Top Paddock

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

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Message from the editor

The prediction of a good early start to the Wet Season has come true for most of the Top End. While it has not been ideal for mango harvesting because of late flowering this year, it has been welcomed by pastoralists.

As with most years, the rainfall distribution has been variable. The rainfall maps on page 17 show Point Stuart has had triple its normal rainfall for the period, Darwin Airport and Douglas River are both up about 75%, Batchelor Airport is up 18%, while Adelaide River is down 19%. Let us hope the Wet Season keeps the promise going!

The editorial team wish readers a safe and happy break over Christmas.

Arthur Cameron and Paige Richter, Top Paddock's editorial team

Pastoralists to benefit from new detailed land use maps

Pastoralists will benefit from a new mapping project detailing the use of each plot of land in the Northern Territory.

“Pastoralists, fodder producers, farmers, industry groups, developers and many others will find uses for these new maps,” said Bob Williams, Director of Plant Industries Development with the Department of Primary Industry and Resources (DPIR).

The maps will show how much land—and which areas—are devoted to animal industries, horticulture, urban areas, Indigenous uses, forestry, animal industries, and more.

The mapping project will also assist biosecurity risk management and emergency disease preparedness. If a biosecurity incursion threatens a specific fodder crop, for example, all the areas where that crop is grown can be identified so DPIR can respond quickly.

Detailed mapping will inform decisions about regional development, private and government investment and sustainable and efficient use of soil and water. By better understanding existing production land uses, we can better understand further intensive agricultural development and sustainable use of resources to support potential new agriculture.

The Department of Environment and Natural Resources (DENR) is leading the project in collaboration with DPIR and NT Farmers. The nationwide project is funded by the Commonwealth Government’s Department of Agriculture and Water Resources in collaboration with the states and territories.

Project collaborator NT Farmers can add details including which crops are irrigated or which fodder crops are being produced on any particular plot.

This represents the first major update to the Territory’s land use maps in 10 years, and will contribute to a national land use picture of the NT’s 1.4 million square kilometres.

The project will align with the Commonwealth Government’s Stronger Biosecurity and Quarantine Initiative and the objectives of the National Landcare Programme according to project leader DENR, which brings extensive experience in mapping land resources to the project.

The maps will be freely available through the NRMaps web portal.

The project is due to be completed in June 2017.

Department participates in the Territory Natural Resource Management Conference

The 2016 Territory Natural Resource Management Conference, an event proudly sponsored by the Department of Primary Industry and Resources (DPIR), was held last week in Darwin with a strong department presence throughout the conference.

This year's theme 'Shaping the future of natural resource management' focused on innovative practices and collaborative projects to showcase and encourage real natural resource management change.

The department hosted a conference trade booth highlighting our agricultural diversification research, buffalo research program, Darwin Aquaculture Centre collaborative projects and legacy mines rehabilitation work.

The Darwin Aquaculture Centre hosted a field trip focusing on tropical rock oyster aquaculture development in Indigenous communities, shellfish quality assurance development and trepang aquaculture at the Warruwi community in Arnhem Land. Coastal Plains Research Farm and Plant Industries staff also hosted a field trip to build awareness of the importance of soil management and water for a successful horticultural industry in the Top End.

Participation from across the department continued throughout the three-day conference. 'Understanding soil nitrous oxide emissions from NT farms: Improving efficiency of nitrogen fertilisers' was presented by Mila Bristow, Principal Research Scientist, focusing on better understanding and management of nitrogen on farms.

Stuart Smith, Central Australian Horticulture Development Project Manager participated in the interactive poster sessions discussing 'Water with quality constraints: Can you still sustain plant industries in Central Australia?'

The Quality Graze Producer Steer Challenge in Central Australia was also a finalist in the 'Research in natural resource management' award category and received a highly commended accolade. Coral Allan from Arid Zone Research Institute (AZRI) attended the awards ceremony as part of the TNRM Gala Dinner on behalf of the team.

Access information on the department's presentations at the Territory Natural Resource Management Conference by contacting Mila Bristow via email: mila.bristow@nt.gov.au

Arthur Cameron talks about good soil and tropical grasses during the TNRM tour to Coastal Plains Research Farm

Consultation for vegetable strategic investment plan

Mila Bristow, Principal Research Scientist, Darwin

As part of the process for producing a new strategic investment plan for the vegetable industry, Horticulture Innovation Australia (HIA) and AusVeg met with growers and industry representatives at a workshop hosted at the NT Farmers Coolalinga office on Tuesday 8 November. The workshop allowed growers to have their say on where and how levy funding is spent.

The workshop began with introductions from HIA and AusVeg, describing how their organisations work before opening into a discussion on where the levy funding should be spent, the main challenges for growing vegetables in the Top End and what areas of research and development (R&D) growers would like to see investigated.

Some of the challenges to vegetable growing in the Top End that were discussed included:

- changes in biosecurity—there have been significant changes to biosecurity and farm hygiene practices over the last five years. The new practices have increased costs for farmers but commodity prices have not increased, so profits are constrained
- understanding export requirements—growers felt they need better interaction with export agencies and government to understand the protocols and market opportunities involved in exporting their products. The NT Government can help with this; if you want further information about export protocols, please visit http://micor.agriculture.gov.au/Plants/Pages/default.aspx

  Also, we are currently seeking to engage with industry on the export of Asian vegetables and pumpkin (as well as melons) to Singapore and pumpkin to Japan. Please contact Michael Daysh, DPIR, at michael.daysh@nt.gov.au or 8999 2300 to discuss this further
- labour—there is a greater need for more qualified people in all aspects of growers' enterprises
- water—growers are concerned about water security in the future. They would like to know how water will be managed if the vegetable industry is to expand in the future. There was also concern that metering water usage is the initial step to administering a cost on water

Some new R&D ideas offered from growers were:

- new varieties of snake bean and okra—there is a need for new selections to improve productivity
- soil health—growers would like to know more about the interaction of soil health with pest and disease. There was also concern for bore water nutrient composition and its impact on field grown vegetables and soil health
- biosecurity—ongoing questions of market entry and biosecurity issues
- hydroponics—growers are interested in how much water is required by a hydroponic system in the tropics and whether it is sustainable. They would also like more information on ideal management regimes for successfully growing hydroponic crops in the high temperatures of the Top End
- pollinators—biosecurity issues of invasive pests threatening our pollinators; and what more do we need to do to maintain healthy pollinators

There is still time to have input and NT Farmers are calling on all vegetable growers and industry representatives to provide feedback about the challenges they face in the industry and the areas for R&D they are most interested in. Please contact Greg Owens, NT Farmers, on 0437 082 551.

Are you interested in improved pasture?

With improved cattle prices many producers in the Northern Territory are looking at ways to improve production through improved pastures. The Department of Primary Industry and Resources (DPIR) is conducting a survey to better understand the needs of producers regarding improved pasture.

The aim of the survey is to identify knowledge gaps to allow researchers and extension staff to have a more targeted approach to developing improved pasture projects.

The survey can be found at https://www.surveymonkey.com/r/NTDPIRPASTURE

For further information please contact Callen Thompson on 8973 9724.

New export app

The Export Credit Agency and the Export Council of Australia have released an app designed specifically with new and less experienced small and medium exporters in mind. The first of its kind, Export Essentials, fills the export information gap for Australian small to medium enterprises, providing key details often overlooked by businesses when planning to export. From checklists and calculators, to understanding how to manage currency risk and export finance solutions, Export Essentials will help Australian SMEs understand how to take advantage of opportunities and develop export strategies.

Dimethoate chemical review in progress

Dimethoate (O,O-dimethyl S-methylcarbamoylmethyl phosphorodithioate) is an organophosphorus insecticide and acaricide used in agriculture and the home garden to control insects and mites.

The Australian Pesticides and Veterinary Medicines Authority (APVMA) has assessed the available information and concluded that the use of dimethoate according to its current instructions for use does not meet the safety criteria listed in sections 5A of the Agvet codes for continued registration and approval.

On 26 October 2016, APVMA published the 'Dimethoate proposed regulatory decision report: Volume 1' and 'Submissions and technical reports: Volume 2' for a consultation period of three months. You have the opportunity to comment on the proposed changes with submissions closing by COB Tuesday 27 January 2017.

The volumes can be downloaded from http://apvma.gov.au/node/12496

While some uses for crops have changed, the use of dimethoate in mangoes pre-harvest and post-harvest is unchanged from August 2011.

Panoramic view of Senior Research Leader Cameron McConchie applying a growth promoter spray to mangoes at Berry Springs

Inducing early flowering in mangoes

Amy Dobell, Technical Officer, Darwin

Mango trees require cool temperatures at the beginning of the Dry Season to induce flowering. This year the cooler weather took longer than usual to reach us; resulting in later flowering and thus later fruiting. This delay in cool weather allowed us to test the potential of growth promoting foliar sprays to initiate flowering. This technology could allow farmers to increase the reliability of their crop during years when weather conditions are not ideal.

Two experiments were conducted in a Kensington Pride mango orchard in Berry Springs. The first examined eight different growth inhibitor treatments to stop premature vegetative growth, which occurs in response to the lack of cool weather. Vegetative growth at this time further delays flowering even after the cool weather finally arrives. The second experiment examined six treatments of growth promotors that targeted bud break and early flowering prior to the late arrival of cool weather.

This year's work indicates that the growth promoting foliar sprays worked only on certain parts of the trees. The most exposed parts of the canopy did not respond to any treatment, and flowering between the trees, in the cooler and less exposed canopy positions, had the strongest response to treatments.

This may indicate that there is a high temperature inhibition as well as a low temperature requirement for flowering. We also found that the conventional use of potassium nitrate was almost ineffective in triggering flowering during these periods of high night temperatures. Where there was a response to the growth promoting treatments, it occurred rapidly with growth after one week and flowers within two to three weeks.

These results demonstrate that specific floral promoters are able to initiate flower growth at temperatures when mango trees would not normally flower. With further work this could open the opportunity for mango production to occur from June all the way through to December.

Plant growth regulators evaluated in promising aromatic rice cultivars

Constancio Asis, Senior Research Agronomist and Nick Hartley, Senior Technical Officer, Darwin

Rice is an important crop for inclusion in diversified cropping systems in the Northern Territory. To develop a profitable rice industry, the Plant Industry Development Group of the NT Department of Primary Industry and Resources has been conducting trials at Tortilla Flats to identify aromatic rice cultivars suitable for the Top End. Aromatic rice commands higher prices in the local and international rice market and thus may provide higher financial returns to growers.

Nick Hartley applying plant growth regulator to rice at Tortilla Flats

Some of the promising aromatic rice cultivars grown under Tortilla Flats soil conditions are susceptible to lodging (falling over after a strong wind or heavy rainfall event). The agronomic character that contributes to lodging in these cultivars is their taller plant height. This problem needs research attention as plant lodging before harvest results in inefficient mechanical harvesting, low yield and poor grain quality, which in turn, reduces market price and profit.

Recently, several plant growth regulators (PGRs) have been applied in a number of agricultural and horticultural crops to modify growth, increase yield and improve yield quality. A PGR is an organic compound, natural (hormone) or synthetic, which changes plant growth and development when present or applied in small amounts.

Trinexapac-ethyl (TNE) and prohexadione-calcium (PHC) are family members of acylhexanedione PGRs that are now applied on temperate cereals. These PGRs reduce vegetative growth by blocking gibberellin biosynthesis, the hormone mainly responsible for controlling stem elongation. However, information on the use of TNE and PHC in reducing plant height and lodging resistance of aromatic rice is lacking and these PGRs are not registered for rice in Australia.

We are conducting a field trial to determine the effect of commercially available PGRs on the growth and yield of promising aromatic rice cultivars. The treatments were application of PGR TNE or PHC on rice cultivars Basmati and Kyeema. A treatment with no PGR application served as control. PGRs were sprayed 35, 45, and 55 days after emergence at label rates.

Data obtained 30 days after the last PGR application showed that tiller number per linear meter was similar between cultivars but higher in plots applied with PGR. Without PGR application, Basmati plants were taller than Kyeema but their plant height was significantly reduced, similar with application of either of the PGRs (Figure 1, below). These results indicate that PGR not only effectively reduced plant height, but also induced the plants to produce more tillers. We are still monitoring the experiment through to harvest to determine the effect of these PGRs on grain yield.

Further studies will be conducted to determine the best time and amount of PGR application for these aromatic rice cultivars. We will also determine whether PGR will enhance nitrogen use efficiency of the crop. It is hoped that this research will enable us to formulate recommendations for improving lodging resistance of aromatic rice.

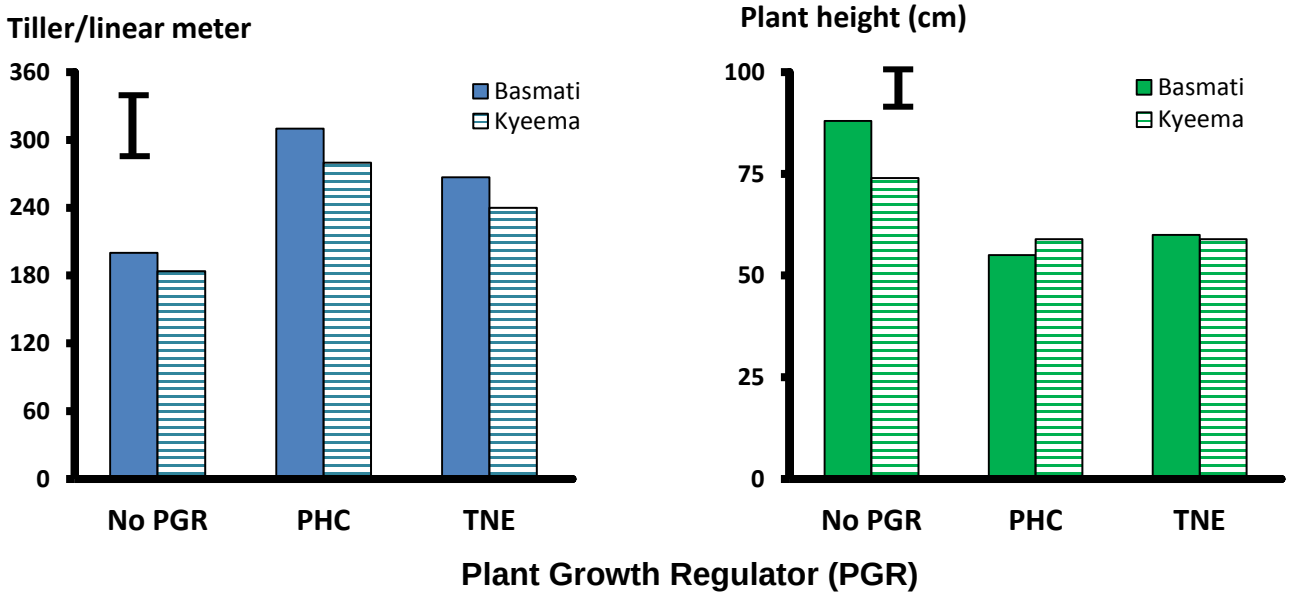


Figure 1. Plant population (tiller number per linear meter) and height (cm) of aromatic rice cultivars 30 days after last application of PGR prohexadione-calcium (PHC) and trinexapac-ethyl (TNE) at Tortilla Flats, Northern Territory, 2016. Bars indicate LSD at 5% level of significance

Cool season production of tropical grasses

Arthur Cameron, Principal Pastures Agronomist, Darwin

There is interest in growing fodder under irrigation during the Top End Dry Season to supply live cattle export yards and cubing/pelleting plants with hay.

Tropical grasses generally do not grow well under irrigation during the cooler months of the year in the Top End of the Northern Territory. Sugargraze Forage sorghum (*Sorghum* sp) and Finecut Rhodes grass (*Chloris gayana*) have been shown to produce commercial yields of 25 to 35 tonnes per hectare per year at Douglas Daly Research Farm (DDRF). Both of these options for fodder production under irrigation have limitations. The Forage sorghum generally needs to be resown every year to maintain a productive stand. In the Top End, the Finecut Rhodes grass is not liked by cattle as a fodder, and it has a high tensile strength, which makes it difficult to grind and make into fodder cubes and pellets.

There are a number of other tropical grasses which have cold tolerance, and may be suitable as alternatives to Forage sorghum and Finecut Rhodes. The cool season growth of seven other tropical grasses is being compared with that of Finecut Rhodes at Coastal Plains Research Farm (CPRF) to select one or more cultivars which have equivalent or better cool season growth and/or better acceptance by cattle and better grinding characteristics.

Seven of the grasses were sown by seed in December 2014. The eighth grass, Strickland Finger grass, was planted by runners in February 2015. The grasses planted and the first year's yield results are presented in

Table 1 (below). The establishment was good except for the Premier Digit grass which was attacked by Crab grass leaf beetle larvae. While Strickland finger grass and Premier digit yields were lower overall, the yields were similar for all of the grasses at the final harvest

The trail continued this year to get a full dry season's results. Samples from each harvest will be submitted for nutrient and quality analysis.

Grass	DM kg/ha (2015)					Total DM Kg/ha
	6 May	25 Jun	11 Aug	29 Sep	17 Nov	
Finecut Rhodes	5980	5500	3000	6900	7080	28450
Gulfcut Rhodes	6980	4720	2690	7350	6990	28720
Reclaimer Rhodes	7730	4990	2850	6570	7500	29640
Premier digit	940	1540	2110	4940	7120	16640
Strickland finger grass	4690	4360	2450*	6030	6770	24370
Gatton panic	7340	6510	2230	4930	6340	27350
Nucal panic	8980	4630	3590	6538	7880	31320
Splenda setaria	9280	5870	2290	6210	6320	29980
Mean	6490	4760	2660	6180	7000	27100

*Table 1. First year yield results. *Strickland finger grass yield was decreased by selective grazing by wallabies prior to the 11 August harvest*

The plots were cut and cleared off on 23 February 2016, then fertilised. The irrigation was turned on to water the fertiliser in, and left turned on because of the low rainfall wet season. Results to date for 2016 are presented in Table 2 (below).

Grass	DM kg/ha (2016)					Total DM Kg/ha
	6 April	31 May	26 July	13 Sep	25 Oct	
Finecut Rhodes	3850	4520	5800	6500	2480	23140
Gulfcut Rhodes	3590	4990	6830	5950	1830	23190
Reclaimer Rhodes	4060	5120	6280	6730	2280	24470
Premier digit	4110	3130	3240	3820	4040	18330
Strickland finger grass	4790	3710	3820	4270	3520	20110
Gatton panic	4370	3950	3910	4180	2840	19250
Nucal panic	6380	4020	4780	5630	6150	26950
Splenda setaria	2720*	4920	4910	3620	4370	20550
Mean	4230	4300	4950	5090	3440	22000

*Table 2. Second year yield results. *Splenda setaria yield was reduced because it was set back when the plots were sprayed for broadleaf control with metsulfuron methyl/2,4-D amine*

At the clearing cut, the site was dry. Nucal clearly had the best yield, estimated at 5 tonnes/ha, with the rest about the same yield except for the 2 Digitarias, which were slightly lower.

The Rhodes grasses lost an estimated 10 to 15% of plants following this clearing cut. There was no apparent mortality in the other five grasses.

Please note that the dry matter yields presented here are at 0% moisture. Hay generally is about 12% moisture, so hay yields would be that much higher.

One of the impressive Nucal plots at Central Plains Research Farm on 26 October 2016

At the harvest on 13 September, some of the grasses were displaying symptoms of potassium deficiency, so the potassium application for the final period was doubled.

At the final harvest it was noticeable that the plant populations in most of the Rhodes grass plots and in the Gatton panic had declined. This is reflected in the yields from the final harvest.

The two-year total yield is presented in the Table 3 (below).

Grass	Total DM 2015 Kg/ha	Total DM 2016 Kg/ha	Total DM over both years Kg/ha
Finecut Rhodes	28450	23140	51600
Gulfcut Rhodes	28720	23190	51900
Reclaimer Rhodes	29640	24470	54100
Premier digit	16640	18330	34970
Strickland finger grass	24370	20110	44480
Gatton panic	27350	19250	46600
Nucal panic	31320	26950	58570
Splenda setaria	29980	20550	50530
Mean	27100	22000	49100

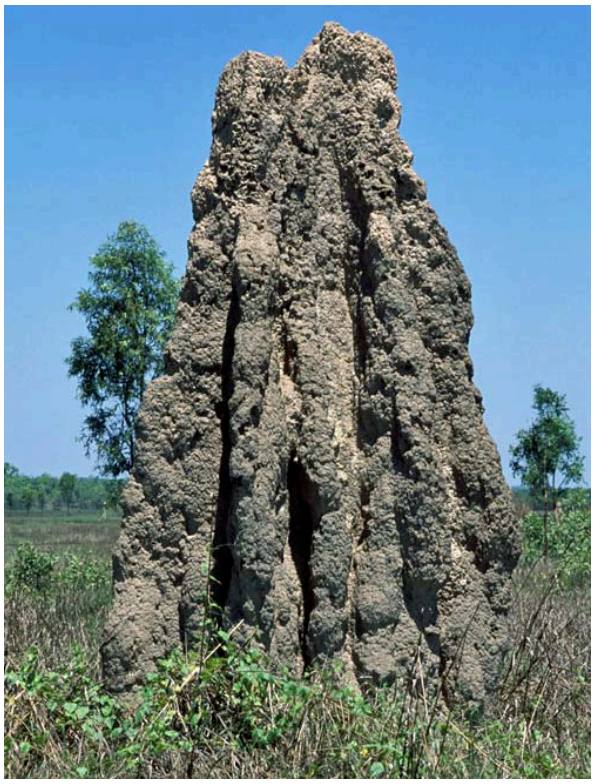
Table 3. Total yield over the two years.

Overall, the yields of all the grasses were satisfactory. The annual yield for 2016 was five tonnes lower than 2015. This was because the first cut in 2016 was only a clearing cut, as the trial was not fertilised but managed to produce a hay cut by February. The highest yield was Nucal panic at 58 tonnes followed by Reclaimer Rhodes at 54 tonnes.

Good termites and bad termites

Michael Neal, Senior Technical Officer, Darwin

Termites live in complex, highly organised social groups inside nests which are either above or below the ground. These nests can be free standing mounds or inside a tree. Each colony consists of several casts: A king, queen (or in some species more than one queen), soldiers who protect the colony and workers whose job is to maintain the nest and collect food to feed the young, soldiers and the reproductives. Colony size depending on the species can range from a few hundred individuals up into the millions.



Cathedral termite mounds (built by the Nasutitermes *species) are a common site across northern Australia*

The benefits of Termites

There are more than 2,800 species in the world. Of these, Australia has around 263 species and in northern Australia we have close to 140 species. All of these are beneficial to the natural environment as they are responsible for removing fallen tree limbs, leaf litter and some grasses from the forest floor. This helps reduce the fuel load for fires. Also, their many foraging galleries in the soil allow nutrients and water to move down through the soil profile, supplying much needed nutrients for our native plants.

Mastotermes *alates. These are the primary reproductives that leave the colony on dispersal flights during the early storms to mate and establish new colonies. Only a small number manage to establish a new colony and the rest become an important food source for many birds and reptiles*

Pest species

The main problem species for industry and in the home garden in the Top End are *Mastotermes darwiniensis* and *Microcerotermes* spp. Both of these will feed on live trees. Although *Microcerotermes* is found building conical shaped mounds up against trees and palms, it is rare for them to kill a mature plant. *Mastotermes* is a different story, inhabiting the trunks and root crown of trees. There are very few plant species that they won't attack and in most cases, if not managed, inevitably the plant will be severely damaged or die.

Mastotermes *workers and some reproductives*

Microtermes *workers and soldier*

If you are interested in developing a management strategy for termites on your farm, please contact Senior Technical Officer Michael Neal on (08) 8999 2326 or michael.neal@nt.gov.au

Predicting heifer pregnancy rates from pre-mating weights

Tim Schatz, Beef Production Research Officer, Katherine

There is a strong relationship between weight/body condition and pregnancy rates in heifers at both their first (maiden) and second (first lactation) matings. Generally when heifers are heavier or in better condition they have higher pregnancy rates. Due to the strong relationship between pre-mating weight and pregnancy rate, it is possible to develop models that predict pregnancy rates from pre-mating weights and to set target mating weights that will ensure good pregnancy rates. These can be used to make management decisions and to do cost-benefit analyses of strategies that aim to increase re-conception rates through increasing pre-mating weights.

Research conducted with commercial Brahman heifers at Victoria River Research Station (VRRS) and Douglas Daly Research Farm (DDRF) has established the relationship between pre-mating weight and pregnancy rates for several different situations (Figure 1, right). The different situations represented by the relationships in Figure 1 are when heifers are first mated at two years old and pre-mating weight is recorded in Oct/Nov, for two-year-old heifers when weight is recorded in late December, and for yearling mated heifers when weight is recorded in late December.

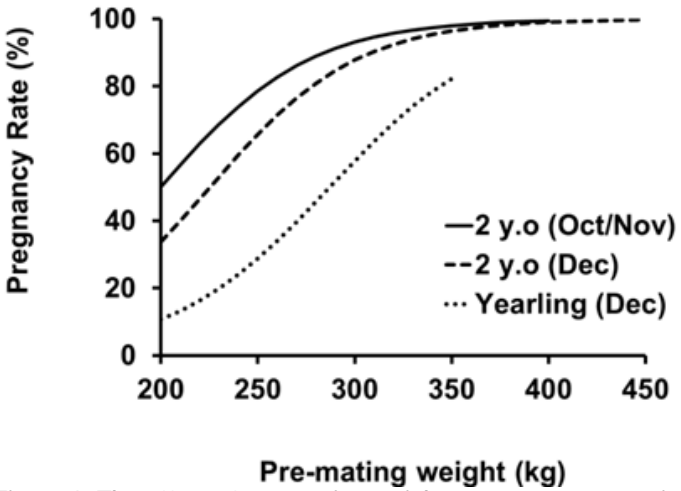


Figure 1. The effect of pre-mating weight on pregnancy rate in maiden Brahman heifers

From these relationships, tables have been produced that show the predicted pregnancy rates for Brahman heifers at different pre-mating weights. These tables are useful tools for managers of Brahman heifers in northern Australia. They can be used to identify target weights for different situations, and to predict the number of calves likely to be produced by groups of heifers, which will be useful for budgeting and assessing the profitability of different management strategies or scenarios.

However it should be noted that there are a number of things that can affect the weight recorded for heifers and the relationship between pregnancy rates and pre-mating weight. These things should be taken into account when using these tables. Some of these things are:

Gut fill: If heifers are weighed straight after mustering then they will have more gut fill than heifers that have been in the yards overnight (or for several days). On average the difference in weight after an overnight curfew (12 hours) without feed or water is usually 7% (which equates to about 20 kg in a 280 kg heifer) although individual animals vary around this average.

Time of year when heifers are weighed: Often it is convenient to weigh heifers before the wet season (eg. October) for practical reasons, but many pre-mating weights quoted in research papers are actually recorded at the start of mating (usually in January). Usually rain falls between these times and heifers can grow considerably so a heifer weighed in October may be more than 30 kg heavier by the time mating actually starts in January.

Age of heifers: While weight is the most important factor affecting pregnancy rates, there is an interaction with age where younger heifers usually have lower pregnancy rates at the same weight as older heifers. For example, heifers which grow faster and are mated as yearlings usually have lower pregnancy rates than heifers joined at the same weight as 2 year olds. Note - This applies more to Bos indicus heifers than Bos taurus heifers.

The growth that occurs during mating: Heifers that grow more during mating are likely to have higher pregnancy rates than heifers that don't grow as much (as they will reach heavier weights during the mating period). For example if there is a poor wet season and/or the stocking rate is too high then heifers that only grow 50 kg over a wet season will have lower pregnancy rates than heifers that had the same pre-mating weight but grew 120 kg over the wet season.

Brahman cattle

So when someone says that their heifers have a pre-mating weight of 275 kg we need to know more information about that weight to properly understand what it means. For example, was it recorded after a curfew or straight after mustering? Was it recorded in October or January? Because a heifer weighing 275 kg at the start of mating in January without a curfew probably weighed about 228 kg if weighed after a curfew in October (if it grew 30 kg between Oct and Jan and lost 7% of its weight during the curfew).

So understanding these things, the tables below can be used for heifer management, planning and budgeting. To use the tables find the PM Wt column that best suits your situation eg. if you weigh your heifers in October after they have been in the yards overnight then use the first column. Read down the column to find the average weight of your group of heifers and then read across to the Predicted pregnancy rate column to find the pregnancy rate predicted for that weight.

PM Wt (kg) Oct/Curfew	PM Wt (kg) Oct/No curfew	PM Wt (kg) Dec/Curfew	PM Wt (kg) Dec/No curfew	Predicted Pregnancy rate (%)
200	215	226	243	50
210	226	236	254	57
220	237	246	264	63
230	247	256	275	69
240	258	266	286	74
250	269	276	297	79
260	280	286	307	83
270	290	296	318	86
280	301	306	329	89
290	312	316	340	91
300	323	326	350	93
310	333	336	361	95
320	344	346	372	96
330	355	356	383	97
340	366	366	393	98
350	376	376	404	98

Table 1. Predicted pregnancy rates for 2 year old maiden Brahman heifers when grazing on native pasture. (The average growth over the wet season = 105 kg and growth from Oct to 20 Dec = 26 kg)

PM Wt (kg) Dec/Curfew	PM Wt (kg) Dec/No curfew	Predicted Pregnancy rate (%)
186	200	11
195	210	13
205	220	16
214	230	20
223	240	24
233	250	29
242	260	34
251	270	40
260	280	46
270	290	52
279	300	58
288	310	64
298	320	69
307	330	74
316	340	78
326	350	82

Table 2. Predicted pregnancy rates for yearling Brahman heifers when grazing on improved pasture. (3.5 month period mating from 20 Dec to end of March. The average growth from weaning to the end of mating = 102 kg)

Predicting pregnancy rates from weights in first lactation heifers

When it comes to predicting pregnancy rates from weights in first lactation heifers (ie. re-conception rate after first calving) the other factor to take into account when evaluating pre-calving weights is whether the weights have been corrected for the weight of the pregnancy. Most weights quoted in research papers have been corrected for stage of pregnancy as the weight of a pregnancy (including the foetus/calf, fluid, membranes and placenta) varies greatly depending on how advanced the pregnancy is. For example, a two month pregnancy weighs two kg while a nine month pregnancy weighs 59 kg. Note that the weight of the pregnancy is lost at calving, so it is not actually part of a heifer's body weight and does not reflect her body reserves.

It is best to measure pre-calving weights a couple of months before calving so that the heifers are not stressed in late pregnancy and don't calve while being handled. Also many producers are not familiar with correcting pre-calving weight for stage of pregnancy, therefore in addition to weights that have been corrected for stage of pregnancy Table 3 (over page) shows the predicted pregnancy rates from different weights when heifers are weighed about two months before calving (eg. in August).

So Table 3 shows the pregnancy rate for weights that have either been curfewed/not curfewed and corrected/not corrected for stage of pregnancy. Where weights have not been corrected for stage of pregnancy it is assumed that heifers are weighed about two months before calving and so most heifers are around seven months pregnant at the time of weighing (when the weight of the pregnancy would be about 30 kg).

PM Wt (kg) Corrected Curfew	PM Wt (kg) Corrected No curfew	PM Wt (kg) 7 Months preg. Curfew	PM Wt (kg) 7 Months preg. No curfew	Predicted Pregnancy rate (%)
260	280	290	312	6
280	301	310	333	8
300	323	330	355	11
320	344	350	376	15
340	366	370	398	21
360	387	390	419	28
380	409	410	441	35
400	430	430	462	44
420	452	450	484	53
440	473	470	505	62
460	495	490	527	70
480	516	510	548	78
500	538	530	570	83
520	559	550	591	88
530	570	560	602	90

Table 3. Predicted re-conception rates (by weaning) for Brahman first lactation heifers when grazing on native pasture. The pregnancy rate is shown for weights that have either been curfewed or not curfewed, and corrected for stage of pregnancy or not. Where stage of pregnancy has not been corrected for, the weights are shown for a 7.4 month pregnancy

These tables can be used to identify target mating weights for different situations, and to predict the pregnancy rates likely from groups of heifers which will be useful in budgeting and to assess the profitability of different management strategies.

Example: *A manager wants to know whether a supplementary feeding program that is designed to increase the pre-calving weight of his first calf heifers by 40 kg will be profitable.* To determine this he can use Table 3 to find out how much the re-conception rates will be increased by when the pre-calving weight is increased by 40 kg. If the heifers are due to start calving in October and he weighs them in August straight after mustering them and does not know how to correct for stage of pregnancy then he should use the 4th column in Table 3. If their weight is likely to be 440 kg at this time without feeding then they are likely to have a re-conception rate of about 35%. If they were 40 kg heavier, they would likely have a re-conception rate of 52%. So the feeding program is likely to give an extra 17 pregnancies per 100 heifers fed. If we value a weaner at $630 (ie. 180 kg x $3.50 per kg) then the benefit of feeding 100 heifers is $10,710. This can be compared to the cost of feeding 100 heifers to determine whether the strategy is cost effective.

Predicting pregnancy rate from body condition score

If heifers cannot be weighed prior to calving then it is possible to predict pregnancy rate from pre-calving body condition score (BCS).

Pre-calving BCS (1-5 system)	Pre-calving BCS (1-9 system)	Pre-calving Weight (kg)	Predicted Pregnancy Rate (%)
1 (poor)	2	335	12
2 (backward)	4	395	30
3 (moderate)	5	450	55
4 (forward)	7	510	77
5 (fat)	9	570	90

Table 4. The predicted pregnancy rates for Brahman first lactation heifers in different pre-calving body condition scores

Ionomics and compositional data analysis

Constancio Asis, Senior Research Agronomist, Darwin

Ionomics is the study of the ionome—the mineral component of plant and soil ecosystems. Ionomics can be used to determine changes in mineral composition in response to physiological stimuli.

Since ionomic data has units in percentages, parts per million or milligram per kilogram, it is considered compositional data. Compositional data is the quantitative description of the parts making up a whole and can be further expressed as proportions, concentrations and fluxes of properties. It is the type of data most commonly collected in ecology and agronomy. However, statistical analysis of compositional data is potentially biased, often leading to conflicting interpretations.

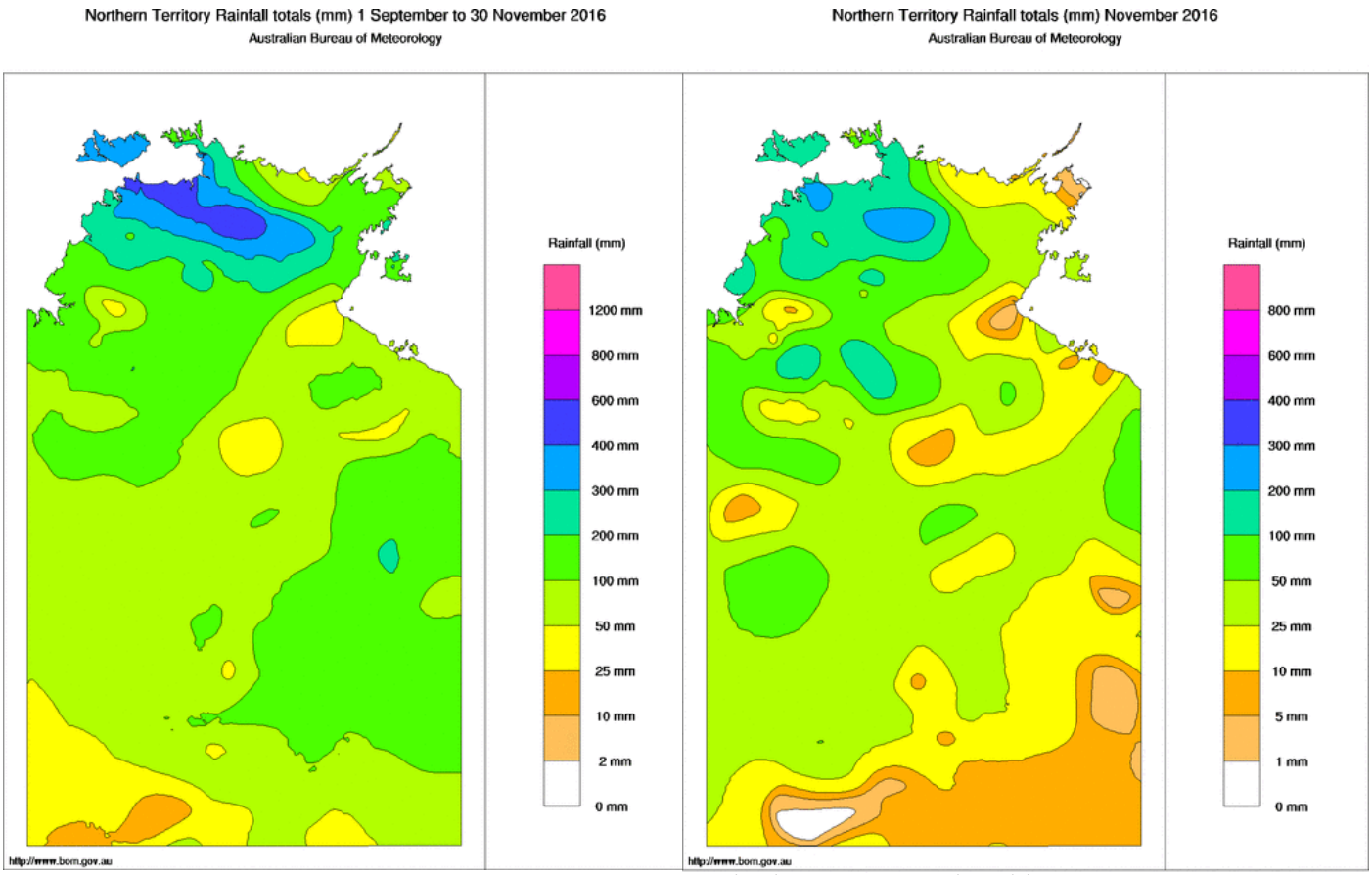
I attended a training course on 4-8 July at the University of Girona in Spain, to learn how to analyse compositional data using the free software 'CoDaPack'. The training was conducted by the Research Group in Compositional Data of the University of Girona and consisted of lectures, laboratory sessions and case study presentations. There were 11 participants from Australia, Canada, China, Colombia, Denmark, Italy and Spain.

The training provided me with the theoretical and practical aspects of statistical analysis for compositional data. This is a valuable skill for analysing nutrient balances of mango trees. DPIR will be working with leading local mango growers to investigate whether this approach will improve nutrition management in local mango orchards. It may also have applications in other horticultural crops in the Northern Territory.

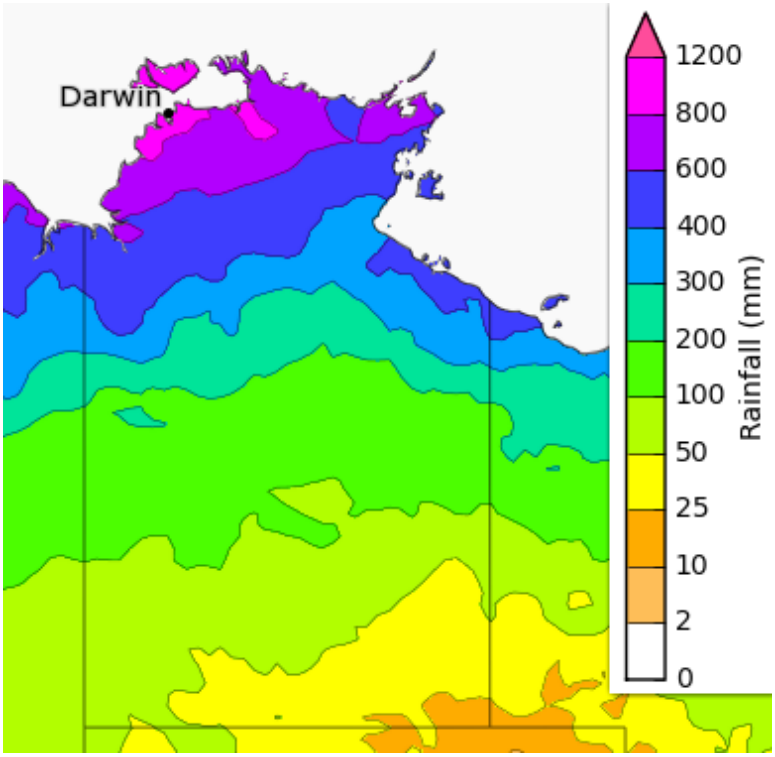
For more information, material and ideas about compositional data analysis, please visit the CoDaWeb website, maintained by the Research Group in Compositional Data, at http://www.compositionaldata.com/

Researchers whose interest goes from real case studies to the mathematical foundations of compositional data are welcomed to join the website forum. The CoDaPack software can be downloaded from http://ima.udg.edu/codapack/

Rainfall maps for the Northern Territory



Rainfall maps for the Northern Territory for September–November (left) and November (right) (Image source: Australian Bureau of Meteorology)



Rainfall outlook for the Northern Territory for December–February. These totals have a 75% chance of occurring (Image source: Australian Bureau of Meteorology)

NORTHERN TERRITORY GOVERNMENT

Pastoral Market Update

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

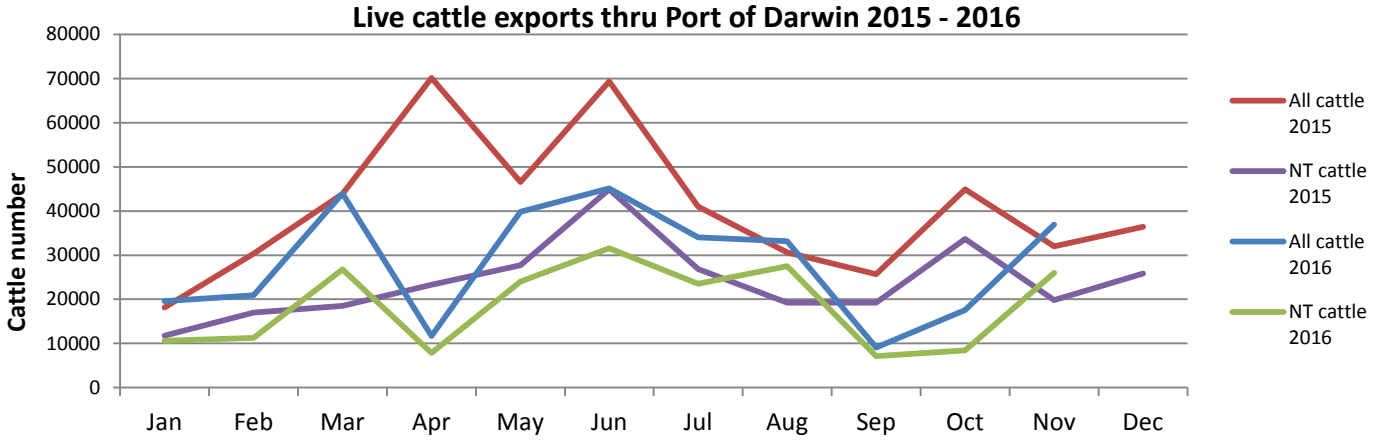
Live Cattle Exports via Darwin Port – NOVEMBER 2016

Please note: figures are for cattle exported through the Port of Darwin only; some NT cattle are exported through interstate ports.

Destination	Export of ALL CATTLE (including interstate) from Darwin Port							Export of NT CATTLE from Darwin Port (estimate only)						
	2014	2015	Last year to 30/11/15	YTD to 30/11/16	NOV	Last month	*Difference*	2014	2015	Last year to 30/11/15	YTD to 30/11/16	NOV	Last month	*Difference*
Brunei	4,925	4,122	3,249	3,379	**0**	**0**	0	4,925	2,069	1,450	2,314	**0**	**0**	0
Indonesia	386,183	341,759	311,704	257,176	**34,151**	**17,582**	16,569	251,232	197,155	175,816	167,426	**24,042**	**0**	24,042
Philippines	16,080	23,611	21,561	4,697	**0**	**0**	0	11,221	13,559	12,103	3,236	**0**	**0**	0
Sabah	0	0	0	0	**0**	**0**	0	0	0	0	0	**0**	**0**	0
Sarawak	0	300	300	1,220	**0**	**0**	0	0	0	0	843	**0**	**0**	0
Malaysia	22,309	11,503	11,503	10,959	**1,105**	**0**	1,105	15,708	7,499	7,499	7,476	**778**	**0**	778
Vietnam	64,461	100,119	96,682	31,737	**1,644**	**0**	1,644	41,391	63,998	61,558	21,483	**1,157**	**7,158**	-6,000
Egypt	0	0	0	0	**0**	**0**	0	0	0	0	0	**0**	**0**	0
Thailand	0	6,154	6,154	0	**0**	**0**	0	0	3,610	3,610	0	**0**	**0**	0
Cambodia	0	0	0	2,766	**0**	**0**	0	0	0	0	1,936	**0**	**0**	0
TOTAL	**493,958**	**487,568**	**451,153**	**311,934**	**36,900**	**17,582**	19,318	**324,477**	**287,892**	**262,037**	**204,714**	**25,978**	**7,158**	**18,820**

November at a glance

- 36,900 cattle through the Darwin Port during November; 19,318 more than last month and 4,888 more than in Nov last year.
- 25,978 NT cattle through the Darwin Port during November; 18,820 more than last month and 6,130 more than in Nov last year.



OTHER LIVESTOCK EXPORTS VIA DARWIN PORT

Includes NT and interstate stock.

Destination	Buffalo		Goat		Camel	
	YTD	NOV	YTD	NOV	YTD	NOV
Brunei	599	**0**	0	**0**	0	**0**
Indonesia	0	**0**	0	**0**	0	**0**
Philippines	0	**0**	0	**0**	0	**0**
Sabah	0	**0**	0	**0**	0	**0**
Sarawak	0	**0**	0	**0**	0	**0**
Malaysia	1,212	**372**	0	**0**	0	**0**
Vietnam	3,981	**300**	0	**0**	0	**0**
Egypt	0	**0**	0	**0**	0	**0**
Thailand	0	**0**	0	**0**	0	**0**
Cambodia	0	**0**	0	**0**	0	**0**
TOTAL	**5,792**	**672**	**0**	**0**	**0**	**0**

NT CATTLE MOVED INTERSTATE

Destination	Number
NSW	1,902
QLD	13,215
SA	6,393
VIC	1,249
WA	1,288
Total	**24,047**

NATIONAL CATTLE PRICES

www.mla.com.au/prices-and-markets

CURRENCY EXCHANGE RATES

www.oanda.com/currency/converter

Total Cattle, Port of Darwin								NT Cattle, Port of Darwin							
2008	2009	2010	2011	2012	2013	2014	2015	2008	2009	2010	2011	2012	2013	2014	2015
364,944	347,314	295,605	269,617	246,990	359,616	493,958	487,568	295,539	304,818	272,749	253,797	234,249	308,784	324,477	287,892

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