advisory Committee is reviewing its recommended date for the introduction of legislation requiring saleyards to scan NLIS-identified store and breeding cattle. The Advisory Committee has proposed that the date for the introduction of the required legislation be brought forward from 1 January 2005 to 1 January 2004.

LIVESTOCK TRACING AND RISK MANAGEMENT

For Victorian cattle, the database holds information on the property of birth, (increasingly) their movements between properties, and a range of statuses relating to specific disease or residue risks and their eligibility for processing for certain markets. Victoria is progressively moving from traditional herd/transaction tag-based disease and residue risk management programs, to individual animal NLIS-based programs.

Information on NLIS devices at 24 March 2003

STATE	EU accredited NLIS devices	Total number NLIS devices	EU accredited properties	Number of properties with NLIS devices	Numbers killed for the EU market (by NLIS device)
NSW	521 400	663 671	858	1219	196 826
NT	7 527	26 433	3	12	125
QLD	645 356	827 604	5321	757	238 794
SA	133 161	167 636	188	286	45 101
TAS	127 014	190 771	322	850	32 618
VIC	277 497	4 053 139	455	24 332	70 246
WA	0	20 722	0	26	18
TOTAL	**1 711 955**	**5 949 976**	**7147**	**27 482**	**583 728**

The NLIS database has the ability to establish quickly and accurately where cattle have been sold or slaughtered. This tracing facility is available for prime and cull cattle traded in saleyards and abattoirs throughout Australia that routinely communicate with the NLIS database about the Extended Residue Program (ERP) status of Property Identification Codes (PICs). As a consequence, there is substantial trace-back and trace-forward information available on the NLIS database for cattle that were not NLIS-identified at the time of sale/slaughter. In abattoirs with full NLIS systems (including the 'Easycheck' software), cattle from a suspect property can be matched on the NLIS database against date of slaughter, PIC of the consignor, body number, carcase weight, and if present, NLIS device details.

During a recent residue incident, details of the Victorian saleyards and abattoirs where cattle from the affected property had been sold/slaughtered were quickly accessed from the NLIS database. The benefits to producers, processors and departmental staff of the NLIS (in the context of cattle tracing, risk management and market assurance) are already considerable. Other benefits include the relaxation of bovine Johne's disease-related restrictions on the movement of NLIS identified cattle into other jurisdictions.

ON-FARM BENEFITS

The dairy industry in Victoria has embraced the NLIS system with enthusiasm because of the opportunities the technology provides to enhance cow identification, improve and simplify herd-recording, and facilitate the operation of automated feeding and drafting systems.

Within the beef industry, a number of herd management software packages are now available that are designed to operate in conjunction with NLIS technology. The use of such software in conjunction with panel or wand reading equipment and electronic scale heads is becoming more common, particularly on larger beef-producing properties.

The NLIS database has the ability to receive and distribute carcase feedback from abattoirs. Victorian processors have agreed to supply to the NLIS database as a minimum Hot Standard Carcase Weight (HSCW) on all NLIS-identified cattle. This information is then available via the internet to both the breeder and the last owner. On-farm software systems can then import the data and, through the unique RFID number, link carcase information with pedigree, feeding and management data.

TAIL TAGGING EXEMPTIONS

Exemptions from the requirement to 'tail-tag' NLIS-identified cattle have been introduced for cattle consigned direct from their property of birth to an abattoir.

In addition, Victorian saleyards are now able to apply for a 'tail-tagging' exemption for NLIS-identified store cattle that have been consigned by the breeder, provided they commit to scanning the cattle and registering the ownership change on the NLIS database.

Additional tail-tagging exemptions will be introduced in Victoria, on the recommendation of the Advisory Committee, as NLIS is progressively implemented.

PROPERTY CARDS

Starting in mid-April 2003, an information brochure about NLIS will be mailed to all Victorian beef producers and dairy farmers. Included with the brochure will be a plastic credit-card-sized card on which will be printed the producer's name, property address and PIC.

The property card will enable cattle buyers to comply with their legal obligation to provide selling agents promptly with the PIC of the next property to which purchased cattle will be taken. This will then enable saleyards to efficiently register transactions involving NLIS-identified cattle on the NLIS database.

POSTSCRIPT — PIMC, APRIL 2003

At the Primary Industries Ministerial Council (PIMC) meeting in Brisbane in early April 2003, Ministers agreed to develop a risk-based national approach to livestock identification and tracing for cattle and sheep.

In respect of cattle, herd-based identification and tracing arrangements will apply where cattle go from property of birth direct to slaughter or live export. However, where cattle go to saleyards, feedlots or other properties before slaughter or live export, individual (NLIS-approved) animal identification devices will be applied before leaving the property of birth. Both mechanisms would be linked to a central database.

For sheep, flock-based identification and tracing arrangements would apply across the board, using National Flock Identification Scheme (NFIS) approved devices linked to a central database.

Ministers agreed to aim for implementation by 1 July 2004 for cattle and 1 July 2005 for sheep, noting that full implementation will depend on a range of practical considerations that will need to be worked through by industry and their respective State/Territory government.

Further information on NLIS and NFIS is available on the internet (at www.mla.com.au.).

Contributed by: Tony Britt, Livestock Quality Assurance, Department of Primary Industries, Victoria

Animal Health Australia Strategic Plan 2003–2008

Animal Health Australia released details of a revised strategic plan for the next five years. The plan focuses on the strategic intent of Animal Health Australia, and re-states its commitment to Australia's national animal health system delivering a competitive advantage for livestock industries.

The plan outlines a range of key areas of focus in the short to medium term. Pivotal to these is an undertaking that Animal Health Australia's contribution to the national animal health system needs to focus on the key areas of awareness and biosecurity, animal health service capabilities, animal health surveillance systems, and emergency animal disease response capability.

The *Animal Health Australia Strategic Plan 2003–2008* was released in March and will be followed by the release of operational plans for Animal Health Australia's core and special programs at a special general meeting scheduled for May.

Further information on the Strategic Plan 2003–2008 and Program Plans for 2003–04 is available on the internet (at www.aahc.com.au/communications/reports_plans/strategic_plan/index.htm).

Contributed by: Jamie Penrose, Animal Health Australia

AUSVETPLAN

Two documents, the revised BSE manual and the interim draft of the manual for anthrax, were published on the internet (at www.aahc.com.au/AUSVETPLAN) during the quarter. The anthrax manual is now with PISC/PIMC for final endorsement.

The editing of two manuals, brucellosis and the wild animal response strategy, was completed during the quarter, and the points raised are being considered by the AUSVETPLAN Technical Review Group and the Animal Welfare Working Group, respectively. Comments on the Newcastle disease manual were also provided to the Technical Review Group to consider.

The revision of six other manuals will continue during the April–June quarter:

- Veterinary Practice Enterprise Manual;
- Destruction Manual (by a new writing group);
- Disposal Manual;
- draft of the Dairy Enterprise Manual (convened by the Dairy Industry, and scheduled for June);
- finalisation of the Control Centres Management Manual, Parts 1 & 2 (NSW Agriculture); and
- formation of a writing group to revise the Valuation and Compensation Manual.

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

Improving JE monitoring

Using sentinel pigs and serology has proved successful in monitoring for Japanese encephalitis (JE) in the Torres Strait and Cape York Peninsula over the past five wet seasons. However, airfreighting pigs to the sites and caring for them is expensive. There is also a danger from the pigs amplifying the virus when infected. Consequently, a search for better methods is being made, with Queensland Health, the Northern Australia Quarantine Strategy, and Biosecurity Australia involved in funding and implementing the work.

One line of research is already producing promising results. Pools of mosquitoes are collected using a variety of traps suited to remote locations. The mosquitoes are sent to a laboratory equipped to perform 'genetic fingerprinting' (by reverse transcriptase polymer chain reaction). This method is known to be highly specific, with JE virus readily distinguished from closely related endemic viruses. The trials involve using the method in the vicinity of sentinel pigs to determine if sensitivity is adequate (that is, if the mosquito trapping system picks up infection as readily as sentinel pigs).

A second approach, being examined by the Australian Animal Health Laboratory, is to determine if cattle are as suitable as pigs as sentinels for JE. Cattle are known to be susceptible to infection but do not show disease and do not produce sufficient virus to be a danger. The research is being conducted in conjunction with the district veterinary laboratory in Bali, where pigs and cattle are kept in proximity and JE is prevalent. Should cattle prove comparable, the existing sentinel cattle herds on Cape York Peninsula can be used to monitor for JE with limited additional expense.

Contributed by: Tim Buick, Northern Australia Quarantine Strategy

Aquatic animal health

EXERCISE TETHYS

In January, work began on the design of a multi-jurisdictional simulation exercise centred on aquatic animal health — the first in Australia. The simulation, called 'Exercise Tethys' after the Greek goddess of fresh water, will address issues of inter-jurisdictional communication and cooperation in response to an emergency disease incident, and heighten the awareness of these jurisdictions to the potential for outbreaks of emergency diseases in Australia's aquatic environment.

Although the simulation is a desktop exercise and will not incorporate physical field operations, it will test:

- both formal and informal communication networks between jurisdictions;
- State and Territory control centre manuals;
- the Murray–Darling Basin Commission fish kill protocol (currently being developed);
- cooperation between jurisdictions during an emergency response;
- awareness of emergency disease management mechanisms (e.g. disease control policies and strategies as described in AQUAVETPLAN, aquatic CCEAD operation) among States and Territories; and
- general awareness of aquatic animal emergencies.

The Department of Agriculture Fisheries and Forestry — Australia (AFFA) has appointed a project manager to lead a working group (with representatives from each State and Territory department with responsibility for aquaculture, the Australian Animal Health Laboratory, AFFA and the Murray–Darling Basin Commission) in the design and development of the exercise.

The design will be completed in June, with the simulation to be conducted in late November 2003.

AQUATIC CCEAD TRAINING

In March, the first of three training workshops on the enhancement of emergency disease management through education and training on the CCEAD (Consultative Committee on Emergency Animal Diseases) process was held in Hobart. Participants were from the Victorian and Tasmanian State governments, the Commonwealth Government, and the salmon industry.

The workshop addressed the role of CCEAD and its members in an effective emergency response, the committee's terms of reference and operating guidelines, and its relationship to other committees (such as Aquatic Animal Health Committee and Primary Industries Standing Committee). Victoria's Chief Veterinary Officer, Hugh Millar, shared his wealth of experience arising from terrestrial CCEAD incidents. Mark Crane from the Australian Animal Health Laboratory (AAHL) described AAHL's role in aquatic animal disease emergencies, and outlined procedures for submitting diagnostic specimens to AAHL and overseas laboratories, and of reporting on specimen examinations by AAHL.

AQUATIC ANIMAL HEALTH ADVISORY GROUP

The first meeting of the Asia Regional Advisory Group (AG) on Aquatic Animal Health was held at the Network of Aquaculture Centres in Asia-Pacific (NACA) Headquarters, Bangkok, Thailand in November 2002. This high level advisory group, comprising health experts from governments and the private sector, was constituted by NACA to advise Asian governments on aquatic animal health matters in Asia, and more specifically on the implementation of the Asia Regional Technical Guidelines on Health Management and the Responsible Movement of Live Aquatic Animals (available on the internet at www.enaca.org/NACA-Publications/AsiaRegionalTechnicalGuidelines.pdf). This first meeting provided a number of important recommendations on aquatic animal disease control in Asia, a summary of which is below. The full report is available on the NACA website (at www.enaca.org).

The recent suspected outbreak of koi herpesvirus (KHV) that has spread rapidly through koi and common carp in Indonesia has re-emphasised the need for effective surveillance programs of serious aquatic animal disease, and also the need for implementation of the 'Asia Regional Technical Guidelines'. A short summary of the key epidemiological features of the incident, containing background for concern, case definitions, outbreak investigation, and diagnostic test options, will be prepared and circulated.

The continued occurrence of viral nervous necrosis (VNN) in marine groupers and red spot disease in grass carp was highlighted during discussions and both remain a serious concern for the region.

Within the region, mollusc diseases are under-estimated with too little attention given to these species and associated diseases. However, cases of mass mortality in molluscs are known to occur in the region and underline the importance of addressing mollusc disease issues.

Recent reports show that Taura syndrome virus (TSV) is spreading in the region, related to the continuous introduction of *Panaeus vannamei,* and highlight concern over possible new pathogens that may be

passed to *P. monodon* and other species. The occurrence of TSV, although generally accepted as being increasingly widespread, is not being officially reported. Hence, there is a need to strengthen surveillance and reporting. AG urged the rapid reporting of any new outbreaks to OIE and NACA.

A number of recommendations related to the Quarterly Aquatic Animal Disease (QAAD) list used to report disease status. AG agreed that, notwithstanding the improved quality of disease reporting, further improvements were needed and suggested ways this could be achieved.

The QAAD list will be revised during 2003 to reflect changes in disease status and needs for disease reporting. For example, both viral haemorrhagic septicaemia and multinucleate sphere X (MSX) disease (*Haplosporidium nelsoni*) have been reported in the region and will be moved to a different section of the list. Although there is no definitive aetiological diagnosis, 'koi mass mortality' and 'Akoya oyster disease' will be added to assist in the collation of data. Epitheliocystis, the mollusc pathogen *Marteilioides chungmuensis,* and grouper iridoviral diseases are proposed additions because of concern in the region. Information cards will be provided for any newly included diseases.

A three-year review of the reporting system was proposed. It was hoped that a meeting of all national coordinators for NACA (in preference to a number of sub-meetings) could develop the structure of the review.

Finally, the need to enhance cooperation between veterinary and fisheries authorities was emphasized strongly, by improving communication between national coordinators and Chief Veterinary Officers (and OIE national delegates), improving national coordinators' access to national experts, and generally promoting in-country networking on disease status.

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

Australian Wildlife Health Network

Animal Health Committee (AHC) has endorsed the Network's approach to general wildlife surveillance. A system complementing NAHIS will be used. The first teleconference of coordinators, assistants and representatives from Animal Health Australia is scheduled for mid-May to discuss a *modus operandi*. Reporting will focus on six disease categories:

- OIE listed diseases;
- viral diseases of bats;
- mass, or unusual mortality events;
- *Salmonella* cases;
- cases of infection with arboviruses; and
- diseases that State and Territory coordinators think are unusual or interesting.

AHC has also requested that the Network be involved in developing a protocol for wildlife sample submission. The protocol will be based on those currently used by the regional veterinary laboratories for livestock sample submission.

The Network is interested in receiving reports of wildlife incidents, and definitive diagnoses of causes of death in wildlife in Australia. A list of the 'ten least wanted' diseases of wildlife, to be based on Biosecurity Australia's import risk analyses, is being prepared for comment.

FREE-RANGING WILDLIFE

Two incidents of mortalities of threadfin leather jacket fish (*Artrolepsi filicauda*) on Fraser Island, Queensland, were reported in early March. The first involved an estimated 300 000 fish washed up along the entire east coast of Fraser Island, and the second involved an estimated 100 000 fish centred on the north-eastern beaches of the island. The cause of death in both cases remains unknown.

Deaths of up to 30 eastern grey kangaroos (*Macropus giganteus*) at Yarrambat (near Yan Yean) in Victoria over a two-week period are under investigation.

A structured investigation into reports of an emerging proliferative skin disease in Tasmanian devils (*Sarcophilus harrisi*) in Tasmania has commenced. This will be a model for improving Tasmania's capacity for prevention of, preparedness for and response to emerging infectious diseases in wildlife.

Investigations into deaths of 26 koalas (*Phascolarctos cinereus*) over five weeks at Raymond Island (near Bairnsdale, Victoria) have ceased, with no further deaths. The cause of death is unknown at this stage.

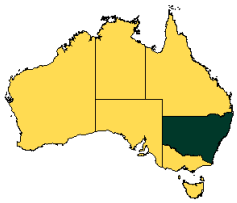
CAPTIVE WILDLIFE

The acute mortality of six birds of captive psittacine species in a private South Australian aviary is currently under investigation. Hepatic intranuclear inclusions were observed in tissues from one individual. Samples were sent overseas to rule out Pacheco's disease, and preliminary results of DNA hybridisation were negative.

Contributed by: Chris Bunn, Office of the Chief Veterinary Officer, AFFA, and Rupert Woods, AWHN Coordinator.

State and Territory reports

New South Wales



Contributed by:
Barbara Moloney
NSW Agriculture

There were a number of mortalities related to the drought during the quarter.

VITAMIN A DEFICIENCY

Low levels of vitamin A were detected in the sera of Merino sheep that had been hand fed in a shed for three months. Ill-thrift and mortalities had been observed in greater numbers than in paddock mobs, which were also being hand fed during the drought.

KIKUYU POISONING

More than 40% of a herd of 130 Friesian milkers at a dairy south of Kempsey died over five days. Initial clinical signs included staggering, recumbency, drooling, dehydration and abdominal pain. Post mortem examinations all showed massively distended rumens containing undigested grass. The animals had been grazing kikuyu pasture with grain supplement. This case was unusual in that the kikuyu was not young and lush, the state normally associated with toxicity, but mature and rank since it had been locked up for hay. In another case, near Coffs Harbour, the death of 19 out of 40 dry dairy cattle was attributed to kikuyu poisoning because of the presence of typical microscopic lesions in the rumen. NSW Agriculture is undertaking further studies to identify the toxic agent involved. Nitrate and oxalate have been excluded.

OTHER PLANT POISONINGS

There were continuing reports of plant poisoning across the north-west of the State, as storms allow some growth, and hungry cattle gorged on pure stands of rapidly growing species rather than a more balanced pasture mix. Liverseed grass (*Urochloa panicoides*), button grass (*Dactyloctenium radulans*), pigweed (*Portulaca* spp.), and sorghum species have been implicated in deaths. Consumption of rosewood cuttings was associated with cattle deaths on one property and, although the toxic agent is unknown, nitrate and cyanide toxicities were ruled out. Lantana poisoning was suspected to have caused the death of nine of 47 mixed age cattle. Photosensitisation was evident and was confirmed as secondary to liver damage on histology.

PROTEIN MEAL TOXICITY

Thirty-five out of 400 mixed age beef cattle died following the feeding of lupins for several days. Tests on the lupins did not show high levels of lupin alkaloids or bittersweet. Animals were dying within several hours of showing neurological disturbance: ataxia progressed to weakness, recumbency and twitching, then death. Animals in better condition seemed more likely to be affected – presumably, these animals had a greater intake of the lupins. Excess ammonia from the breakdown of protein in the rumen is normally converted to urea in the liver for excretion. In this situation, the liver was overloaded and the level of ammonia in the circulation produced the signs of toxicity, due to hepatic encephalopathy.

ANTHRAX

Laboratory examination confirmed anthrax as the cause of death of 12 of 120 mixed age cows that died over the New Year period on a Riverina district property. There was no previous history of anthrax on this property but it is located in an area where anthrax is known to have occurred in the past. The property was placed in quarantine, carcases were burnt, the site was disinfected with formalin, and in-contact animals vaccinated. All of 18 other investigations for anthrax (one sheep and the remainder cattle) were negative with diagnoses including pneumonia, acidosis, trauma, nitrate poisoning, and ammonia toxicity.

LYSSAVIRUS EXCLUSIONS

During the quarter, there were 10 Australian bat lyssavirus (ABL) exclusions where a person had been bitten or scratched by a bat. Species of bats examined included grey-headed flying-fox and black flying-fox, and various micro-bats. All 10 cases were negative for ABL, as were three other investigations unrelated to human injury. Diagnoses included bacterial myelomeningitis, trauma, and fibrinopurulent pleuropneumonia.

Northern Territory

Contributed by:
Diana Pinch
DBIRD

BOVINE EPHEMERAL FEVER

Reports of bovine ephemeral fever (BEF), or three-day sickness, in cattle have been widespread during the quarter.

Deaths of 18-month-old steers on a Barkly Tablelands property were investigated. Many animals in the paddock were down and many showed clinical signs typical of BEF. The mortality rate was about 1%. Blood samples from two downer animals were

collected, and polymerase chain reaction (PCR) results were positive for BEF virus. PCR results from a blood sample taken from a downer cow on a neighbouring property were also positive for BEF virus.

Blood samples were submitted from three lame bulls at an export yard near Darwin. All had a neutrophilia and, although the BEF PCR result was negative, the titre of the BEF serum neutralisation test was high, indicating recent exposure to the BEF virus.

TOXICITY

A report of lame, weak and ataxic buffalo on Melville Island was investigated by Northern Australia Quarantine Strategy staff. Clinically affected buffalo were found to be staggering and dragging their hind legs. They were in an area where cycad plants/zamia palms (*Cycas* spp.) showed evidence of being eaten. Histological examination of spinal cord sections showed some evidence of an axonopathy. A diagnosis of zamia staggers was made.

The owner of a small farm in Katherine applied endosulfan (with wetting agent) direct to nine steers as a treatment for buffalo fly. All animals showed signs of salivation and two died. Samples of brain and fat showed a very high level of endosulfan. Because of the likelihood of violative residues, the stock on the property have been placed under quarantine and a residue management plan formulated.

A station in the Alice Springs region had 21 cows and two weaners die overnight, from a mob of 150, due to caltrop (*Tribulus terrestris*) and buttongrass (*Dactyloctenium radulans*) poisoning in stockyards. Both plants accumulate nitrates when growing rapidly on nitrogen-rich soils. Caltrop also contains saponin poisons. The deaths only occurred after stock were not fed hay the second day, supporting the view that poisoning generally occurs in hungry stock.

ARBOVIRUS MONITORING

As part of the National Arbovirus Monitoring Program (NAMP), insects are collected using light traps on a property on the southern edge of the Barkly Tablelands. During the quarter, a single male *Culicoides brevitarsis* was identified from insects trapped on the station in November last year. This station has been involved with NAMP since 1994 and there has been no seroconversion to bluetongue virus in the sentinel cattle. No vector of bluetongue virus had been identified at the site until this incident.

HENDRA VIRUS EXCLUSION

A private practitioner examined an 8½-month-old quarterhorse foal in the Katherine area. It showed weakness, frothing at the mouth, and an altered mental state. Despite treatment, it progressed to lateral recumbency and became non-responsive over the next 24 hours. Histological examination of lesions in the lung was indicative of severe, acute suppurative bronchopneumonia. There was also marked dilation of the choroid plexus by proteinaceous fluid. Samples were sent to the Australian Animal Health Laboratory for exclusion of Hendra virus and Australian bat lyssavirus, which was particularly important in this case, as the foal had bitten the owner's arm. Results from a range of tests for these two viruses were negative.

Queensland

Contributed by:
Janet Berry
QDPI

PLANT TOXICITY DIAGNOSED BY E-MAIL

Forty Angus x Brahman cows died out of a mob of 300 that had been drought-fed with pushed lancewood (*Acacia shirleyi*). The mob had just been offered a new patch of lancewood and had to travel over a burnt-out area to get to water. An unidentified red-stemmed herb on the burnt-out area was suspected as a possible cause of the deaths. The investigating veterinary officer placed a specimen of the plant on a computer scanner on the property and e-mailed the resultant image to the Queensland Herbarium for identification. Within two hours, advice was returned to the property that cyanide was the likely toxin and further losses were avoided. Plant specimens and fragments of the plant in a rumen sample from one of the cows autopsied were later identified as red crumbweed *(Dysphania glomulifera*). A sample of the plant had a cyanide potential of more than 6000 mg/kg as received and contained 4.8% potassium nitrate as well. Plants with more than 200 mg HCN/kg or more than 1.5% KNO_3 are potentially toxic to ruminants.

NITRATE POISONING

There were a number of reports of significant stock losses on properties in the central region in stock fed freshly cut forage sorghum hay containing excessive levels of nitrate. One property in the Broadsound Shire lost 16 head of cattle, and another property in the Fitzroy Shire lost two out of 200, with another two sick. There were other unconfirmed reports of more significant stock losses. Levels of nitrate in the aqueous humour in both cases were highly indicative of nitrate poisoning.

PLANT TOXICITY IN GOATS

Eight out of 80 Boer goats died on a property near Childers. Neurological signs, including posterior paresis, incoordination, proprioceptive deficits and

nystagmus were noted in the last sick animal, which was euthanased and autopsied. Histological examination of submitted tissues revealed severe, subacute hepatic periacinar necrosis. Other findings included mild to moderate vacuolation of both grey and white matter, and moderate acute interstitial pneumonia. Subsequent investigations revealed that the animals had access to Noogoora burr (*Xanthium pungens*), but no information was obtained regarding the growth stage of the plant. Neurological signs were attributed to hepatic encephalopathy. The cause of the pneumonia was not established.

ASPERGILLUS CLAVATUS

A producer in the Peak Downs Shire lost two cattle from a small herd of seven being fed sprouted wheat infested with a blue mould. One affected cow showed posterior ataxia and recumbency after about two weeks' exposure to infested wheat sprouts. This syndrome is consistent with overseas reports of *Aspergillus clavatus* tremorgenic mycotoxicosis. Tremogenic mycotoxins were also the presumed cause of nervous signs, tremor and ataxia in a six-year-old Hereford cow submitted for TSE exclusion. One animal had died in addition to the clinically affected animal from a group of 16. Cattle were being supplementary fed lucerne and barley shoots. The barley shoots were heavily contaminated with *Aspergillus clavatus*.

ONION POISONING

One Santa Gertrudis bull died and others in the group were febrile with discoloured urine and pale mucous membranes. They were being fed onions *ad libitum* as a drought feed. Laboratory testing revealed a marked regenerative anaemia and hemoglobinuria. No tick fever organisms were evident and methyl violet stains of blood indicated large numbers of erythrocytes with Heinz bodies. The diagnosis was onion poisoning. Although sheep can adjust to an unlimited supply of onions, onions should not be fed at greater than 25% of the total ration to cattle.

SOYA BEAN MEAL TOXICITY

Numerous cases were reported (and investigated) of substantial losses with sudden introduction of freely-fed soya bean meal to sheep and cattle. Clinical signs were predominantly sudden death with preceding neurological signs such as ataxia, convulsions, high stepping, star-gazing and recumbency. Laboratory testing was conducted for acidosis, enterotoxaemia, lead and arsenic, with all results negative. There were no significant histological changes in tissue sections including brains. There are some brief references to high protein diets producing high rumen and blood ammonia levels as occur in urea poisoning, and the clinical signs were similar to urea poisoning. The measurement of ammonia in blood or rumen fluids is difficult due to the loss of the gas from samples and formation of ammonia from protein breakdown with decomposition. Ammonia toxicity remained as the most likely cause of these deaths.

CAUSTIC VINE TOXICITY

Caustic vine (*Sarcostemma* sp.) was confirmed as the cause of death and illness in a group of 120 Brahman cows on a property south of Winton. Ten cows died and six demonstrated signs of recumbency, paddling, muscle tremors, chewing and excessive salivation. The owner had previously burnt the paddock and rain had fallen a week before the cows were introduced. Caustic vine was found throughout the paddock and, based on the clinical signs, the submitting officer diagnosed caustic vine poisoning. The Queensland Herbarium confirmed *Sarcostemma* sp. plant material in sieved rumen contents.

BOVINE EPHEMERAL FEVER

Sporadic cases of bovine ephemeral fever (BEF) were being reported during the very dry conditions earlier in the year as result of some isolated summer falls of rain. However, there have been widespread reports of BEF along the coastal areas of Queensland since the rains began in February. Significant morbidities and mortalities have been reported and confirmed on some properties.

HENDRA VIRUS EXCLUDED

Hendra virus was excluded as the cause of death of three thoroughbred mares with signs of depression, dyspnoea and congested mucous membranes. At post mortem examination, the lungs were congested and oedematous, and the kidneys had a mild nephrosis. Lung and kidney were sent to AAHL and virus was not detected by either culture or immunohistochemistry. The cause of death was not established.

SPORADIC BOVINE LYMPHOSARCOMA

A three-month-old male calf in Kingaroy Shire was presented with gross enlargement of all superficial lymph nodes. It had been clinically normal but on the day of examination had mucoid diarrhoea and a raised temperature. The calf tested negative on the agar-gel immunodiffusion test for bovine leucosis virus. Haematology showed a lymphoid leukaemia and sporadic bovine lymphosarcoma was diagnosed.

LYSSAVIRUS EXCLUDED

In early January, a three-year-old male cat from Loganholme that had caught and eaten a small bat three weeks earlier, developed clinical signs of fits and foaming at the mouth. The cat was autopsied at Yeerongpilly Veterinary Laboratory and tested negative on fluorescent antibody testing for ABL.

AVIAN TUBERCULOSIS IN A CASSOWARY

An autopsy on a juvenile cassowary from north Queensland revealed granulomatous lesions on the liver and the spleen. Samples submitted for laboratory examination demonstrated small numbers of acid-fast rod-shaped bacteria within the necrotic centres of the granulomas, consistent with a mycobacterial infection. *Mycobacterium avium* was identified on tissue culture. Avian tuberculosis has been diagnosed on several occasions in cassowaries in the northern coastal areas of Queensland, particularly in young adults.

South Australia

Contributed by:
John Weaver
PIRSA

COMPLEX DISEASE PRESENTATION

Older sheep, in a Merino flock in the Millicent area, were examined because of persistent diarrhoea, photosensitisation and a low but persistent mortality over the last few months. On examination, they were found to be in poor body condition. The area is one where mineral deficiencies are common and a number of properties over the past few years have reported photosensitisation from severe liver damage of unknown cause. This property also had been reported to have increased anthelmintic resistance.

At post mortem examination, multiple calcified granulomas were seen in the liver as well as thickening of the gut wall and enlarged mesenteric lymph nodes with histology indicating the presence of acid fast bacilli in gut, lymph nodes and the liver lesions. As these findings were suggestive of ovine Johne's disease (OJD), further sampling of six sheep was undertaken, five of which were serologically positive for OJD. Sheep strain *Mycobacterium paratuberculosis* was grown and identified from culture.

For SA, this is an unusual presentation of OJD and further investigation of mineral levels was made. Sheep with better body scores had uniformly higher glutathione peroxidase levels (considered indicative of selenium levels) than those with poorer body scores. Further analyses are continuing.

JOHNE'S DISEASE IN GOATS

There have been no reports or detections of JD in goats for a number of years in SA. A clinically affected goat diagnosed with JD was traced back to a goat breeding operation, where further testing confirmed a number of the animals as being infected. Tracing animals sold from this second farm has detected possible infection on other properties. The investigation is continuing.

TOXICITY/DEFICIENCY PROBLEMS

A property in the far west of the State had sheep presenting with paresis, including knuckling in the front legs, diarrhoea and deaths. Samples were negative for *Clostridium perfringens* toxins and histology suggested an oxalate nephrosis.

POULTRY

A severe diarrhoea problem in 12–14-week-old chickens was non-responsive to antibacterial and anticoccidial medication administered by the owner. At autopsy, there was severe caseous inflammation of the caecae with adhesions to other organs. A diagnosis of histomoniasis (blackhead) was confirmed.

DEATHS IN BARBARY SHEEP

A flock of Barbary sheep at an open range zoo has had intermittent mortalities, the main feature of which was a consolidating pneumonia. Histologically, the lesion was reported to resemble maedi–visna but samples forwarded to the Australian Animal Health Laboratory were negative.

LEPTOSPIROSIS IN FERAL PIGS

Samples were collected and tested serologically for *Leptospira* from two populations of feral pigs culled during a control exercise in the North-East Pastoral region of SA. One population was serologically negative but in the other 70% were positive for *L. pomona*.

Tasmania

Contributed by:
John Elliott
DPIWE, Tasmania

FOOD POISONING IN LAYER HENS

A flock of 13 backyard layers died within 12 hours of being given pellets from a freshly opened bag. There were no deaths in a group of six bantams that had been kept with the layers. These had, however, refused to eat the pellets, flown out of the pen and so found alternative feeds.

A heavy growth of *Bacillus cereus* was cultured from the feed pellets. Some strains of *Bacillus cereus* produce toxins and are recognised causes of food poisoning. The presence of toxin in the feed could not be confirmed but the circumstances strongly suggest that this was the cause of death of the birds.

LEAD POISONING IN CATTLE

One animal in a group of ten cattle was found dead. A second animal was apparently blind and ataxic, and head-pressing was observed when the animal was yarded. After this animal died, nothing remarkable was

found on post mortem examination. Liver lead levels were at the upper end of normal limits, although levels greater than zero are unusual in Tasmanian cattle. A thorough investigation of the paddock found a derelict car with a broken battery. There was obvious evidence that the cattle had had access to this.

LABORATORY ACCESSIONS

During the quarter, there were 159 aquatic animal accessions, 400 livestock accessions, 36 companion animal accessions, 26 wildlife accessions and 17 accessions from other sources.

The following investigations into possible cases of notifiable diseases were done during the quarter.

Disease	Investigations	
	+ve	No.
Avian psittacosis	0	3
Bovine tuberculosis (*M. bovis*)	0	10
Brucella abortus (bovine brucellosis)	0	15
Brucella ovis	0	10
Enzootic bovine leucosis	0	7
Foot-and-mouth disease	0	1
Hydatids	3	5
Infectious bursal disease (hypervirulent form)	0	1
Johne's disease	7	77
Leptospira hardjo	0	6
Leptospira pomona	3	6
Listeria	0	1
Negative fish bacteriology*	0	101
Negative fish virology+	0	2
Piscirickettsiosis	0	5
Q fever	0	6
Salmonella	3	19
Salmonella abortus ovis	0	1
Shellfish diseases#	0	5
Verotoxic *E. coli*	0	35

* Furunculosis, goldfish ulcer disease, marine aeromonad disease, strepococcosis of salmonids

\+ Epizootic ulcerative syndrome, infectious haemopoietic necrosis, infectious pancreatic necrosis, onchorhynchus masou virus disease, spring viraemia of carp, viral encephalopathy and retinopathy, viral haemorrhagic septicaemia

\# Bonamiasis, iridovirosis of shellfish, nocardiosis of shellfish, perkinsosis of shellfish

LIVER FLUKE ON KING ISLAND

Liver fluke has not been common in cattle bred on King Island. From time to time, fluke have been found in cattle brought onto the island. Since 2000, there have been four abattoir detections of fluke in homebred cattle from one property on the island. However, the snail *Austropeplea tomentosa* was found recently in the small catchment in which the infected property is located.

Although the snail is endemic in Tasmania, the Queen Victoria Museum in Launceston has not recorded this species from King Island. Investigations of other catchments found no evidence of the snail. It is possible that *A. tomentosa* may have been present on King Island for many years but with its distribution naturally restricted. Most catchments on King Island become brackish from time to time and the water bodies are generally shaded by vegetation, with neither factor being preferred by the snail.

A fluke infection cycle may have been set up comparatively recently when infected animals were introduced to the apparently small area where the snail occurs. The owner of the property from which the home-bred infected cattle came believes that a bull brought from mainland Tasmania 10 years ago introduced fluke. This animal was unthrifty and was destroyed on-farm. Unfortunately, no post mortem examination was done.

Victoria

Contributed by:
Tristan Jubb
DPI, Victoria

HAEMOLYTIC *E.COLI* IN PIGS

During the past ten years, pig producers have been plagued by diarrhoea in suckling pigs caused by a haemolytic *E. coli*. The particular strain K88:O149 has been a problem in weaner pigs for the last 50 years, but it had not occurred in suckling pigs (10–28 days of age) before the early 1990s. A collaborative research program between scientists in Bendigo and Quebec in Canada recently discovered why the bacteria had emerged in suckling pigs. PCR technology showed that the haemolytic K88:O149 had picked up a toxin plasmid from non-haemolytic strains that cause a problem in the first few days of life, but are incapable of causing disease after five days of age. These non-haemolytic strains are very well controlled by vaccinating the breeding sows, which then pass on high levels of colostrum that protect the pigs for the first 4–5 days of life, after which there is an age-related resistance. In contrast, the haemolytic *E. coli* does not cause a problem until the colostrum has declined to negligible levels in the milk (after about 10 days). The disease can be prevented by oral administration of vaccine to sows to induce mucosal (IgA) antibodies in milk for the duration of lactation.

EPIZOOTIC HAEMATOPOIETIC NECROSIS

In mid-January, approximately 100 dead redfin perch (*Perca fluviatilis*) fingerlings (3 cm length) were found washed up on the shores of a reservoir near Melbourne.

Histopathology revealed necrosis in the liver and kidney with marked depletion of haematopoietic tissue in the kidney consistent with epizootic haematopoietic necrosis (EHN). EHN was confirmed by electron microscopy and viral culture. EHN was first reported in Australia in 1986 and is caused by a ranavirus of the Iridoviridae family. EHN is unique to Australia and has been reported previously only in farmed rainbow trout and redfin perch. Fatalities usually occur in young fingerlings and can be massive in redfin but are usually minimal in rainbow trout. The virus is generally not found in live, in-contact fish, although antibodies to the virus have been demonstrated in live fish in various studies. In this outbreak, there were only about 20 mortalities recorded the next day, and one or two in the days following. However, cormorants and pelicans were active.

NITRITE TOXICITY IN CATTLE

Nitrite toxicity was diagnosed as the cause of sudden death of five adult cattle in one dairy herd in East Gippsland, 16 adults in a second dairy herd, and six beef cattle on a grazing property in north-eastern Victoria. The five dairy cattle died suddenly while grazing a crop of millet. The crop had been fertilised with urea 10 days before grazing. The second dairy herd was also grazing millet. No clinical signs were observed before the cattle were found dead and no clinical signs of nitrite toxicity were observed in herd mates. The beef cattle also died within hours of being fed millet hay. The hay came from the middle of a large round bale and was still green and had a wilted appearance. Unconsumed hay was scattered on the ground around the bodies. The paddock from which the hay originated had been heavily fertilized with nitrogen. Post mortem examinations in two of the outbreaks found very dark, almost black blood and extensive ecchymotic haemorrhages in the trachea. No other tissue changes were evident. Samples of the millet and the millet hay had high concentrations of nitrate.

ARSENIC POISONING IN CATTLE

In February, DPI was asked to assist in the investigation of sudden deaths in several cattle on a beef property in central Victoria. A property visit found two cattle showing incoordination and severe diarrhoea with shreds of mucosa present in the manure. Several other cattle were showing distension of the abdomen suggestive of a primary gastrointestinal problem. Two carcases of animals that had died the previous day were opened but failed to reveal any pathological changes that would indicate a cause of death.

While inspecting a hay shed, a strong pungent chemical smell was noticed and a patch of yellowish powder thought to be an arsenical compound was found. This was accessible to the affected cattle, but only after the overlying hay in the shed had been consumed. It would not have been apparent to the owner when the hay was present in the shed. The previous property owner recalled that arsenic and other chemicals had been stored in the shed when the property operated as an apple/pear orchard some 30 years previously. The two animals severely affected with diarrhoea were not expected to live and were killed and autopsied. The gross changes observed related entirely to the gastrointestinal tract, which was moderately congested throughout on both the serosal and mucosal surfaces, particularly the abomasum, which also had ulcers scattered across the mucosal surface. High concentrations of arsenic in liver (12 ppm) and kidney (16 ppm), and the yellow powder provided laboratory confirmation of the diagnosis.

EXCLUSION OF SMALL HIVE BEETLE

A beekeeper in central Victoria notified his suspicions of small hive beetle (SHB) when he found a dead hive with sloppy honey. Investigation found numerous plump live active larvae entwined in the cells but no beetles were obvious and there was no 'sour oranges' smell often found with SHB. The damage to the combs was consistent with advanced SHB. The larvae were slightly different to wax moth larvae, which were also present in the hive, but of concern was the presence of two spikes on the tail, like those found in SHB larvae.

Some of the other hives were infested with beetles but no larvae, while other hives were infested with larvae but no beetles. Samples of larvae and beetles were submitted for identification and found to be hover fly larvae (*Syrphidae* sp.) and native hive beetle (*Brachypeplus* sp.). The severity of the damage associated with the presence of these two species was considered unusual. Hover fly are normally predatory. Some species are known to live in bee's nests where they are scavengers, occasionally predatory on bee larvae.

A second report of beetles in bee hives on the Dargo High Plains was investigated. A large number of insects that quickly ran away from the light were seen on the top bars of the frames and under the hive mats. They were identified as a species of cockroach (*Blattellidae* sp.) closely related to the German cockroach (*Blattella germanica*).

PASTEURELLA PNEUMONIA IN CATTLE

Nine cows died suddenly while awaiting slaughter at an abattoir. They were part of a consignment of cattle originating from three different properties in South Gippsland that had been transported from nearby saleyards six days previously. The animals were found dead with blood oozing from the nostrils and mouth. The deaths followed one of the hottest days on record

for the area (~42°C). Several other cattle in the consignment showed respiratory distress and weakness with blood-stained mucous discharge from the nose and some with froth coming from the nose. After eliminating anthrax as the cause of the deaths, autopsy of two cattle found fibrinous pleurisy, emphysema and haemorrhagic interstitial pneumonia consistent with pneumonic pasteurellosis. *Pasteurella multocida* and *Actinomyces pyogenes* were cultured from fresh tissues submitted to the laboratory. The stress of recent transport, exposure to a new environment, feed changes, and extreme heat probably triggered this outbreak.

PARASITIC ABOMASITIS IN CATTLE

Five of 20 cows in a small beef herd died during February. Post mortem examination of the fifth cow found oedema of the gastrointestinal tract and severe abomasitis, and numerous raised nodules giving a 'morocco leather' appearance plus haemorrhages and ulceration of the abomasal folds. The faecal egg count on fluid faeces was 990 eggs per gram. A total worm count without digestion of the abomasal mucosa recovered 440 000 *Ostertagia ostertagi* and 170 000 *Trichostrongylus axei*. The developmental stages of the *Ostertagia* were approximately 15% early fourth larvae, 25% late fourth larvae, 30% immature adults and 30% mature adult. The gross pathology and worm count are consistent with type II *Ostertagia* infection and resumed development of previously inhibited larvae. Probable contributing factors were severe drought over the preceding eight months with access to limited pasture and hay, and very high temperatures in January and February. Deaths ceased and the cattle slowly improved after anthelmintic treatment and increasing the ration of hay.

Western Australia

Contributed by:
Richard Norris
WA Department of Agriculture

PERENNIAL RYEGRASS STAGGERS

Perennial ryegrass staggers was seen in cattle on the south coast in late summer. Typically, the mortality was low and affected animals recovered within days.

MALIGNANT CATARRHAL FEVER

Malignant catarrhal fever (MCF) with some atypical lesions was seen in cattle adjacent to a farm at Mt Barker that had experienced a similar disease in sheep. Although MCF is not known to occur in sheep and there was no evidence of direct exposure of sheep to these cattle, transmission studies in sheep have commenced to investigate this possibility.

SPORADIC BOVINE ENCEPHALOMYELITIS

Sporadic bovine encephalomyelitis (SBE) was seen in Shorthorn cattle in the northern wheat belt. Usually, SBE affects only one or two animals in a herd. However, in this case 10 of 180 animals showed clinical signs and several clinically normal animals also had high titres, suggesting an unusually high morbidity. The chlamydial organism causing SBE was recently renamed *Chlamydia pecorum*.

SHIPPING FEVER

Shipping fever caused deaths and illness in yearling cattle in the south-west, after three days of fever. Affected animals had nasal discharges, lameness and severe bronchopneumonia. *Mannheimia* spp. were recovered from the lungs and parainfluenza viruses were also likely causal agents.

MISCELLANEOUS SHEEP DISEASES

Disease patterns for sheep were consistent with previous seasons, with the summer providing nutritional stress, allowing opportunist infections such as salmonellosis to occur. Again, there were many reports of enterotoxaemia in unvaccinated stock and selenium/vitamin E deficiency caused ill-thrift and myopathy throughout the south-west of the State. Toxic algae caused deaths on the south coast.

CONGENITAL TREMORS IN PIGS

A further case of congenital tremors associated with porcine circovirus type 2 (PCV2) was seen. The possible role of PCV2 in this condition continues to cause debate in scientific circles and it may be some time before the issue is resolved. Further studies on the WA outbreaks are under way.

CONJUNCTIVITIS/RHINITIS IN POULTRY

An unusual case of conjunctivitis and rhinitis caused by *Mannheimia haemolytica* (formerly *Pasteurella haemolytica*) was seen in young poultry at Albany. Avian influenza and Newcastle disease were ruled out by testing at the Australian Animal Health Laboratory.

INFECTIOUS CORYZA

Infectious coryza in a flock of free-range layer birds was associated with low mortality. This endemic disease is not often reported to the laboratory but is known to cause significant ill-health in some flocks. As well as the primary agent, several other opportunist bacterial pathogens were involved.

Quarterly Disease Statistics

Quarterly disease statistics — control activities

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 1 shows the number of accredited flocks at the end of the quarter.

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 2 shows the number of dairy herds tested free of EBL at the end of the quarter.

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.

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 2004. 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.

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

Table 1: Ovine brucellosis accredited-free flocks at 31 March 2003

NSW	NT	QLD	SA	TAS	VIC	WA	AUS
825	0	52	479	104	630	138	2228

Table 2: Dairy herds tested free of enzootic bovine leucosis at 31 March 2003

	NSW	NT	QLD	SA	TAS	VIC	WA	AUS
Free	1300	0	1130	535	605	7067	360	10 997
Herds	1302	0	1135	535	605	7157	360	11 094

Table 3: Results of the National Granuloma Submission Program

	Granulomas submitted	TB +ve
Jan – Mar 02	1074	2
Apr – Jun 02	1438	0
Jul – Sep 02	1576	0
Oct – Dec 02	1373	0
Jan – Mar 03	866	0
NSW	27	0
NT	0	0
QLD	558	0
SA	77	0
TAS	8	0
VIC	72	0
WA	124	0

Table 4: Herds/flocks with JD at 31 March 2003

	Cattle	Sheep	Goats	Deer	Alpaca	Total
NSW	146	1123	12	1	1	1283
NT	0	0	0	0	0	0
QLD#	2	0	0	1	0	3
SA	49	65	2	3	0	119
TAS	20	41	6	0	0	67
VIC	1107	80	7	7	4	1205
WA	0	0	0	0	0	0
AUS	1324	1309	27	12	5	2677

The Queensland herd is in quarantine after finding an infected animal introduced from an endemic area.

Table 5: Herds/flocks with a JDMAP status of at least MN1/TN1 status at 31 March 2003

	Cattle	Sheep	Goat	Alpaca	Total
NSW	885	311	33	124	1353
NT#	0	0	0	0	0
QLD#	1	10	0	0	11
SA	258	235	19	38	550
TAS	116	34	1	1	152
VIC	357	157	6	37	557
WA#	0	0	0	0	0
AUS	1617	747	59	200	2623

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

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 183 abortion investigations were performed during the reporting period — all with negative results for bovine brucellosis, as shown in Table 6.

Table 6: Surveillance for bovine brucellosis

	Abortion investigations		Test for other reasons	
	Tests	+ve	Tests	+ve
Jan – Mar 02	146	0	5125	0
Apr – Jun 02	275	0	7082	0
Jul – Sep 02	182	0	2336	0
Oct – Dec 02	69	0	3617	0
Jan – Mar 03	183	0	5133	0
NSW	8	0	545	0
NT	0	0	0	0
QLD	51	0	588	0
SA	4	0	17	0
TAS	3	0	33	0
VIC	37	0	215	0
WA	80	0	3735	0

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 7.

Table 7: 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
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	21762	264	1196	273	11428	7	1142	0	432	22
Oct – Dec 02	3222	358	12223	462	1754	243	8155	4	1127	1	417	12
Jan – Mar 03	5604	505	16018	406	1689	308	2277	4	686	3	353	11
NSW	5	0	1682	10	488	41	928	0	193	0	92	8
NT	624	322	886	266	630	151	0	0	5	0	0	0
QLD	374	149	872	125	315	92	144	0	136	3	0	0
SA	2	0	58	0	0	0	9	0	13	0	9	0
TAS	0	0	15	0	0	0	833	0	0	0	0	0
VIC	1118	0	12418	0	190	0	346	0	209	0	133	2
WA	3481	34	87	5	66	24	17	4	130	0	119	1

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 January to 31 March 2003

Serovars	avian	bovine	canine	equine	feline	ovine	porcine	other	Total
S. Bovismorbificans	0	14	2	1	1	3	1	1	23
S. Dublin	0	30	1	0	0	0	0	0	31
S. Infantis	0	1	2	0	1	0	3	2	9
S. Typhimurium	2	28	1	3	3	4	6	0	47
Other	4	118	27	1	8	0	35	21	214
Total	6	191	33	5	13	7	45	24	324

ZOONOSES

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

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

Table 9: Notifications of zoonotic diseases in humans

Disease	Q1-02	Q2-02	Q3-02	Q4-02	Q1-03	Current quarter						
					AUST	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Brucellosis#	12	6	11	11	5	0	2	0	3	0	0	0	0
Leptospirosis	71	55	17	25	33	0	20	0	11	0	0	2	0
Listeriosis	15	18	16	13	24	0	6	0	6	0	1	8	3
Ornithosis	17	52	97	33	27	0	8	0	1[nn]	0	0	17	1
Q fever	183	193	181	196	205	0	110	1	79	1	0	11	3

nn disease is not notifiable in these States

Brucella melitensis and *Brucella abortus* are exotic to Australia.

AUSTRALIAN MILK RESIDUE ANALYSIS SURVEY

The Australian Milk Residue Analysis (AMRA) Survey is an independent monitoring program for agricultural and veterinary residues and environmental contaminants in raw cow's milk. The AMRA Survey is 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's 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 10 summarises the results for the quarter.

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 10: Australian Milk Residue Analysis Survey, 1 January to 31 March 2003

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	0	0	0	0	0	0	0	0	0	0	1
Antimicrobials	0	16	0	0	0	12	0	11	0	9	0	97	0	5	0	150
Macrocyclic lactones	0	6	0	0	0	7	0	3	0	1	0	31	0	3	0	51
Organochlorines	0	3	0	0	0	2	0	2	0	2	0	16	0	1	0	26
Organophosphates	0	3	0	0	0	2	0	2	0	2	0	16	0	1	0	26
PCBs	0	3	0	0	0	2	0	2	0	2	0	16	0	1	0	26
Synthetic pyrethroids	0	3	0	0	0	2	0	2	0	2	0	16	0	1	0	26
Triclabendazole	0	16	0	0	0	12	0	11	0	9	0	97	0	5	0	150

NATIONAL TSE SURVEILLANCE PROGRAM

The National Transmissible Spongiform Encephalopathies 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 11 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 www.aahc.com.au/surveillance/ntsesp).

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

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.

Table 11: Number of animals tested under NTSESP (All were negative for TSE)

	Jan – Mar 02		Apr – Jun 02		Jul – Sep 02		Oct – Dec 02		Jan – Mar 03	
	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep
NSW	16	17	30	32	29	21	17	23	15	26
NT	0	0	8	0	10	0	6	0	0	0
QLD	36	4	41	8	43	16	69	29	37	4
SA	8	28	1	6	6	17	6	3	5	7
TAS	3	0	3	0	2	5	2	5	0	0
VIC	17	29	17	33	34	24	28	36	12	10
WA	4	29	7	40	5	28	9	36	7	35
AUS	84	107	107	119	129	111	137	132	76	82

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 12 and 13 summarise NAQS activity in Australia over the past five quarters.

Contact: David Banks, Biosecurity Australia

Table 12: Summary of recent NAQS activity in Australia

	Jan – Mar 02		Apr – Jun 02		Jul – Sep 02		Oct – Dec 02		Jan – Mar 03	
	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve
Aujeszky's disease	13	0	143	0	179	0	197	0	53	0
Classical swine fever	9	0	143	0	179	0	197	0	53	0
Japanese encephalitis	368	16	279	0	79	0	210	0	362	17
Nipah virus			143	0	179	0	197	0	76	0
Porcine reproductive and respiratory syndrome	13	0	143	0	179	0	197	0	53	0
Surra	47	0	72	0	8	0	69	0	182	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 13 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 13: Number of inspections of insect trap sites

	Jan – Mar 02	Apr – Jun 02	Jul – Sep 02	Oct – Dec 02	Jan – Mar 03
Port surveillance					
Asian bees	5	10	0	12	16
Bee mites	35	22	16	27	31
Culicoides	32	34	35	34	35
Screw-worm fly	35	36	35	36	36
NAQS					
Screw-worm fly	150	39	33	53	108

NATIONAL RESIDUE SURVEY

Of 3707 samples tested during the quarter for agricultural and veterinary chemicals, there were two anthelmintics, seven growth promotants, and three metal detections above action levels. Table 14 summarises the results.

Two moxidectin residues were detected in goat liver. Since a maximum residue level (MRL) for moxidectin in goats has not been set, any detection is a contravention, and so trace back was initiated. Zeranol metabolite residues in a beef faecal sample were detected. The presence of zeranol metabolites indicates likely ingestion of *Fusarium*-infected pasture or grain. No traceback investigation was initiated. Detections of 17-alpha 19-nortestosterone were found in two samples of cattle urine and two of sheep urine. All residues detected were well below the traceback action level of 0.01 mg/kg. A boldenone residue was also found in one of the 17-alpha 19-nortestosterone cattle urine samples, but the level did not suggest illicit use and so no traceback was initiated.

Three of the sheep samples (with cadmium residues of 1.9, 2.4 and 3.5 mg/kg) exceeded the maximum level (ML) of 1.25 mg/kg. However, traceback was initiated only on the sample that exceeded the residue action level (RAL) of 2.5 mg/kg.

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

Contributed by: Peter Miller, National Residue Survey, AFFA

Table 14: National Residue Survey, 1 January to 31 March 2003
Each pair of figures gives the number of residues above the maximum residue limit or the maximum level and the number of samples tested.

	NSW		NT		QLD		SA		TAS		VIC		WA		AUS	
Anthelmintics																
cattle	0	45	0	0	0	35	0	10	0	4	0	56	0	7	0	157
pigs	0	8	0	0	0	7	0	4	0	0	0	5	0	1	0	25
sheep	0	113	0	0	0	3	0	28	0	5	0	62	0	40	0	251
other	1	14	0	0	1	9	0	8	0	0	0	14	0	6	2	51
Total	1	180	0	0	1	54	0	50	0	9	0	137	0	54	2	484
Antimicrobials																
cattle	0	70	0	0	0	75	0	20	0	3	0	85	0	8	0	261
pigs	0	32	0	0	0	20	0	12	0	1	0	25	0	17	0	107
poultry	0	33	0	0	0	11	0	11	0	0	0	7	0	7	0	69
sheep	0	244	0	0	0	7	0	107	0	9	0	105	0	116	0	588
other	0	9	0	0	0	11	0	1	0	0	0	9	0	1	0	31
Total	0	388	0	0	0	124	0	151	0	13	0	231	0	149	0	1056
Growth promotants																
cattle	1	110	0	1	2	111	0	11	0	8	2	60	0	13	5	314
pigs	0	12	0	0	0	7	0	7	0	0	0	15	0	3	0	44
poultry	0	8	0	0	0	3	0	5	0	0	0	2	0	2	0	20
sheep	1	116	0	0	0	4	0	45	0	4	0	52	1	57	2	278
other	0	4	0	0	0	10	0	4	0	0	0	7	0	0	0	25
Total	2	250	0	1	2	135	0	72	0	12	2	136	1	75	7	681
Insecticides																
cattle	0	102	0	5	0	91	0	23	0	2	0	142	0	14	0	379
pigs	0	6	0	0	0	2	0	3	0	0	0	10	0	4	0	25
sheep	0	191	0	0	0	9	0	94	0	7	0	96	0	89	0	486
other	0	33	0	0	0	24	0	11	0	0	0	8	0	5	0	81
Total	0	332	0	5	0	126	0	131	0	9	0	256	0	112	0	971
Metals																
cattle	0	20	0	1	0	27	0	3	0	0	0	27	0	1	0	79
pigs	0	8	0	0	0	2	0	2	0	0	0	10	0	1	0	23
sheep	1	31	0	0	0	2	1	12	0	1	0	15	1	14	3	75
other	0	16	0	1	0	11	0	4	0	0	0	3	0	6	0	41
Total	1	75	0	2	0	42	1	21	0	1	0	55	1	22	3	218
Miscellaneous																
cattle	0	52	0	0	0	29	0	15	0	3	0	49	0	8	0	156
pigs	0	15	0	0	0	18	0	4	0	0	0	7	0	4	0	48
sheep	0	33	0	0	0	1	0	14	0	2	0	20	0	14	0	84
other	0	1	0	0	0	1	0	2	0	0	0	5	0	0	0	9
Total	0	101	0	0	0	49	0	35	0	5	0	81	0	26	0	297

SUSPECT EXOTIC OR EMERGENCY DISEASE INVESTIGATIONS

There were 34 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 from 1 January to 31 March 2003

DISEASE	SPECIES	STATE	MONTH	RESPONSE	FINDING
Anthrax	bovine	VIC	Jan	2	positive
Anthrax	bovine	VIC	Feb	2	arsenic poisoning
Anthrax	bovine	VIC	Feb	2	negative
Anthrax	bovine	VIC	Feb	2	negative
Anthrax	bovine	QLD	Feb	2	negative
Anthrax	bovine	QLD	Feb	2	negative
Anthrax	bovine	VIC	Mar	2	negative
Anthrax	bovine	VIC	Mar	2	nitrite poisoning
Australian bat lyssavirus	feline	QLD	Jan	2	negative
Australian bat lyssavirus	equine	NT	Feb	3	negative
Avian influenza	avian	NSW	Feb	3	negative
Contagious bovine pleuropneumonia	bovine	VIC	Jan	2	pasteurellosis
Foot-and-mouth disease	bovine	TAS	Jan	3	negative
Foot-and-mouth disease	bovine	NSW	Feb	3	bovine papular stomatitis
Foot-and-mouth disease	bovine	SA	Feb	3	malignant catarrhal fever
Foot-and-mouth disease	bovine	VIC	Feb	1	negative
Foot-and-mouth disease	porcine	NSW	Mar	3	negative
Foot-and-mouth disease	bovine	NSW	Mar	3	bovine papular stomatitis
Foot-and-mouth disease	bovine	TAS	Mar	2	mucosal disease
Infectious bursal disease	avian	TAS	Mar	3	negative
Maedi–visna	ovine	SA	Mar	3	lymphosarcoma
Newcastle disease	avian	NSW	Jan	2	suspected poisoning
Newcastle disease	avian	NSW	Jan	3	negative
Newcastle disease	avian	NSW	Feb	2	Marek's disease
Newcastle disease	avian	WA	Feb	3	negative
Newcastle disease	avian	VIC	Mar	2	negative
Newcastle disease	avian	NSW	Mar	3	neck trauma
Piscirickettsiosis	piscine	TAS	Dec	3	negative
Screw-worm fly	fauna	NT	Feb	2	negative
Screw-worm fly	fauna	NT	Feb	2	negative
Screw-worm fly	canine	NT	Mar	2	negative
Venezuelan equine encephalomyelitis	equine	WA	Mar	3	negative
Vesicular disease	bovine	QLD	Mar	2	pyrrolizidine alkaloids
Vesicular stomatitis	equine	WA	Mar	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

NAHIS contacts

The National Animal Health Information System (NAHIS) collects summaries of animal health information from many sources. NAHIS is on the internet (at 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
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

AnimalHealth Surveillance

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