

High beef production increase from low nutrient fertilizer inputs

Max and Beth Walker are beef producers near Bridgetown in Western Australia who run a self replacing herd of breeders on a 275 Ha property that has undulating to steep hills in a high rainfall zone. Max has turned his property around and increased his stocking rate, stock condition and animal health using Optima Agriculture's alkaline based soil and plant nutrition products.

In 2004, the Walkers pastures were in poor shape; dominated by barley grass, silver grass, capeweed, corkscrew and wild oats. Variegated thistle also dominated the ridges on the property. Max had 70 breeders (approx 5 DSE/Ha) and was quite concerned with the quality of the pasture. He locked up 90 Ha for hay annually, but as Max says "If you could call it hay". Max met Optima consultant Roy Symes with a plan to turn things around, with a budget of \$21/Ha, and a soil test taken 7 years previous. Max said the place was going backwards and he was on a shoe string budget, so that's why he decided to give the Optima Agriculture product range a go.

Based off the previous soil test, a blend of 5 kg of MAP and 5 kg of Manganese Sulphate (soils were low in Mn) was applied, however to mineralise locked up nutrients in the soil, 1 Litre of BioBrew Soil was mixed with 8 L of Molasses per Ha. BioBrew Soil is a mix of bacteria and fungi resulting from the final stages of compost and decomposing organic matter. The bacteria and fungi are able to breakdown dead organic matter in the soil and release nutrients. The molasses acted as an energy source for the microbes in the BioBrew Soil. After application, Max started to notice a change in his pastures, where white clovers started to appear in spots.

Max decided that he was on the right track, so in 2005, he allocated a larger budget and Optima made a custom blend consisting of HiCal*, 'BioPhos'[#], MAP, Manganese sulphate and traces zinc, copper, boron, cobalt and selenium blended with molasses to act as an energy source for the microbes. The plan for the Walkers was to improve the nutrition on a 3rd of the farm over successive years, however Max was pretty happy with 2004's result that he put the product at 70 kg/Ha over 180 Ha.

In 2006, Optima were producing CalSap and liquid fertilizers. Max applied CalSap at 20 L/Ha the liquid fertilizer called 'OptiGraze' which by industry standards was a low analysis fertilizer. However the product also contained 'BioBrew' and organic complexes to make use of the fertilizer already in the soil. This product contained micronised phosphate, a finely ground rock phosphate (sub 75 um) with a very large surface area for rapid adsorption. Max was quite impressed by the results obtained with the CalSap and OptiGraze. Clover was really starting to dominate the pasture, out competing the less productive species such as corkscrew and capeweed.

Max got such positive results from the liquids that he bought in 40 more breeders. This increased the stocking rate to 130 breeders (8.5 DSE/Ha) and also supported 600 head of sheep from January to August when the wheat belt was in drought (another 2 DSE/Ha).

Max continued to use only liquid fertilizers and CalSap from 2007 to 2009, where in 2009 he applied a HiCal and Lime/Dolomite blended with a total fertilizer (Cal-Mag Plus %) across most of the farm to increase pH and supply magnesium. In other places, he spread straight HiCal. Most of the liquid fertilizers that he applies have added organic complexes and a dash of “BioBrew” to aid mineralization of the applied fertilizer and organic matter and improve soil health, all in one easy application.

Table 1: History of Fertilizer and soil amendment products applied to higher production paddocks

2004	Custom Blend (20 kg/Ha) MAP, Manganese Sulphate, BioBrew, Molasses
2005	Custom Blend (70 kg/Ha) - HiCal, BioPhos, MAP, Copper, Zinc, Manganese, Cobalt, Boron, Selenium, molasses
2006	CalSap 20 L/Ha, OptiGraze 20 L/Ha
2007	CalSap 30 L/Ha, OptiGraze 25 L/Ha + (6 kg/Ha) micronised phosphate
2008	CalSap 30 L/Ha, Optimax 30 L/Ha
2009	Liquid Pasture Power 50 L/Ha (has a CalSap base), 200 kg/Ha HiCal, 130 kg/Ha CalMag Plus
2009 Spring	OptiGraze 25 L/Ha + Molasses 4 L/Ha (for red legged earth mite control)

Max says the big savings from liquids have come in transport of the product, where he uses 1000L shuttles to transport and store the product on farm. He also notes the ease of application, where he uses a “Boomless Jet” to apply product. He converted an old boomspray by removing the boom and attaching the jet nozzle which spreads the product about 18m in a pass. He can apply the product when it is raining.

Max now runs 174 Breeders (11.5 DSE/Ha) across the farm and this year, with the late break, ran out of hay in April, but was able to pull the herd through in very good nick through the wintertime. He now has a sense that he can do something productive with the place, and that the Optima products had aided in breathing new life back into the farm.

A recent field day at Max’s impressed all attendants, after going through the history of inputs on the farm. The group examined the pastures composition and noted the high density of clover and well established root structure. The rhizobium were nodulating the clover roots and surviving well where no clovers had been planted in 25 years. This is a massive turnaround in pasture species on the paddocks, considering no herbicide or pesticide had been applied to the paddocks in over 15 years.

The clover has naturally out competed the weeds in the pasture with balanced nutrition and a good supply of soluble calcium. Max noted the large change is pasture composition after the first time he used CalSap. “Roy wanted me to use 30 L/Ha straight up, but I was pretty cautious, so I only used a smaller amount in the first year”. Now Max is happy with the benefits that CalSap is providing to the pasture that he uses between 20-30 L/Ha every year.



Figure 1: Optima Agronomist Chris Hourigan demonstrating improved soil structure and health, and healthy root growth at a recent field day

Chris Hourigan, Optima’s agronomist noted the clover response was probably due to the doubling in phosphate recovery seen in soil tests taken from 2006 to 2009. The addition of the microbes from the biobrew and the micronised phosphate in the liquids, with its large surface area, has certainly done a good job creating more plant available phosphorus.

“The CalSap has also helped kick start the clover by supplying available calcium and making phosphate available, and improving the soil structure. It’s a matter of providing these smaller plant available nutrients up front as a maintenance ration, and then every couple of years, adding a large amount of nutrients to replace those removed from the farm through hay production and stock going off farm.”



Figure 2: Use of CalSap and liquid fertilizers has seen a turnaround in pasture species where white clover now dominate the pasture, out competing undesirable plant species without a drop of herbicide or pesticide being used

Max has also bought and used an aerator over most of the property, and the aeration, combined with the CalSap has significantly improved soil structure to be very friable, where Max noted the clayey-loam soil used to smear. The rain now penetrates into the soil instead of running off. At the field day, 18 mm fell in about 5 hours. Vehicles were able to drive over the paddock without stirring up any mud.

The Walkers have not lost a cow in the past 3 years, where previously the occasional cow went down with grass tetaney. Max thinks the better animal health may be due to better nutrition from the plants and hay being produced. In 2007, we produced our heaviest hay rolls of very high nutrient value. In 2008 the stock was fussy, only liking our 2007 hay rolls, not leaving a mouthful on the ground. When we fed out purchased hay from another farmer, the stock walked right over it.

Max also notes an improvement in the quality of the stock. “Our January 2008 drop calves look unbelievable, but what surprised us were the results of our 18 month old steers at Market in July 2008. Our independent stock agent from IRA Pty Ltd, Colin Thexton assessed the calves for market with an estimated dress weight of 223kg and a \$730 return per head. But the stock was held back an extra 11 days from kill on the nutrient heavy pasture, and they dressed in at 240 kg and we received \$772 return each”. Max recently applied a reformulated ‘OptiGraze’ liquid fertilizer on his paddocks for spring growth. OptiGraze contains large amounts of N for grass growth with Ca to reduce N volatility and trace elements to supply plants at the quick vegetative growth stage.



Figure 3: Pasture growth 9 days after application of 25 L/Ha OptiGraze

Table 2: Summary of major elements (kg) applied every year to the higher production paddocks. Note the bulk nutrient input from CalMag Plus product in 2009, which the microbes in BioBrew can aid in making plant available.

	N	P	K	S	Ca	Mg
2004	0.625	1.4		1.1		
2005	0.3	1.6		0.4	22.0	
2006		0.5	1.5	0.3	1.6	0.3
2007		2.2	1.5	0.4	2.4	0.4
2008	7.0	0.8	0.5	0.2	2.6	0.2
2009	7.0	4.0	4.4	2.5	92.0	6.8
2009 Spring	7.75		0.075	0.1	0.25	
Total	22.7	10.4	8	5	120.8	7.7
Soluble Ca[^]					1.5 kg/ha	

[^]CalSap contains 18 % of its Calcium as Soluble Calcium

Table 3: Summary of trace elements (kg) applied every year to higher production paddocks. The liquid fertilizers are blended for a balanced addition of trace elements and being liquid, allow for much more even spread than granular additions. The trace elements in CalSap are not included.

	Mn	Zn	Cu	Co	B	Se	Si	Mo
2004	1.8							
2005	0.3	0.25	0.1	0.1	0.1	0.1		
2006	0.3	0.001	0.001					
2007	0.4	0.001	0.001					
2008	0.1	0.114	0.036	0.001				
2009	0.00026	0.00018	0.00017	0.00001	0.00011		3.9	0.00001
2009 Spring	0.0875	0.0875	0.03					
Total	3.1	0.5	0.13	0.1	0.1	0.1	3.9	0.00001

* **HiCal** is a Lime fortified with calcium hydroxide (which has a higher NV than carbonate) with solubilising agents added to make calcium more soluble and plant available.

BioPhos is a reactive rock phosphate solubilised and made plant available by bacteria

% **CalMag Plus** is a dolomite/lime blended with a mix of granular fertilizers, including trace elements that can be spread all at once

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