

Big Head

**By The Nude Horse
(Equine Epidemiologist)**

What is bighead in horses?

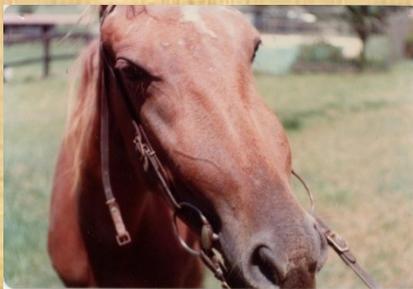
Most people think of swollen facial bones as the first clinical sign of big head in horses.

Clinical signs also include

- Course coat (despite a good diet)
- Ill thrift/losing weight
- Difficulty breathing
- Loose teeth and pain while eating
- Stiff gait
- Signs of lameness/shifting weight
- Swelling of the facial bones
- Muscle tremors/twitching
- Lethargic
- Even stop eating

Did you know Big head was once called “Bran Disease”. Bighead can be caused by feeds made from excessive wheat bran and other grains.

How do bran and grain cause bighead?



Bran and grain are both high in phosphorous, low in calcium AND contain phytates (Phytic acid) in higher than desirable levels. Phytates bind to

calcium in the gut in a similar way to oxalates. Phytates form insoluble complexes with minerals such as iron, zinc and calcium thus reduce their bioavailability. Phytates are coined anti-nutritional as a result.

Wheat bran is detrimental to calcium balance in two ways: Firstly, 90% of the phosphorous in wheat-bran exists as calcium phytate, binding both calcium and phosphorous and preventing their absorption into the horses' blood stream. Secondly, wheat bran has sixteen times as much phosphorous than calcium. The combination of excessive dietary phosphorous and little available dietary calcium causes calcium to be leached from the bones. Vitamin D can also play a part it maintains blood calcium levels and it regulates calcium and phosphorous, which keeps bones hard.

Commonly known grasses high in oxalates are setaria, kikuya, buffel, green panic, signal, guinea and pangola.

How do grasses cause bighead?

Grasses with high oxalates bind to calcium in the blood, rapidly reducing blood calcium levels. Grasses containing more than 2% soluble oxalate have the potential to cause acute oxalate poisoning. Given a free choice, horses prefer NOT to consume oxalate grasses, but interestingly after rains, the incidence of bighead has been reported to increase within just a few weeks.



Buffel Grass



Pangola Grass

Why? The new growth horses either find more palatable or the increased moisture increases oxalate content of tropical grasses.

Why bones become porous

The body has a handy mechanism when a sudden calcium deficiency occurs, it releases a hormone called Parathyroid (PTH). In the short term, this is an essential survival mechanism to ensure calcium is kept available for immediate needs in the blood.

PTH increases phosphate excretion in the urine and attempts to re-absorb any calcium remaining in the urine. All ingested calcium from feeds sources is triggered to be efficiently utilised. During this process affected horses also enter a state of phosphorous deficiency. Bones need phosphorous (more than half of bone is made from phosphate). Next PTH stimulates the release of small amounts of calcium from the bone – potentially affecting bone density. In the short term this is a lifesaving mechanism. However, when calcium and phosphorous remains deficient, bone integrity and other body functions begin to rapidly decline.

Bighead prevention

Of note the volume of calcium alone will NOT prevent or treat bighead. **The overall ratio of calcium to phosphorous in your horse's diet is key.**

Not to be overlooked is Vitamin D, it keeps the serum calcium and phosphorous concentrations within the normal range to promote mineralization of the skeleton. Rugging a horse, eliminates the ability of the skin to take up Vitamin D from natural sunlight. **Sunlight exposure of 5 to 8 hours/day** – will produce enough Vit D to meet their needs. Those with limited exposure to sunlight need to be fed a daily supplement with Vit D.

Four considerations need to be made:

1. Are my horses grazing high oxalate grasses?
2. Do their hard feeds contain an unbalanced phosphorous to calcium ratio?

- Do my hard feeds contain high phytates? How can I reduce the phytic acid?
- Is my horse receiving enough Vitamin D?

Avoiding high oxalate grasses is not always possible. However, supplementing an average size horse with a weekly supply of quality lucerne hay of around 20kg has shown to be sufficient to supply additional calcium needs without increasing phosphorus ratio. Lucerne sports a ratio of 6:1 – a great way to shift the daily dietary balance when on high oxalate grasses. The recommended calcium to phosphorus ratio is 3:1.

It can take 4 to 12 months for re-mineralisation of bones to occur. The vitamin and mineral supplement *Flowers Gold* by Wattlelane Stables delivers a ratio of calcium to phosphorus of 4:1 along with the necessary Vitamin D ratio, fed alongside safe base feeds of soaked cracked lupins & beetpulp, will likely bring the real ratio to the ideal 3:1 at the end of the day. *Flowers Gold* contains a calcium carbonate source mostly and a small portion of Di-calcium Phosphate. These calcium sources come highest recommended for horses. When calcium is matched correctly to phosphorus, bioavailability is optimised. There are NO clinical studies suggesting chelated calcium to be any more beneficial when fed in large doses without phosphorus optimally matched at the 3:1 ratio.

Phytase Enzyme

- how it reverses the phytate

New studies show *phytase enzymes* can be used to correct phytate-rich feeds such as grains. This is very good news! Finding a way to reduce phytic acid uptake is highly beneficial for bighead prone horses.

Phytase enzymes can totally degrade the anti-nutritional compound phytate. What does this mean? Simply put, adding a rich probiotic formula such as Gut Centric (Wattlelane Stables) containing significant potency of Bifidobacterium and Lactobacillus species creates phytase enzymes thereby removing phytic acid (phytates) during digestion.

Making hard feeds to treat bighead

Making your own hard feeds and choosing the right hay can dramatically return the calcium to phosphorus ratio back into safe perimeters. You need to read all pre-made feed labels carefully and likely contact feed companies who list ingredients as 'cereal', 'wheat bi-products', 'wheat' or 'grain' to make sure no high phosphorus feeds are sneaking into your horse's diet under misleading product disclosure.

First, check the calcium to phosphorous ratios:

Millet grain	1 to 35
Wheat bran	1 to 16
Corn	1 to 22
Barley	1 to 9
Oats	1 to 8
Copra	1 to 7

Soybeans	1 to 5
Soybean hulls	2.3 to 1
Lupins	1 to 2
Beet pulp	6.8 to 1

Next, check phytate contents. The higher the phytate content the less calcium will be absorbed.

Wheat bran	73g/kilo
Rice bran	87g/kg
Corn	63g/kg
Sorghum	33g/kg
Rice	22g/kg
Oats	11g/kg
Barley	11g/kg
Millet	16g/kg
Soy	15g/kg
Lupins	8g/kg

Of interest phytates interact with proteins, which may affect protein digestibility negatively if phytates are high. **On a good note:** Phytates are not 'all bad', they are beneficial in fighting disease, however should only be consumed in small volumes.

TIP: Soaking feeds (tipping off water) reduces the phytate content of feeds.

Hays and Chaffs

Choosing the right hay and chaff is just as important as the hard feeds you select. Lucerne hay ranks best choice in the calcium to phosphorus ratio.

Lucerne	6 to 1
Oaten hay	1.6 to 1
Barley hay	1 to 1
Pangola grass hay	2 to 1
Buffalo grass	4.6 to 1
Clover white	6 to 1
Clover red	5.5 to 1
Wheaten hay	2 to 1
Grassy hay	1.5-2.5 to 1
Rye	1.7 to 1

In Summary

Making your own hard feeds (avoiding all grains and brans) can greatly improve your chances of managing big head successfully. Select base feeds higher in calcium and lower in phytates. Removing a horse from all grasses is not a wise choice for the monogastric animal, who requires constant picking to maintain healthy gut activity.

Add a 'ratio balanced' complete mineral supplement such as *Flowers Gold* (cal to phos 4:1 with adequate Vit D3) along with lucerne hay as first choice forage will aid in reducing bighead or preventing it. During recover phase add a suitably potent probiotic supplement that supports phytase activity (phytase enzymes totally degrade phytate) such as *Gut Centric*.

See *Base Feeds and Keep It Simple Diet* by www.thenudehorse.com.au for the science behind recommended base feeds and how to make your own hard feeds safely.

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