NSW GOVERNMENT

Information contributed by staff of
NSW Department of Primary Industries
and Local Land Services

NEW SOUTH WALES

ANIMAL HEALTH SURVEILLANCE

April–June 2017 » Issue 2017/2

In this issue

Background to the NSW DPI – Local Land Services animal disease and pest surveillance program

The NSW Department of Industry is obliged under the *Biosecurity Act 2015* to detect and manage notifiable disease outbreaks. The risks to government of failure to detect these diseases are managed by an active, district-based disease and pest surveillance program. Part of the program requires government veterinary officers to investigate potential notifiable disease outbreaks and unusual diseases that may be new, emerging or hard to diagnose. These officers also conduct targeted surveillance projects, inspect stock at saleyards and monitor compliance programs.

The outcome is district-based early detection of notifiable diseases and valid reports on the animal pest and disease statuses of all districts in NSW. These reports are aggregated at the state level for subsequent official reporting to Animal Health Australia's National Animal Health Information System (NAHIS) and (through the Commonwealth) to OIE (the World Organisation for Animal Health). The surveillance program is supported by a State Veterinary Diagnostic Laboratory with world class diagnostic facilities and by research staff who design and improve diagnostic tests and, working with field vets, investigate the epidemiology of diseases that have important biosecurity impacts.

The following case reports include field investigation reports chosen to highlight the system's surveillance and diagnostic capacity and reports demonstrating the management of the system. The reports chosen are not necessarily representative of the full range of livestock disease incidents that occurred during the quarter.

Animal disease surveillance in the April–June quarter

During the quarter, 729 livestock disease investigations were conducted in NSW to investigate suspected notifiable diseases, including emergency diseases. The numbers of investigations are listed by livestock species in the table below. A total of 453 field investigations were conducted by government veterinary or biosecurity officers, and another 276 were conducted by private vets. All diagnostic testing was done at the State Veterinary Diagnostic Laboratory, Menangle and (where follow-up was necessary) at the Australian Animal Health Laboratory, Geelong.

During the quarter the State Veterinary Diagnostic Laboratory processed 457 submitted livestock samples to investigate suspected notifiable diseases or rule out emergency diseases. A large number of submissions were also processed to substantiate proof-of-disease-freedom certifications for accreditation programs and for targeted surveillance projects, including for the National Arbovirus Monitoring Program.

For further information contact Rory Arthur, Manager Animal Disease Surveillance, NSW DPI, Orange, on (02) 6391 3608.

Numbers of field investigations of suspected notifiable diseases or possible emergency diseases in NSW, April–June 2017

	Number of field investigations		
	April	May	June
Cattle	64	73	78
Sheep	64	79	66
Goats	5	2	3
Horses	31	39	52
Deer	2	1	0
Pigs	1	3	5
Poultry	13	31	13
Cats	1	0	0
Bats	4	6	0
Camelids	0	1	0
Dogs	11	29	29
Not specified	5	9	9

Anthrax in NSW, April–June 2017

There were no anthrax incidents during the quarter.

However, there were 35 mortality investigations, in the course of which anthrax was excluded as the cause of death. Seven of these involved sheep; alternative diagnoses included clostridial infection and enteritis. Twenty-six investigations involved cattle; alternative diagnoses included clostridial infection, pneumonia, meningitis, traumatic reticulopericarditis and *Cheilanthes sieberi* (bracken fern) toxicity. One investigation each in a pig and goats yielded no alternative diagnoses. Immunochromatographic testing was used in 21 of these mortality investigations, with negative results.

In the other 14 investigations anthrax was excluded by laboratory testing or on clinical grounds based on alternative diagnoses.

For further information contact Barbara Moloney, Technical Specialist Epidemiology, NSW DPI, Orange on (02) 6391 3687.

Notifiable disease exclusions across the Riverina Local Land Services region

In NSW, responsibility for notifiable disease surveillance is delegated to the district level. All potential notifiable disease outbreaks should come to the attention of the district government vet, who usually conducts a field investigation.

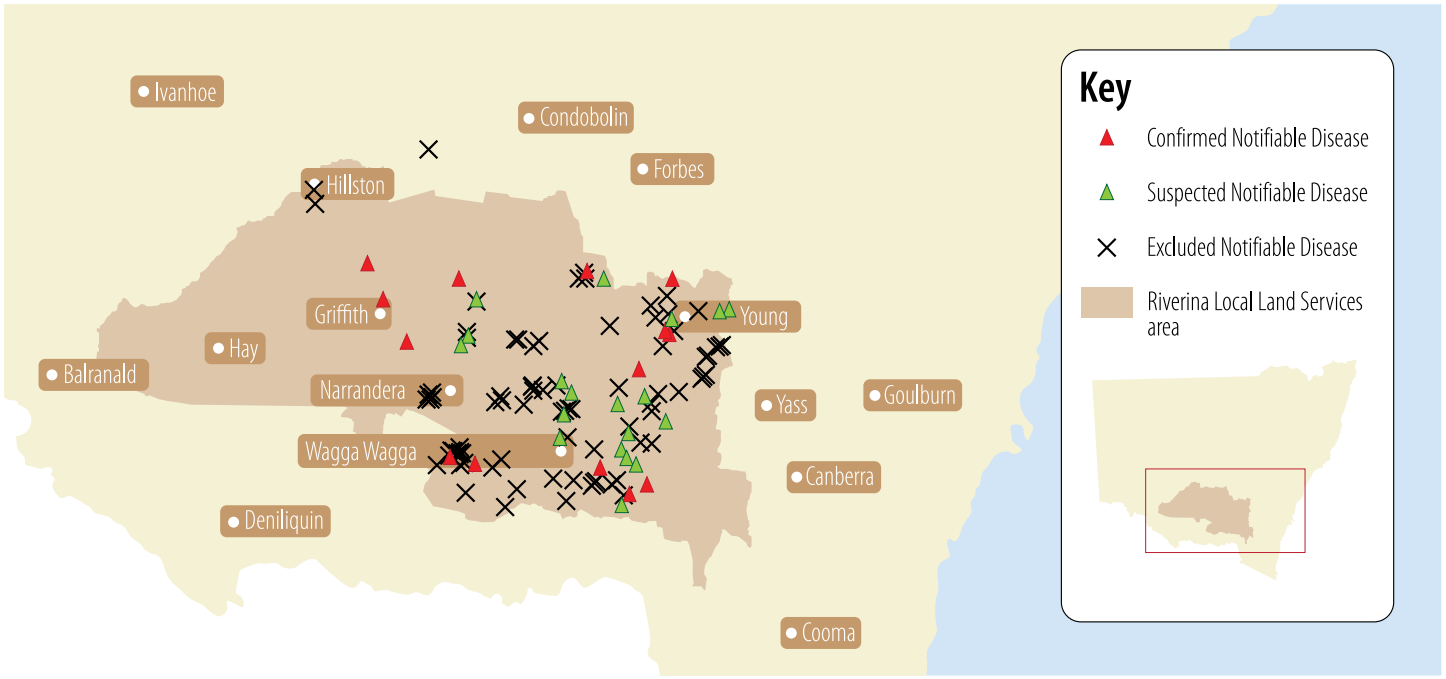
Information from Riverina Local Land Services demonstrates how this works in practice. During the last quarter, there were 41 recorded disease exclusions in the region. The approximate locations of these disease events are shown on the map below. In a few cases, a notifiable disease was diagnosed; in some cases a notifiable disease was suspected and excluded but the cause of the disease was not confirmed by the laboratory at the time of reporting; in other cases, the notifiable disease was excluded and an alternative diagnosis was reached.

The notifiable diseases exclusions were virulent footrot in sheep (n = 26), bovine brucellosis (n = 1), equine herpesvirus 1 (n = 1), anthrax (n = 2), transmissible spongiform encephalopathy (n = 3), foot-and-mouth disease (n = 1), vesicular stomatitis (n = 1), infectious laryngotracheitis (n = 1), highly pathogenic avian influenza (n = 1), Newcastle disease (n = 1), fowl plague (n = 1), bluetongue virus (n = 1) and ovine Johne's disease (n = 1).

The data are generated by district vets, who enter the details of each investigation into the Livestock Health Management System and then use reporting tools to generate intelligence on the disease status of the district and to determine whether targets for investigation activity are being met. The data can also be mapped by using NSW DPI's BioMAP application. This also allows managers to see the gaps (if any) in the geographic coverage of clinical surveillance for potential notifiable diseases.

For further information contact Rahul Shankar, District Veterinarian, Riverina Local Land Services, Young, on (02) 6381 4700.

Surveillance for notifiable diseases in the Riverina Local Land Services Region, April–June 2017



Leptospira pomona: the likely cause of reduced fertility in Angus heifers

On the Central Tablelands of NSW, leptospirosis was provisionally diagnosed as the cause of reduced fertility in a mob of Angus heifers in which 47 out of 191 were found to be not pregnant at routine pregnancy testing. Four of eight of the non-pregnant heifers had *Leptospira pomona* titres of 3200 or greater. Two heifers had evidence of previous exposure to pestivirus, whereas the remainder were naïve. None of the eight heifers tested had serological evidence of exposure to *Neospora*.

Another 10 non-pregnant heifers and cows from across the herd were subsequently tested. Four had *L. pomona* levels of 800 to 3200. *Leptospira hardjo* levels were low (200 or lower) in six cows and negative in four. Four of the 10 cows had evidence of previous exposure to pestivirus, but again not recently. One of the 10 was positive for *Campylobacter* on a vaginal mucus agglutination test.

None of these cattle had been vaccinated against leptospirosis. Feral pigs are an increasing problem on this property, which is in the Oberon district.

Although isolation of the causative organism is normally regarded as necessary to diagnose leptospirosis, these high antibody levels, in unvaccinated cattle, are consistent with a recent *L. pomona* infection with subsequent abortions. Cattle in the mob were about 5 months pregnant when pregnancy tested. *Leptospira pomona* is said to be able to cause abortion any time after the fourth month of gestation – most commonly in the sixth and seventh months. It is possible that the non-pregnant cattle had failed to conceive, rather than aborting, and that the high *L. pomona* levels indicated exposure before the risk period for abortion.

These test results are not enough to prove that *L. pomona* was a major factor in this instance of reduced fertility. However, they at least show that *L. pomona* is a risk to the property and that a full vaccination program against leptospirosis is warranted. The finding of a low level of *Campylobacter* is of uncertain significance but, given the low cost and high efficiency of vaccinating bulls against *Campylobacter*, bull vaccination was recommended. It was also recommended that a vaccination program against pestivirus be started, given that six of eight heifers and six of 10 cows were naïve.

Outbreaks of leptospirosis have occurred across NSW in the past, but not recently in the Central Tablelands. Despite routine surveillance as part of infertility and abortion investigations, *L. pomona* has been diagnosed as a cause of abortions only once on the Central Tablelands in the past 13 years. Continued surveillance is important because the reason for the current rarity of *L. pomona* on the Central Tablelands is not well understood; moreover, feral pig numbers are increasing in some areas, vaccination against leptospirosis is not routine, and (last but not least) leptospirosis is an important zoonosis.

For further information contact Bruce Watt, Team Leader Animal Biosecurity and Welfare, Central Tablelands Local Land Services, Bathurst on (02) 6333 2303.

Prenatal deaths in ewes

Abnormally high death rates of pregnant ewes before lambing were widely reported on the Southern Tablelands between April and June 2017. Owners noticed ewes dying suddenly, with the first deaths occurring about 2 weeks before the expected date for lambing to start. Deaths occurred in all breeds – especially first crosses – and mainly in multiparous ewes.

Most of these deaths involved spontaneous vaginal rupture (or 'exploding ewe syndrome'). A tear, usually in the dorsal wall of the vagina, allowed herniation of the intestines. Most ewes were found dead; at post mortem examination there was internal haemorrhage from the root of the mesentery or external haemorrhage from trailing intestines.

Few producers recognised the condition from previous experience, and most queried the cause. Most of the losses were in twin-bearing ewes in fat condition (body condition score 4/5) following good autumn pasture growth. Not all mobs on the property were affected, and the pasture type varied. Some producers had provided mineral supplements. One common factor was the availability of clover in the pasture, suggesting that increased intra-abdominal pressure from gas build-up in the intestines played a part.

Losses in some mobs were up to 5%, with more than 1% commonly reported. One producer noted that 21 of 2100 ewes had died from the condition. He had been inspecting his ewes twice a day and had found all cases in the morning. Two-thirds of the affected ewes were carrying twins, with the remainder each carrying a large single foetus. This owner noted a similar number of vaginal prolapses in his lambing ewes.

For further information contact Bill Johnson, Team Leader Animal Biosecurity and Welfare, South East Local Land Services, Goulburn, on 0428 484 668.

Balanitis makes bulls unable to join

About 2 weeks after the start of joining, two of five newly introduced Angus bulls being joined to a mob of first-calf heifers were observed unable to mate. These newly introduced bulls were removed from the mob and two different, newly introduced bulls were joined with the same mob. These bulls also had to be removed after about 2 weeks, having been observed unable to mate. They were replaced with two older bulls that had been resident on the property for a number of years, and a private vet was contacted. Lesions and pus were observed on the penile mucosa of the non-working bulls. A request for help was made to the Braidwood district vet.

The district vet examined all newly introduced bulls and the two older bulls and took samples for laboratory testing. All bulls had balanitis, with varying degrees of inflammation, vesicles and ulcerative lesions on the penile mucosa.

All five newly introduced bulls tested negative for antibody to pestivirus using the antibody AGID test. Swabs from the penile mucosa from four out of five of the newly introduced bulls tested positive for ureaplasma-like DNA associated with *Ureaplasma diversum*. Blood samples from all of the newly introduced bulls and one of the older bulls were positive on bovine herpesvirus-1 (BHV-1) antibody ELISA (enzyme-linked immunosorbent assay).

However, pooled penile swabs from the newly introduced bulls and an individual swab from one of the older bulls were negative for BHV-1 and bovine herpesvirus-5 on real-time polymerase chain reaction.

A second set of blood samples were taken 3 weeks later and re-tested for antibody to BHV-1. No increase in antibody levels was detected, indicating that infection was neither recent nor very active.

Although *U. diversum* and BHV-1 were associated with this outbreak, they can be present in clinically normal bulls. In this case, the factors that led to clinically significant disease expression are not clear. It couldn't be determined whether the pathogens were endemic in the herd or whether they had been introduced via the newly purchased bulls.

Poor reproductive performance due to balanitis may be undiagnosed, as its detection depends on observing bulls joining cows for the duration of the joining period.

For further information contact Kate Sawford, District Veterinarian, South East Local Land Services, Braidwood, on (02) 4842 2594.

Unruptured vesicles at the base of the penis of an older bull that was unable to join. Photo K Sawford

Ammonia toxicity causing sudden death in cattle

A landholder east of Coonamble called the government district vet to report that six cows had died overnight and one was sick.

They were part of a mob of 160 cows running in two 250-hectare paddocks watered by a common bore drain. About 60% of them had recently calved. Pasture quality was poor and in very limited supply. The cows were being fed 6 kilograms of oaten hay and 6 kilograms of faba beans daily. They also had access to a dry-season lick and 10% urea lick blocks.

The six dead cows were in the advanced stages of decomposition and unsuitable for post-mortem examination, but there was no evidence of blood having oozed from the orifices, as would have occurred with anthrax. The sick cow, who was 6 years old and had a 2-week-old calf at foot, was examined in the paddock. She was blind, with no menace response, and she was non-responsive to sound and movement: she didn't react to the vehicle approaching and was head-pressing into a fence. Her heart rate was 53 beats per minute and her temperature was 38 °C. She had a large bladder, and this prevented other structures from being felt rectally. She was dehydrated, with sunken eyes and skin tenting, and she had extreme muscle fasciculation (twitching).

The differential diagnoses at this stage were ketosis, hypocalcaemia, hypomagnesaemia, ammonia toxicity and lead toxicity.

Urinalysis revealed that the urine had an elevated pH of 9 and moderate protein levels and was negative for ketones. A stomach tube was placed; the pH of the rumen contents was also 9. The cow defaecated while she was being examined. The faeces contained a large amount of undigested faba beans and some traces of fresh blood.

A provisional diagnosis of ammonia toxicity was made and vinegar administered orally. The cow recovered overnight.

Further questioning of the owner revealed that the cattle had been fed by a different member of staff over the weekend and a larger quantity of faba beans than usual had been fed out. The supplementary diet was adjusted and no further losses occurred.

Faba beans are relatively high in protein (about 22%). When a large quantity of high-protein feed is eaten by ruminants, the protein is quickly broken down into ammonia in the rumen. When the quantity exceeds that required by the rumen microbes, the excess is absorbed across the rumen wall into the bloodstream. It is converted by the liver to urea before being excreted by the kidneys in the urine. The liver has only a limited capacity for this type of conversion, and the levels of ammonia in the bloodstream may become toxic, causing neurological and other clinical signs.

For further information contact Jillian Kelly, Team Leader Animal Biosecurity and Welfare, Central West Local Land Services on (02) 6822 1588.

Performance measures for surveillance

One of the great dilemmas faced by governments all around the world is answering the question, 'When are we doing enough disease and pest surveillance?'

It's obvious when enough is *not* being done, because there will be widespread incursion of an exotic agent before it's detected, or a market will be lost because the certification was invalid. But waiting till the crisis is evident is not appropriate. Conversely, governments can't have a blank cheque to respond to pressure for more resources, more data or more laboratory testing just to be sure that a crisis is being averted.

NSW DPI and Local Land Services have been trialling proxy key performance measures over recent years. If taken together, and if achieved, these measures will reduce to a very low level the probability of failing to detect a notifiable disease early, while accepting that 'no risk' is not achievable.

One of the measures assesses 'diagnostic activity' by government vets. This is the broadest of the measures and is not particularly useful for fine comparisons, but it's useful for indicating performance trends. The underlying rationale of this measure is the fact that *all* suspected notifiable disease incidents must, by law, be reported to government vets, who are located in the most at-risk areas of NSW. If we can assess what the 'normal level' of diagnostic contacts is, then we can use that to measure whether or not our diagnostic surveillance intensity is likely to be as effective as usual in detecting a notifiable disease when it occurs.

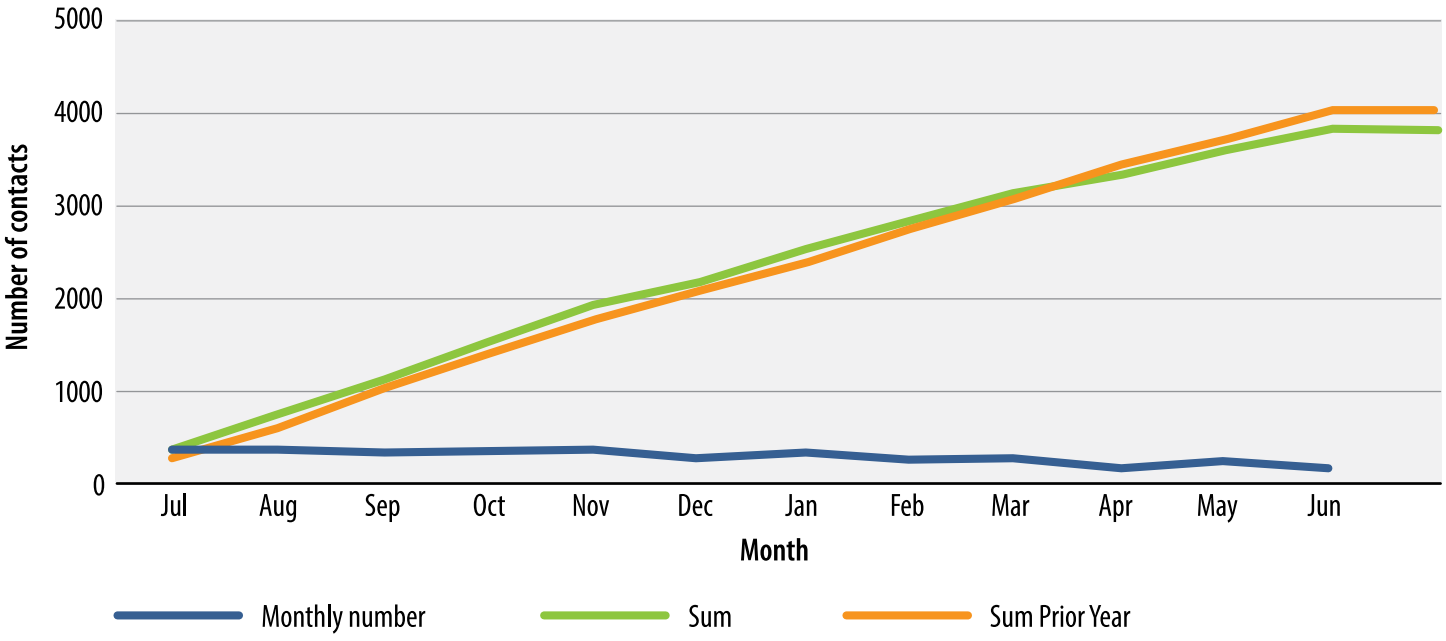
From historical records, we know that between 4000 and 5000 contacts about notifiable disease diagnoses are made with district vets across the state over a 12-month period. These include investigations on the property, or examinations of animals brought into the vet's post-mortem exam room. They also include phone contacts in which it's decided that the problem is not a suspected notifiable disease and is referred to a private vet. So the yearly performance measure has been arbitrarily set at 4500. If it's higher than that, there is some comfort. If it falls significantly below that figure, then it's possible that producers are not contacting their government vets when they perhaps should be. This actually occurred in the midst of the old ovine Johne's disease program, when the quarantine policy discouraged owners from reporting the disease.

The chart below illustrates performance against the measure over the last 2 years. Performance was below the target but was considered to be within the normal range. We know from other measures that there is potential to increase the number of diagnostic contacts in one particular region, and we expect that next year's performance will be closer to the key performance indicator. The important point of setting the target is not that it's an absolute figure that must be met; instead, it requires managers to reflect on whether all surveillance risks are being managed and whether new treatments should be applied.

Future editions of *Animal Health Surveillance* will examine other performance indicators used to drive surveillance performance in NSW.

For further information contact Rory Arthur, Manager Animal Disease Surveillance, NSW DPI, Orange, on (02) 6391 3608.

Diagnostic activity (numbers of notifiable-disease-related contacts with district vets) under the surveillance program for the year 1 July 2016 to 30 June 2017



Innovations in animal disease surveillance: point-of-care test developments

Point-of-care (POC) diagnostics are increasingly being integrated into the management of human diseases but have yet to find an important role in veterinary diseases. This is largely due to two issues. First, POC tests for veterinary pathogens have relied on technologies that are invariably insensitive and consequently can be used effectively only for 'rule-in' testing. In other words, a positive result will confirm the diagnosis – most likely in animals that are very sick (i.e. they have clinical disease) – but it can't rule out infection in animals in which the disease hasn't progressed far enough (i.e. the disease is sub-clinical) to produce a positive test result. Second, the cost benefit of veterinary POC tests has been limited, and this, in turn, has limited the interest of commercial partners in their production and distribution.

New technologies for rapid, field-based testing have slowly been developed and are now emerging as real opportunities for POC. New compact molecular devices with specifications equal to, or greater than, those of their larger predecessors are now available. This allows us to build on the strengths and advantages (sensitivity, specificity and speed) of laboratory diagnostics based on quantitative polymerase chain reaction (qPCR) but to apply them to POC instead.

The Australian company Bio Molecular Systems has developed a new and very affordable qPCR thermocycler called the Magnetic Induction Cycler, or MIC, that is ideally suited to POC or NPOC (near-POC) applications.

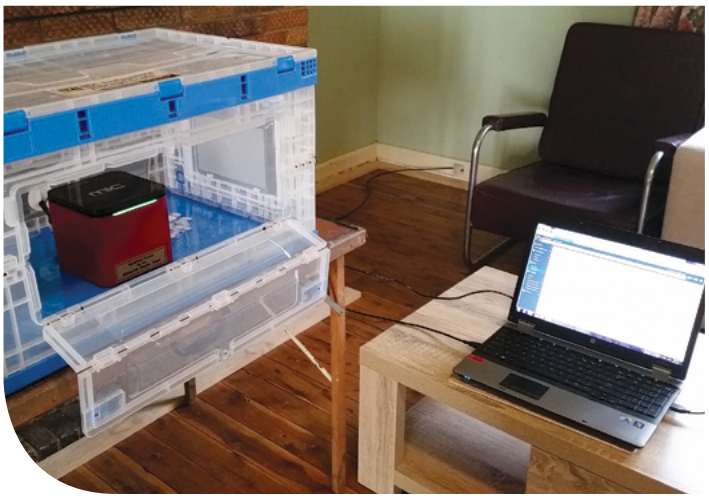
Recently, NSW DPI researchers Narelle Sales, Bethany Bowring and Ian Marsh joined forces with Local Land Services and private vets Scott Ison and Des McRae on a cattle property in Southern NSW. qPCR testing was applied for the first time in a POC format to evaluate preputial samples from bulls for *Campylobacter* infection.

Bovine campylobacteriosis (*Campylobacter fetus* subspecies *venerealis*) is a venereal disease characterised by infertility, early embryonic death, and occasionally abortion. It can be isolated from the genital tracts of cattle (e.g. from the preputial smegma or vaginal mucus) or from the internal organs of aborted foetuses. Currently, bacterial culture is used to confirm the diagnosis in bulls, but culture can lack sensitivity and specificity. This is consistent with the scientific literature on bovine campylobacteriosis, which clearly shows that the disease remains difficult to diagnose and is an ongoing problem in cattle production.

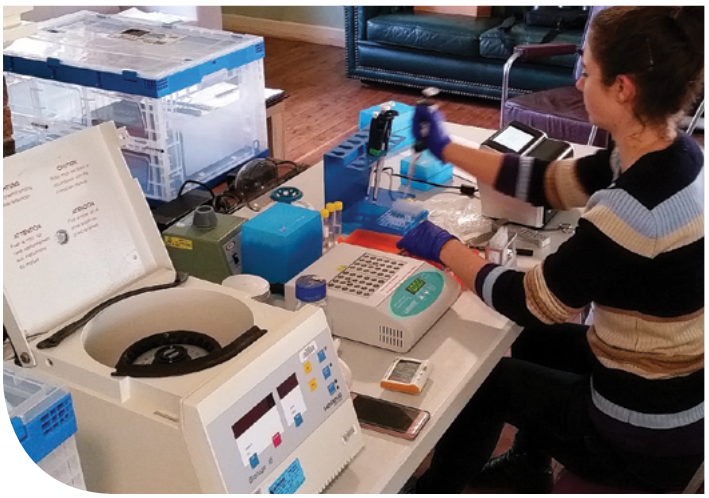
Collecting samples for campylobacteriosis diagnosis. Photo I Marsh

As part of the abovementioned on-farm investigation, the qPCR results were integrated with the bacterial culture results to develop a better understanding of what was happening in the herd and assess the value of the technology. The initial results were exciting, but more work needs to be done to validate them and understand their significance. Researchers hope to pursue this collaboration with Local Land Services in the future.

For further information contact Dr Ian Marsh, Research Officer, NSW DPI, Menangle, on (02) 4640 6502.



The qPCR machine used for assessing *Campylobacter* infection in bulls. Photo I Marsh



Preparing samples for on-farm ('point-of-care') qPCR testing. Photo I Marsh

Getting information on animal diseases

This surveillance report can convey only a very limited amount of information about the occurrence and distribution of livestock diseases in New South Wales.

For statewide information, contact the Department of Primary Industries Animal and Plant Biosecurity Branch in Orange on (02) 6391 3237 or fax (02) 6361 9976.

If you would like more specific information about diseases occurring in your part of the state, contact your Local Land Services District Veterinarian or the Department of Primary Industries Senior Veterinary Officer for your region, or go to: *www.lls.nsw.gov.au*

For more information on national disease status, check the National Animal Health Information System (NAHIS) via the internet at: *www.animalhealthaustralia.com.au/status/nahis.cfm*

This is a report under the Animal Disease Surveillance Operational Plan, Project 8, 'Reporting for Animal Disease Status in NSW'.

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www.dpi.nsw.gov.au/newsletters/animal-health-surveillance

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