GrazingFutures Case Study

Northern P Roadshow

Bringing researchers and producers together to ramp-up phosphorus feeding across the Gulf

Overview:

The majority of Gulf beef businesses are in phosphorus (P) deficient country (Figure 1). When implemented, P supplementation greatly improves the herd performance (branding, death and growth rates) of northern breeding operations faced with **seasonal variability** and is a fundamental feature of **resilient livestock businesses**. The positive benefits P supplementation has on herd performance and profitability is an essential message to share among beef producers. The 2019 **GrazingFutures Northern P Roadshow** enabled extension staff and scientists to deliver information directly to regional areas where P deficiency is a major contributor to poor herd production and business outcomes. Bringing science to the bush, connecting producers to respected researchers and fostering peer to peer learning increased the adoption of P supplementation across the region.

Phosphorus:

Phosphorus deficiency is very common across northern Australia and extensive studies have established the importance of appropriate P supplementation in improving the production and profitability outcomes of the northern cattle industry. GrazingFutures staff delivered Phosphorus information days across three Gulf properties near Georgetown, Normanton and Burketown in October 2019. The Northern P Roadshow was delivered in partnership with the Queensland Alliance for Agriculture and Food Innovation (QAAFI), the Northern Territory Department of Primary Industries and Resources (NTDPIR) and regional NRM catchment groups (Northern Gulf Resource Management Group and Southern Gulf NRM).

In these areas, soil P is acutely deficient to deficient. Low soil P equates to low P in pastures and nutritional deficiencies of P in cattle that rely on grazing. Cattle require P for almost every vital function of the body including building bones and teeth, energy metabolisation, weight gain, late pregnancy and milk production. Severe and prolonged dietary P deficiency results in reduced feed intake, poor growth, reduced fertility and milk production, as well as high breeder mortalities.

Despite extensive research and information available to producers about the benefits of feeding P, the adoption of wet season P supplementation remains low. Dr Rob Dixon (QAAFI) identified that there is a general lack of understanding of how P deficiency impacts on herd productivity and profitability.

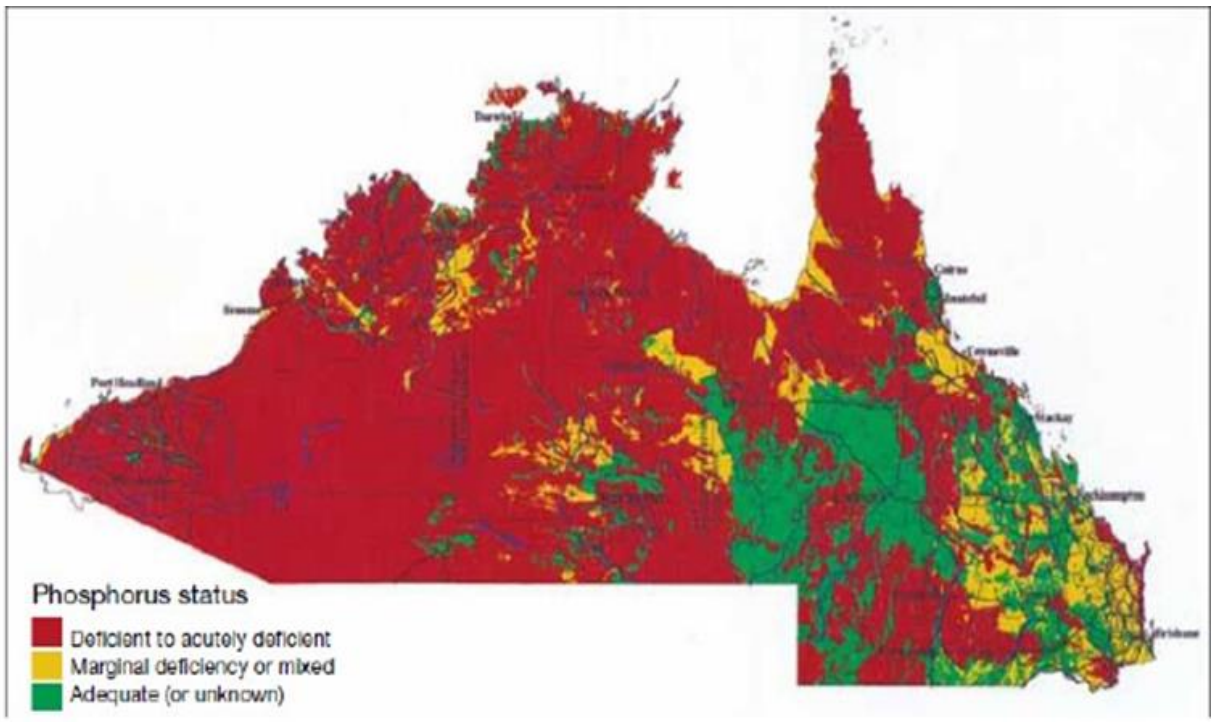

Figure 1: *Map showing general extent of phosphorus deficiency across northern Australia (Adapted from McCosker and Winks 1994)*

The science of feeding P:

During the three on-property workshops, producers had the opportunity to hear from Dr. Rob Dixon (QAAFI) in relation to P nutrition in northern grazing systems (Figure 2) and Tim Schatz (Principal Livestock Research Officer, Northern Territory Department of Industry, Tourism and Trade) who spoke about the considerable responses to P supplementation in their research trial at Kidman Springs.

Figure 2: Dr Rob Dixon (QAAFI) explaining P supplementation benefits to producers at Greenhills (Georgetown)

Rob discussed how cattle have the biological ability to mobilise their bone P reserves when their dietary P is insufficient, particularly evident during pregnancy and lactation. Likewise, a cow can top up her bones and replace P reserves when dietary P is in excess of her immediate needs. Rob presented steer and breeder daily P requirement (Table 1) and how effective P supplementation (wet and dry season) improves liveweight gains in growing cattle and re-conception rates in breeding cattle. GrazingFutures staff also discussed the importance of stocking rates and Grazing Land Management (GLM) in maintaining good land condition and maximising herd productivity.

Table 1. *The liveweight performance of steers and lactating breeders determines their daily phosphorus requirements (Rob Dixon QAAFI).*

Growing Steer		***Breeders in early – mid Lactation***	
Liveweight performance (kg/day)	***Dietary P required (g/day)***	***Liveweight performance (kg/day)***	***Dietary P required (g/day)***
-0.3	***4***	***-0.3***	***13***
0.0	***7***	***0.0***	***17***
0.6	***14***	***0.6***	***23***
1.2	***21***		

So, the P required by the animal <u>minus</u> P ingested from pasture = P required in the supplement.

As protein and energy requirements are usually catered for during the northern wet season, ***P becomes the primary limiting nutrient for production during this time.*** *Lactating cows have the highest risk of suffering from P deficiency. This is particularly the case when lactation is extended well into the dry season resulting in an increased need for mobilisation of body tissue reserves including P to ensure continued lactation is possible. Producers found the P supplementation science interesting with one Georgetown attendee commenting:* ***"….the workshop was very good overall and even though we are feeding P, it is reassuring to know what we are already doing on our property is backed by science."***

The impact of P supplementation:

Tim Schatz (NT DITT) presented the results of the Kidman Springs Phosphorus trial which began in mid-2014 (Figure 2). A total of 179 randomly allocated Brahman weaner heifers were selected for treatments with P supplement (P+) or without (P-). The weaner heifer weights were similar for both treatment groups (average weight: +P = 171.7 kg, -P = 171.2 kg). The treatment groups grazed two similar, acutely P deficient (soil analysis: 2.5-3.1 mg P/kg) neighbouring paddocks.

Figure 3. *Tim Schatz and Rob Dixon discuss P supplementation on Haydon (Normanton)*

The paddocks were set stocked and the treatments mobs swapped paddocks at the first- round muster (May) each year to minimise any paddock effect. Loose lick supplements were distributed twice weekly and fed year-round in troughs under lick sheds. The wet and dry season supplement recipes fed to each mob are shown in Table 2.

Table 2. *Recipes for loose lick supplements used in the Kidman Springs P supplementation Trial (Tim Schatz, NT DITT)*

	Wet Season		Dry Season	
	P+	**P-**	**P+**	**P-**
Biophos MCP	42.5%		25%	
Salt	50.0%	73.5%	40%	65%
Ammonium Sulphate (Gran Am)	7.5%	7.5%	10%	10%
Urea			25%	25%
Limestone		19%		

The poor body condition of lactating cows in the P- treatment resulted in much lower pregnancy rates than in lactating P supplemented (P+) cows (P- = 8%, P+ = 70%). The dramatic deterioration in P- treatment cows was attributed to the utilisation of their P reserves during their first and second lactations. Tim explained to producers that:

"When cows don't get enough P from their diet during lactation, they are able to mobilise P from their bones and tissues to put into their milk. Blood testing confirmed this with blood P levels adequate in calves from P- cows but were very low in the P- cows. This drain of P over two consecutive lactations without P stores being replenished by supplementation resulted in the P- treatment cow weights and performance crashing (Figures 4 and 5)."

Figure 4: *The Kidman Springs P + wet cows (average weight = 432kg) (Tim Schatz, NT DITT)*

Figure 5: *The Kidman Springs P - wet cows (average weight = 317kg) (Tim Schatz, NT DITT)*

Tim reflected that overall, they observed large increases in pregnancy rates, calf weaning weights and reductions in calf losses and cow mortalities, resulting in a large return on investment from P supplement (more than 500% over 5 years). Of the P workshops, Tim reflected:

"I really enjoyed the series of field days. It was great to see some new country, meet some new people and share the results that we have found with people running cattle in similar environments. The local graziers that I met were fantastic and really interested in the results of the trial. "

Dan Slaney from Amber station, commented:

"I found it very useful to see the data from the Kidman springs trial, which really demonstrated the performance difference between P fed and non-P fed breeders. We've since been looking into modifying and fine tuning the lick we feed to ensure it has enough P in it to optimise our breeder cow performance."

Producer led learning and feedback:

The P Roadshow workshops took place on three properties across three regions and were generously hosted by Greg and Carol Ryan, Greenhills (Georgetown), Luke and Helen Simmons, Haydon Station (Normanton) and Jason and Hannah Simms, Armraynald (Burketown).

Producer led discussions were an important element of the P workshops (Figure 5) with many property managers sharing the details of their P supplementation programs, and what had or had not worked for them.

Figure 5: *Producers at the Georgetown P Workshop*

There was discussion about practical ways to achieve adequate lick intake levels and several P delivery systems for the wet season were discussed. One Georgetown grazier commented:

"It was great to have time to hear from other producers and have discussion time in the paddock. It was a really beneficial workshop to attend and great to see the statistics and records of change associated with feeding P."

Overall, most producers already had some sort of wet season P program in place. But many commented that the cost of starting a P supplement program ($12-$16/breeder) and the associated concerns around achieving adequate P intakes were still a barrier. However, after seeing the results from the Kidman Springs trial and learning from other producers the benefits and impacts they were seeing, most producers felt it was important that they try feeding P, or modify their current P feeding practices:

"After starting to feed SuperPhos blocks during the wet season, the cattle were looking pretty good afterwards and were in quite good condition, compared to previous years without the lick."

"A really good workshop, and it made me realise there is probably just a few more things I can do to tweak the supplement I am feeding out, to maximise performance. "

"After attending the workshop and listening to the information on P, feeding P seems to be the way to go, to improve our breeder cows' performance."

"I ended up feeding P in a loose lick form last wet season. The cattle seemed to do much better and quickly bounced back from their dry season condition quite fast. There are a lot more calves which is unusual, and it seems the cows are cycling a lot quicker too since feeding the loose lick P."

Figure 6: *Discussing pasture management and stocking rates at Armraynald (Burketown).*

Grazing Land Management (GLM):

Grazing land management underpins all successful beef businesses operating in a variable rainfall environment. During the workshops, DAF Beef Extension officers presented simple guidelines on stocking rates, pasture budgeting, pasture monitoring and wet season spelling. Using the Queensland Governments Long paddock website, decision support tools such as Forage were demonstrated to producers.

Other key discussion points included the importance of maintaining 3P grasses, break of season ground cover and good land condition (Figure 6). A critical point that is often overlooked is that pasture intakes can increase when feeding supplements, placing additional pressure on paddocks and pastures. Feeding P or urea supplements can increase feed intake by approximately 25%. This really highlights the importance of knowing how much useful pasture is available and adjusting stocking rates to suit.

"After the workshop, I better understood that feeding cattle P supplement will result in a 25% increase in their feed intake, meaning they would eat that much more grass. This was something I'd not heard before and it is certainly something I will have to factor in."

Figure 7: Producers discussing P at the Armraynald yards.

Phosphorus supplementation options:

Feeding supplement can often be confusing for producers with so many products available. Various P supplements, P percentages as fed and required lick intakes are described in Table 3. Ensuring cattle consume enough P/day to maximise herd performance on specific land types is critical and usually requires some trial and error. Intakes can vary enormously between paddocks, and even water sources (bores or dams) can influence lick consumption. It is important to record numbers fed and lick consumed in particular paddocks. Recipes must be adjusted if P intakes are not adequate. The pros and cons of phosphorus delivery systems (loose mix, loose mix in bulker bags and blocks) are outlined in Table 4.

Table 3. *Wet season P supplement options and recommended intakes to supply 10g P/day to breeders on acutely deficient country.*

Bulker Bag (no lick shed)	*Hard Block - (no lick sheds)*	*Example Only - Wet Season loose lick (lick sheds)*	*Kynofos or MDCP (lick Shed)*
Kynofos (70%)	Fed straight	Salt (25%)	Fed straight
Lime (5%)		Gran Am (10%)	
Salt 25%		MDCP (53%)	
		Sulphur (2.6%)	
		Molasses (2%)	
		Lime (6.9%)	
		Trace (0.5%)	
P as fed: **15%** Daily lick requirement **70g**	P as fed: **12%** Daily lick requirement: **85g**	P as fed: **11%** Daily lick requirement: **90g**	P as fed: **21%** Daily lick requirement: **50g**

It is not always simple to determine if cattle are P deficient, particularly in marginal P country. However, a combination of blood, faecal and soil sampling can help determine P deficiency across a mob in a particular paddock. Local beef extension officers can assist producers with sampling guidelines and kits.

Table 4: Pros and cons of phosphorus delivery systems

Loose lick	Blocks	Loose lick in bulker bags
Need lick sheds/covered troughs	Weather resistant in most cases	Reasonably weather resistant with limestone
Lower cost/kg of P	Higher cost/kg P	Lower cost/kg of P
Recipe can be changed to achieve target intakes	Set recipe	Recipe can be changed to achieve target intakes
Difficult to put out full wet season requirements	Adequate supplement can be distributed in paddocks before onset of wet	Adequate supplement can be distributed in paddocks before onset of wet
Labour intensive	Less labour intensive	Less labour intensive But need suitable lifting gear to distribute
Severe storms/cyclonic rain can spoil supplement	Storm resistant	Prolonged heavy monsoon rain can result in some spoilage of supplement
Freight efficiency Option to increase P% and reduce freight cost/tonne of P	Less freight efficient as P% is usually lower	Freight efficiency Option to increase P% and reduce freight cost/tonne of P

"We decided to try loose lick following the workshop, in tubs under sheds. This seemed to work better, with a much better level of lick consumed without gorging, minimal waste, and only fed 10 bags at a time to minimise waste and ensure cattle were consuming it all before replacing."

"Feeding hard blocks this wet season has been good, these blocks were much harder and stood up well during the wet season."

Summary

The benefits of feeding P were clearly demonstrated through this Roadshow and a number of producers have opted to trial P supplementation for the first time or have modified their current P feeding systems. A participant survey after the Northern P Roadshow event confirmed all producers had implemented management changes, with most producers attributing positive production outcomes on their properties to P supplementation. All the producers feeding P indicated they would continue the practice in the long term.

Eight producers who attended the Northern P Roadshow implemented a P feeding program for the first time and started to observe obvious improvements the following year in calving numbers, re-conception rates and body condition scores. An additional five producers in attendance confirmed they changed their P feeding programs and noted economic benefits in doing so.

Producers said:

"….by keeping the recipe simple we were addressing the problem of P without all of the other unnecessary stuff in the lick. This made our supplement cheaper and more effective."

"Since we have increased the P levels in the supplement and changed how we segregate our breeder cows over the last few year, we have seen an increase of up to 10-15% in annual calving rates. Most of our cows are getting back in calf immediately, and this has been since we changed how much P we have been feeding."

Created by Megan Munchenberg, Lindsey Perry, Joe Rolfe and Bernie English (DAF, Mareeba & Cloncurry); Dr Rob Dixon (QAAFI); and Tim Schatz (NT DITT)
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