

Top Paddock

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES



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Message from the editor

The dry season is here and it is wonderful to have some cold weather. There have been plenty of nights below 20°C in the Darwin rural area and mango flowering is underway.

There is a full line up of calendar events this quarter ranging from Integrated Pest Management (IPM) veggie field days, business opportunities such as the regional pitchfest and national conferences for bananas and forestry. So don't forget to check out our calendar of events.

Cheers

Editor



Figure 1: Mango flowers in full bloom.



Figure 2: Heather Wallace (first from left) shared the on-going nutrition studies on curcuma under nursery conditions.

Charles Darwin University horticulture students learn beyond classroom walls

Tony Asis, Senior Research Agronomist and Heather Wallace, Technical Officer

Staff from the Plant Industry Development (PID) gladly received and provided a positive learning experience to horticulture students from Charles Darwin University (CDU). The students were accompanied by their mentors Tania Paul and Emily Hinds during their visit at Berrimah Farm on 30 March 2017. The main objective of their visit was to gain knowledge about plant nutrition, ornamental flowers and nursery nutrition.

The students were briefed about the importance of biosecurity and farm hygiene practices. They got hands on experience when they walked through the foot bath before entering the greenhouse. There they also learned about the use of the aeroponics technique in understanding the physiological process and monitoring nutritional dynamics in mango under greenhouse conditions.

At the horticulture block, the students viewed the latest curcuma pot trial and were given information on the performance of control release fertilisers (CRF) under the Top End climate. The method for collecting leachate samples from the pot was demonstrated. They also received a hand out showing the relationship between the pH and electrical conductivity of the leachate and the application of CRF.

Moreover, some general topics were discussed which included the use of tissue culture method to achieve disease free plants, nursery management such as pest control and irrigation system and the importance of, and equipment needed, in sterilising potting medium.

On behalf of the students, Tania Paul expressed her thanks and appreciation for showing them around the plant nutrition trials and other research work at Berrimah Farm. "The students got a lot out of it", Tania Paul added. We look forward to meeting with the students again as they plan to visit Coastal Plains Research Farm during the semester.

NT Farmers IPM seminar and field day.



NT FARMERS



Integrated Pest Management Seminar



Date: Tuesday the 27th of June 2017

Time: 2:00pm (Food and Drinks Provided)

Location: NT Farmers Office, Coolalinga Shopping Centre NT

RSVP: admin@ntfarmers.org.au

Featuring Guest Speakers: Paul Horne and Angelica Cameron

Paul Horne - Paul has over 30 years' experience working on research, development and implementation of IPM and is recognised both in Australia and internationally as a leader in this field. He is also recognised as an expert in facilitating practice change from insecticide-based pest management to successful IPM. Paul has co-authored two books and many scientific papers on IPM and control pests in agriculture. Paul is an Honorary Research Fellow at La Trobe University, where he lectures in entomology and IPM, and where he regularly supervises undergraduate and post-graduate students.

Angelica Cameron - Angelica Cameron joined IPM Technologies in 2013 with qualifications in Agricultural Science and International Development. She has since become an IPM specialist with experience in a wide range of horticultural and broad-acre crops. She has run field demonstrations of IPM and delivers practical IPM training and support to farmers and agronomists across south-eastern Australia. She lectures in entomology and plant protection at The University of Melbourne and delivers education programs for recreational gardeners and children about entomology, 'good bugs', and IPM.

IPM Technologies - IPM Technologies is an Australian company that was established in 1996 to help farmers get better value out of fewer insecticides and improve control of insect pests by using Integrated Pest Management (IPM). We specialise in facilitating adoption of IPM using a participatory approach. We offer a range of services including training courses and workshops, crop monitoring, insect identification, IPM and entomology research and extension, bioassay work, and practical IPM advice and support for farmers and advisors.



This project has been funded by Horticulture Innovation Australia Limited using the Vegetable levy and funds from the Australian Government.





NT FARMERS



Integrated Pest Management Field Day



Date: Thursday the 29th of June 2017

Start Time: 10:00am (Food and Drinks Provided)

Location: Coastal Plains Research Farm, Anzac Parade
Middle Point NT

- Field Walk
- Identification of Pest and Beneficial Insects
- Fertigation Equipment Demonstration
- IPM Strategies with IPM Technologies
- Lunch

RSVP: admin@ntfarmers.org.au



This project has been funded by Horticulture Innovation Australia Limited using the Vegetable levy and funds from the Australian Government.



Katherine Regional Roadshow 2017

Giving locals a voice in northern development

Presented by NT Farmers and Office Northern Australia

Wednesday 12 July 2017 - 1.00pm to 5.00pm
Katherine Research Station (KRS)

Followed by drinks and a BBQ

Topics include:

- farming future in Katherine
- successful farmers in Katherine
- government's role in research and development and water planning
- fracking and its possible impacts
- forming a Katherine farmers group.

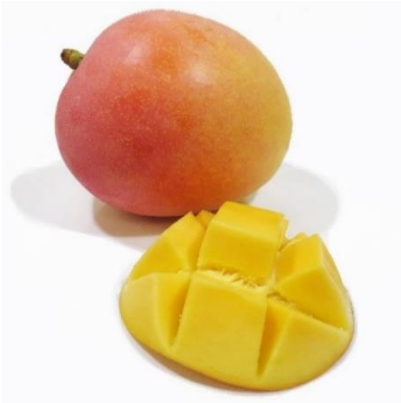
Key speakers include:

- Maree Piccone, Manbulloo and Chris Howie, Douglas Daly - successful Katherine farmers
- Simon Smith, President NT Farmers Assoc.
- Tim Hill, Aus Industry and Office Northern Australia
- Matt Barnes, Deputy General Manager Forestry Operations, QUINTIS update
- Mark Sullivan Flying Fox Station and Callen Thomson DPIR, surface water and furrow irrigation of crops
- Ian Biggs, research by DPIR
- Her Worship The Mayor, Fay Miller; Warren de Witt, Amateur Fishing and Kylie Gracey, NT Cattleman's Association, community relations
- Prof Michal Douglas, NT Water Resources and North Environment Research Hub, water allocations
- Dr Damien Barrett, CSIRO - fracking and possible impacts

RSVP NT Farmers info@ntfarmers.org.au, or by phone on 8983 3233 or 0437 092 551

For more information visit: <http://ntfarmers.org.au/food-futures>

2017 Australian Mango Industry conference a blast



The Australian Mango Industry Association held the 11th Australian Mango Conference in Bowen, in May this year. It was the first time the conference has been held in Bowen and was held in the wake of Tropical Cyclone Debbie, which caused significant damage to businesses, homes and mango orchards in the region. More than 200 mango growers and several Northern Territory Department Primary Industry Resources (DPIR) staff attended, giving presentations during the sessions and in the field demonstrations.

Figure 3: (left) fresh Australian mangoes

"The highlight for me was the interaction with growers. As a new-comer to mango research, it was my first mango industry conference and it was terrific to engage with the industry. Several NT mango growers attended the conference and were interested in the research findings. Our mango research teams work closely with the industry and I was pleased to hear positive feedback about how well our industry thinks we (DPIR) are performing. It was great to see the results of our research is being adopted. The conference left me enthused with new ideas and I look forward to following the impact of our research on NT farms." Mila Bristow.

Some of the speaker's topics included:

- mangoes as a conditional non-host of fruit fly- Brian Thistleton, presenting work by Austin McLennan and Mary Finlay-Doney (DPIR).
- measuring Yield and Maturity- Kerry Walsh (Central Queensland University), Andrew Robson (University of New England, UNE) and Mila Bristow (DPIR)
- understanding nitrogen in mangoes – Mila Bristow and Tony Asis (NTDPIR), David Rowlings (QUT) and Andrew Robson (UNE)
- the use of molecular markers in designing trees- Stacey Cook funded by the Small Tree – High Productivity Initiative (STHPI)
- managing Magpie Geese- Amelie Corriveau (Charles Darwin University)
- managing mango flowering and implications for growers- Cameron McConchie (DPIR) and Bob Williams (Australian Centre for International Agricultural Research (ACIAR) and Horticulture Innovation Australia (HIA) project).

Panel session topics included:

- opportunities and Challenges for Mangoes
- growing for Flavour and Profit
- implementation of the Harmonised Australian Retailer Produce Scheme (HARPS) and quality assurance systems (see our article on HARPS)
- market access, protocols and disinfestation research (with Peter Leach, Andrew Loch Department of Agriculture and Water Resources (DAWR) and Brian Thistleton (NDPIR), chaired by Bob Williams).

Overall it was an exciting conference, with a lot happening in innovative new systems, varieties and technology. There were several linkages made with industry and government counterparts regarding potential new projects and the vibe was really positive, especially since the conference was nearly cancelled after Cyclone Debbie.

HARPS, harmonising fresh food safety certification

Excerpts from Richard Bennett, Head of Food Safety & Technology, PMA A-NZ & Fresh Produce Safety Centre A-NZ

HIA have been working with the major grocery retailers and certification bodies in Australia to create a new food safety standard - (HARPS). In the past producers who supplied multiple different retail chains had to provide certification through multiple schemes, proving both costly and time consuming. HARPS links in with participating standards and systems allowing growers and packers to complete a single audit (in two parts) against a single standard. It reduces duplication between food standards including Freshcare, GlobalG.A.P. BRC and SQF. The project has been supported by ALDI, Coles Supermarkets, Costco, Metcash (IGA), Woolworths, as well as the Australian Competition and Consumer Commission (ACCC) and the Australian Food and Grocery Council (AFGC).

The new arrangement is fairly simple. Direct suppliers are required to be certified to the standard in one of four globally recognised schemes (BRC, Freshcare, GLOBALG.A.P. or SQF). The standard chosen is referred to as the base standard. The HARPS standard is audited at the same time as the base standard. All participating retailers are now accepting direct suppliers certified against the appropriate base standard plus the HARPS standard.

Direct suppliers to the chain retailers are growers, grower-packers and wholesalers/brokers who pack into retailer-branded packaging and/or invoice the retailer. This includes sub-contract packers and co-packers. Retailer-branded packaging includes crates, cartons, bins and other packaging that bears the retailer's name on tags, labels or film or the package itself.

HARPS applies to whole fruit, whole vegetables and nuts-in-shell. HARPS does not apply to processed or value-added lines. Direct suppliers are required to be certified to their base standard plus the HARPS standard by 1st January 2018, so all direct supplier audits being conducted in 2017 must include the HARPS standard.

Indirect suppliers are those who supply product to direct suppliers on its way to the five chain retailers. This includes growers supplying packers, and packers who are not packing into retailer-branded packaging. From 1st January 2019, indirect suppliers will be required to be certified to one of the four base standards (BRC, Freshcare, GLOBALG.A.P. or SQF). Codex HACCP will no longer be accepted. Indirect suppliers are not required to be certified to the HARPS standard but can do so if they wish.

HARPS is managed by PMA Australia-New Zealand, with the Project Team, led by Kitchener Partners, actively engaged with a range of stakeholders. For further information on HARPS, including the standard, the scheme rules, a comprehensive Q&A, a pre-audit checklist, a comments page and a free call number, go to www.harpsonline.com.au.



Figure 4 Individual mango flowers

Working out when to harvest your mangoes?

Chelsea Moore

Flowering season is here for the mango industry and with it the promise of the harvest ahead. So it is a good time to start thinking about maturity indicators and which tools to use.

Heat sums

Heat sums are a way of predicting your maturity based on flowering information and seasonal temperature. The formula adds the daily average temperatures until a pivotal heat unit is reached. You can calculate your own heat sums or use an online calculator. For the departments online heat sum calculator and information on how to use the calculator [click here](#).

Dry matter

Dry matter is essentially a calculation of the water content of fruit, it is an easy method for determining maturity. The Industry standard for dry matters at harvest is 15%. Learn how to prepare and measure your own mango samples for maturity using the dry matter test by reading our instruction sheet or view our video on [how to measure mango dry matter](#).

Near infra read (NIR) spectroscopy

Near infra-red (NIR) spectroscopy guns are a non-invasive way to read the colour of your fruit flesh, and determine sweetness and maturity. There is an interesting Mango Matters article on factors that influence dry matter and [NIR](#).

Flesh colour test

Some growers cut a set number of fruit to judge the internal quality before harvesting. You can request a set of flesh colour cards to compare against your crop by calling (08) 8999 2323 or emailing horticulture@nt.gov.au.

NT passionfruit hybrids are going commercial

NT passionfruit hybrids could be coming to a grocery store near you as the hybrids enter the commercialisation stage.

The passionfruit industry in the NT is small and primarily focuses on supplying local markets. In response to the price premium and market demand for the *edulis* type of passionfruit, a breeding program was developed by the Northern Territory Government. Beginning in 2007, its objective was to produce a hybrid *edulis* x *flavicarpa* that incorporates tropical vigour and heat tolerance of the Panama variety with the market preferences for a sweet, black fruit. The new varieties have been the culmination of trials aiming to stimulate further growth of the Territory's passionfruit industry and meet consumers' desire for availability throughout the year.

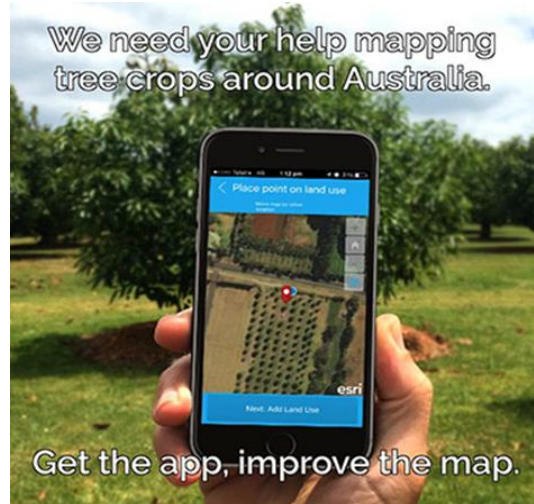
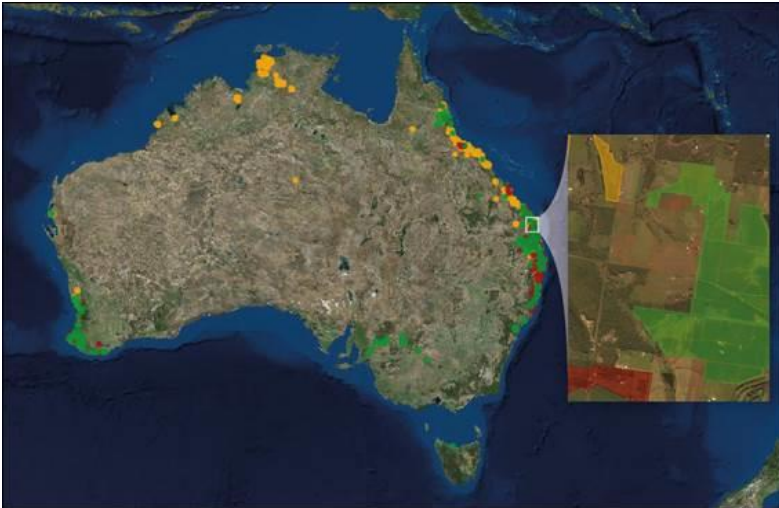
After conducting research on passionfruit for several years, the Department of Primary Industry and Resources will be taking eight of the top performing hybrids to the commercialisation stage. These new lines are currently being trialled on-farm through commercial partners in the Darwin and Katherine regions.

The department expects that commercialisation of these new lines will underpin significant growth for the NT passionfruit industry in coming years. The NT has advantage over eastern production areas by being free of many passionfruit viruses that cause loss of productivity, poor fruit development and premature vine death. The market price of fresh passionfruit peaks in October and November due to limited supply from traditional Australian production areas. By targeting this high price window and developing better quality fruit with longer vine life, NT passionfruit production has scope for expansion.

The process for selecting a proponent for commercialisation is likely to commence before August 2017. Full details will be available on our website. For more information on the commercialisation process please contact Linda Lee on 08 8999 6058 or email at linda.lee@nt.gov.au



Figure 5: DPIR passionfruit hybrid



Land use mapping? There's an app for that.

Marije ten Napel

Figure 6 (above) the industry engagement web map and app

The Department of Primary Industry and Resources (DPIR) recently hosted a seminar at Berrimah Farm, to hear a presentation from Craig Shephard (Queensland Department of Science, IT and Innovation {DSITI}), about his work on [mapping horticulture tree crops](#) in Australia.

The Queensland Government is developing a national program to map the location and extent of avocado, mango and macadamia orchards in Australia. The interactive mango, macadamia and avocado map, which can be found at <http://arcg.is/2cEJt50>, is the first spatial representation of orchards in Australia.

Collaboration is the key in this project as the map could not have been created, or validated, without participation from industry and other stakeholders. The project has partnered with universities and industry groups such as the Australian Macadamia Society, the Australian Mango Industry Association, Avocados Australia and Horticulture Innovation Australia, and is funded through the Federal governments 'Rural R&D for profit' scheme. The NT Plant Industries Development researchers provided the draft data for mango orchards in the NT.

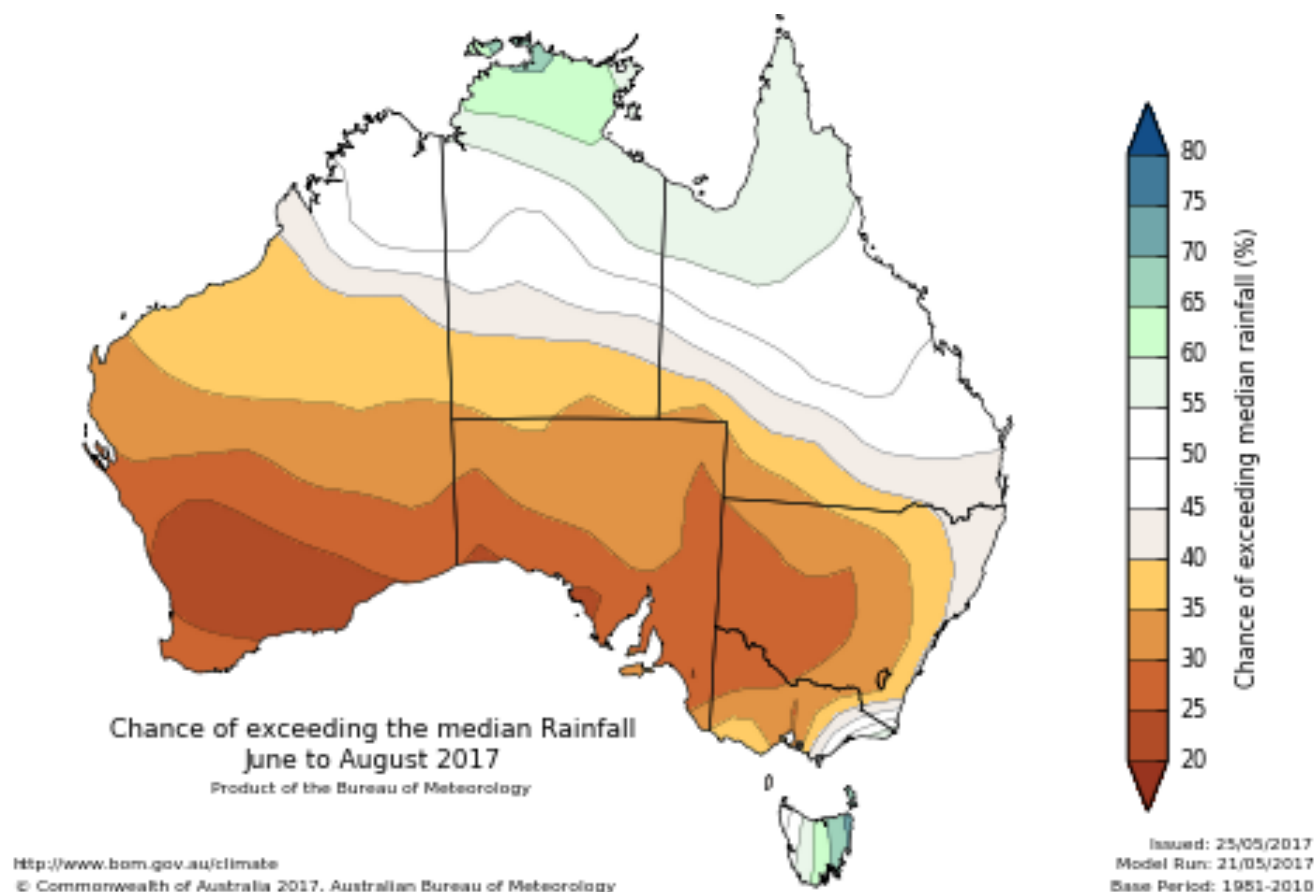
As part of the project an Industry Engagement Web Map has been created allowing viewers to review the maps 'footprints' identifying parcels of land with avocado, macadamia and mango orchards across all states and territories in Australia. You can help make sure the map is accurate, the team have created an app to help enable reviews. You can provide comments and feedback in the 'live' map—from your computer or from the easy to use *Land Use by QLUMP* App. Search your app store for 'land use' and start capturing observations to improve land use mapping!

Of particular interest are missing orchards, orchards shown incorrectly or where the wrong commodity/crop is shown. Your input to the mapping is extremely valuable. Any questions or issues please contact:

Joel McKechnie, joel.mckechnie@dsiti.qld.gov.au (07) 3170 5668; or

Craig Shephard, craig.shephard@dsiti.qld.gov.au (07) 3170 5664.

NT seasonal outlook




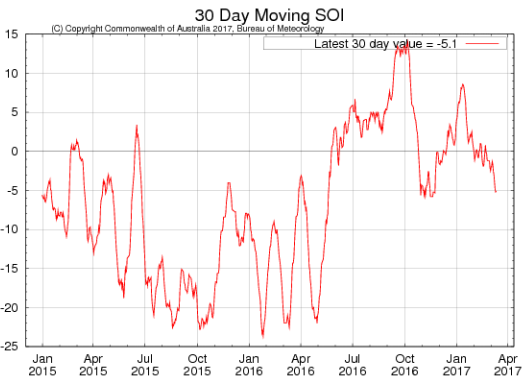
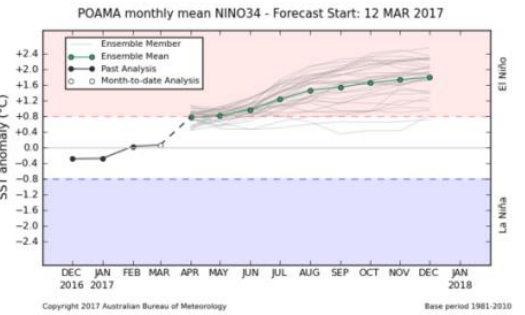
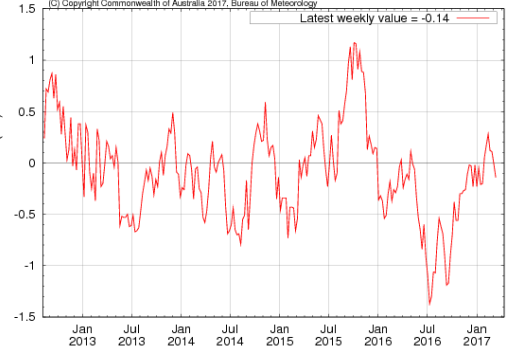
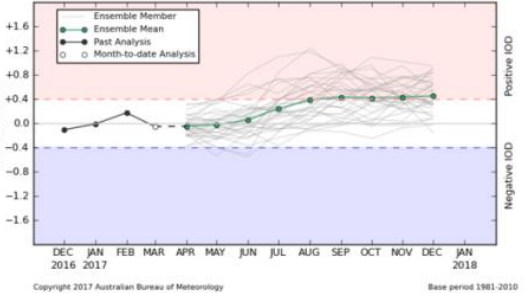
Source: The Australian Bureau of Meteorology.

The national outlook for June to August 2017 period indicates that:

- **Drier** than average conditions are expected across the southern two-thirds of the NT, south of Elliott.
- **Wetter** than average conditions expected across the Top End, Katherine and Roper districts
- **Warmer** than average days and nights are more likely across the Southern NT.
- **Cooler** than average days and nights are more likely across the Northern NT.

Without a strong influence from the Indian or Pacific oceans, secondary climate drivers contribute more to the outlooks. Higher than average pressure is forecast over the Great Australian Bight and southern and western Australia, meaning fewer rain-bearing systems are likely to cross the coast.

Bureau climatologists continually monitor the climate for any significant developments, with information on El Niño/La Niña and IOD events available fortnightly via the [ENSO Wrap-Up](#). For more information on seasonal outlooks visit the [BOM website](#).

<p>Seasonal Indicators</p>  <p>El Niño Southern Oscillation (ENSO)</p> <p>www.bom.gov.au/climate/enso/</p> <p>Current outlook:</p> <p>El Niño WATCH</p>	<p>Comments (sourced from the Australian Bureau of Meteorology)</p> <p>ENSO at neutral.</p> <p>Although ENSO is currently neutral, some indicators show an increased chance of El Niño developing during 2017.</p> <p>While recent changes in tropical Pacific Ocean sea surface temperatures and the Southern Oscillation Index (SOI) are typical of those expected prior to an El Niño, both these and other indicators remain firmly within neutral boundaries. All climate model outlooks show further warming of the Pacific is likely, with six reaching El Niño thresholds during the southern hemisphere winter of 2017.</p> <p>El Niño WATCH means that there is approximately a 50% chance of El Niño developing in 2017, which is about twice the normal likelihood.</p>	<p>30 Day Moving SOI</p>  <p>POAMA monthly mean NINO34 - Forecast Start: 12 MAR 2017</p> 
<p>Indian Ocean Dipole (IOD)</p> <p>www.bom.gov.au/climate/enso/#tabs=Indian-Ocean</p> <p>Current outlook:</p> <p>Neutral</p>	<p>IOD also neutral.</p> <p>The IOD also remains neutral (neither positive nor negative), as is typical at this time of year.</p> <p>When the IOD is neutral it has limited impact on Australian climate.</p> <p>However, the continued presence of much warmer than average water to the north and northwest of Australia may see continued influence on Australia, including enhanced rainfall.</p>	<p>IOD Index Time Series</p>  <p>POAMA monthly mean IOD - Forecast Start: 12 MAR 2017</p> 

Building the Resilience and On-Farm Biosecurity Workshop Series:

The process of diagnosing plant health problems

DETAILS

DATE	Friday, August 4, 2017	TIME	10am till 3:30pm
VENUE	The Plantsmith Nursery		



Figure 7 leaf spots

In collaboration with The Plantsmith Nursery, NT DPIR & Department of Agriculture and Fisheries (Queensland) will deliver a workshop aimed at providing information on how to improve decision making processes following the detection of a new plant health problem.

A number of aspects will be covered in this on-farm workshop including:

A detailed process on how to diagnose unknown plant health problems. A range of problems will be discussed including those caused by insects, mites, diseases and abiotic stress. Management options and resources for many causes, including pesticides, will be discussed.

Following on from above, attendees will be provided details of mock plant health problems in small groups. Each group will determine the cause of their problem to reduce or eliminate its impact.

How to capture images of pest and disease problems cheaply. This will include options for in-field and office/lab photo capture.

Farm-walk describing how Plantsmith Nursery manages their farm in relation to pest and disease management.

Pest and disease resources available to production nurseries through the levy funded project.

The workshop will be delivered by DAF entomologists and pathologists as part of the co-funded DAF, HIA and levy funded project "Building the resilience and on-farm biosecurity capacity of the Australian production nursery industry."

Please be pest conscious: if visiting your nursery prior to the workshop, be mindful not to share. Please change your clothes prior to arrival if you have handled plants.

For more information contact: Andrew Manners, Queensland Department of Agriculture and Fisheries.

T 07 3708 8377 E growhelp@daf.qld.gov.au W www.daf.qld.gov.au/plants/health-pests-diseases/plant-pest-diagnostic-services/grow-help



The Department of Primary Industry and Resources (DPIR) provides a free disease investigation service to livestock owners for diagnosis of notifiable emergency, exotic and endemic disease, including zoonotic

diseases. Berrimah Veterinary Laboratories provide free diagnostic testing for exclusion of notifiable disease for all disease investigations, and subsidies are available to private veterinarians for significant disease investigations in livestock. The Northern Australia Enhanced Disease Surveillance program has been introduced from 2017-2019 on a trial basis providing increased subsidies for cattle and buffalo disease events reported to and investigated by private veterinarians. This program recognises the higher costs and challenges associated with conducting disease investigations in more remote regions.

During January to March 2017, 58 livestock disease investigations were conducted to rule out emergency diseases or investigate suspect notifiable diseases across the Northern Territory (NT). Figure 8 shows the number of investigations by species of livestock.

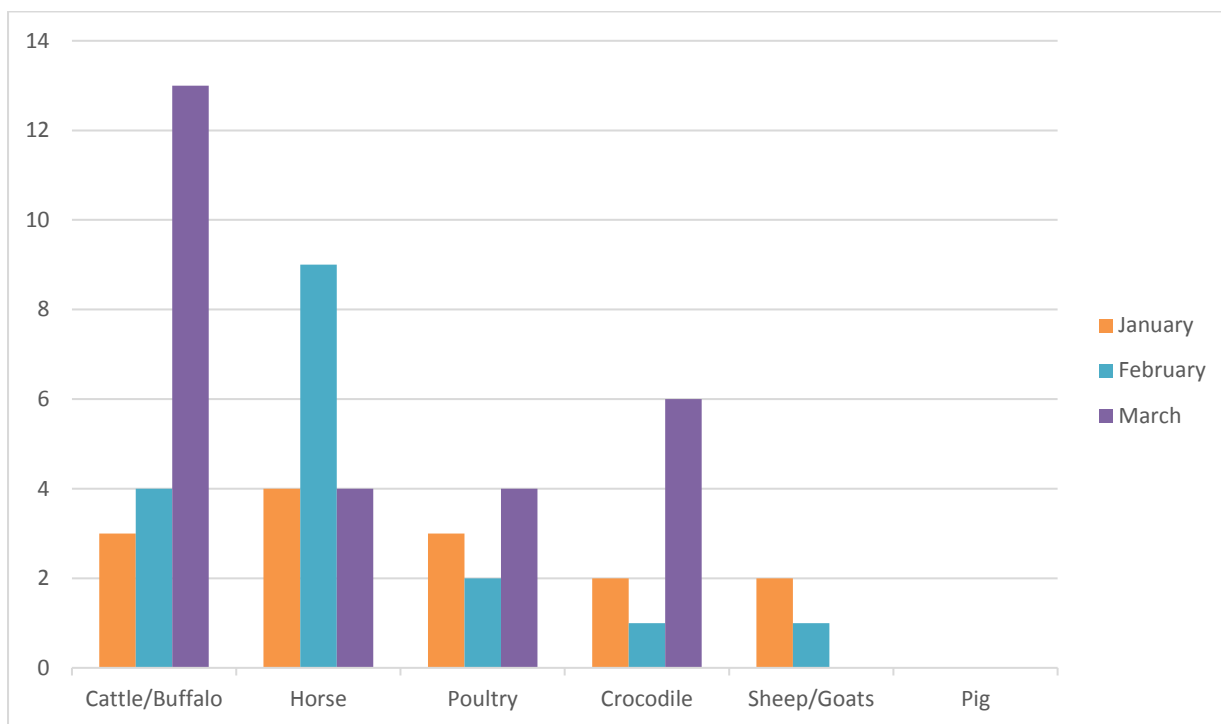


Figure 8. Livestock disease investigations by species for January to March 2017

The following case reports are a selection of field investigations of livestock disease incidents during the quarter.

Foot and mouth disease excluded in cattle herd

A property in the Katherine region reported losses in their 12-18 month old cattle after an estimated 20 head out of 60 were found to be missing and presumed dead after a prolonged wet season. Some of the remaining cattle were displaying signs of dehydration and scours at the time of the investigation.

One of the heifers was found to be in very poor body condition. The heifer was euthanised and an autopsy was performed. The autopsy revealed a full rumen with dry contents. There was no evidence of diarrhoea in this animal. Two small ulcerations were found on the inside of the heifer’s mouth, the sores appeared to be healing. Samples were collected from this animal and 30 cohorts for diagnosis and to exclude foot and mouth disease (FMD).

Laboratory tests run on the tissue from the ulcer and serum excluded FMD. Tests on the faecal samples showed no evidence of internal parasites, including coccidiosis. Blood samples from the heifer showed a moderate increase in neutrophils; a type of white blood cells that helps to kill bacteria. There was also elevated urea levels in the blood, likely due to dehydration. *Salmonella subsp ser rough: e.h:1.2* was isolated by direct faecal culture and *S. montevideo* and *S. reading* was isolated by enrichment culture. Salmonella isolation from direct culture of faeces is often associated with clinical disease. Salmonella isolation from enrichment culture reflects lower numbers of organisms in the faeces and can indicate a carrier or recovered animal.

Severely affected cattle were treated with antibiotics and all cattle recovered with no further illness or death. The presumptive diagnosis is salmonella infection but it is believed to have followed another significant stress event that remains undetermined.

Salmonella is a bacteria that can be found in the digestive tract of humans, mammals, reptiles and poultry. The bacteria can be spread from infected hosts through faecal matter, resulting in illness for previously uninfected animals. There are over 12 different types of salmonella organisms in Australia. The Salmonella bacteria is mainly spread to mammals through food and water that has been contaminated by animals already infected with the bacteria. Wildlife are known carriers of salmonella infections and have been responsible for outbreaks of the disease in cattle. Cattle may not show symptoms until they are exposed to stress factors, lowering their resistance. Such stress factors include lack of food or water, change in diet, extremely hot or wet weather, weaning and transport.

Clinical Signs vary between cases, with some cases resulting in scouring, others in pneumonia or even odd deaths in older cattle. Any of the following may be related to salmonella:

- High temperatures (fever)
- Depression
- Bloody, foul smelling scours that may contain blood and mucous membrane
- Loss of appetite
- Rapid weight loss
- Abortion in pregnant animals
- Significant number of rapid deaths in calves
- Spasms and trembling of muscles
- Salivating and frothing at the mouth

For those animals that do not die, diarrhoea, emaciation and wasting are likely to continue for a while before the animal recovers.

It is important to remember that salmonella poses a threat to humans. Salmonella is spread relatively easily to humans and/or other animals as it can be ingested through direct or indirect contact with faecal material. If you believe your animals have salmonella, please contact your regional DPIR veterinary officer or local veterinarian for tests which can be run to ensure a correct diagnosis is made and appropriate medication administered. There are a number of alternative diseases that can cause the syndrome seen. Salmonella is not a common diagnosis in Northern Territory herds. There should be few consequences for this herd under improved management.



Figure 9 Cattle herd investigated following losses

Reference:

Hungerford, T. G. (Thomas Gordon) 1990, *Diseases of livestock*, 9th ed, McGraw-Hill, Sydney

Bovine herpesvirus 5 causes mortality in weaner cattle

The manager of a property in the Katherine region reported sudden death in 26 weaner cattle from a herd of 2000 over the space of a few weeks. The cattle had been weaned, processed, and transported to the property in multiple consignments during the preceding month. Weaners had access to weaner pellets, hay, and unimproved pasture once they arrived at the property. Conditions had been particularly wet during the previous months.

The mob was in overall average condition, with some very young animals. Dead cattle were generally in poor condition, and had been found under trees and in feed troughs. One heifer was seen to be circling and was found the next day with a head tremor and unable to stand. This heifer and an additional two steers, which were the weakest of the mob, were euthanized for autopsy and 30 animals were blood sampled.

At post mortem the lungs of all three animals were pale, with the bottom sections of the lungs filled with liquid instead of air. The ruminal papillae in the heifer and one steer were smoother than would be expected. Ruminal papillae are the thousands of tiny finger like bumps attached to the inside surface of the rumen which help with absorption. Other organs looked normal.

Tests undertaken at Berrimah Veterinary Laboratory (BVL) found inflammation of the air sacs in the heifer's lungs. The lung tissue collected from the steers showed severe bronchopneumonia (inflammation of the lungs, particularly in the bronchi). A mixed bacterial growth including *Pasteurella sp.*, was cultured from the steers. Inflammation of the brain was also identified in one of the steers and the heifer, with changes in the heifer being more severe. Laboratory tests found a mild to moderate increase in neutrophils (white blood cells) in all

the animals. Muscle damage was also seen in all animals which is commonly associated with downer animals. The *Pasteurella* infection may have indicated a degree of 'shipping fever'.

The heifer had a moderate faecal egg count (600eggs/g) but overall egg counts were low as expected. Laboratory tests excluded infection with Kunjin virus, Murray Valley encephalitis virus, Chlamydia and herpesvirus. Bovine ephemeral fever was ruled out, and tests for bovine virus diarrhoea (pestivirus) and coccidiosis infection were negative. Testing of brain tissue specifically for bovine herpesvirus 1 and 5 was positive for bovine herpesvirus 5 in the heifer and one of the steers.

Bovine herpesvirus 5 is present in Australia and may cause inflammation of the brain and neurological disease in young animals. The virus can establish, lay dormant and may be reactivated when infected cattle are stressed; it is then excreted in nasal, eye and genital secretions. BHV 5 is part of the 'growing up' phase for cattle with problems rarely seen in adult cattle.

Serological testing for leptospirosis demonstrated a very consistent exposure to a range of *Leptospira* but particularly *Leptospira Pomona*. No disease attributed to *L Pomona* was seen in live cattle or post-mortem. The presumed source was the large number of feral pigs on the property of origin.

The cattle were dipped for cattle tick to exit the Parkhurst Resistant Tick Infected Zone. Amitraz levels in the dip were correct. No other issues were seen in other mobs of young cattle that were dipped.



Multiple stressors are likely to have contributed to the observed mortality of these cattle. In this case, early weaning, processing, prolonged periods of time spent in yards and transport of the large number of young cattle in a very wet season. Further stressors include; the concurrent worm burden, the cattle tick plunge dip, transport and the sudden introduction of the weaners to the new post-weaning hard ration. The level of mortality (approx. 1.3% in this mob) is significant but the diagnosed diseases are difficult to prevent in a cost effective manner other than by strategic treatment of sick animals (anthelmintic, antibiotics) if detected early enough to allow a good chance of response.

The cattle were turned out into a clean paddock for several weeks before being run through the yards again, and there were no further losses reported.

Figure 10: BHV-5 affected recumbent weaner heifer

Poultry mortality on remote Northern Territory Island

A report of sudden death in a backyard flock of chickens was investigated in a remote community on an island off the Northern Territory coastline. Eight out of 12 birds on the property had shown signs of weakness, were lying down, unable to get up, and had died over a two day period. There had been no recent management changes, other than herbicide that had been applied to the yard the week previously. The weather had been particularly wet and cyclonic. A hen was euthanized, its carcass frozen and transported to the Berrimah Veterinary Laboratories.

An autopsy of the hen found no evidence of infectious disease. Further examination revealed evidence of a firm mass within the air sac, likely incidental and from a previous passing condition such as mild air sacculitis or serositis, with no active inflammation present. Sacculitis is lower respiratory disease in chickens, where one or more of the air sacs become inflamed. Serositis is the inflammation of the tissues that line the lungs, heart, abdomen and inner abdominal organs. Avian influenza and Newcastle disease viruses were excluded by tests on swabs collected from the cloaca and oral cavities. A presumptive diagnosis of avian botulism was made on the basis of clinical history and lack of gross and histological evidence of other disease.

Cases of botulism in poultry, caused by consumption of maggots containing *Clostridium botulinum*, are seen commonly in poultry during the wet season in the Top End. In this case, maggots were not found in the gastrointestinal tract of the bird on post-mortem, however in subacute cases of poisoning maggots may already be digested. Upon questioning the owner it was discovered that the chickens in this case were regularly fed leftover fish and meat. When decayed, these are common sources of *C. botulinum* toxin and maggots, which concentrate the toxin. The owner was given recommendations to remove decaying food scraps from the birds, and no further losses have been reported.

New industry-agreed NT entry requirements for Johne's disease management in 2017

The Northern Territory (NT) cattle industry has agreed an assurance level of Johne's Beef Assurance Score (J-BAS) 6 including five years freedom from Johne's disease (JD) infection in source herds would best facilitate movement of cattle into the NT while maintaining biosecurity requirements consistent with the live export requirements.

J-BAS Need a quick catch-up on what has been happening

JD is a serious wasting disease that affects cattle, buffalo, bison, sheep, goats, deer and camelids. The Territory was previously a JD Protected Zone with no known disease. On 1 July 2016, zones were no longer recognised and producers were responsible for risk assessments and assurances for JD prevention and management on their individual properties.

The Johne's Beef Assurance Score (J-BAS) was developed as a risk profiling tool for beef producers. There is an equivalent tool for the dairy industry – Dairy Score. All NT properties were given a J-BAS of 7 for trading purposes during the 12-month transition period from 1 July 2016-30 June 2017. A J-BAS 7 was also applied as an interim entry requirement for cattle and buffalo into the NT during the transition period. The J-BAS rating is from 0-8 (lowest to highest level of assurance).

The transition period for changing to the new national JD management system was due to end on 30 June 2017, however there has been a change to this date allowing producers until 30 September 2017 to complete and implement a property biosecurity plan in line with the requirement for a biosecurity plan under the Livestock Production Assurance (LPA) program.

What's happening now?

From 1 October 2017, Northern Territory properties have the following options:

1. Maintain current low-risk status J-BAS 7.

To maintain this status properties will need to:

- a. By 30 September 2017 - complete and implement a Property Biosecurity Plan that addresses JD risks, in collaboration with a veterinary advisor, which requires annual review.
- b. By 30 June 2018 – complete a Check Test (testing of 50 representative adult cattle from the herd by faecal PCR or culture). This will need to be completed within the past 12 months for properties trading into Western Australia from 1 January 2018.
- c. Ongoing – Maintain an annual veterinary review of the property biosecurity plan and a Check Test every three years. The Check Test will need to be done within the past 12 months for properties trading into Western Australia from 1 January 2018.

2. Move to a J-BAS 6

- a. By 30 September 2017 - complete and implement a Property Biosecurity Plan that addresses JD risks. Veterinarian oversight is not required.
- b. Check Testing is not required

3. Do nothing. Reduce to J-BAS 0

- a. By 30 September 2017 – Fail to complete and implement a Property Biosecurity Plan that addresses JD risks

4. Achieve maximal assurance (J-BAS 8)

- a. By 30 September 2017 - complete and implement a Property Biosecurity Plan that addresses JD risks, in collaboration with a veterinary advisor, which requires annual review.
- b. Sample Test (210-300 adult cattle sampled), repeated two years apart
- c. Ongoing – Maintain annual veterinary review of the property biosecurity plan and a Check Test every three years. The Check Test will need to be done within the past 12 months for properties trading into Western Australia from 1 January 2018.

Northern Territory properties trading with Western Australia will need to initiate measures to maintain J-BAS 7 score. To maintain the **J-BAS 7** score, properties need to implement a property biosecurity plan before 30 September 2017 in collaboration with a veterinary advisor, which will require annual review. J-BAS 7 also requires properties to complete a check test of 50 representative adult cattle from their herd. From 1 January 2018, Western Australia requires that the check test is completed within the past 12 months.

Cattle or buffalo entering the NT consigned direct to export must meet the J-BAS 6 score entry requirements and declaration of 5 years with no JD infection on the property of origin. This is to manage the disease risk associated with animals ineligible for export (export rejects). Cattle or buffalo entering the NT consigned direct to slaughter are exempt from J-BAS score entry requirements.

Producers will need to be aware of risk for acquiring JD when purchasing stock from interstate. For interstate movements into the NT and WA, the property's J-BAS, biosecurity plan, JD property of origin status and any JD testing results will have to be declared by the vendor.

NT producers are encouraged to apply the J-BAS 6 requirements for intrastate movements to protect their JD status and to seek a higher level of JD assurance for seed stock purchases because of the potential disease risks that apply to importing breeding stock. Animals vaccinated for JD must be identified with the three-hole ear punch to assist with interpretation of any future JD exposure status.

The new national arrangements do not distinguish between bovine, ovine and other strains of JD and biosecurity risk assessment must take this into account. Of particular concern is contact between dairy and beef herds or some extent of co-grazing on contaminated land on a property where the JD status of the dairy animals is less than J-BAS 7 or Dairy Score (DS) 7. The lower level of assurance applies to the potential livestock movement.

What do I need to do to maintain a higher J-BAS?

The table below outlines the conditions a property needs to meet and the dates to maintain or reach the J-BAS 6, 7 or 8.

J-BAS Score	Action to be taken and date required
J-BAS 6	<ul style="list-style-type: none"> <input type="checkbox"/> Complete and implement a property biosecurity plan by 30 September 2017 <input type="checkbox"/> No history of JD infection in herd for a minimum of five years
J-BAS 7	<ul style="list-style-type: none"> <input type="checkbox"/> <i>By 30 September 2017</i>- complete and implement a property biosecurity plan in collaboration with a veterinarian <input type="checkbox"/> <i>By 30 June 2018</i>- complete a check test of 50 adult cattle. <input type="checkbox"/> Maintain an annual veterinary review of the property biosecurity plan and a check test every three years. <input type="checkbox"/> For entry to WA, the check test will need to be completed within the past 12 months for from 1 January 2018.
J-BAS 8	<ul style="list-style-type: none"> <input type="checkbox"/> <i>By 30 September 2017</i>- complete and implement a property biosecurity plan in collaboration with a veterinarian <input type="checkbox"/> <i>By 30 June 2018</i>- complete a sample test of 210-300 adult cattle, sampled two years apart. <input type="checkbox"/> Maintain an annual veterinary review of the property biosecurity plan and a check test every three years. <input type="checkbox"/> For entry to WA, the check test will need to be completed within the past 12 months for from 1 January 2018.

Property biosecurity plan

J-BAS requires a property biosecurity plan for all scores from J-BAS 1 to 8. The [grazing manual biosecurity template](#), which incorporates the JD biosecurity checklist, has been developed for producers to use for this purpose. This meets the national industry minimum standards of the [National Farm Biosecurity Reference Manual – Grazing Livestock Production](#). A number of other biosecurity plan templates are also available to help livestock producers develop biosecurity plans for their properties.

- Get the [grazing manual biosecurity template \(concise version\)](#)
- Get [the on farm biosecurity plan template \(comprehensive version\)](#)
- Get the [guideline for developing an on-farm biosecurity plan for producers](#)

JD testing

Specific information on the J-BAS and testing requirements can be found at www.animalhealthaustralia.com.au/jd-cattle-tools/

What are the NT JD entry requirements from 1 July 2017?

From 1 July 2017, cattle, buffalo, bison, sheep, goats, deer and camelids imported into the NT will be required to meet the following minimum JD requirements, in addition to existing livestock movement requirements. Cattle or buffalo entering the NT consigned direct to slaughter are exempt from J-BAS score entry requirements.

Livestock being imported into the NT	Johne's Disease J-BAS requirement
Cattle & buffalo (beef)	Property score of at least J-BAS 6
Cattle & buffalo (dairy)	Property score equivalent to at least DS 7
Sheep, goats & camelids	Property score of at least J-BAS 6

What are the JD entry requirements for sending livestock interstate from the NT?

The entry requirements for sending livestock interstate from the NT have changed. Producers should contact the relevant state to confirm entry requirements prior to transporting livestock.

Destination	Johne's Disease requirement
WA	Property score of at least J-BAS 7. Other testing requirements may apply –see WA LB1 form.
QLD, SA, NSW, Vic	No specific movement controls in relation to JD. Producer obligation not to introduce JD infection.

JD remains a notifiable disease under the *Livestock Act* and must be reported to the Chief Veterinary Officer as soon as reasonably practicable if known or suspected to be present. Properties will not be placed under quarantine.

Further JD risk management.

NT producers are advised to seek a higher level of JD assurance on stock purchases, particularly bulls and should discuss this with their vendor, agent and veterinarian. Vaccination with Silirum is one measure that can be used. Identification of vaccinated animals with a three hole ear punch is required.

For further biosecurity information please contact Susanne Fitzpatrick
e: susanne.fitzpatrick@nt.gov.au p: 8999 2123 m: 0407 498 003

For further movement information please contact Greg Crawford
e: greg.crawford@nt.gov.au p: 8951 8125 m: 0401 118 125

Leptospirosis - a work health safety issue

In the past wet season a significant number of NT stock workers have been affected by *Leptospira Pomona*. Confirmed cases of leptospirosis in humans are reported by the NT Department of Health Centre for Disease Control. Leptospirosis is a notifiable disease in humans, commonly referred to as 'Lepto', poses a serious threat to staff working on cattle stations, particularly in the flood plain and rural Darwin/Katherine regions. Leptospirosis is caused by a number of strains of the *Leptospira* bacteria, which have the ability to infect both animals and also cause serious disease in humans. Animals infected include cattle, pigs, sheep, goats, horses, dogs and rats in addition to native wildlife including kangaroos.

Leptospirosis is highly contagious because of the many ways it can be spread from animal to animal, or from animals to humans. The disease can be spread through urine, or at birth or abortion, resulting in the contamination of water, feed, pastures and soil. Once in the environment, the bacteria are able to infect animals and humans through damaged skin or the membranes lining the nose, eyes or mouth. Stock workers are most likely to contract the disease when working in cattle yards or abattoirs with infected cattle. Infection can result from both direct exposure to urine when handling or slaughtering cattle and working in yards where the water, mud, soil or vegetation have been infected. 'Bang tailing' and cleaning of water troughs are two key activities which can pose a risk to stockpersons. Handling the foetus of an aborted calf, or assisting with calving can be a further source of infection for humans. Recreational activities that may pose a risk include camping, bushwalking, gardening and hunting.

The clinical signs in cattle will vary depending upon the strain of the disease. In general, animal signs associated with leptospirosis include weak newborns, fever, infertility, mastitis, jaundice, depression and anorexia. Abortion 'storms' may also be seen in cows that are greater than five months pregnant. Abortions may occur weeks after initial symptoms, or even in the absence of symptoms. These signs are rarely recognised in the NT.

Symptoms in humans have been found to occur within 10 days; however can range from 4 to 19 days. The length of illness varies, with people being sick for a few days, or as long as three weeks or more. Relapses are common however it is rare for person to person transmission to occur. Symptoms can include any of the following:

- | | |
|---|-----------------|
| - Sudden onset of fever | - Reddened eyes |
| - Severe headaches | - Cough |
| - Chills | - Diarrhoea |
| - Severe muscle pain (especially in the legs) | - Vomiting |

Occasionally, people with Leptospirosis will develop Weil's disease, symptoms include jaundice, bleeding, breathing difficulties and confusion. Although extreme cases can prove to be fatal, most cases involve people with mild symptoms that resolve themselves with little to no complications, or cases where there are no symptoms at all. It is important to reach a diagnosis for proper treatment and to exclude more serious diseases such as melioidosis.

As there is no vaccination against leptospirosis for humans, employers and staff members need to be aware of the disease, take precautions to avoid exposure and know what to do if a staff member suspects that they may have leptospirosis or displays symptoms consistent with the disease. Precautions to take against leptospirosis include:

- avoiding unnecessary contact with water that may be contaminated
- wearing gloves and eye protection when handling the tail end of animals to minimize urine contact (pregnancy testing, bang tailing etc.)
- covering all cuts or wounds with waterproof dressing
- washing hands and arms thoroughly after handling animals, carcasses or other contaminated materials
- avoiding hand to mouth (i.e. smoking), nose and eye contact when handling animals that may be infected
- washing and drying hands thoroughly before smoking or drinking
- controlling rodent populations
- instituting wild pig management programs
- vaccinating livestock with '7 in 1' vaccine against *Lepto Pomona* and *Hardjo* strains.

For further information regarding leptospirosis:

<https://nt.gov.au/wellbeing/health-conditions-treatments/bacterial/leptospirosis>

If you believe that you, or a staff member has leptospirosis contact your local doctor for testing. It is important to mention your risk factors or possible exposure to Lepto.

If you think that your livestock have leptospirosis please contact your DPIR Regional Veterinary Officer.

Darwin	(08) 8999 2035
Katherine	(08) 8973 9716
Alice Springs	(08) 8951 8181

Livestock movement and identification in the Northern Territory

The last edition of Animal Health News featured a section on livestock movement and identification in the Northern Territory, focusing on Property Identification Codes (PIC), Brands and National Livestock Identification System (NLIS) requirements. This article carries on from that, with information regarding livestock transport standards, requirements for moving livestock within the Northern Territory and for moving livestock into the Northern Territory from interstate. If you have any queries relating to livestock movement or identification, please do not hesitate to contact your local livestock biosecurity officer (see contact information at the end of this article).

Livestock Transport Standards (LTS)

The Livestock Transport Standards (LTS) were incorporated in NT Legislation and commenced in 2012.

The aims of the LTS are to have a consistent approach and responsibility across Australia for all persons involved in the handling, selecting, loading and transporting of livestock.

The LTS is in two sections:

Part A - General Standards (for each species.)

- 1 - Responsibilities and Planning.
- 2 - Stock handling competency.
- 3 - Transport vehicles and facilities.
- 4 - Pre-transport selection.
- 5 - Loading, transport and unloading.
- 6 - Humane Destruction.

Part B - 'Species Specific' Standards

It is a requirement of the LTS that all persons, who are involved in the handling, selecting, spelling, loading and transporting of livestock at all venues, must only load and handle livestock that are fit for the intended journey.

Further information on LTS requirements can be located at:

<https://nt.gov.au/industry/agriculture/livestock/moving-and-exporting-livestock/livestock-welfare-and-land-transport-standards>

The standards have been agreed to be enforced under the Livestock Act with some standards subject to infringement notices if non-compliance is detected.

Moving Livestock within the NT

When moving livestock **within the NT**, the following requirements apply:

Animal / species	NT PIC	NT Waybill	Brands	NLIS device	Transport standards apply	Treatment for Cattle Tick (When moving out of tick zones)
Cattle*	✓	✓	✓	✓	✓	✓
Buffalo	✓	✓	×	✓	✓	✓
Horses (incl. mules and donkeys)	✓	×	×	×	✓	✓ + permit
Pigs	✓	✓	×	×	✓	×
Poultry	✓	×	×	×	✓	×
Sheep and goats	✓	✓	×	✓	✓	✓
Deer **	✓	✓	×	×	✓	✓ + permit *
Camels	✓	✓	×	×	✓	✓
Alpacas and llamas* *	✓	✓	×	×	✓	✓ + permit *
Honeybees	✓	×	×	×		×

* All cattle over the age of eight months must be branded

** Permit from NT Parks and Wildlife may be required

Moving Livestock into the NT from interstate

When moving livestock into the NT from interstate, the following requirements apply:

Animal / Species	Health Certificate and Waybill	NT PIC	Brands	NLIS Device	Johne's disease clearance	Transport standards apply	Treatment for Cattle Tick (When moving out of tick zones)
Cattle	✓	✓	✓	✓	✓	✓	✓
Buffalo	✓	✓	×	✓	✓	✓	✓
Horses (incl. mules and donkeys)	✓	✓	×	×	×	✓	✓ + permit
Pigs	×	✓	×	×	×	✓	×
Poultry	×	✓	×	×	×	✓	×
Sheep and goats	✓	✓	×	✓	✓	✓	✓
Deer *	✓	✓	×	×	✓	✓	✓ + permit *
Camels	✓	✓	×	×	✓	✓	✓
Alpacas and llamas *	✓	✓	×	×	✓	✓	✓ + permit *
Honeybees**	✓	✓	×	×	×		**

* Permit from NT Parks and Wildlife may be required.

** Must have health certificate confirming they do not have European foulbrood, American foulbrood and small hive beetle.

You do not need a permit to move pigs, pigeons and poultry.

<http://brand.primaryindustry.nt.gov.au/>
<https://nt.gov.au/industry/agriculture/livestock>

<http://pic.primaryindustry.nt.gov.au/>
<https://www.nlis.com.au/>

Contacts

Alice Springs: Greg Crawford, Regional Livestock Biosecurity Officer
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Tennant Creek: Tom Haines, Principal Livestock Biosecurity Officer
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Katherine: Josh Haigh, Regional Livestock Biosecurity Officer
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Darwin: Rob Wait, Livestock Biosecurity Officer
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Calendar of Events

22 June	Australian Banana Industry Congress
27 June	NT Farmers and HIA funded IPM technology workshop
29 June	IPM Workshop
04 July	Regional Pitchfest
07 July	Alice Springs Show
10 July	XII International Mango Conference, China
12 July	Katherine regional roadshow
14 July	Tennant Creek Show
21 July	Katherine show
27 July	Royal Darwin Show
4 August	DAF Workshop: the process of diagnosing plant health problems
14 August	Institute of Foresters Australia Conference
04 September	Nominations close for Territory NRM and NT Landcare awards

More Information?

You can find hundreds of publications on our website, or if you prefer video content visit our YouTube site for instructional videos on practical topics. Can't find something? Drop us an email and we'll help direct you.

Website: www.dpir.nt.gov.au

YouTube: www.dpif.nt.gov.au/youtube

Email: horticulture@nt.gov.au