ReefSafe grazing project

Final activity report — June 2014

This publication has been compiled by Bernie English of Animal Science, Department of Agriculture, Fisheries and Forestry.

Contents

Water sampling in the Upper Herbert River and increased awareness of baseline sediment

Water sampling

This was the third and final wet season on the Wet Coast and Tablelands where we conducted water sampling across six sites.

We had three major rainfall events this year, with the break of season rainfall in late November–early December 2013. The second major rainfall event and water sampling activity was at the end of January–beginning of February 2014. The last major rainfall event coincided with Tropical Cyclone Ita, 11–12 April 2014 (see Image 1).

We had good sampling from the producer co-operators for the first two major rainfall events, but the end of catchment sampling for the Cyclone Ita event wasn't as thorough as required due to the producer being away and roads being cut, which prevented our team from sampling. Year one and two sampling results have been published by Terrain, titled *Reef Plan Herbert Water Quality Monitoring Program (May 2014)*.

Results from the first two wet season's samplings have been presented at the Malanda Beef Plan Group's annual Field Day in August 2013—by Mike Nash—and at an Upper Herbert beef producer forum at Gunnawarra in late April 2014—by Bernie English.

This Herbert River project's aim is to improve the water quality entering the Great Barrier Reef. The main pollutants of concern are sediment, nutrients (nitrogen and phosphorus) and pesticides. Specific water sampling sites were selected to enable identification of pollutant sources.

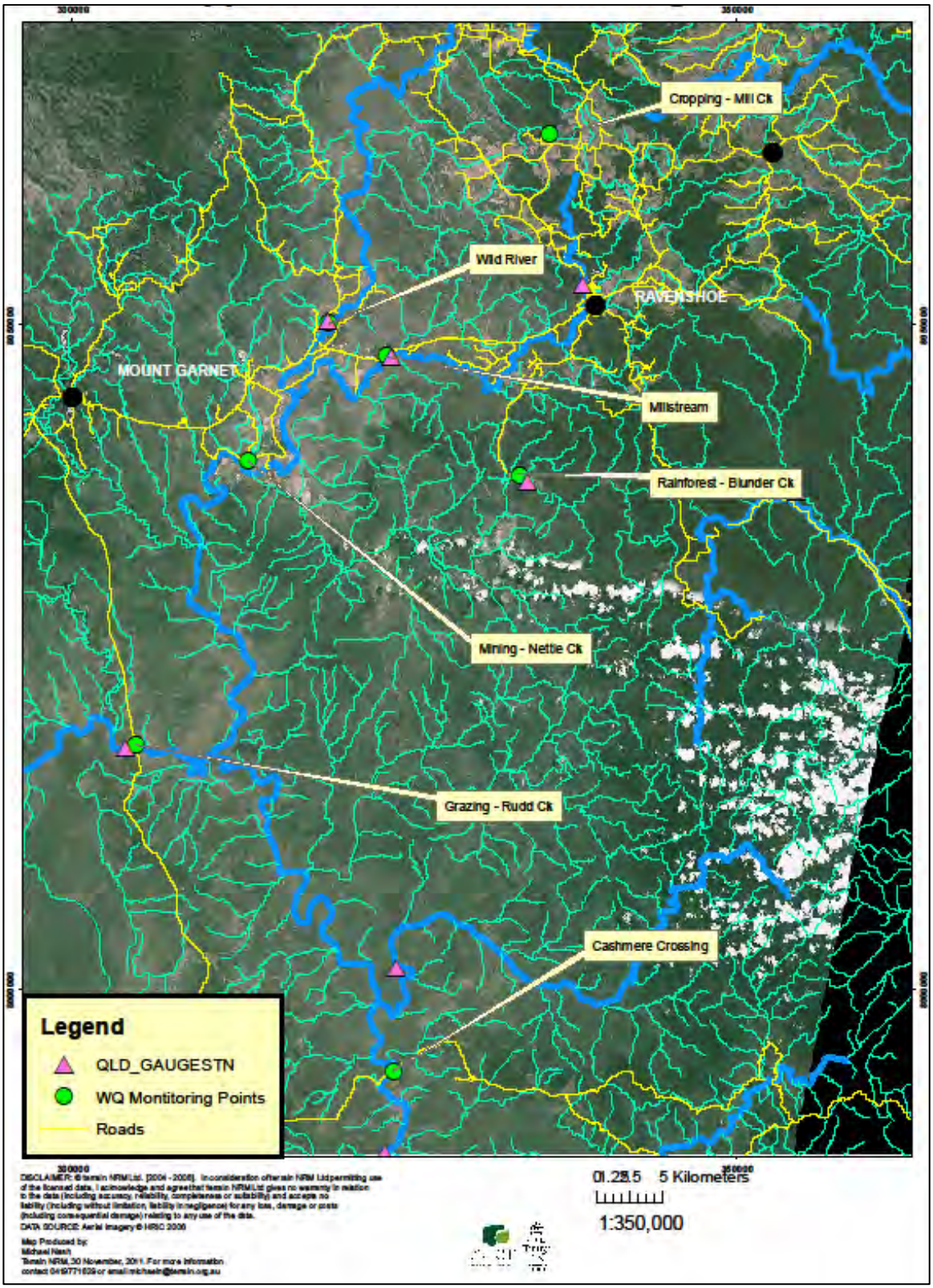
Our sampling (seven sites) covered the Upper Herbert only and the sites selected targeted run off from (see Image 2):

- mixed cropping farms (potatoes, maize, avocados);
- mining tailings dams;
- extensive dry grazing; and
- rainforest.

The water sampling process and its results have been carried out in consultation with all interested rural businesses. It is hoped this process of engagement will more readily lead to on ground practice changes, where needed, to improve water quality. At this point in time no specific results of the water sampling can be released until they have been discussed with the relevant rural businesses.

Image 1: The Herbert River during and after the Cyclone Ita rainfall event.

Image 2: Upper Herbert WQ monitoring sites.



Increasing awareness of serious weeds on the Tablelands and Wet Coast

Run a paddock walk/info day

The Wet Coast–Atherton Tablelands area has over 800 beef producers, with total cattle numbers of over 140,000 head turning off approximately 40,000 head per year to various markets. The average property size is around 140ha, which requires most producers to have a day job to supplement their income, or they are retired people looking for a relaxed lifestyle.

Many of these producers are new to this district—especially since the deregulation of the dairy industry—and are foreign to the numerous production issues of the district, including recognising serious weeds.

Navua sedge is the most serious weed we have ever encountered in Wet Coast and Atherton Tablelands improved pasture areas. It has an invasive nature (with seed viability of five years), aggressive growth habits, and is easily spread via cattle, wildlife, machinery and flood water. Navua sedge is causing serious problems with all livestock producers.

The local shire council has been responsible for spreading the sedge throughout the shire with their slashers, graders and other equipment. Our team has supported the Malanda Beef Plan Group in a series of meetings with local government officials to organise a coordinated approach to control and minimising the spread of this weed. The Tableland Regional Council donated $5,000 to the Malanda Beef Plan Group to publish a weed brochure. Mareeba's Future Beef team coordinated the photos, design and publication. The brochure will be especially valuable to any new producers in recognising weeds of significance in their area, especially Navua sedge (see Image 3).

Image 3: Weed brochure.

Five newspaper articles have been published to raise community awareness of Navua sedge. One of the articles is shown at Image 4.

Image 4: North Queensland Register article, December 2013.

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Thank you also to our selling agents Queensland Rural and McCaffrey's Australian Livestock Marketing for your expertise and efforts in marketing our bulls for optimum results.

Ron & Bev White, Robert & Mandy White, Wilangi Stud
Les & Helen Donald, El Ja — Andrew & Roxanne Olive, Raglan
AJ & Pam Davison, Viva — Stewart & Kerry Wallace, Wallace

Urgent action needed to halt 'horror weed' on Tableland

By BRIGITTE DALEY

ORIGINALLY native to tropical Africa, navua sedge (Cyperus aromaticus) has been a problem in Queensland as early as 1959, and has since spread north to the Daintree-Mossman area, south to Ingham and west across the wetter areas of the Atherton Tableland.

Navua sedge is extremely aggressive and is capable of forming dense stands that can smother many tropical pasture species.

It is unpalatable and provides little feed value for cattle, and if pastures are heavily or overgrazed, navua sedge can quickly take over.

Spread occurs through the normal extension of the rhizome system, by seed and by dispersal of viable rhizome fragments during cultivation.

Seed production per hectare is extremely high with estimates well in excess of 200 million seeds.

Seed is viable for five years, so producers can have five years of trouble ahead of them if plants mature and produce viable seed.

The dispersal of seed can occur through many ways, such as by passing through the digestive system of animals and birds, and also by being transported in mud on hooves, footwear, flood or running water, or machinery and/or vehicles.

> Navua sedge will have a devastating effect on the Tableland hay and grazing industries if immediate action is not taken.

Seedlings develop quickly from seed and flower in just 10 weeks after emergence.

It is without doubt that navua sedge is a horror weed which will have a devastating impact on the Tableland hay and grazing industries if immediate action is not taken.

"This is the worst pasture weed ever that we have encountered on the wet coast Tableland," DAFF senior beef extension officer Bernie English said.

"It is extremely invasive. Roadsides all over the district are full of it.

"The Malanda Beef Plan Group want to get some coordination across the district to attack this weed."

The Malanda Beef Plan Group has coordinated a series of meetings with the Tablelands Regional Council (TRC).

"There needs to be coordination across all groups in the district, which include local government, all producers, as well as contractors who access properties," Mr English said.

There is currently no registered selective herbicide available for navua sedge, but work is continuing on the herbicide Sempra.

"It is possible that it could be registered at some point in 2014 and is currently being used at the landholder's own risk," Mr English said.

"Producers must be prepared to do their bit and be vigilant and monitor their properties.

"They need to monitor roadsides and be prepared to spray. Roadside drains can easily divert water containing navua sedge seeds on to properties.

"Machinery such as slashers can readily spread seed to other areas, so it is important to ensure that all vehicles and machinery are thoroughly washed down before moving from one infested area to a clean one.

"Not overgrazing and managing pastures well to ensure that you maintain good ground cover is critical in minimising possible navua sedge invasion."

ngr.farmonline.com.au

Page 38 — North Queensland Register, December 12, 2013

Information days (eight farm walks for pastures, two workshops for cattle management) and a major field day were run in conjunction with the Malanda Beef Plan Group in August 2013. Subjects covered at the August field day included the Herbert River water sampling results, Navua sedge research and the best herbicide applications. Also covered were grazing management and stocking rates. Stocking rate figures were used at the field day to demonstrate to producers the economic benefit of sustainable stocking rates (see Table 1).

Table 1: Stocking rate figures

	Heavy Stocking Rate		Light Stocking Rate	
Area (acres)	100		100	
Stocking rate(beast: acre) & Cattle numbers	1:1	100	1:2	50
Buy in weight (kg)	300 ($480/head)	$48,000/100 head	300 ($480/head)	$24,000/50 head
Daily live weight gain (LWG) (kg)	0.45		0.73	
Annual LWG (kg)	164		266	
Sale weight (kg)	464		566	
Dressed weight	246 (@ 53%)		305 (@54%)	
Value per head	$713 (@$2.90/kg)		$961 (@3.15/kg)	
Value per total Sale		$71,300		$48,050
Cartage x 2 (HGP, 3 Day vaccine, pour on)		$5000		$2,500
Urea $800/t – 1.5 bag/acre/year (50kg bag)		$6000		$6000
DAP $1,000/t –1 bag/acre/year (50kg bag)		$2500		$2500
Sale Price		$71,300		$48,050
- less buy in price		-$48000		-$24,000
- less cattle costs		-$5000		-$2,500
- less fertiliser costs		-$8500		-$8,500
Gross margin	**$9800**		**$13,050**	

We have assisted numerous new producers in the district with establishing new pasture paddocks and results have been outstanding. Many of these producers need education on grazing management methodology to maintain productive grass/legume pastures. Marketing and live animal evaluation booklets have also been developed by our beef team to assist new producers who market their cattle through sale yards, abattoirs, private sale, agents or online.

Develop legume planting direct drill machinery to assist industry in the labour intensive process of introducing legumes into a new or pre-existing pasture

Minimum till shows promise in pastures

Far North Queensland's Wet Coast and Atherton Tablelands areas are very fortunate with the wide selection of pasture species available for planting for beef and milk production. Several production options have been available to the producer in this high rainfall area including:

- pure grass pastures, which can be highly productive with the regular addition of nitrogen fertiliser; or
- using a mixture of legumes and grass, which also is very productive and doesn't need the extra cost of nitrogen fertiliser but needs specific rotational grazing management.

Since dairy deregulation, the departure of many expert pasture managers due to sale of properties, and conversion of numerous dairy properties into beef production, many pastures have lost their legume content through lack of basic fertiliser applications and/or poor rotational or over grazing practises.

Legumes in a beef pasture offer numerous benefits to the grazing animal. With their higher protein, energy and digestibility compared to grasses, legume consumption converts to extra daily weight gain. Legumes convey atmospheric nitrogen into the soil in a form usable by the legume itself as well as the grasses nearby, also boosting animal performance. Legumes, with their deep tap roots, also have the ability to grow well into the dry season.

The Malanda Beef Plan Group in conjunction with DAFF officers from Mareeba (Joe Rolfe, Olivia Pisani and Bernie English) have been evaluating several planting options to re-introduce legumes back into pure grass swards.

As well as the obvious benefits to Beef Plan Group members' pasture, productivity and reduced fertiliser costs, the group is also keen to improve water quality on their properties, tying in with community concern and Terrain and Government targets to improve the condition of the Great Barrier Reef.

The more traditional methodology to establish a grass-legume pasture is to cultivate your paddock to remove all living plants (usually done during the dry season in October–November). Then, when the storms and wet season breaks (December–January), recultivation removes any weeds and prepares a fine firm seed bed, which is then planted with a mixture of grasses and legume seeds, then covered and the paddock rolled. This system is well proven and has been used for many years but is expensive, the paddock is out of production for many months, numerous weeds will also germinate, and your field is bare of all cover during the time when heavy rain is most likely, which can easily result in serious soil loss and impact on downstream water quality.

Local crop farmers have been using minimum till equipment for many years and we have adapted this technology to plant tropical legume seeds back into pure grass pasture swards. Basically this is done by:

- The pasture is grazed down low after the wet season has begun (December–January) so the soil is soft and moist. Soil nutrients are tested before-hand to ensure adequate levels are present.
- The paddock is then mulched to just above ground level (see Image 5). If there is a lot of vegetation on the surface mulch twice, about a week apart.
- A suitable minimum till machine is then used to direct drill legume seed into pasture (see Image 6). It is important to select the correct legumes for the soil type and district and to apply inoculant to legume seed.
- The grass height is managed with slashing and/or light grazing to avoid shading of establishing seedling legumes (see Image 7).

The costs per hectare of this new system is basically half that of the more traditional methodology, plus your paddock is back ready for grazing in half the time and there is no flush of new weeds. An added bonus is that there is no risk of soil loss if heavy rainfall is experienced as good ground cover is maintained at all times.

Image 5: Mulching the paddock.

Image 6: Minimum till machine direct drilling legume seed into pasture.

Image 7: Monitoring grass height.

The Malanda Beef Plan Group members have kept a regular eye on the progress of this project with several farm walk days (see Image 8). They are keen to share their knowledge with other beef producers of the district and have regular newspaper articles in the local papers (see Image 9).

Image 8: Malanda Beef Plan Group members at one of the farm walk days.

Image 9: Article in the North Queensland Register, 15 May 2014.

NEWS

Making the most of pasture species

FAR North Queensland's wet coast and Atherton Tableland area is very fortunate with the wide selection of pasture species available for planting for beef and milk production.

Several production options have been available to the producer in this high-rainfall area, with pure grass pastures that can be highly productive with the regular addition of nitrogen fertiliser, or using a mixture of legumes and grass, which is also very productive and does not require the extra cost of nitrogen fertiliser, but needs specific rotational grazing management.

Since dairy deregulation, the departure of many expert pasture managers, and the conversion of numerous dairy properties into beef-production facilities, many pastures have lost their legume content through lack of basic fertiliser applications, or poor rotational or over-grazing practices.

DAFF senior extension officer (beef) Bernie English said legumes in a beef pasture offer numerous benefits to the grazing animal with their higher protein, energy and digestibility compared to grasses – which in turn creates extra daily weight gain.

"Legumes also convey atmospheric nitrogen into the soil in a form usable by the legume itself and the grasses nearby, which also boosts animal performance," Mr English said.

"Legumes, with their deep-tap roots, also have the ability to grow well into the dry season."

The Malanda Beef Plan Group, in conjunction with DAFF officers from Mareeba, have been evaluating several planting options to re-introduce legumes back into pure grass swards.

All project work has been subsidised by the government's Reef Safe Grazing project, led by Carla Wegscheidl.

As well as the obvious benefits to Beef Plan Group members such as pasture productivity and reduced fertiliser costs, the group is also keen to improve water quality, leaving their properties to tie in with terrain and government targets to improve the condition of the Great Barrier Reef.

"The more traditional methodology to establishing a grass-legume pasture is to cultivate your paddock to remove all living plants in the dry season from October to November," Mr English said.

"Then when the storms and wet season breaks in December to January, the idea is to recultivate to remove any weeds, and prepare a fine firm seed bed, and plant a mixture of grasses and legume seed, and also cover and roll the paddock.

"This system is well proven and has been used for many years, but is expensive. The paddock is out of production for many months. Numerous weeds will also germinate and your field is bare of all cover during the time when heavy rain is most likely, which can easily result in serious soil loss and impact on downstream water quality.

"Local crop farmers have been using minimum till equipment for many years, and we have adapted this technology to plant tropical legume seeds back into pure grass pasture swards."

Mr English said the process involves the pasture being grazed down low after the wet season has begun in December to January so the soil is soft and moist – before which soil nutrients should be tested to ensure adequate levels are present.

"The paddock is then mulched to just above ground level (if there is a lot of vegetation on the surface you may have to mulch twice, about a week apart).

"A suitable minimum till machine is then used to direct drill legume seed into pasture (it's imperative that you select correct legumes for your soil type and district, and apply inoculant to legume seed).

"The final step is to manage grass height with slashing and/or light grazing to avoid shading of establishing seedling legumes.

He said the costs per hectare of this new system were basically half that of the more traditional methodology, plus your paddock would be back ready for grazing in half the time and there would be no flush of new weeds.

"An added bonus is that there is no risk of soil loss if heavy rainfall is experienced, as good ground cover is maintained at all times."

Mulching the pasture down.

Legume seeds emerging.

Bruce Carcary and Lyn Hosie from Malanda Beef Plan Group inspecting results.

Producers inspecting results: Warren Hosie, Bruce Carcary, Penny Shaw, Rob Pagano (Malanda Beef Plan Group) and Mark Kindelin from TGT Tolga.

The minimum till planter in action.

Various methods have been used to re-establish legumes back into pure grass pastures. Rob Pagano is a Malanda Beef Plan Group member who was keen to get legumes back into his pastures and agreed to evaluate various establishment methods.

Plots were planted in January 2014. These included:

- Seeding legumes (see Image 10), then mulching and aerating the paddocks.
- Mulching (see Image 11), aerating (see Image 12) and harrowing the paddock first, then planting seed and rolling.
- The direct drill machine, which has been described at another site above (see Image 13).

Image 10: Treatments 1 and 2 — Spreading the legume seed.

Image 11: Treatments 1 and 2 — Mulching the paddock.

Image 12: Treatments 1 and 2 — Aeration and roller machine.

Image 13: Treatment 3 — Rob Pagano and direct drill machine.

The Pagano legume site figures (see Table 2) are 0.25m² quadrat squares, counting established legume seedlings. The results clearly demonstrate the outstanding results of direct drilling legume seeds into mulched pure grass pasture.

Table 2: Pagano legume site, 14 March 2014.

	Legume Seedlings 0.25m² quadrant					
	Seed, Mulch and Aerate		Mulch, Aerate, Harrow, Seed and Roll		Direct Drill	
	0	0	1	4	6	4
	2	0	6	0	0	2
	0	7	8	3	50	20
	0	1	6	3	10	40
	0	1	2	1	7	30
	0	2	3	0	30	10
			11	1	40	21
	1	3	15	1	35	16
	0	0	3	3	26	19
	1	1	30	6	21	43
	2	0	4	3	15	40
	1	1	0	0	3	18
	0	1				
	1	2	0	3	18	11
	0	3	0	26	22	1
	1	1	20	1	33	0
	3	0	3	4	30	15
	0	0	6	1	18	17
	0	0	5	1	25	8
	2	1			40	12
	1	0	1	3	12	3
	0	2	6	4	7	3
	3	1	4	0	9	4
	0	0	8	3	26	7
	0	0	33	0	40	30
	3	0	2	2	12	3
			0	6	8	0
	7	1	11	2	29	6
	0	2	6	3	18	2
	2	1	0	3	15	20
	0	0	7	11		30
	1	0	3	5		11
Average Legume Seedlings per Quadrant	1		5		17	

An evaluation of the cost benefit of the use of aeration machinery in established pastures

Many producers on the Atherton Tablelands are using aeration machines on their improved pasture paddocks instead of fertiliser. Claims that the operation is boosting pasture growth and fertiliser is not needed are common, so in conjunction with the Malanda Beef Plan Group an evaluation was conducted on Warren and Lyn Hosie's property at Tarzali.

A Nandi setaria paddock was used at Tarzali. The soil was tested before treatments started, as it was planned to apply fertiliser to match the cost of the aeration alone (Plot 3) and mulching-aeration (Plot 4) operations. The soil test (see Table 3) indicated nitrogen as the only limiting nutrient so urea was applied (see Image 14).

Table 3: Hosie soil test results.

	Nandi setaria	Recommended pasture levels
pH levels	5.4	> 5.5
Phosphorus	66	> 30
Sulphur	37	> 10
Calcium	1.2	> 1
Magnesium	1.1	> 0.6
Potassium	0.38	> 0.3
Nitrate nitrogen	1.2	> 20
Zinc	1.1	> 0.6
Copper	2.6	> 0.5

Image 14: Fifty days after urea application.

Treatments

Treatments were applied after the wet season had started (see Table 4), on:

- 23 December 2013 — mulch (see Image 15), aeration (see Image 16)
- 16 January 2014 — urea applied

Pasture yields have been measured with quadrant cuts. Leaf samples have also been taken from various treatments for Crude Protein, Energy and Dry Matter digestibility (samples being tested). A no treatment plot was used as a control (see Image 17) to establish a baseline.

Table 4: Treatments applied to Nandi setaria paddock at Tarzali.

Plot	Treatment	Cost
1	Control (no treatment)	$0/ha
2	+ Urea to value of aeration of mulching	$195/h
3	+ Urea to value of aeration	$84/ha
4	Mulch, aeration, plant legumes narrow, roll	$195/ha
5	Plant legumes, mulch, aeration	$195/ha
6	Aeration	$84/ha

Image 15: Mulching machine operating at Hosie farm.

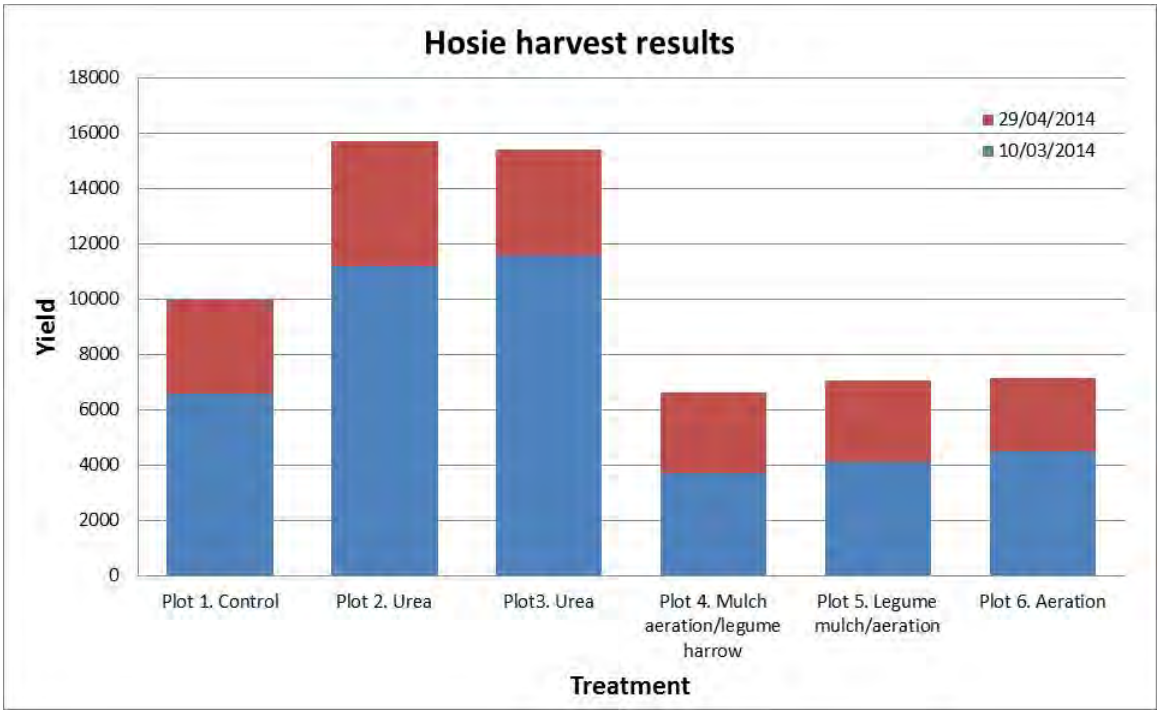
Image 16: Aeration machine.

Image 17: Control (on right) and aeration (on left) ten days after treatment.

Results

At the time of writing this report the plots that have been mulched and/or aerated are well behind in measured dry matter yields (see Image 18).

Image 18: Dry matter yield results.



Evaluation of new pasture species

Over the last two years the beef team has planted and established several pasture plots on the Atherton Tablelands and wet tropical coast near Innisfail. New grasses and legumes have been established and grazed to determine their adaptability and suitability compared to species being used by the grazing industry at present. All plots were planted after preparation of good seed beds and superphosphate was applied.

Highlights

- New Pintoi peanut release (*Arachis pintoi* cv Bolton) has performed well on the Wet Coast and Tablelands plots but poor seed supply is preventing widespread use of the legume.
- Shaw vigna (*Vigna parkeri* cv Shaw) has performed very well and tolerates shading better than most other legumes. Seed supply is again an issue and currently seed is approximately $90/kg.
- Cardillo Centro (*Centrosema molle* cv Cardillo) established quickly and easily and was producing feed before all other legumes. Seed supply is good.
- New Stylosanthes (*Stylosanthes guianensis* ATF 3308) has grown well from establishment but does not persist well after being grazed by cattle.
- Newly planted grass-legume mixtures must be managed carefully to prevent over shading of young legume seedlings. Grass plants grow rapidly in comparison to legume seedlings and light cattle grazing or slashing must be used to keep grass in check for the first six months.

We have a serious problem with seed supply for some of the new *Brachiaria* and *Panicum* species showing promise. We planned to establish several areas of up to 20ha so that live weight gain figures could be obtained but the lack of seed for planting has prevented any further evaluation of the new species. Under the Plant Breeder Rights (PBR) system poor seed availability, especially of new cultivars, is a common problem.

Legume plots were established right across the region and most were successful but in the Ravenshoe district our plots have not performed as well. The higher altitude and severe winter frosts certainly give the legumes serious setbacks and our thinking is that we have to move to legumes that will prosper in the cooler weather months, like the clovers, sub-clovers and medics. These plants do not persist well in the dry summer and there may be merit in trying some of the new clover–medic type legumes that grow well during autumn, winter and spring and set a lot of seed that will survive the dry summer and re-establish the following autumn.

Grass and legumes used in trials at five different properties

- Tolga Rhodes
- *Arachis pintoi* AG Prine — new
- *Arachis pintoi* AGCP 193469 — new
- *Arachis pintoi* AP ATF 2320 — new
- *Arachis pintoi* AP ATF 495 — new
- *Arachis pintoi* cv Amarillo
- *Arachis pintoi* cv Bolton — new
- *Brachiaria brizantha* Mekong (Toledo) — new
- *Brachiaria decumbens* cv Basilisk
- *Brachiaria* hybrid Mulato — new
- *Brachiaria* hybrid S155 — new

- *Centrosema molle* cv Cardillo
- *Clitoria ternatea* cv Milgana
- *Panicum maximum* alto (mombacca) — new
- *Panicum maximum* G2 — new
- *Panicum maximum* Gatton
- *Panicum maximum* NuCal (C1) — new
- *Panicum maximum* Tanzania — new
- *Pennesetum clandestinum* cv Kikuyu
- *Setaria sphacelata* cv Splendia
- *Setaria sphacepata* var. *anceps* cv Narok
- *Stylosanthes guianensis* ATF 3308 — new
- *Stylosanthes guianensis* cv beef builder
- *Stylosanthes guianensis* cv beef maker
- *Vigna parkeri* cv Shaw

Improved management practices relating to water quality in reef catchments

Wet tropics

We have participated regularly with agribusinesses on joint field days on the Atherton Tablelands and Wet Coast (see Images 19–21). Most days have included field inspections of good legume-grass pasture, fertiliser use and management issues. Groundcover and its effect on sediment loss is usually not a big issue with reasonably managed improved pasture, but cattle watering in the numerous creeks and streams are a major water quality issue (see Image 22) and with funding from Terrain, numerous projects installing off stream waters and riparian fencing (see Image 23) have been completed.

Image 19: Producers inspecting new pasture species, East Palmerston.

Image 20: Producers inspecting cattle and pasture management.

Image 21: Pasture day inspecting new stylo under grazing.

Image 22: Water quality problem with cattle watering in creeks

Image 23: Good riparian fencing project, Hanrahan property.

Dry tropics

$avannaPlan, a “Beef Business Management Package”, is our flagship operating process and is a structured learning program suitable for new and experienced producers. It is an on-property program aiming for profitable, sustainable beef production. We are currently working with seven properties in the Upper Herbert dry tropics. All are participating in new water quality improvement projects this coming year. Projects include riparian fencing, off stream waters and wetland repair. We have also developed a guide for producers to assist in determining stocking rates.

Stocking rate guide

That main land types recognised across the Upper Herbert region are shown in Table 5. The best grazing land is rated 10 with poorer grazing land types rated from 9–1.

The carrying capacities for land condition A (the top rating) are indicated in Table 5. Stocking rates for soils in poorer land conditions (B–D) are not listed.

Table 5: Stocking rate guide for the Upper Herbert.

Soil Type	Grazing Value	Carrying capacity in A and 100% access (ha/AE)
Alluvial	10	4
Black soil/Black basalt	8-9	3
Red basalt	8-9	6
Red earth	5-7	9
Old Alluvial	6	7
Yellow earth	5	9
Sandy	2	20
Range soil	2	15

A standard methodology for gauging progress with changes to land management practices is to install permanent monitoring points. Images 24–25 show a black soil flat on Gunnawarra Station over time. This was an area that was part of a large paddock and because of its fertility and proximity to water was continually over grazed. Through the $avannaPlan process it was an area identified as always being over grazed and was being invaded by weeds and poor pasture species. After fencing and installation of water it can now be wet season spelled and grazed judiciously to maintain productivity, as well as maintain good groundcover and minimise sediment loss into the nearby Herbert River.

Image 24: Gunnawarra monitoring point paddock before improved pasture management.

Image 25: Gunnawarra monitoring point after fencing and wet season spelling.

Case Study of an Upper Herbert dry grazing property

Wombinoo Station

Owners: **The Jonsson Family**
(Dean, Emmalee and William Jonsson)

Station area: **25,700 hectares**

Background

Wombinoo Station is located 50km south of Mt Garnet on the Gunnawarra Road. The Jonsson family has owned the property now for nearly 30 years and has an approximate 18km frontage onto the Herbert River, which forms its eastern boundary. 303ha have been cleared of trees and planted to improve pastures, plus 100ha can be cropped and irrigated.

The property is typical of this district, with a mixture of soils (basalt, red and yellow earth, river frontage, alluvial and range country) and native pastures that are dominated by black spear and kangaroo grass with some blue grasses (*Bothriochloa* family), Indian couch and angleton grass (*Dichanthium*) (see Image 26). The cleared areas have been planted to a mixture of grasses and legumes including Rhodes, Sabi grass, Dawson petusa, Seca and Verano.

Seca, Verano and Wynn-cassia legumes have been planted extensively across all areas of the property. The area is naturally timbered with a range of species depending on soil types but the most common trees are iron bark, blood wood, box and cabbage leaf gum.

Rainfall averages 1100mm with 90% falling in the wet season months of December–April.

Image 26: Native pasture woodland on Wombinoo.

Production System

The property plays and important role in the Jonsson family business, which operates a fresh fruit, vegetable and meat outlet in Cairns (see Image 27–28). All the beef marketed through their shop is bred and fattened on Wombinoo and their Tablelands property situated near Ravenshoe.

Image 27: Jonsson's Farm Market, Cairns.

Image 28: Meat on display at Jonsson's Farm Market.

Their breeders graze across a range of different paddock sizes but stocking rates are kept at approximately one adult equivalent (AE) to 7.5ha. Weaners and growing stock are rotationally grazed across the cleared and improved pastures areas and the more fertile paddocks (see Image 29.)

Image 29: Cleared areas with improved pasture.

Cattle are fattened to turn off for their retail business or the heavy live export trade and abattoir market, depending on prices.

Wombinoo steers can be fattened on good improved pasture on the Ravenshoe property or placed on their Wombinoo feedlot (see Image 30), which is licenced to carry 999 head. This way both pasture fed and feedlot beef is supplied to the shop.

Maize silage is also grown on Wombinoo and stored for use at the feedlot (see Image 31). This enables good quality fat cattle to be produced for their commercial food store business in Cairns every week of the year independent of seasonal conditions.

Their country is mostly phosphorous and sulphur deficient and these elements are fed in a supplement mix to maximise animal performance.

The Jonsson family has always been aware of community concern for the Great Barrier Reef and water quality. The property has been involved for many years in Terrain subsidised projects—fencing off the Herbert River and installing off stream waters. This is an ongoing process and the property is currently applying for more devolved grant money (2014–15) for fencing and off Herbert River waters to allow improved grazing management in paddocks along the Herbert River.

Image 30: Wombinoo beef cattle feedlot.

Image 31: Maize silage cutting at Wombinoo.

Dean has recognised the importance of good pastures and ground cover to maximise pasture productivity and cattle performance and, depending on seasonal conditions, always spells several paddocks over the wet season (see Image 32).

Image 32: Wet season spell showing good black spear and kangaroo grasses.

The wet season spelling also allows the legumes such as Seca to grow out to seed, which ensures its survival in the drier years. The biggest grazing land management issue facing the property is timber thickening and subsequent negative impact on pasture growth.

Fire is the only economic tool available to producers where tree clearing is not an option. Dean uses fire across the property to control lantana and young tree suckers less than 1.5m in height.

Dean's recipe for burning after identifying an area of concern

- Lock paddock up at start of wet season and lightly graze.
- Plan to burn paddock the following dry season (October–December). Only light up after 40–50mm rain as this soil moisture allows the grass to respond quickly after the fire.
- Light fire on a good hot day with some breeze to maximise damage on tree suckers.
- Don't graze paddock straight after fire, allow grass to grow and seed before allowing stock in.
- Fire does not affect any trees over 2m in height. Don't burn after Christmas if you haven't received the required rainfall (40–50mm) as a late break in the season could severely impact on grass growth after a late fire.

The biggest economic issue on Wombinoo and all other North Queensland grazing properties in the dry tropics is that rising costs are overtaking productivity, resulting in minimal profits or losses. Wombinoo—with their cleared country, improved pastures, feedlot and taking some of their turn off right through the supply chain to retail—are producing better figures than most (see Table 6).

Table 6: Herd and economic performance a Wombinoo Station (averaged over 2011–2014).

Total cattle carried	3886 head
Total calves per year weaned	1168 head
Total cows and heifers sold	492 head
Average female price	$548.21
Total steers and bullocks sold	566 head
Average steer/bullock price	$659.86
Net cattle sales	$643,240.00
Dips, vaccines and supplements	$192,695.00
Bull replacement	$29,297.00
Gross margin for herd	$421,108.00
Gross margin per AE	$120.32

Most other properties in the district have a gross margin/AE around the $90.00 mark or less.

Cattle supplementation during the wet and dry seasons has been fine-tuned with numerous soil tests (see Table 7). Also, maize silage and improved pasture paddocks are regularly soil tested to fine tune fertiliser applications and prevent unnecessary nutrient applications.

Table 7: Wombinoo soil test results, 2014.

	Paddock 1 Green Springs	Paddock 2 Steer paddock	Paddock 3 River paddock	Paddock 4 Martin's paddock	Recommended pasture levels
pH levels	6.6	6.4	6.1	6.1	> 5.5
Phosphorus	5.3	< 5	< 5	12	> 10
Sulphur	6.4	4.3	4.3	3.9	> 10
Calcium	8.5	4.8	1.8	3.6	> 1
Magnesium	2.6	1.2	1.1	1.1	> 0.6
Potassium	0.61	0.43	0.29	0.26	> 0.25
Zinc	2.5	0.36	0.39	0.35	> 0.6
Copper	3.9	0.97	0.86	0.59	> 0.5

The Seca and Verano planted across the property many years ago has lifted growing cattle live weight gain and allowed heavier stocking rates, which has lifted productivity to allow Wombinoo to keep ahead of the cost price squeeze.

Production benefits of planting legumes into native pastures (see Table 8) are:

- Developed paddock size is 3947ha.
- Cost of $50/ha for Seca and Verano seed and spreading; therefore total cost is $197,350.00
- Adult Equivalent is 450kg per animal.
- Takes three years for paddock to reach full productivity.

Table 8: Production benefits in planting Seca-Verano.

Conditions	Native Pasture Only	Native Pasture with over sown Seca-Verano
Stocking rate	1 AE per 6.5ha	1 AE per 4ha
Actual AE	607 AE	986 AE
Actual number of growing cattle	1,115 (av. weight 245kg)	1701 (av. weight 260kg)
Annual live weight gain	110kg	150kg
Gross value of production @ $1.50 per kg	$183,975	$382,725

The Jonsson family are continuing to plan ahead to improve productivity with a tree clearing application for 1000ha to plant silage crops and hay for their feedlot. Leucaena is another pasture improvement option for their cleared country. The Leucaena has the potential to improve annual live weight gain to 240kg head and achieve stocking rates to 1 AE per 3.5ha. On the downside projected development costs will be over $300/ha.

Dean has introduced high quality Brangus genetics to cross breed with his mainly Brahman cross-Santa female herd. This cross breeding will generate a 10–15% growth advantage to sale stock also boosting economic performance. Dean is now moving into producing stud stock from his Brangus herd and done properly this has the potential to lift the average value of sale stock significantly.

Increased collaboration with Industry stakeholders

Most enquiries from producers on the Wet Coast and Tablelands areas involve pasture management, fertiliser requirements, cattle management and marketing.

The biggest issue with pasture management is sustainable stocking rates, so that pastures remain productive as well as maintain good ground cover that prevents soil loss, inhibits weeds and conserves moisture in the soil. Our team has made a big push to get producers to soil test before fertilising pastures (see Image 33) so that applications are only applied when required and the right elements are used, plus it saves dollars.

Image 33: Fertilising pasture.

Improving legume content in producers' pastures lifts cattle productivity and removes the need for applying expensive bag nitrogen.

George and Dawn Bloomfield run approximately 1,000 head of beef cattle in total on their Upper Barron district properties and several nearby agistment blocks. They sell fat cattle and breed stud Charlois × Charbray cattle. After attending several of our field days and becoming interested in improving his pastures and cattle performance George assisted us to establish an evaluation plot of new grasses and legumes on his home block. This proved very successful and with rotational grazing used on the new pastures George was then keen to implement a rotational grazing system across all his properties.

The first step was to reduce overall stock numbers to a sustainable level. Next was more fencing and waters for paddocks (see Image 34).

George and Dawn have now been using rotational grazing on the home farm for over a year now and there has been a good response from the legume in his pasture with Tinaroo *Glycine* and Shaw *Vigna* being the stand outs (see Image 35).

Image 34: Inspecting legume content in pastures, Bloomfield property.

Image 35: Tinaroo *Glycine* and Shaw *Vigna* in paddock.

Ongoing work with Malanda Beef Plan Group

Blady grass (*Imperata cylindrica*)

Blady grass is invading many improved pastures areas across the Atherton Tablelands. Most producers associate blady grass invasion with poor soil nutrient levels (see Image 36). The Malanda Beef Plan Group was keen for some work looking into the issue and several co-operators were used to trial various treatments. The first point resolved was that blady grass patches did not necessarily have lower fertility (see Table 9).

Image 36: Blady grass.

Table 9: Pagano soil test results.

	Nandi Setaria (nearby)	Blady Grass	Recommended pasture levels
pH Levels	5.7	5.7	> 5.5
Phosphorous (P)	23	42	> 30
Sulphur (S)	32	25	> 10
Calcium (Ca)	1.6	3.6	> 1
Magnesium (Mg)	1.7	2.7	> 0.6
Potassium (K)	0.39	0.61	> 0.3
Zinc (Zn)	1.7	2.1	> 0.6
Copper (Cu)	2.1	2.4	> 0.5

Several treatments (see Table 10) were imposed on two different properties. The outstanding result was achieved by burning, complete cultivation and reseeding of blady grass patches. Although this is the most expensive option and has the longest time out of production it is the only treatment that destroys the blady grass and ensures your pasture is back to full productivity.

Table 10: Blady grass treatments (2012–13)

Treatments	Result
Slash	Not effective
Slash + fertiliser (DAP 150kg/ha)	Reasonable result
Roll during wet season	Not effective
Burn	Not effective
Burn + cultivate + reseed + fertilise (DAP 150kg/ha)	Outstanding result
Fertilise — superphosphate 200kg/ha	Not effective
Fertilise — DAP 150kg/ha	Not effective
Fertilise — CK55 200kg/ha	Not effective
Fertilise — urea 200kg/ha + superphosphate 200kg/ha	Reasonable result

Pasture grubs

The Future Beef team work closely with the Malanda Beef Plan Group and other beef producers across the district with project work and other general beef matters. Late in 2013 we became aware of large areas of pastures dying out, especially in the area to the south of Atherton. We quickly identified the problem as being pasture grubs. We researched control options and put a information leaflet together (see Image 37) for the numerous producers that were affected. Our Beef team also assisted and monitored progress with several pasture replanting options to assist pasture recovery.

Image 37: Pasture grub information leaflet

Pasture Grubs Wipe Out Tableland Pastures
November 2013

The Upper Barron district just to the south of Atherton has had hundreds of hectares of improved pastures devastated by white grubs (scarab grubs, witchey grubs, cane beetle larvae) causing severe economic impact on numerous beef and dairy producers. Most Tableland pastures suffer some damage from pasture grubs across paddocks every year, but usually the damage observed is several square metre patches scattered across the improved pasture paddocks. Local beef producer Greg Binnie's property has been severely affected and a 200 acre paddock that usually runs 100 cows and calves has had to be destocked.

For some unknown reason the adult beetles must have been very concentrated in the Upper Barron region when they migrated to lay their eggs. The damage inflicted is the worst recorded since improved pastures were first planted after scrub was cleared over a 100 years ago.

The typical life cycle of the white or pasture grub (which is a collection of various species including *Lepidot*a spp., *Anoplognathus* spp. and *Rhopae*a spp.):

- November–January. Adult beetles emerge from soil with first soaking rain, often feed and mate in trees and then return to soil to lay eggs. Producers will often observe large numbers of beetles attracted to lights at night.
- February–May. Small grubs hatch and feed on organic matter and some plant roots, but as they grow in size the growing larvae will vigorously eat plant roots off just below the soil surface. The setaria pasture species seem to be more vulnerable than the brachiaria grasses.
- May–November. Developing grubs continue to feed and cause pasture damage until they mature, then the larvae burrow down deep into the soil to pupate and transform back into beetles.
- Control is difficult as the damaging larvae live under-ground and chemical control is expensive and not very successful, plus long with-holding periods for chemicals used.

Naturally occurring control is caused by fungal, bacterial, viral and protozoan diseases that function better in moist soil and on small larvae. Pasture damage usually becomes more evident as soil conditions dry out on the Atherton Tableland from August onwards. Plants will start to yellow off and dry out as their roots are eaten off, and large patches of pasture can be rolled up with the damaging larvae quite prominent just under the soil surface.

George Bloomfield, another severely affected beef producer in the Upper Barron district, has tried fertilising some affected patches plus ploughing other areas and re-sowing signal grass. The cultivation and re-sowing option seems to have been the best recovery-control option but also the most expensive. Dave Little a neighbouring beef producer tried burning off the dead grass and re-sowing grass seed but with out the cultivation the new pasture seed was very slow to re-establish.

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