16th October 2014 **Banded Chook Manure Trial with Petrik soil ameliorant**

Scott McLean, Allan McLean and Shane Hare

Objective: To measure any potential yield responses and soil health benefits from using chook manure with and without Petrik (soil microbe inoculant) on plant cane and older ratoons.

Background: Allan and son Scott Mclean are 4th generation farmers and grow approximately 17,000 tonnes of cane on their 3 farms in the Narpi area approximately 5km North of Kuttabul. They have always been innovative in their approach to farming by exploring new ideas, technology and products in an attempt to boost productivity, minimise environmental impact and yet still keep costs sustainable.

Part of their normal nutrition program for the last 7 years has included their own trial placement of chook manure on both plant cane and ratoon crops to hopefully improve yield but also to bolster the longevity of ratoons, to mend soil health and structure long-term. Their initial observations were a notable increase in yield in 1st ratoon crops and that application of manure needed to have soil contact to begin functioning as opposed to being placed directly on top of the trash. The need to get reputable trial data on this was then decided.

Apart from the additional N,P and K gains in the manure, it also contains a suite of trace elements needed for the complete sugarcane cropping system. Another important bonus is that the chook manure adds organic carbon to the soil which is the foundation food source for all soil biology. This would in theory allow the introduced Petrik microbes and other native microbial flora to flourish under a trash blanket. The process known as in ground composting is expected to initiate humus creation in soils that have since lost that ability through intensive monoculture farming.

While soil biology and the role microbes play specifically within a sugarcane system is not a fully understood or an easily measured science. It is known that soil biological processes involving micro-organisms play a major role in organic matter decomposition and nutrient cycling. This group of organisms include bacteria, fungi, algae and protozoa (tiny animals that feed on bacteria, fungi and algae).

Microbes and their Beneficial Biological processes:

- The maintenance of soil structure (formation of polysaccharides which aid aggregation and the creation of soil pores). This opens up compacted soil to better air and water flow resulting in higher native soil biology function, water filtration, rooting depth and nutrient access.
- Root disease processes including disease suppression.
- Nutrient uptake chemistry (rhizophere and mycorrhizal associations). An increase in symbiotic mycorrhizal activity around the sugar cane root system means a much greater surface area for nutrient and water uptake.
- The breakdown of agricultural chemical and soil pollutants.
- Competition with detrimental microbes that have built up under a sugarcane monoculture system.

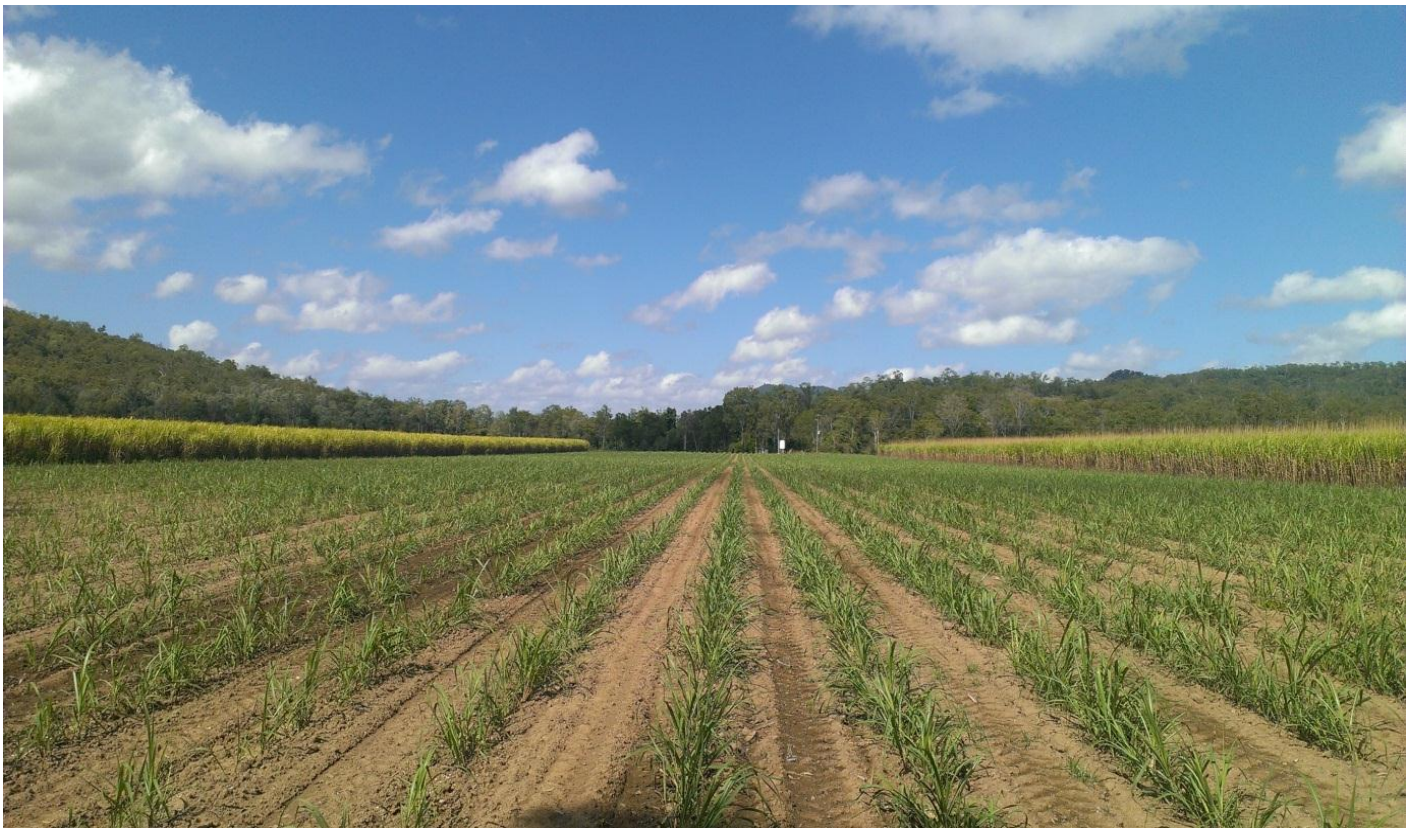
After gaining more confident that chook manure product had some viable benefits to their long-term cropping system they have decided to undergo reputable trials. The procedure, method, costs and material of which will be described below.

Methods and Procedure:

- Farm 2214A block 40-4 was confirmed as a suitable site with an area of 2.34ha. Uniform soil type and well drained. A representative soil sample was taken from 12 sub core samples at a depth of 25cm across the paddock. The sample was analysed by Mehlich on 16/4/14 and results displayed in **Appendix 1** (see sample 3).
- The block had an average-good crop of Soybean in 2013.

- The nutrient content of the chook manure was analysed on the 12th of March 2008 and results are displayed in **Appendix 2.**
- Mechanical operations involved in working the fallow: Offsett x2, Hoe x 2, rip x 1
- Lime was applied banded at 2.4T/ha in accordance with the soil test recommendations.
- The block was billet planted on the 3rd and 4th of June 2014 with variety Q242 at a planting rate of 2.5T/acre. Row configuration was 1.6m singles.
- Fertilizer at planting was 100mL/Ha of Flowfos HQ10, 1L/Ha of growth fomula BM7, 5L/Ha of Urea.
- Insecticide at plant ½ L/Ha of Lorsban.
- Fungicide at plant 100mL Tilt/Ha.
- A good even germination was achieved as seen in **image 1** below.

Image 1: Trial site planted with variety Q242 on the 3rd and 4th of July had a good even germination



- Irrigation strategy so far has been 25mm applied with a winch.
- Dunder Lo P planter 3.3m3/Ha was applied banded at 3rd leaf stage.
- The site was pegged out and treatments applied using a 4 Tonne capacity 3 row banded spreader on the 30th October. Refer to the table below showing the treatments to be assessed.

Table 1: Treatment Description and Costing

Treatment	Description
T1 (Control treatment)	-100mL/Ha of Flowfos HQ10, 1L/Ha of growth formula BM7, 5L/Ha of Urea @ PLANT. -Dunder Lo P planter 3.3m3/Ha top dress. Cost $170/Ha
T2	-100mL/Ha of Flowfos HQ10, 1L/Ha of growth formula BM7, 5L/Ha of Urea @ PLANT. -Dunder Lo P planter 3.3m3/Ha top dress. Cost $170/Ha - 2.5T/ha of Chook Manure top dress. Cost $296/Ha.
T3	-100mL/Ha of Flowfos HQ10, 1L/Ha of growth formula BM7, 5L/Ha of Urea @ PLANT. -Dunder Lo P planter 3.3m3/Ha top dress. Cost $170/Ha - 2.5T/ha of Chook Manure top dress. Cost $296/Ha. - Petrik (soil microbes) applied: Evergreen 4L/Ha, Green Manure Plus 1L/Ha. $70/Ha

Trial Design and Layout.

Each treatment plot is 6 rows wide. 54 rows total in trial. 336m row length. 2.34ha area. 3 treatments x 3 reps.

T1	T2	T3	T2	T1	T3	T1	T3	T2

Image 2: The treatment 2 (chook manure) being applied @2.5T/ha below with the 3 row banded spreader.

Image 3: Treatment 3 being applied with the Petrik (Soil Microbes) being sprayed directly onto the compost as it leaves the bin as pictured below

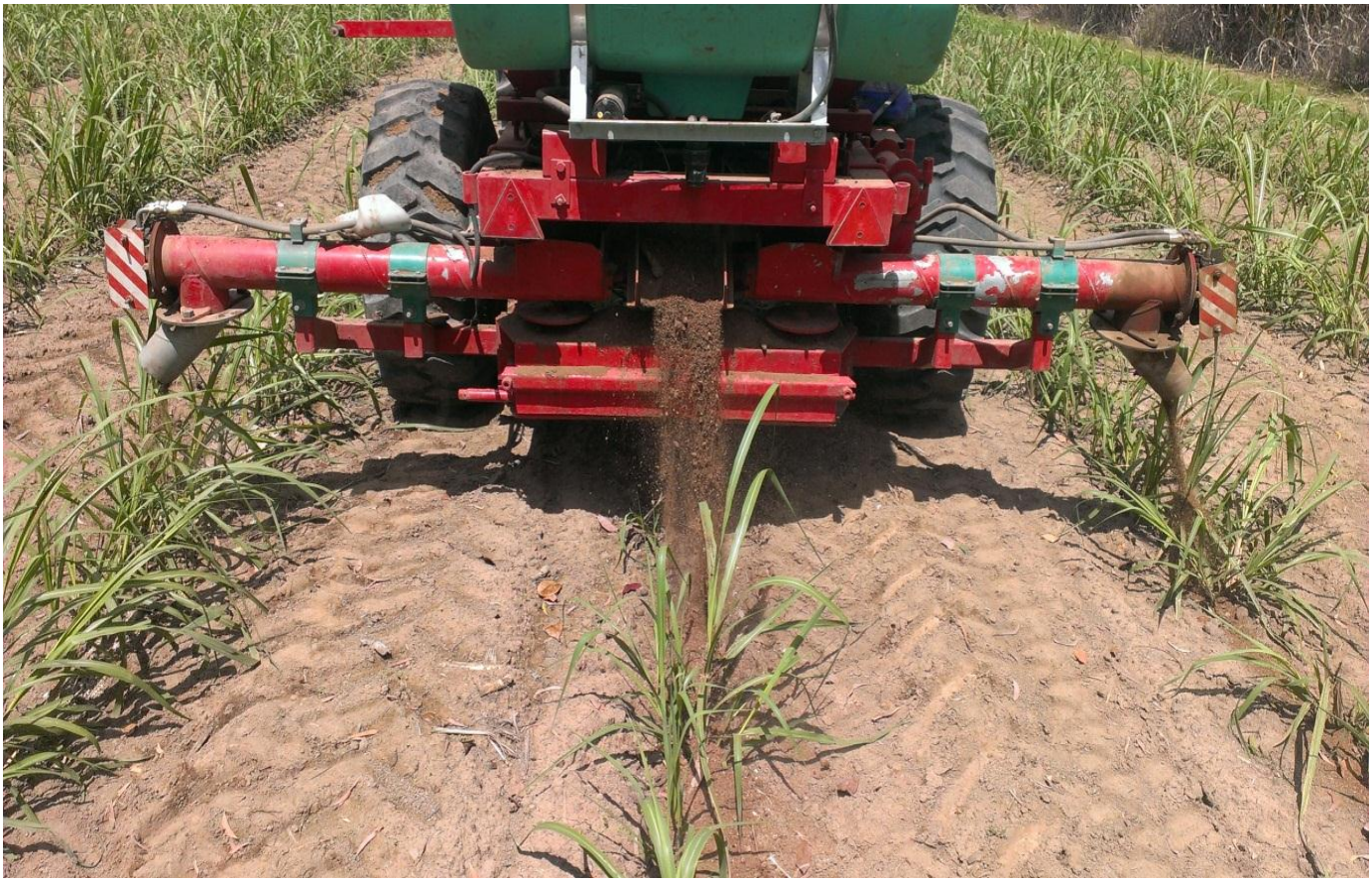
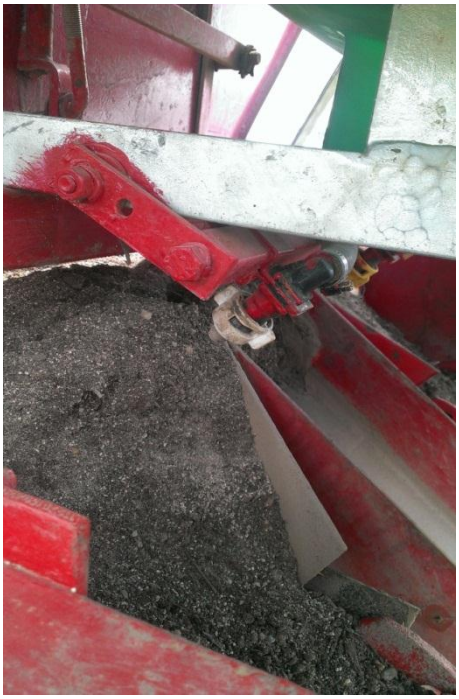


Image 4: Close up of the Petrik Evergreen 4L/Ha and Green Manure plus 1L/Ha mixture being sprayed directly onto the chook manure as it leaves the bin.



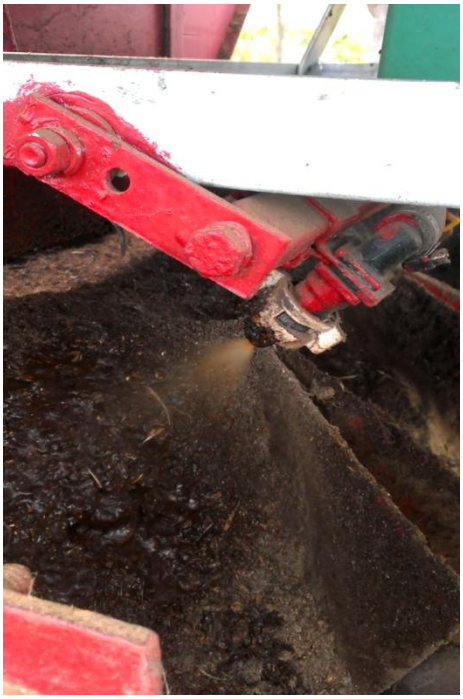
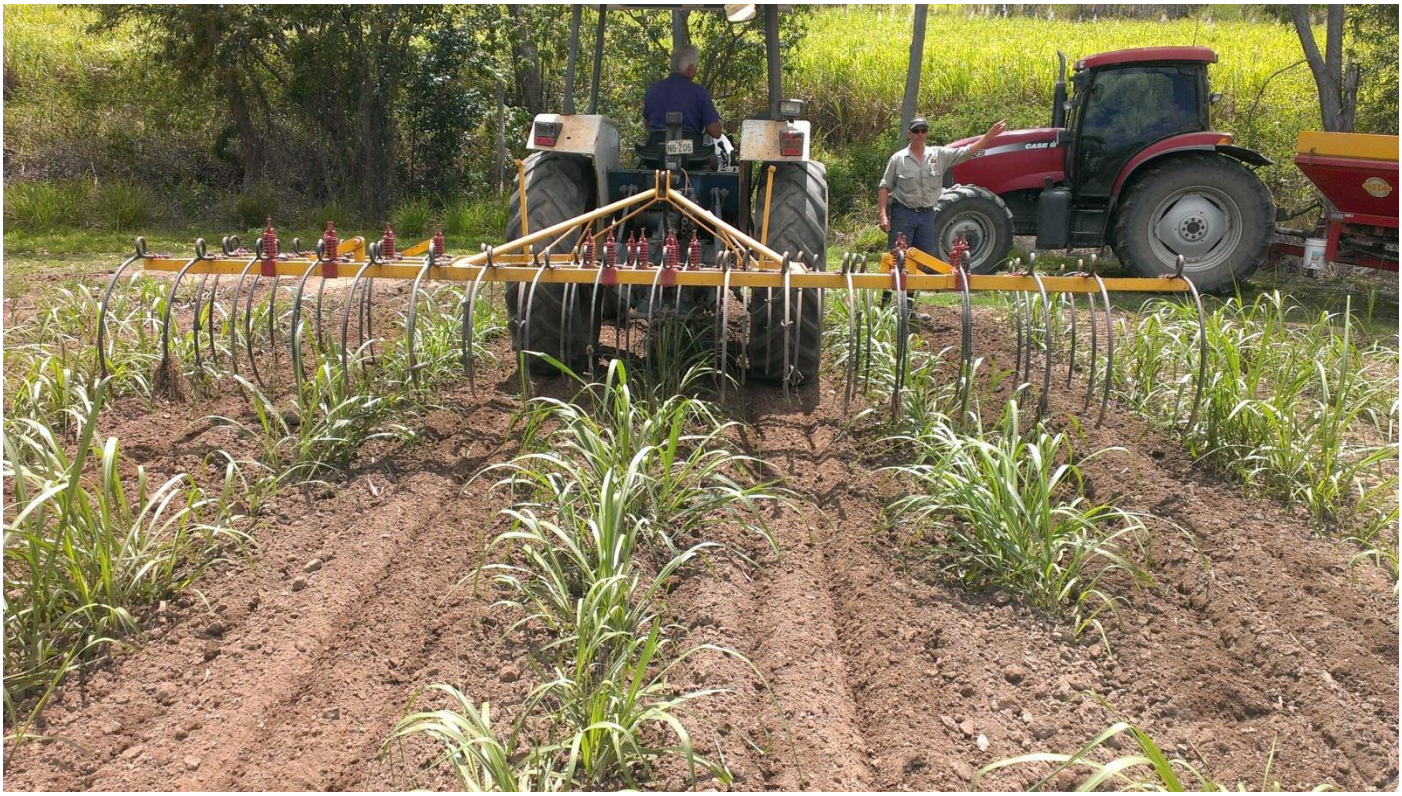


Image 5: All the treatments were incorporated in immediately using rakes to avoid UV damage to microbes and increase soil contact.



Future data to collect

- Harvest weights and individual CCS tests will be taken from each treatment plot in 2015 and followed in older ratoons.
- Leaf Tissue and Soil test Analysis will be taken each year to monitor soil health changes between treatments.
- Stick diameter and shoot counts to be measured annually.
- The costs of every operation will be assessed and reported on.
- As with any trial, going head we expect to have a lot more questions raised for further trial exploration.

For more information please don't hesitate to call Shane Hare on 0417 326 668

APPENDIX 1 "Soil Test Analysis"

MEHLICH NUTRIENT SOIL ANALYSIS REPORT

6 soil sample/s supplied by New Tech Ag Services on 16th April, 2014 - Lab Job No. D2904.

Analysis requested by Philip Jones.

F F

				Sample 1	Sample 2	Sample 3
	Sample/Block ID:			Block 21 - 1Top	Block 21 - 1 Bottom	Farm 2316
	Crop:			Sugarcane	Sugarcane	Sugarcane
	Client:			Silkwish Pty Ltd	Silkwish Pty Ltd	Silkwish Pty Ltd
	Nutrient		*Units*	*D2904/1*	*D2904/2*	*D2904/3*
Morgan	Calcium	Ca	mg/kg	398	971	588
	Magnesium	Mg	mg/kg	86	304	234
	Potassium	K	mg/kg	52	38	31
	Phosphorus	P	mg/kg	2.0	3 1	4.3
KCL	Nitrate Nitrogen	N	mg/kg	4.3	4.2	8.6
	Ammonium Nitrogen	N	mg/kg	7 1	10.2	10.7
Mehlich 3	Phosphorus	P	mg/kg	32	36	40
Bray 2	Phosphorus	P	mg/kg	14	18	36
KCl	Sulphate Sulphur	S	mg/kg	8.7	5 1	9.4
1:5 Water	pH		units	5.50	5.70	5.40
	Conductivity		dS/m	0.024	0.028	0.036
Calculation	Chloride Estimate		equiv ppm	15	18	23
Calculation	Organic Matter		% OM	1 4	1.6	1.8
Mehlich 3 & Calculations	Calcium	Ca	M.E./100g	3.10	5.93	3.72
		Ca	kg/ha	1388	2662	1670
		Ca	mg/kg	620	1188	745
	Magnesium	Mg	M.E./100g	0.99	3.22	2.52
		Mg	kg/ha	269	878	686
		Mg	mg/kg	120	392	306
	Potassium	K	M E /100g	0.22	0 22	0.17
		K	kg/ha	195	192	153
		K	mg/kg	88	86	68
	Sodium	Na	M.E /100g	0 29	0.49	0.17
		Na	kg/ha	148	252	89
		Na	mg/kg	66	113	40
Calculations	Aluminium	Al	M E /100g	0.04	0.08	0.06
		Al	kg/ha	8	15	12
		Al	mg/kg	4	7	6
Calculations	Cation Exchange Capacity		M E /100g	4 59	9.86	6.59
	Total Cation Exchange (inc H/ Al)		M.E /100g	6.62	13.08	9.92
Base Saturation Calculations	Calcium	Ca^{2+}	%	47 2	45.7	37.8
	Magnesium	Mg^{2+}	%	15 0	24.8	25.6
	Potassium	K^{+}	%	3 4	1.7	1.8
	Sodium	Na^{+}	%	4 4	3 8	1.7
	Hydrogen	H^{+}	%	30 0	24.0	33.0
	Other Bases	Al^{3+}	%	0 6	0 6	0.6
Calculation	Calcium/ Magnesium Ratio		ratio	3 13	1.84	1.48
DTPA	Zinc	Zn	mg/kg	0 7	0.3	0.6
	Manganese	Mn	mg/kg	12	34	33
	Iron	Fe	mg/kg	541	187	258
	Copper	Cu	mg/kg	0 7	0.9	0.9
$CaCl_2$	Boron	B	mg/kg	0.15	0 22	0.28
	Silicon	Si	mg/kg	17	42	45
LECO IR Analyser	Total Carbon	C	%	0.80	0.92	1.04
	Total Nitrogen	N	%	0.06	0.07	0.08
Calculations	Carbon/ Nitrogen Ratio		ratio	13.6	13.7	13.2
PCSM	Paramagnetism		µcgs	240	80	80
	Basic Texture	t		Loam	Clay Loam	Clay Loam
	Basic Colour	c		Brownish	Brownish	Brownish

140 130 130

0 0 0

100 120 120

15 10 10

1t gypsum (for Ca)

2t lime

APPENDIX 2 "

COMPOST "TOTALS' ANALYSIS REPORT

1 sample supplies by Casco Civil Construction on 12th March 2008 - Lab job no P3342

analysis requested by Peter Cassidy

			Block ID:	
			Crop:	
			Client:	
	NUTRIENTS		UNITS	P3342/2
TOTAL nutrients (acid Digest/ combustion				
	Nitrogen	N	%	3.38
	Phosphorus	P	%	1.53
	Potassium	K	%	1.87
	Sulphur	S	%	0.44
	Carbon	C	%	40.5
TOTAL Salts (Acid Digest)				
	Calcium	Ca	%	2.39
	Magnesium	Mg	%	0.5
	Sodium	Na	%	0.32
TOTAL Metals (Acid Digest)				
	Copper	Cu	ppm	82
	Zink	Zn	ppm	370
	Manganese	Mn	ppm	448
	Iron	Fe	ppm	994
	Boron	B	ppm	38
Calculations / Ratios				
	Nitrogen : Sulphur Ratio		UNITS	7.7
	Nitrogen : Phosphorus Ratio		UNITS	2.2
	Nitrogen : Potassium Ratio		UNITS	1.8
	Carbon: Nitrogen Ratio		UNITS	12
	Crude Protein* see note 5		%	21.1