

KEEPING YOUR OTT SAFE ON QUEENSLAND PASTURES

BY DR. NERIDA MCGILCHRIST



INTRODUCTION

Grasses that love to grow in warm climates go by a few different names, including warm season grasses, subtropical grasses or C4 type grasses.

But they all have one thing in common... a compound called 'oxalate'.

Oxalate loves calcium!

So much so that when it is present, it steals calcium off your horses.

Which means that horses grazing these warm season grasses can be at risk of severe calcium deficiency.

The calcium deficiency is commonly so severe that their bones get brittle and will eventually break.

Or their muscles will stop working to such an extent that they can no longer stand up.

BUT, the onset of the deficiency, in many cases, is slow and insidious.

And it creates nondescript and often varying symptoms that are frequently misdiagnosed.

In fact, all too often the first a horse owner knows about high-oxalate grasses is when, heartbreakingly, they end up with a horse with a broken leg!

Don't let this be you! Or your horse!!

Keep reading to learn which grasses present the highest risk to your horse, how to identify them, how the calcium deficiency occurs and importantly, how to prevent it!

The good news is, it's easy and cheap to prevent! You just have to know how.



Nerida

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DANGEROUS GRASSES

WHICH GRASSES ARE DANGEROUS?

Nearly all warm season grasses contain some oxalate, but many of them, like rhodes grass, paspalum and digit grass contain such small amounts that they don't steal enough calcium to cause your OTT any grief.

There are however three grasses that are common in Queensland and do present significant risk to the health of your horse. These are kikuyu, buffel grass, and the worst of them all, setaria! It's important that you can identify these grasses so that you know when your horse is at risk of calcium deficiency... and when you need to take preventative action! Let's look at kikuyu first.

Kikuyu

Kikuyu is usually a bright, almost lime green colour when it is young and growing. It is a grass that grows in long runners, so if you pull at it, you will often get what look and feel like leafy grass ropes.

Its leaf is a tiny bit hairy with a dominant vein running down the middle which is especially visible and able to be felt from the back.

The stem is a bit flat, the leaves look folded (as opposed to rolled) where they are emerging from the leaf sheath (see 'Identifying Grasses' diagram, page 4). And typically kikuyu is soft to the touch, especially when young and green.



And, one cool feature is kikuyu's ligule... the ligule is a little structure that wraps around the stem at the base of the leaf. In kikuyu, it is made up of really visible, fine little hairs. And something unique to kikuyu is that it never has visible seed heads!

WHICH GRASSES ARE DANGEROUS? (CONT..)

Buffel grass

Buffel grass has a darker green to almost blueish colour. Unlike kikuyu which tends to grow along the ground, buffel grows in a tussocky bunch.

Its leaves are sparsely hairy, up to 1 cm wide and also have a prominent vein or mid-rib down the centre. The leaves feel rough to the touch.

The emerging leaves are rolled (as opposed to folded) and, like kikuyu, its ligules are hairy (see 'Identifying Grasses' diagram, below).

And its seed heads are like little bottle brushes that are up to 10 cm long and frequently purplish in colour, aging to a straw colour as the plant matures.

For an EXCELLENT resource to identify buffel grass, see <https://www.malleeconservation.com.au/buffel-grass/identifying-buffel-grass>



Both kikuyu and buffel are capable of causing severe calcium deficiency. They contain around 15 g/kg dry matter of oxalate, which to give you some perspective, is about 5 times higher than the amount found in the low oxalate digit, paspalum or rhodes grasses.

Kikuyu and buffel pose significant risk to horse health if not managed properly, but their risk pales in comparison to the risk posed by Setaria.

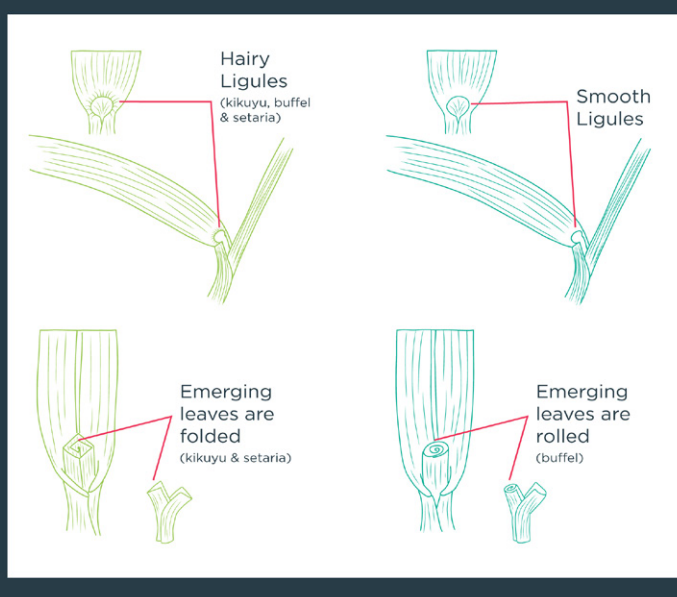
Setaria

Setaria is grey-blue-green in colour, and like buffel, grows in tussocky bunches. With the entire plant reaching 1 to 2 metres tall at maturity!

Leaves are broad, flat and usually hairless. They are folded (as opposed to rolled) where they emerge from the leaf sheath (see 'Identifying Grasses' diagram, right).

The base of young leaves are compressed into a fan shape and are often reddish around the stem.

Setaria's ligules are also hairy. And its seed heads are like a LONG bottle brush... 8 to 25 cm long! And they will vary in colour from purplish to brown.

Identifying Grasses

WHICH GRASSES ARE DANGEROUS? (CONT..)

Setaria (cont..)

Setaria can contain anywhere from 35 to nearly 80 grams of oxalate... **twice to more than 5 times the oxalate in kikuyu and buffel grass** and has been known to cause fatal calcium deficiency in as little as 6 weeks in lactating broodmares.

So if you have this grass, you NEED to know you have it so you can feed in a way to prevent severe calcium deficiency occurring.



WHAT HAPPENS WHEN HORSES EAT THESE GRASSES?

To understand the potential impact of these grasses on your OTT, let me first explain, in simple terms, normal calcium metabolism.

Under Normal Conditions

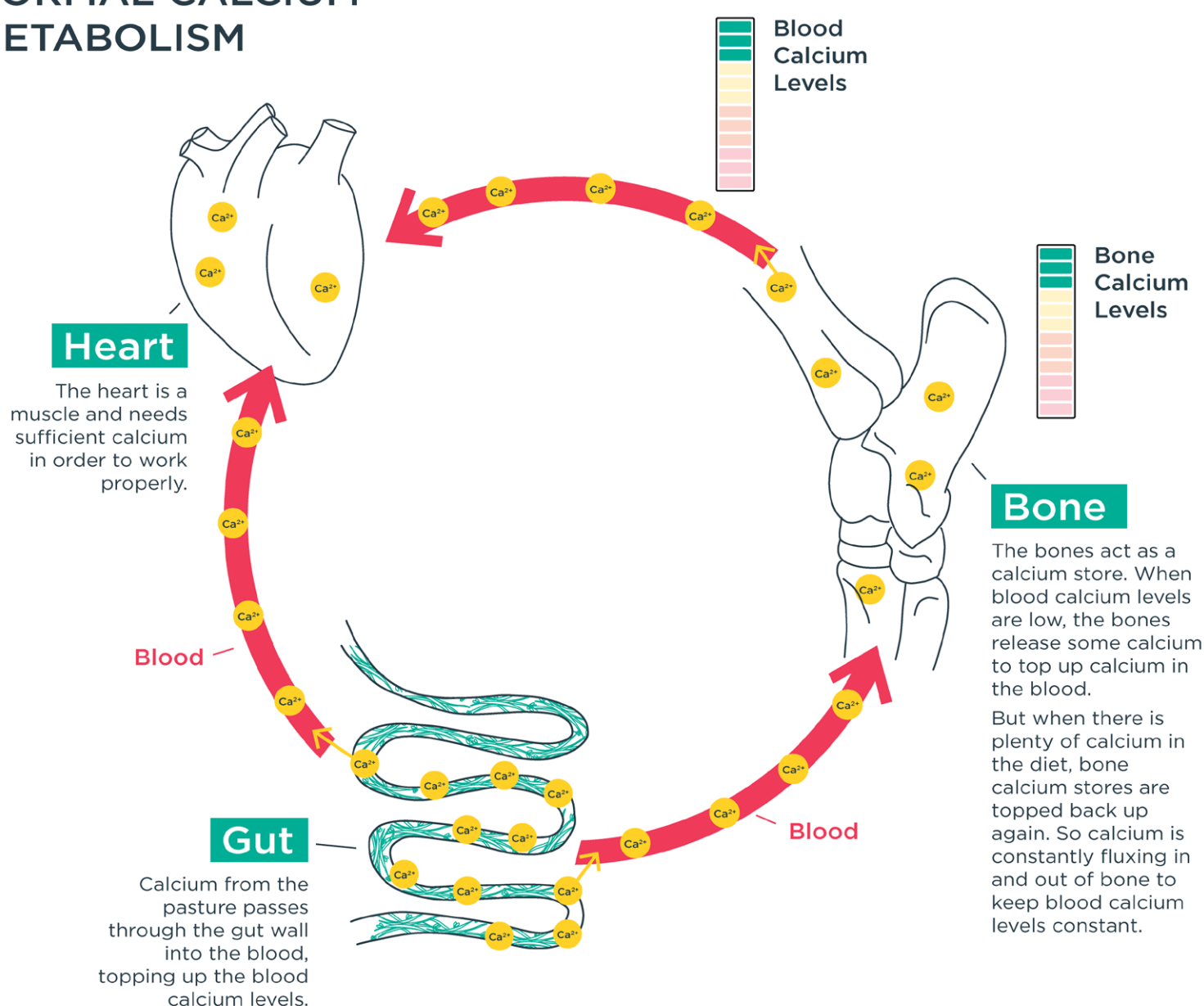
- Calcium's major roles in the horse's body are providing strength to bones and enabling muscle contraction and relaxation.
- Because the heart is a muscle that must consistently contract and relax to keep your horse alive, blood calcium levels must be maintained within a very tight range so that muscle contraction and relaxation, and therefore heartbeat can occur correctly.
- If blood calcium gets too low, the heart cannot beat properly, and that will, ultimately, result in death.
- In order to ensure blood calcium levels never get too low, the body has developed a very clever system where there is a store of calcium in the bones. Should blood calcium start to drop, calcium is released from the bones to 'top up' the blood levels.
- Then when there is excess calcium from the diet, the bones top up their calcium stores.

So the calcium is constantly fluxing in and out of the bones, alternating between topping up blood calcium levels and topping up bone calcium stores.

(See 'Normal Calcium Metabolism' diagram on the following page)

WHAT HAPPENS WHEN HORSES EAT THESE GRASSES? (CONT..)

NORMAL CALCIUM METABOLISM



When a horse grazes 'normal' pasture, without high levels of oxalate, this normal calcium metabolism is what is happening... they absorb the calcium from the pasture as well as from other ingredients in their diet, and that calcium tops up both the blood calcium and bone calcium levels.

But, when your horse grazes the high oxalate, warm season grasses, the oxalate essentially steals calcium from your horse, and that changes the way this finely balanced calcium metabolism works.

Remember the number one priority for your OTT is to maintain blood calcium levels in order to keep their heart beating.

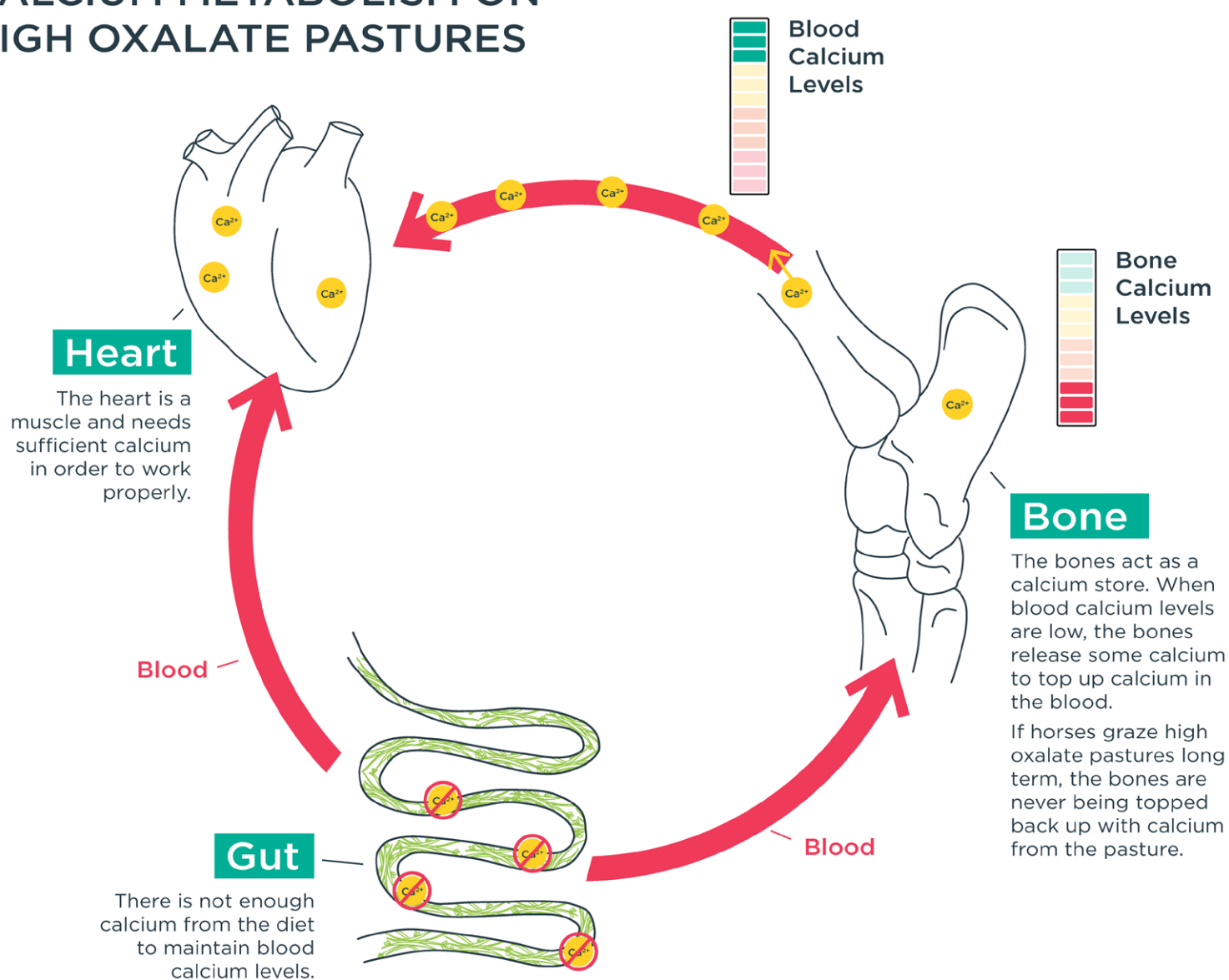
When they graze the high-oxalate grasses, these grasses don't contribute to topping up blood calcium levels. So, to maintain blood calcium, the bones will release calcium and blood calcium levels are maintained.

This is the normal process... the smart safety catch our horses have built in to keep them alive.

(See 'Calcium Metabolism on High Oxalate Pastures' diagram on the following page).

WHAT HAPPENS WHEN HORSES EAT THESE GRASSES? (CONT..)

CALCIUM METABOLISM ON HIGH OXALATE PASTURES



THE PROBLEM arises when this keeps happening, day after day, week after week, month after month... calcium has to keep being released from the bones to top up blood calcium levels. AND bone calcium stores don't get an opportunity to be topped up...

Eventually, so much calcium gets mobilised, that the bones become weak and your horse will now have a disease known as "Nutritional Secondary Hyperparathyroidism", or what is commonly known as 'bighead disease'.

Bighead disease is really just generalised osteoporosis, or weak bones, and puts your horse at high risk of bone fractures, with tragic leg and pelvic fractures the most common.



Image courtesy of Dr Doug Edlington BVSc



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BIGHEAD DISEASE

The three hardest things to say in life are I'm sorry, I was wrong and Nutritional Secondary Hyperparathyroidism... Which is why we call it 'bighead disease' - but it's definitely no laughing matter.

WHAT ARE THE SYMPTOMS OF BIGHEAD DISEASE?

It is really important to be able to recognise bighead disease so you can quickly reverse the calcium deficiency should your horse ever be affected by this condition.

The most characteristic symptom, as the common name for this disease suggests, is a big head. In young horses, so much calcium is leached from the jaws and skull that the bones become spongy and enlarge, creating the well-recognised big head appearance.

HOWEVER, it is super important to remember that the name 'bighead disease' is misleading, because in mature horses, the disease is **RARELY** accompanied with the characteristic 'big head' that is seen in young horses.

While the characteristic big head is rare in mature horses, they can still get bony changes on their head, with a bump running between their eyes or on the bridge of their nose relatively common.

What you are more likely to see though, in the early stages of the disease, is **generalised soreness** and a **shifting lameness that moves around all 4 legs** as horses favour certain legs over others depending on which ones are most sore.



2 ponies with symptoms of NSH or "bighead" with demineralization of the facial bones.

Image credit: Luthersson, Nanna & Chunekamrai, S. & Estepa, José & Aguilera-Tejero, E.. (2005). Secondary nutritional hyperparathyroidism in ponies in Northern Thailand. Pferdeheilkunde. 21. 97-98. 10.21836/PEM20050741.

WHAT ARE THE SYMPTOMS OF BIGHEAD DISEASE? (CONT..)

I almost always find these horses are also generally unhappy, don't like being touched and are sour and grumpy. And when the calcium deficiency is severe, you may find they become reluctant to move, or they may start to move with an odd gait.

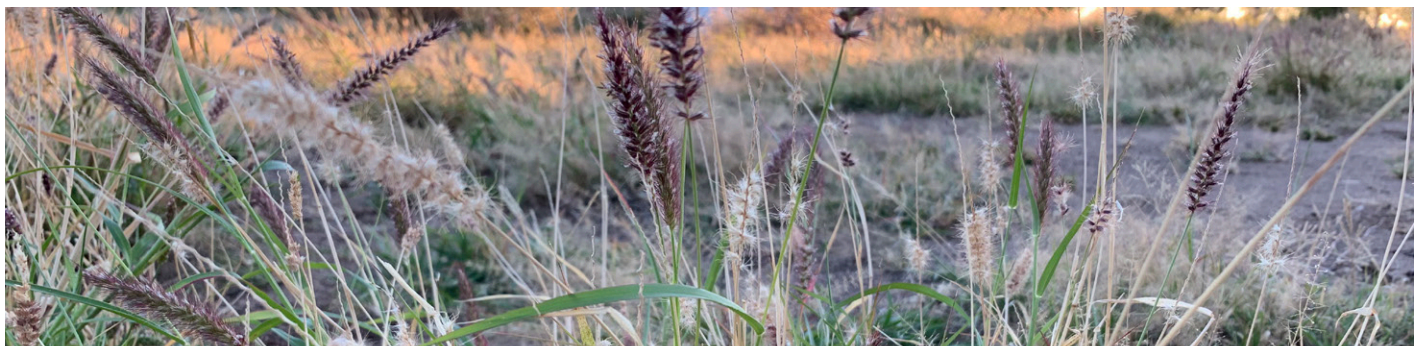
Their coat will often become rough, they may lose weight and do poorly even when being fed plenty of feed and their hoof health may suffer. And when the disease is well progressed, their teeth may fall out.

One common symptom, that is almost always misdiagnosed, is some form of noisy breathing. The nasal passages become restricted, creating odd breathing sounds, especially when your OTT is working.

In its final stages, the bones become so weak that bone fracture is almost inevitable. Horses will most commonly break legs or they fracture their pelvis when rolling.

If they are lucky to escape fractures, it is possible for the disease to deplete the bones of calcium so much, that blood calcium levels can no longer be maintained, resulting in horses unable to stand up, and ultimately ending with heart failure and death.

All of it is heartbreaking!! But the good news is, it is also all preventable! Here is how...



PREVENTING BIGHEAD DISEASE

First things first, if your horse is already symptomatic you need to seek out an experienced nutritionist and also your veterinarian to help you with managing your horse's recovery.

If your horse is grazing these pastures, but is not symptomatic, take heart... because preventing severe calcium deficiency is easy, and cheap!!

The main thing you have to do is **add more calcium to your OTT's diet!** Simple!

Except it needs to be done properly, with **enough calcium added to prevent the disease. AND enough magnesium and phosphorus to keep the ratios of these minerals correct** in the diet.

Let me give you some options for exactly how to do this!

Note that all diets given in this e-Book are intended as starting points for your OTT. They are all based on an average sized OTT of 500 kg bodyweight and use feeds, balancer pellets and supplements from QOTT partners.

PREVENTING BIGHEAD DISEASE (CONT..)

Diet Option 1 - Specialised Balancer Pellets

There are some well formulated balancer pellets available on the market that are high in calcium, and balanced with magnesium and phosphorus, that will add enough calcium to your OTT's diet to prevent calcium deficiency occurring when they are grazing high-oxalate grasses (but not setaria!).

These balancer pellets give you a convenient and reliable option for preventing oxalate induced calcium deficiencies!

Diet Option 1.1 - High Calcium Balancer Pellet Diet

1 kg/day	Specialised high calcium balancer pellet (Pryde's High Cal)
60 ml/day	Flaxseed oil
500 g/day	Lucerne chaff
24/7 access	High oxalate pasture (excl setaria)
Free Choice	Salt

Diet Option 1.2 - High Calcium Balancer Pellet Diet + Lucerne

0.5 kg/day	Specialised high calcium balancer pellet (Pryde's High Cal)
60 ml/day	Flaxseed oil
500 g/day	Lucerne chaff
2 kg/day	Lucerne hay
24/7 access	High oxalate pasture (excl setaria)
Free Choice	Salt

Diet Option 2 - Add Your Own Calcium

You can also add your own calcium to your OTT's diet to prevent calcium deficiency if they are grazing high oxalate grasses. The key to doing this well is making sure you are adding enough calcium AND balancing it with magnesium and phosphorus.

The amount of calcium you need to add will depend on how much calcium is already being fed as hard feed or from other forages like lucerne hay. You can use these diets as a starting point, to calculate the amount of calcium, magnesium and phosphorus you need to add depending on how much hard feed and/or lucerne you are feeding.

Diet Option 2.1 - Pasture Based Diet

250 g/day	Any combination of copra meal, sugarbeet pulp and lupin hulls*
80 g/day	Limestone
50 g/day	Dicalcium phosphate (DCP)
20 g/day	Magnesium oxide (Causmag)
60 g/day	Vitamin & Mineral Supplement (Poseidon Digestive VM)
60 ml/day	Flaxseed oil
500 g/day	Lucerne chaff
24/7 access	High oxalate pasture (excl setaria)
Free Choice	Salt

* These ingredients are added to give you a base to mix the calcium, magnesium and phosphorus powders into.

Diet Option 2.2 - Pasture Based Diet + Lucerne Hay

250 g/day	Any combination of copra meal, sugarbeet pulp and lupin hulls*
20 g/day	Limestone
20 g/day	Dicalcium phosphate (DCP)
10 g/day	Magnesium oxide (Causmag)
60 g/day	Vitamin & Mineral Supplement (Poseidon Digestive VM)
60 ml/day	Flaxseed oil
500 g/day	Lucerne chaff
2 kg/day	Lucerne hay
24/7 access	High oxalate pasture (excl setaria)
Free Choice	Salt

* These ingredients are added to give you a base to mix the calcium, magnesium and phosphorus powders into.

PREVENTING BIGHEAD DISEASE (CONT..)

Diet Option 2 - Add Your Own Calcium (Cont..)

Diet Option 2.3 - Pasture + Complete Feed

1.5 to 2 kg/day	Complete feed (Pryde's Easi Off-The-Track or EasiGoing or EasiSport)
40 g/day	Limestone
20 g/day	Dicalcium phosphate (DCP)
10 g/day	Magnesium oxide (Causmag)
60 ml/day	Flaxseed oil
500 g/day	Lucerne chaff
24/7 access	High oxalate pasture (excl setaria)
Free Choice	Salt

Diet Option 2.4 - Pasture + Complete Feed + Lucerne Hay

1.5 to 2 kg/day	Complete feed (Pryde's Easi Off-The-Track or EasiGoing or EasiSport)
10 g/day	Limestone
10 g/day	Dicalcium phosphate (DCP)
5 g/day	Magnesium oxide (Causmag)
60 ml/day	Flaxseed oil
500 g/day	Lucerne chaff
2 kg/day	Lucerne hay
24/7 access	High oxalate pasture (excl setaria)
Free Choice	Salt

SETARIA

Please note that if your horse is grazing setaria, you will need to add more calcium than these diets provide. If your horse is grazing setaria, I strongly recommend working with an experienced nutritionist or using a reliable online nutrition calculator to properly balance your OTT's diet.

It is also strongly advised to have your specific setaria tested as there are large differences in oxalate content between various setaria species. Southern Scientific Services Pty Ltd (Google will find them for you) can test setaria for oxalate levels. Which then allows you to balance diets for calcium correctly.

In the meantime, at a minimum, change your horse to one of the diets **WITH LUCERNE** above but feed **3 times the amount of limestone, DCP and magnesium oxide.**



Diet Option 3 - Use a specially formulated calcium supplement

There are some high-quality and well balanced calcium supplements on the market specially formulated for horses grazing high oxalate pastures which make adding calcium, magnesium and phosphorus to the diet simple.

If you choose to use one of these products, follow the manufacturer's recommendations, and again, if your horse is grazing setaria, also seek out advice from an experienced nutritionist or use a nutrition calculator to determine correct dose rates.

Diet Option 4 - Free choice calcium

If you have your horses on large stations where they aren't typically fed every day, you can give them access to free choice calcium, magnesium and phosphorus to prevent bighead disease, which field evidence suggests horses will readily consume when they are grazing high-oxalate grasses.

Here is a mix-your-own recipe as a starting point for creating a balanced free choice calcium loose-lick:

Free Choice Calcium Loose Lick

8 kg	Limestone
5 kg	Dicalcium phosphate (DCP)
1 kg	Magnesium oxide (Causmag)
2 kg	Iodised salt

PREVENTING BIGHEAD DISEASE (CONT..)

Diet Option 4 – Free choice calcium (cont..)

Horses *should* eat approximately 200 g/day of this loose lick. This mix will last one horse 80 days; or it will provide a group of 10 horses with enough calcium for 8 days.

If horses are eating less than 200 g/day, you may need to mix in some dried molasses powder and/or reduce the amount of salt to improve palatability.

If they are eating considerably more than 200 g/day, you should also provide access to free choice plain salt as it may be a sodium deficiency driving them to consume large amounts of the loose lick per day.

If the mix is dusty, use a palatable and stable oil like canola oil or use liquid molasses to reduce the dust.

If your horses are grazing setaria, this method of calcium supplementation is not recommended as the risk is too high for any individual horse that won't consume the loose lick!

BEWARE OF MISTRUTHS

There are some products on the market that contain organic calcium, and, if their marketing claims were to be believed, only their very expensive organic calcium is capable of preventing bighead disease.

BUT this simply is not true. Nor does it have any reliable scientific evidence to support it.

It is simply marketing... to make you think you need to buy expensive products when you could, in fact be using common limestone... which is one of the cheapest feed ingredients available and also highly effective for preventing oxalate-induced calcium deficiency.

So keep your wits about you when researching products to use and be sure to ask for the published and peer-reviewed scientific evidence if anyone ever tells you that you can only use their expensive organic calcium to prevent bighead disease!



PREVENTING BIGHEAD DISEASE (CONT..)

THE IMPORTANT BITS

To recap keeping your OTT safe on QLD pastures, remember:

1. Warm season grasses contain a compound called oxalate that will steal calcium from your horse.
2. Kikuyu, buffel grass and setaria are three of the most common, high-risk grasses in Queensland.
3. Horses need to keep their blood calcium levels tightly controlled to make sure their heart can keep beating normally.
4. If their blood calcium level drops, they simply take a little bit of calcium from their bones to top the level up in their blood.
5. When horses graze 'normal' pastures, they absorb calcium from the pasture and this together with any calcium from the rest of their diet, tops up their blood calcium levels AND replenishes any calcium they may have taken from their bones.
6. When they graze high-oxalate pastures, these grasses steal calcium from your horse... they don't provide any calcium to top up blood calcium levels, so a horse has to take calcium from its bones to keep blood levels topped up and bone calcium stores don't get replenished
7. When this happens constantly over a period of time, the bones become depleted of calcium and become weak. This is a disease commonly called bighead disease.
8. The main symptoms of bighead disease are a shifting lameness, general soreness, horses that don't want to be touched and are generally sore and grumpy. You may also notice a rough coat, weight loss, poor hoof health and noisy breathing when horses are working.
9. Preventing bighead is as simple as increasing the amount of calcium in your OTT's diet. And keeping it in the right ratio with magnesium and phosphorus. There are diets in this e-Book that you can use as a starting point for developing diets with enough calcium to counteract the calcium-stealing effects of oxalate.

High oxalate grasses are the cause of far too many sad and untimely deaths in our horse population in Queensland. The wonderful thing is... prevention is simple and cheap! With the information provided here, you can make sure you are keeping your OTT safe, healthy and happy, even when grazing high oxalate grasses!

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JOURNEY