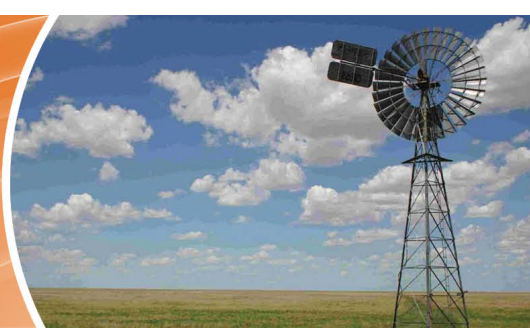


Top Paddock

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES



ISSUE # 67; MARCH 2019

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Figure 1. Come and see what's under the pivot at the Katherine Research Station field day in April.

Message from the editor

This year is jam packed with events. We have a huge couple of days lined up for those of you in the Douglas Daly and Katherine regions with field days in April, as well as some new faces around the department.

I recently spent some time working in the Department of Primary Industry and Resources (DPIR) animal welfare response centre for Tropical Cyclone Trevor. They had volunteers and assistance from the NT Cattlemen's Association, private veterinarians, Roper Gulf Regional Council, East Arnhem Regional Council, and Animal Management in Regional and Remote Indigenous Communities. There was a lot of hard work put in behind the scenes that many people aren't aware of. A lot of people gave up their weekend to support the teams that went out to communities to check and feed animals in the evacuated regions. It was great to see everyone banding together to help out.

Cheers

Ed

Have your say on the Northern Territory Water Regulatory Reform



Figure 2. Irrigation at Katherine Research Station

The Department of Environment and Natural Resources (DENR) have proposed reforms to the Water Regulation in a Directions Paper. The Directions Paper outlines the current issues in water policy and asks stakeholders to provide feedback. This is your chance to provide feedback on:

- solutions to the issues identified
- reforms you believe should be prioritised
- additional issues not included in the Directions Paper

We encourage stakeholders to provide feedback on the reform by 31st March 2019. Go to the [Northern Territory Government's 'have your say' website to give your feedback.](#)¹

Some of these reforms will result in larger changes to irrigated agriculture than others. Here are a few examples:

- Water trading policy
- Management of Unused Water policy
- An alternative to the first-in-first-served allocation approach
- Staged allocation
- Pricing framework
- Surface water harvesting
- An expanded NT Water Allocation Planning Framework
- Clearer guidance on adaptive management
- Management of interconnected systems
- Longer licence tenure
- Unbundling of water and land

¹ <https://haveyoursay.nt.gov.au/waterreform>

We encourage you to read about all the reforms in the Directions Paper at the [Northern Territory Government's 'have your say' website](#).²

Darwin Rural Groundwater Watch

In the Top End, most rural residents and growers access groundwater via a bore. In fact, in the Northern Territory (NT) 90 per cent of the fresh water supply comes from groundwater, compared to 22 per cent worldwide.

Groundwater comes from rainfall, water not used by vegetation filters through the soil until it reaches the saturated zone as groundwater recharge. The water table or level in an aquifer will rise and fall depending on variations in recharge. Aquifers can also get water from rivers and streams draining into the ground. Due to the seasonality of rainfall in the Top End, the majority of rainfall recharge happens in the wet season. The groundwater systems that underlie the Darwin rural area are known as fill and spill systems as they do not have large storages. In above average rainfall years they will refill and the excess water will spill out into our waterways. In the past 30 years we have had above average wet seasons. This year's wet season has been below average to date, although recent rainfall has seen water levels in some areas steadily increase.

What are the current aquifer levels?

In the NT, groundwater levels are monitored, through a system of 150 instrumented bores and 250 plopped bores. This information is compiled into hydrographs showing the depth from the ground surface to the water table over time. The Department of Environment and Natural Resources (DENR) website hosts the [Darwin Rural Groundwater Watch](#).³ This is an interactive map which shows the main Darwin rural aquifers, hydrographs of the aquifers levels and lists the latest water level for that aquifer.

What can I do?

1. Use water wisely.

Being careful with water can extend its availability. Check your irrigation and fix leaks to reduce water wastage. Consider the crop water usage when planning your dry season crops.

Know how much your plants are using and which ones can have their water reduced. Mangoes have a system where partial root zone dryness sends signals to the plant to close stomata and reduce water loss. Sapindaceae (rambutan) lack this signal and do not respond the same way to soil dryness.

2. Know your bore

Specifically, what the groundwater level depth is in relation to where your bore screens are. Bores may start to take in sand and silt causing bore failure so make sure you clean and maintain your pump.

3. Watch out for salinity.

When aquifer levels get low some systems (Lambells Lagoon and Middle Point) are potentially at risk of salt water intrusion into the groundwater. If your orchard is in either of these aquifers, keep an eye on your salinity

² <https://haveyoursay.nt.gov.au/40059/documents/88635>

³ <http://waterresources.nt.gov.au/groundwaterwatch/>

levels, the level of salt in water affects how suitable it is for irrigation. Read [the information sheet on Agriculture Victoria's website](#)⁴ on measuring the salinity of your water and what it means in an agricultural context. Monitor the pH and electrical conductivity/salinity levels in your water and keep track of how your water quality is tracking over the dry season. There are relatively cheap hand held meters growers can buy (Hanna or Eutech Instruments) as well as pH strips (like pool shop ones).

The following table from the United Nations Food and Agriculture Organisation ([FAO crop salt tolerance data](#)) lists some generic salt tolerances for different crops that can be used as a guideline, noting that varieties, rootstocks etc can change these figures.

Crop	Threshold ECe (dS/m)	Rating
Asparagus	4.1	T
Banana		S
Cucumber	2.5	MS
Date	4.0	T
Eggplant	1.1	MS
Fig		MT
Grapefruit	1.2	S
Lemon	1.5	S
Lime		S
Mango		S
Okra		MS
Papaya		MS
Passionfruit		S
Peanut	3.2	MS
Pineapple		MT
Pummelo		S
Sorghum	6.8	MT
Soybean	5.0	MT
Sweet potato	1.5	MS
Tomato	2.5	MS
Watermelon		M
Zucchini	4.9	MT

Key: T- tolerant, MT –Mildly Tolerant, MS- Mildly Susceptible, S- Susceptible,

Where can I get more information?

For agronomic advice, contact DPIR by emailing horticulture@nt.gov.au or phone Matt Hall 0422 938 529

For information on groundwater, visit the [Darwin Rural Groundwater Watch on DENR's website](#)⁵

⁴ <http://agriculture.vic.gov.au/agriculture/farm-management/soil-and-water/salinity/measuring-the-salinity-of-water>

⁵ <http://waterresources.nt.gov.au/groundwaterwatch/>

For water licensing information, visit the [Water Licencing Portal on DENR's website](#)⁶

For DENR publications on water, including a preliminary assessment of groundwater use in parts of Darwin and the Koolpinyah report, visit the [DENR water publications page](#)⁷

Or contact DENR's Water Resources Division

Phone: 08 8999 4455

Email: waterresources@nt.gov.au

DENR release their groundwater level predictions for the end of the dry season in May, so keep your eyes out for that information. It can be found in a number of places, such as the [DENR Facebook page](#)⁸, [DENR website](#)⁹, local newspapers, NT Farmers e-newsletter, ABC country hour, and the mid-year edition of Top Paddock.

NT Seasonal Outlook

Sourced from the Australian Bureau of Meteorology

*This seasonal outlook was correct at the time of publication. For the most up-to-date seasonal outlook, please go to the ["climate outlook" section of the BOM website](#).¹⁰

The outlook for April to June 2019 indicates that:

- Average to Drier conditions are expected across most of the NT.
- Warmer than average days and nights are likely for almost all of the NT

⁶ <https://denr.nt.gov.au/land-resource-management/water/water-information-systems/water-licensing-portal>

⁷ <https://denr.nt.gov.au/land-resource-management/water/water-publications/water-publications>

⁸ <https://www.facebook.com/denrnt/>

⁹ <https://denr.nt.gov.au/>

¹⁰ <http://www.bom.gov.au/climate/outlooks/#/rainfall/summary>

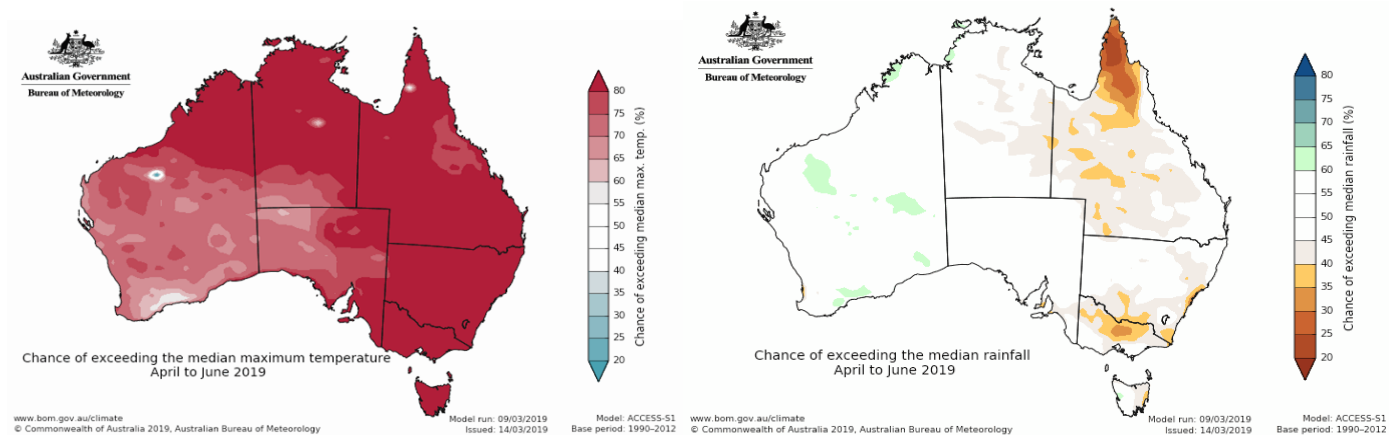


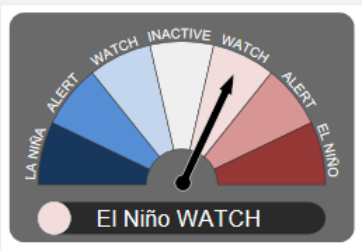
Figure 3. Chance of exceeding the median maximum temperature, April to June 2019 (left), chance of exceeding the median rainfall, April to June 2019 (right). Source: Bureau Of Meteorology

SEASONAL INDICATOR

COMMENTS (SOURCED FROM THE AUSTRALIAN BUREAU OF METEOROLOGY)

EL NIÑO SOUTHERN OSCILLATION (ENSO)
[BUREAU OF METEOROLOGY](#)
[ENSO WRAP-UP](#)

CURRENT OUTLOOK:
NEUTRAL
ENSO STATUS: WATCH

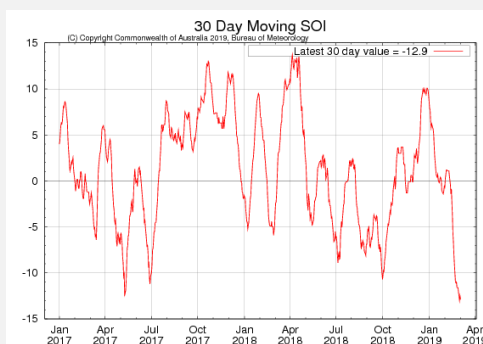
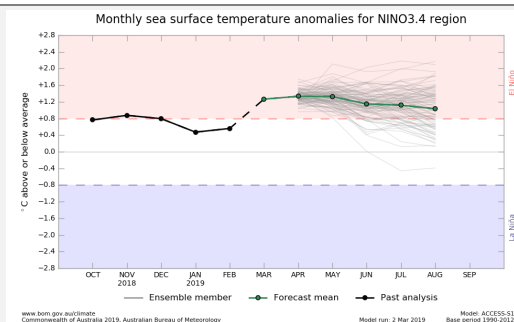


The El Niño Southern Oscillation (ENSO) is currently neutral, but sea surface temperatures across nearly the entire tropical Pacific Ocean have warmed over the past fortnight, and have touched on El Niño thresholds.

The Bureau's outlook remains at El Niño WATCH, meaning there is approximately a 50% chance of El Niño developing during the southern hemisphere autumn or winter; twice the normal likelihood.

However, El Niño predictions made in early autumn tend to have lower accuracy than predictions made at other times of the year. This means that current forecasts of the ENSO state beyond May should be used with some caution.

El Niño typically results in below average rainfall for southern Australia during autumn and for eastern Australia during winter and spring. The March to May climate outlook, which factors in ENSO and other climate influences, indicates autumn is likely to be drier than average for the eastern half of Australia.



To see larger versions of these images, go to the SOI and Outlooks tabs at [Bureau of Meteorology website's ENSO Wrap-Up](#)¹¹

¹¹ <http://www.bom.gov.au/climate/enso/>

INDIAN OCEAN DIPOLE (IOD)
[BUREAU OF METEOROLOGY](#)
[ENSO WRAP-UP](#)

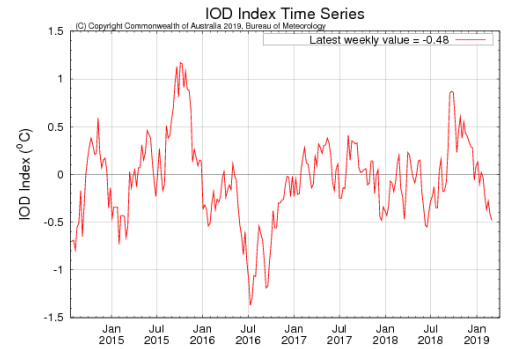
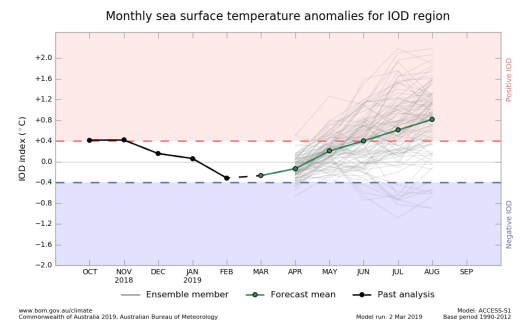
CURRENT OUTLOOK:
NEUTRAL

The Indian Ocean Dipole (IOD) is currently neutral

Surface waters are warmer than average across most of the Indian Ocean, but near average temperatures across the north of the Basin. This has resulted in the negative Dipole Mode Index values.

Due to the movement of the monsoon trough in the Indian Ocean, the IOD typically has little influence on Australian climate from December to April.

All of the six international climate models surveyed by the Bureau indicate that the IOD will be neutral for March. By May, one model indicates a positive IOD may form, with three models predicting positive IOD values during July.



To see larger versions of these images, go to the Bureau of Meteorology's website to see the [IOD Time Series](#)¹² and the Indian Ocean tab at [Bureau of Meteorology ENSO Wrap-Up](#)¹³

Pastoral Feed Outlook for Darwin

In a typical wet season, pasture growth in the Darwin region tends to be limited by available soil nitrogen rather than soil moisture. Therefore, a poor wet season may not generally affect the total quantity of pasture grown on upland country.

The 2018/19 pasture growth for the district as a whole is average, however the inconsistent rainfall across the district has resulted in wide variation. There are pockets of the district experiencing below-average and above-average growth. The previous two seasons (2017/18 and 2016/17) were considered average for pasture growth. 9% of the district has been burnt since 1 July 2018.

For more information on the Pastoral feed outlook, [view the newsletter on the DPIR website.](#)¹⁴

¹² <http://www.bom.gov.au/climate/enso/indices.shtml?bookmark=iod>

¹³ <http://www.bom.gov.au/climate/enso/>

¹⁴ <https://dpiir.nt.gov.au/primary-industry/primary-industry-publications/northern-territory-pastoral-feed-outlook>

Northern Territory goes bananas!



Figure 4. Bananas are now officially freckle free in the Northern Territory

The Northern Territory has been declared banana freckle free, with the proof of freedom from the disease declared on 1 February.

This huge success has been achieved due to industry, government and the community working together, along with other states and territories.

The road to recovery for bananas in the NT has been progressing well following the lifting of the internal movement regulations. This has allowed commercial growers to replant, nurseries to sell plants without a permit and has allowed Territorians to return to growing the popular fruit in their backyards.

Australia's banana industry is worth \$600 million, and reaching this milestone is a great achievement.

Banana freckle will remain a declared pest under NT plant health legislation so everyone will be required to take measures to report and reduce the risk of spreading the disease should it re-occur.

Territorians are urged to remain vigilant and continue to check their banana plants regularly for any signs of banana freckle or other pests or diseases, and to avoid moving or sharing plants. Banana Freckle symptoms should be reported to the Exotic Plant Pest Hotline, 1800 084 881.

Biosecurity is everyone's responsibility. Good biosecurity supports our local producers, and helps ensure the health of our waterways, natural environment and backyard gardens.

Proof of Freedom was endorsed by the National Management Group on 1 February 2019.

Read more in the department's [media release](#).



Northern Territory Agriculture: Pathways to Potential

KATHERINE AND DOUGLAS DALY FIELD DAYS

Join us at **Northern Territory Agriculture: Pathways to Potential**, two jampacked field days at two unique Department of Primary Industry and Resources (DPIR) research stations. The field days will have a strong focus on industry development and highlight the potential of diversified farming systems in the Northern Territory (NT).

Meet industry members, view trade displays, hear from producers regarding their experience with diversification and learn about new emerging industries.

Both field days will include a number of presentations in the morning, including:

- Cotton Australia, Adam Kay - overview of the southern cotton industry, addressing misinformation.
- Tipperary Station, David Connelly - a producer's perspective of diversification and integrating cropping and horticulture into an existing pastoral business.
- Darwin Port, Peter Dummett - an overview of how the shipping industry works including considerations for potential exporters and importers.
- Department of Environment and Natural Resources – getting my project off the ground.
- Louie Dreyfus Company, Tony Geitz - cotton market opportunities, the Australian position in the global market place and an introduction to the pricing of Australian cotton.
- Archer Daniels Midland, Damian Bradford - grain market opportunities from Northern Australia
- Feed Central, Cieran Maxwell - national hay market and opportunities for hay in the NT.

Afternoons will provide attendees with the option to view current DPIR research.

KATHERINE RESEARCH STATION

Tuesday 9 April

~ Livestock ~ Cropping ~ Horticulture ~

- information about birthing sensors and how they are assisting with calf loss research in northern Australia
- preview DPIR's sale select Brahman and composite bulls
- the latest research in beef cattle genetics in northern Australia
- aspects of cover crops, integrated pest management and cucumber green mottle mosaic virus for melon cropping systems
- opportunities for learning about and ordering new mango varieties
- cotton, soybeans, forage and grain sorghum, dryland rice and various species of pasture grass for seed production
- infield discussions with DPIR and other agronomists, market specialists, regulatory bodies and seed suppliers.

&

DOUGLAS DALY RESEARCH FARM

Wednesday 10 April

~ Livestock ~ Improved pastures ~ Forage crops ~

- impact of maternal phosphorus status and subsequent weaner performance
- using livestock to assist in the control of gamba grass and subsequent livestock performance
- update on the current fly tag trials and how they are performing in the Douglas Daly region
- update on the select Brahman females and where the herd is heading next
- irrigated Leucaena and grazing with mixed pasture inter rows
- infield discussions with The Leucaena Network
- improved pastures such as Nucal and Mulato varieties
- cotton
- potential legume pastures including desmanthus, lucerne, cowpea, blue pea, and burgundy bean production.
- infield discussions with DPIR and other agronomists, seed suppliers and market specialists.

Please confirm attendance for catering purposes and find out more by contacting:

Joy Sherlock, Senior Extension Agronomist | joy.sherlock@nt.gov.au | 0436 425 441 | www.dpir.nt.gov.au

The field days are proudly presented by the Department of Primary Industry and Resources with support from the Department of Environment and Natural Resources, the Northern Territory Farmers Association and the Northern Territory Cattlemen's Association.

MAJOR SPONSORS



Beatrice Hill buffalo for sale.

Department of Primary Industry and Resources

RIVERINE BUFFALO FOR SALE

Priced from \$1000 - \$2000 inc GST

Purebred Riverine buffalo bulls of Italian descent

High content Riverine buffalo cows

Fantastic dairy opportunity

Located Beatrice Hill Research Farm

Contact Anthony Green, Beatrice Hill Farm Manager (M) 0427 002 804 (E) anthony.green@nt.gov.au
or Jo Miller, Pastoral Extension Officer (M) 0417 890 200 (E) joanna.miller@nt.gov.au



DPIR Brahman and composite sale

Department of Primary Industry and Resources

ANNUAL BULL SALES

18 June 2019

Quality Brahman and Composite
bulls from the DPIR select herds.

Register with auctionsplus.com.au.

Contact Whitney Dollemore Ph: (08) 8973 9749 E: whitney.dollemore@nt.gov.au



2019: NT Rural Women's Award, congratulations Zoe



Figure 5 (left to right): Donna Digby, Zoe Malone and Rebecca Mohr-Bell - the finalists for the AgriFutures™ 2019 Rural Women's Award

Zoe Malone has been announced as the winner of this year's AgriFutures NT Rural Women's Award, for her passion about the role volunteers play in creating strong and vibrant communities. The AgriFutures™. Rural Women's Award is Australia's leading award acknowledging and supporting the essential role women play in rural industries, businesses and communities. The award provides a platform to inspire and support Australian women to use and develop their skills to benefit their industries and communities.

As the NT winner, Zoe received a \$10,000 Westpac bursary to bring to fruition a project working with grassroots organisations to provide tools and information that will empower volunteers and community groups to take charge of their governance.

The two other inspiring NT finalists for 2019 were:

- Donna Digby – Donna proposed to pilot a business development and leadership program to help women in remote Australia become “InvestHER” ready and build leadership and business skills, capabilities and confidence.
- Dr Rebecca Mohr-Bell – Rebecca identified a lack of financial literacy amongst young people working on farms and in regional communities and proposed developing incentives, training packages and other incentives to teach financial literacy skills to young people in a relevant and engaging way.

TNRM save the date

A promotional poster for a Biofertiliser Course. The background shows three people in winter clothing looking at a large sheet of paper, possibly a soil test result. The text is overlaid in large, bold, black letters. At the bottom, there are three logos: Territory Natural Resource Management, Northern Territory Soil Consortium, and REGENAG.

BIOFERTILISER COURSE
4TH - 6TH JUNE
DARWIN RURAL

 Territory Natural Resource Management

 Northern Territory Soil Consortium

 REGENAG[®]
REGENERATIVE AGRICULTURE

Digging Deeper – TNRM Intensive Soil Extension Program

Territory Natural Resource Management (TNRM) will be running the Digging Deeper program in 2019. This program aims to help farmers understand the processes going on in their soil and give them a helping hand to implement changes that will address their soil's "issues". It is a *hands on* approach to investigating what is below the surface and how that relates to productivity of what happens above the soil surface.

This Expression of Interest (EOI) is for farmers from any industry in the Darwin and surrounds and Katherine regions who wish to participate in this project in 2019. The project is limited to 12 farm business split in two groups, who will take part in the following three project components:

- Soil Pit Day
- Three Soil Health Sessions for each region and held on property (each property hosts ½ day)
- Soil Health Interpretation and Wrap Up Day

As a participating business you can anticipate:

- Getting to know the other local farm business who are interested in improving their soil health
- Professional advice, education, and mentoring for **your issues**
- A comprehensive soil test including commented collection and interpretation. You will *understand* soil (one of your greatest assets) like never before!
- Gaining knowledge so you can make your soil fertility decisions.

For more details on the Digging Deeper program, please contact TNRM on (08) 8942 8300 or by email to jacob.betros@territorynrm.org.au

Monitoring Bore Groundwater Level (click on a point to view historical water levels)



Figure 6. Darwin Groundwater Watch screen shot

Introducing new staff

There are a number of new staff across the department:

Joy Sherlock



Figure 7. Joy Sherlock

Senior extension agronomist, Katherine Research Station.

Phone: 8973 9724

Email: joy.sherlock@nt.gov.au

Joy has worked in the agricultural industry in various enterprises from working in her family market garden, working as a farm hand on livestock/cropping properties, driving tractors for seeding and harvest, to entering the agricultural research field as a skilled technician many years ago.

She has an agriculture degree and has worked as a facilitator with the Western Australian Government's pilot drought reform/farm business resilience project, in environmental management and as an agronomist. Joy was involved with pastoral cattle production for the last 14 years running Droughtmaster/shorthorn crosses for both the domestic and export markets.

She is really passionate about agricultural diversification, and building capacity and resilience within individual businesses to provide options for the highs and lows in production. Expect to see Joy working with regional grower groups, assisting agricultural industry development and guiding diversification and working with NT pastoralists. Please feel free to drop into the Katherine Research Station to see her, or meet her at the Katherine Field Day in April.

Samantha Cullen

Molecular Diagnostician, Biosecurity and Animal Welfare, Darwin

Phone: 8999 2018; email: Samantha.cullen@nt.gov.au

Coming from a botany background, Sam has spent the last few years working on the Banana Fusarium (Tropical Race 4) research project in Darwin. Her new role is to identify vegetable viruses and phytoplasmas through molecular diagnostics as part of an area wide management project funded by Hort Innovation.

Dr Maxine Piggott

Principal Molecular Scientist, Biosecurity and Animal Welfare, Darwin

Phone: 8999 2120; email: maxine.piggott@nt.gov.au

Maxine has over 12 years of research experience in molecular ecology, including being awarded an Australian Museum Eureka Award and an Australian Research Council DECRA Research Fellowship. Her research has included species monitoring and whole community biodiversity assessments from aquatic samples using environmental DNA, population genetics of mammals, marine invertebrates and fish and development of new molecular techniques. Maxine heads the molecular biology section and associated projects. This branch provides research and diagnosis for plant pests and diseases via DNA analysis. The projects include work on CGMMV, fusarium wilt of bananas and the new Hort Innovation project: Area wide management in vegetables.

Simone (Min) Andrews



Figure 8. Min Andrews

Simone (Min) Andrews is the newest edition to the Livestock Biosecurity team in Katherine.

You may know Min from her role as a Biosecurity Officer in the Kununurra/Kimberley region of Western Australia. Min has spent the majority of her life in the Kimberley region and has more than 20 years' experience in the Northern Beef Industry. Her experience and interest in this industry began when she started working in stock camps at a young age on Auvergne station and Newry Station. In 2009, Simone graduated with a Bachelor of Agribusiness from the University of New England. Over the years, Min followed her passion into a number of roles including managing the Charles Darwin University Katherine Campus Brahman stud, Technical

Officer at Victoria River Research Station and for last four and a half years as a Biosecurity Officer for Department of Primary Industries and Regional Development in Kununurra Western Australia. As a Biosecurity officer in Kununurra Simone has acquired extensive knowledge in disease surveillance, protocols for cattle travelling across the Western Australia and Northern Territory border and livestock inspections.

Min looks forward to learning new tasks and expanding her knowledge in the beef industry

A step closer to understanding mango disorder

Scientists in the Northern Territory have made a significant advance towards understanding the cause of resin canal discolouration (RCD) in mangoes. RCD had stumped scientists and growers for decades, who until now had not had any clues about its cause. Research undertaken by ARC Training Centre for Innovative Horticultural Products PhD candidate Umar Muhammad and Department of Primary Industry and Resources (DPIR) scientists found it is expressed after harvest and caused by bacterial infection, which rules out problems with the plant.

Mr Muhammad has been researching the cause of RCD in mangoes in partnership with DPIR for the last two years. DPIR Research Leader Dr Cameron McConchie said this discovery was the biggest local breakthrough in understanding the cause of RCD. “While it is still not clear where in the production system infection normally occurs, this research suggests it occurs post-harvest and that avoiding contamination is essential to prevent RCD,” Dr McConchie said.

During the 2018-19 mango season Mr Muhammed harvested fruit from orchards in Katherine and Darwin with known history of RCD, and artificially induced the disease in otherwise healthy mangoes, the first time this had been done in Australia. “The harvested fruit was exposed to RCD by either placing pulp from infected mangoes directly onto the skin, or injecting infected pulp into the fruit with a hollow needle, and it was this experiment that led to the breakthrough,” Mr Muhammad said. “The trial showed zero infection in the controls and 100 per cent infection in the manually infected fruit. “It found that RCD can spread merely through contact with the intact skin of infected mangoes.”

Although largely expressed at post-harvest, RCD has perplexed growers for decades because it can also appear at any time of the season and no pattern had been established with rain or high temperatures. The number of cases of RCD has been increasing in recent years, particularly in the Northern Territory, which is why researchers have focused on this disease. As well as discovering that RCD develops post-harvest, the research has also found that some mango cultivars are more susceptible to RCD than others. “At this stage we can only say that Kensington Pride are susceptible, and it appears that symptoms are more severe in fruit from Darwin than further south,” Dr McConchie said. “We know that some of the new mango varieties we’ve been developing are very resistant to RCD, even when the infection is injected directly into the fruit.”

Tasmanian horticulture researcher Associate Professor Alistair Gracie has supervised Mr Muhammad’s project since its inception. “This project has been a real collaborative success – Umar has worked closely with mango growers, Northern Territory Government scientists and other researchers at the Tasmanian Institute of Agriculture,” Associate Professor Gracie said. “The findings will help solve a significant problem for Australia’s mango growers – that’s the benefit to industry-focused research like this.”

Future research still needs to be undertaken to determine where the source of bacterial infection is occurring in the supply chain.

The research was funded by the Australian Research Council Industrial Transformation Research Program, Woolworths and the University of Tasmania with in-kind support from the Northern Territory Government and the Tasmanian Institute of Agriculture.

RCD fast facts:

- Mangoes have an extensive network of canals that form a complex network just under the skin and in the flesh.
- These canals store resin, or sap, and are normally flesh-coloured in appearance.
- When infected with RCD, the canals become brown or black in colour as the mangoes ripen.
- Affected mangoes are safe to eat, but the blemishes and discolouration caused by RCD makes the fruit less appealing to consumers.
- RCD is estimated to cost the Northern Territory mango industry between \$5 million and \$10 million per year.

You've heard of ant farms, but have you heard of farmer ants?

Browsing ants (*Lepisiota frauenfeldi*) are an exotic invasive species, ideally suited to Australian conditions. Browsing ants are considered to be a significant threat to our environment and economy. They form super-colonies, which reach very large numbers. Browsing ants can be observed on the ground as well as in trees, leaf litter and infrastructure, such as electrical boxes. They 'farm' and protect scale insects, which reduces plant vigour and can eventually kill the plants they live on. They eat and displace native ant species, as well as other insects, in the infested area.

National Browsing Ant Eradication Program (NBAEP) field staff observed the N.T. native tree commonly known as beach hibiscus (*Hibiscus tiliaceus*) suffering badly from the effects of *Lepisiota fraunfeldi* (browsing ants) farming Mealy bugs (family Pseudococcidae). Mealy bugs, aphids and other scale insects benefit from a symbiotic relationship with some ant species who harvest a sweet nectar called honeydew from the scale insects in return for protection from predators. This can lead to a proliferation of scale insects on the host plant. A high population of scale insects can negatively impact the host plant in many ways and in worst case scenarios lead to the death of the host plant. The beach hibiscus in question was thought to be beyond recovery and headed for this grizzly fate (see picture below).



Figure 9. Hibiscus tree: Before treatment in September 2018 and after treatment in March 2019

However, after NBAEP field staff treated the infested site, the hibiscus made a remarkable recovery. It now has dozens of new shoots and a dense covering of new and healthy leaves. This is a great example of how the NBAEP has benefited native plant species suffering from the effects of this invasive tramp ant species.

Browsing ants are a slender ant, and are a consistent shiny dark brown in colour. They are 3–4mm in length with long antennae and long legs, and run about in a crazy or haphazard manner when disturbed.

Browsing ants were first detected in the NT in June 2015. Known infestations are limited to the suburbs of Berrimah, East Arm, Frances Bay and Wickham Point.

Browsing ants originate from Southern Europe and are commonly found in South East Asia including Timor Leste and Malaysia.



Figure 10. Mealy bugs on tree, with Browsing ant visible on leaf in the background

If you think you have seen a browsing ant population, please contact the Exotic Plant Pest Hotline 1800 084 881.

Asparagus, potential green gold for the Northern Territory



Figure 11. Asparagus- is there potential in the NT?

Matt Hall

Asparagus is not a new crop for the Northern Territory, with commercial production in place since the mid-1990s. Production has declined in the Northern Territory due a range of factors including: the inability to control anthracnose (a fungal pathogen), currency fluctuations and historically high interest rates. The purpose of this article is to summarise the global and national context with regards to technical issues and market opportunities for fresh asparagus grown in the Northern Territory.

The full article is available on the [LinkedIn website¹⁵](https://www.linkedin.com/pulse/asparagus-potential-green-gold-northern-territory-matt-hall/).

¹⁵ <https://www.linkedin.com/pulse/asparagus-potential-green-gold-northern-territory-matt-hall/>

Fusarium wilt of cucumber



Figure 12. Symptoms of Fusarium wilt of cucumber. Left- whole plant wilting in the field (source: Cucurbit Disease Field Guide, Seminis ® DeRuiter ®, 2015). Middle- internal discoloration; right- stem lesions.

Fusarium wilt of cucumber is caused by the fungus *Fusarium oxysporum* f.sp *cucumerinum*. It has been present in Australia for decades, but the first case in the Northern Territory was discovered in 2017. It is a soil borne disease which infects through the roots of cucumber plants, spreading up through the stem and causing the customary wilt and dieback. It is specific to cucumbers and can spread through the movement of contaminated soil, infected plants and plant material as well as through the air.

Symptoms

In seedlings, seed rot and damping off can occur. Symptoms in older plants include wilting lower leaves during the day, with some recovery in the evening. With time, the wilting spreads to the entire plant.

Infected plants can show signs of leaf yellowing and when cut the vascular tissues in the roots and lower portions of the stem may appear yellow or tan. In severe cases, dried tan brown lesions may form on one side of the stem, extending from the base of the plant. Under humid conditions, spore masses can form at the base of the infected stem.

Management

As with many other Fusarium wilts, no viable chemical controls are available.

Control relies on good farm hygiene and prevention. Maintain on-farm biosecurity practices to prevent the introduction of this fungus onto your property (see the [Come Clean, Go Clean factsheet on the DPIR website](https://dpiir.nt.gov.au/data/assets/pdf_file/0008/547163/come-clean-go-clean.pdf))¹⁶.

- Source clean seeds and planting material.
- Prevent the movement of soil and infected plant material onto or around your property.
- Clean and disinfect machinery, tools and equipment that have been in contact with infected plants or contaminated soil before moving to unaffected areas.
- Ensure visitors disinfect their shoes and vehicles.

¹⁶ https://dpiir.nt.gov.au/data/assets/pdf_file/0008/547163/come-clean-go-clean.pdf

- Plants showing symptoms should be reported to the Department of Primary Industry and Resources Plant Pathology laboratory.

If you see similar symptoms, please contact the Department of Primary Industry and Resources

Plant Pathology Laboratory: Ph: 8999 2218

Email: Plant.Pathology@nt.gov.au, or the Biosecurity hotline: 1800 084 881

Livestock disease investigations

The department provides a free disease investigation service, including free diagnostic testing through the Berrimah Veterinary Laboratory, to livestock owners for diagnosis or exclusion of notifiable emergency, exotic and endemic disease, including zoonotic diseases. Subsidies are available for producers to contact private veterinarians for significant disease investigations in livestock.

Subsidies for disease investigation

- Subsidies of up to \$2,000 are available for disease investigations in cattle conducted by private vets until June 2019.
- For disease investigations in horses and other species, subsidies of up to \$250 are available.
- Remember that \$300 is available for cattle showing nervous signs where a post-mortem is performed and the brain collected for “Mad Cow” exclusion testing.

Please contact your local vet or regional Livestock Biosecurity Officer for more information.

During October to December 2018, 74 livestock disease investigations were conducted to rule out emergency diseases or investigate suspect notifiable diseases across the NT.

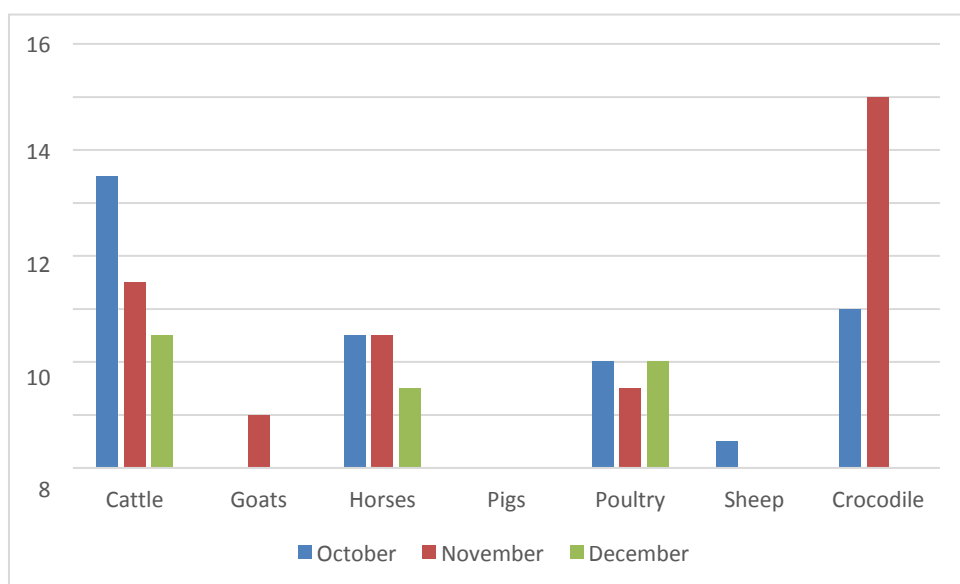


Figure 13. Livestock disease investigations in the NT, October to December 2018

E-Coli in pen feeding trial weaner

A weaner in a phosphorus pen feeding trial herd was noticed to be slow and swaying at a walk during weekly weighing of the animal group. The following day, the animal was off food, tucked up and depressed. A fever, together with nasal discharge and saliva drooling from the mouth were noted, with no visible damage to the nose, mouth or teeth. The breath smelled strongly of acetone, which is an indicator in ruminants of a negative energy crisis, and consequent formation of emergency energy supplies in the form of ketone bodies. The animal was treated symptomatically with electrolyte and fluid replacement and an anti-inflammatory injection; blood, throat and nasal swabs and faeces were submitted to Berrimah Veterinary Laboratory. However, the heifer was found dead the following morning.

On post mortem there was a strong smell of ketones throughout the carcass; ketoacidosis was suspected. One very small section of small intestine (< 5cm long) was severely inflamed (enteritis) without blockage or visible perforation. Another section of intestine contained what appeared to be a hair faecolith (also known as a hair concretion – a hard solid mass of hair). The kidneys and liver were friable to handle, tending to turn “mushy” when sections were cut in preparation for laboratory submission.

Laboratory examination of submitted tissues showed extensive necrosis (tissue death) and ulceration through the range of gastro-intestinal tissues submitted, with abundant bacteria in the walls of the gut tissues. Interestingly, lesions that were seen under the microscope were not limited to the section of small intestine that was seen to be inflamed with the naked eye. Septic thrombi (infected clots), indicative of widespread infection, were found in the spleen and kidney. The findings are consistent with severe bacterial enteritis (infection and subsequent changes to absorption through the intestinal wall) with spread of the causative organism throughout the body.

The clinical signs associated with this enteritis are consistent with infection by a subset of E.coli bacteria which produce Shiga toxins, causing severe illness in affected animals. Cattle are a recognised carrier of this bacteria, which is zoonotic, and a cause of haemorrhagic colitis (bloody diarrhoea) in humans. E.coli is capable of causing different disease syndromes in cattle, based on the specific toxins and virulence of the infecting strain. Enterotoxigenic strains typically cause disease in neonatal calves, while enterohaemorrhagic strains are associated with disease in older animals, as in this case. Disease tends to occur in isolated cases rather than herd outbreaks, as cattle carry the infective organism in the gastro- intestinal flora; a primary cause for the development of overwhelming infection was not identified in this case. No other animals in the pen trial were affected.

Tests on the blood confirmed ketoacidosis, which is likely secondary to the gastro-intestinal disease. A negative energy state in which ketone bodies are elevated can occur when carbohydrate reserves are depleted; in this case, this is a secondary effect following inappetance and depression. Changes in the liver were consistent with hepatic lipidosis, and are secondary changes consistent with ketoacidosis and severe debilitation.

These findings are interesting, as they highlight the fact that the clinical signs that can be seen (and in this case, smelled), may not in fact be the primary cause of disease or death. The results of laboratory testing also serve to emphasize the need to submit a range of tissue samples in order to reach a diagnosis; in this case, microscopic examination of the gut samples demonstrated severe disease that was not visible to the naked eye and would otherwise be missed.

Milk Fever

A property owner in the Darwin region reported two downer cows out of a herd of 12 *Bos taurus* cattle. The cows had been on the property for a few years, and there had been no recent management changes. The cows had had access to a bull. There was no supplement lick and there had been a number of recent storms. A cow was seen to be acting unusually, before being found down and then dead the next day. When a second cow was found down the regional Veterinary Officer and Livestock Biosecurity Officer were called to investigate.

On examination the cow was unable to move the legs or tail, and there was no deep pain response. There were no obvious signs of calving or trauma and the cow had a fever (40.2C). There were normal cow pats near the cow and no signs of struggling. The cow was euthanased for post mortem examination. Post mortem showed the cow to be in late pregnancy. There was significant bruising in the muscles and other tissue, the urine was dark and the kidneys enlarged. The calf was a bull calf, and the liver broke up more easily than expected. A range of samples were taken for lab testing, which showed low calcium (hypocalcaemia), muscle damage and breakdown of the liver.

Based on the findings of the post mortem and the samples collected, a diagnosis of milk fever was made. Milk fever is uncommon in the NT, and is generally associated with dairy cattle that produce a large quantity of milk; however, it can also occur in beef cattle. Milk fever is caused by low calcium in the blood; this causes a decrease in muscle function which can result in weakness, recumbency, depression and ultimately death. Pasture usually contains enough calcium to meet the minimal requirements of cattle, however a dramatic increase in calcium requirements occurs with the onset of lactation in the cow.

For this small managed herd the following recommendations were given and no further losses were reported:

- After joining, keep cows on a low calcium diet (ie. high in roughage and low in green feed) and make sure they don't become over fat.
- In the few weeks prior to calving, keep cows in a close paddock and observe them frequently. If down cows are noted and milk fever is suspected, consider administering a 3 in 1 or 4 in 1 vaccine treatment and contact a vet.
- Consider shortening the joining period so that approximate calving dates are known. This will make it easier to manage feeding and observation close to calving.

Tick Fever

Cattle ticks transmit organisms that cause tick fever, commonly known as 'red water' in cattle. Tick fever can result in loss of condition, mortalities, abortions and reduction in bull fertility. There are three types of tick fever organisms, *Babesia bovis*, *Babesia bigemina* and *Anaplasma marginale*.

Cattle that have been exposed to cattle tick at a young age build up lifelong immunity to these organisms, however, cattle from the tick free area that have never been exposed to cattle ticks will not have immunity. Cattle from the tick free area will require tick fever vaccination before moving in to a cattle tick infected area.

Clinical signs of tick fever

Signs of tick fever include:

- weakness
- depression
- sudden development of fever - temperature around 41° C (106° F). The fever stage usually lasts about a week.
- loss of appetite and rumination (chewing of cud) ceases
- The animal isolates itself from the herd; it is disinclined to move and stands with the head lowered and ears drooping.
- The coat may appear ruffled, breathing becomes rapid and jerky and heart beat is accelerated.
- The mucous membranes of the eyes, nose and mouth become yellow due to anaemia and jaundice.
- The animal exhibits incoordination of the hindquarters, muscle shivering and a tendency to charge when disturbed.
- Emaciation occurs.
- The animal passes red coloured urine.

Note: Most deaths occur in the third week, but may occur any time after 24 hours of infection. Death may be precipitated by exertion or excitement.

Despite the common name 'red water', red urine is only occasionally present and is seen late in the course of the disease. Cattle with *Babesia bovis* infections may be quite sick even if they do not show signs of anaemia and red urine.

Diagnosing tick fever

Tick fever is difficult to diagnose based on clinical signs alone. The best way to diagnose tick fever is through laboratory examination of blood smears.

Risk factors for tick fever

Breed

British and other *Bos taurus* cattle breeds are more susceptible to tick fever caused by *Babesia* organisms than Brahman (*Bos indicus*) breeds. Cross breeds (*Bos taurus* x *Bos indicus*) have intermediate susceptibility which will vary depending on the percentage of each breed type.

Both *Bos indicus* and *Bos taurus* breeds are highly susceptible to disease caused by *Anaplasma marginale*.

Age

There is a strong link between age and resistance with most outbreaks occurring in animals 18 to 36 months of age. Calves exposed to tick fever organisms between three to nine months of age rarely show clinical signs and develop a solid, long-lasting immunity.

Exposure

Cattle born and raised in areas where cattle ticks are endemic can develop natural immunity through exposure to ticks infected with tick fever.

However, exposure of calves to ticks infected with tick fever (and subsequent development of protective immunity) can be highly unpredictable. Exposure is influenced by factors such as breed, season and tick-control strategies.

Cattle from tick free areas should not be introduced into cattle tick infected areas without first receiving a tick fever vaccination. Ideally cattle will be vaccinated prior to nine months of age so they are set for later in life. The second best option is to ensure that cattle have been vaccinated at least two months prior to departure from tick free area to ensure that immunity has developed. If cattle need to be moved shortly after vaccination they should be moved either before day seven, or between days 21 to 30 after vaccination. This provides the less stress during the animals' peak reaction times.

Treatment

There are two types of tick fever vaccination, chilled trivalent vaccine and frozen trivalent vaccine. The more commonly used chilled trivalent vaccine is a live vaccine that contains strains of three tick fever parasites (*Babesia bovis*, *Babesia bigemina* and *Anaplasma marginale*). The frozen vaccine, also known as Combavac 3 in 1, is used in remote areas where it is not possible to get chilled vaccine delivered by the following day, or for properties where vaccine is needed to be kept on hand.

If used as directed, one dose of the live vaccines should provide lifelong immunity against all three parasites. The organisms in the vaccine multiply once injected in to the cattle, as would occur in a real life infection.

The organisms in the vaccine are less infectious, allowing for immunity to develop without mortalities or serious production losses.

Ordering the vaccine

You can order vaccine directly from the Tick Fever Centre, through your local veterinarian or rural agency.

Chilled vaccine

Chilled vaccine is only produced on Tuesdays and Thursdays. Orders are not accepted on the day of dispatch but must be in by 4pm the day prior (Monday or Thursday) to production.

Frozen vaccine

Frozen vaccine is dispatched on Fridays, so orders must be received by 4pm on Wednesday.

References

Business Queensland 2016, [Tick Fever Vaccines for cattle](#), Queensland Government, accessed 1 February 2019¹⁷

Department of Primary Industry and Resources 2016, [AgNote: Tick Fevers of Cattle](#), Northern Territory Government, accessed 19 February 2019¹⁸

¹⁷ www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/livestock/cattle/tick-fever-vaccines

¹⁸ https://dpiir.nt.gov.au/data/assets/pdf_file/0010/233488/713.pdf



NT WAYBILL – 28 DAYS

OBLIGATIONS OF THE OWNER OF THE LIVESTOCK

- 1. A copy of the waybill *must* be forwarded to the Department *within 28 days* after the date on which the waybill was issued.**
- 2. The owner *must* retain a copy of the waybill for at least 7 Years.**
- 3. At the request of an Inspector during that period - the owner *must* produce the copy to the inspector.**

NLIS REPORTING – 48 HOURS

NLIS REPORTING OBLIGATIONS FOR THE OWNER OF PROPERTY OF DESTINATION

- 1. The owner of the destination property *must* ensure the NLIS transfer is entered on the NLIS database *within 48 hours* after the movement is completed .**

If you are unsure or have any questions on any aspect of meeting your compliance obligations please contact your local livestock biosecurity officer.



Post mortem and disease investigation workshop



Figure 14. Recent disease investigation workshop

Veterinary officers Megan Pickering and Elizabeth Stedman from the Livestock Biosecurity Branch, delivered an interactive post mortem and disease investigation workshop for cattle producers in the Katherine Region. Hosted by the Riggs family at Lakefield Station on a blisteringly hot December day, the 24 participants eagerly engaged in the hands-on experience of sample collection and preservation in the field.

Commencing with a theory session, the workshop covered potential biosecurity threats to Australian pastoral industries, the various mechanisms in place to protect livestock, the response systems and combined government/industry approaches that would be taken in the case of an exotic or emergency animal disease incursion, and the role of the producer in on-farm biosecurity and early disease detection and reporting. Extreme climatic conditions and extensive grazing practices in northern Australia pose significant challenges to effective disease investigation options, and the option for producers to collect meaningful samples in the early phases of a disease outbreak was welcomed.

Two complete post mortems were then undertaken, where the practical aspects of tissue sampling were discussed around issues such as appropriate sample size, how to recognise normal versus abnormal tissues, tips and tricks on tissue handling to avoid excessive tissue damage or disruption in sample collection, and how to store, pack and dispatch both fresh and preserved tissues from the field.

At the conclusion of the workshop, participants from each station were presented with a sample collection kit. It is envisaged that such training will encourage and enable producers to confidently collect diagnostically meaningful samples in the early stages of a disease outbreak, which is a key factor in Northern Territory and Australian biosecurity preparedness strategies.

This workshop was funded by the Northern Australia Biosecurity Surveillance project through funding from the Australian Government Agricultural Competitiveness White Paper. The project is a collaboration between the Commonwealth and Queensland, Western Australia and Northern Territory Departments of Agriculture and Animal Health Australia.

Reminder



2018 Audit of NT Brands Register

Have you received the 2018 Audit of NT Brands Register form and Instructions?

Yes.

Have you completed the form as per instructions? and
Have you returned the form to LISA for processing?

No.

You must complete the Brands Audit form urgently.
If lost, please complete the attached by completing all
sections, sign & date, then return for processing.

Changes - If there are any changes to your Brands Registration
please write comments / notes on the Audit form so that the
appropriate paperwork can be sent to you.

For example -

Brand no longer being used - cancel brand, registered owner/s
changed (by marriage, death, company etc), Brand being used
on another proper/run etc

Please return Audit form via any of these options:

Email: adele.kluth@nt.gov.au or susan.gillis@nt.gov.au

Fax: 08 8999 2089 or 08 8973 9759 or 08 8962 4480

Post: DPIR, GPO Box 3000, Darwin NT 0801

Thank you for completing the 2018 Audit.

Various forms are available from our website
www.nt.gov.au/agriculture/livestock

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

Contact the Livestock Biosecurity team

Darwin

Regional Livestock Biosecurity Officer 08 8999 2034
Livestock Biosecurity Officer 08 8999 2030

Katherine

Regional Livestock Biosecurity Officer 08 8973 9767
Livestock Biosecurity Officer 08 8973 9765

Tennant Creek

Principal Livestock Biosecurity Officer 08 8962 4458
Livestock Biosecurity Officer 08 8962 4492

Alice Springs

Senior Field Veterinary Officer 08 8951 8181
Regional Livestock Biosecurity Officer 08 8951 8125

Department website: nt.gov.au/industry/agriculture/livestock

CALENDAR OF EVENTS



KRS field day
DDRF field day
AMIA Mango conference
Australian Banana Industry
Conference
Hort Connections Conference

[9 March 2019, Katherine](#)

[10 March 2019, Douglas Daly](#)

[14-17 May 2019, Darwin](#)

[22-24 May 2019, Gold Coast](#)

[24-26 June 2019, Melbourne](#)

Want to find more information?

NT.GOV.AU

Keep up to date with the latest information from the NT Department of Primary Industry and Resources

You can find hundreds of publications on our website. Check our publications page to search for information sheets and agnotes.

Can't find what you are looking for? Drop us an email and we will help you out.

Subscribe to our newsletters, Top Paddock, Katherine Rural Review, and Animal Health eNews to catch up on what we are doing, subscribe online here:

dpiir.nt.gov.au/primary-industry/primary-industry-publications/regional-newsletters

Our YouTube channel has a selection of "how to" videos on practical topics such as stock handling, grafting mangoes and date pollination. There are technical videos looking at measuring nitrous oxide emissions through to research updates.



Contact us:

Website: www.dpiir.nt.gov.au

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

Email: horticulture@nt.gov.au