



# LAMINITIS & NUTRITION

(C) Integral Equine Nutrition, Sophie Fletcher June 2018

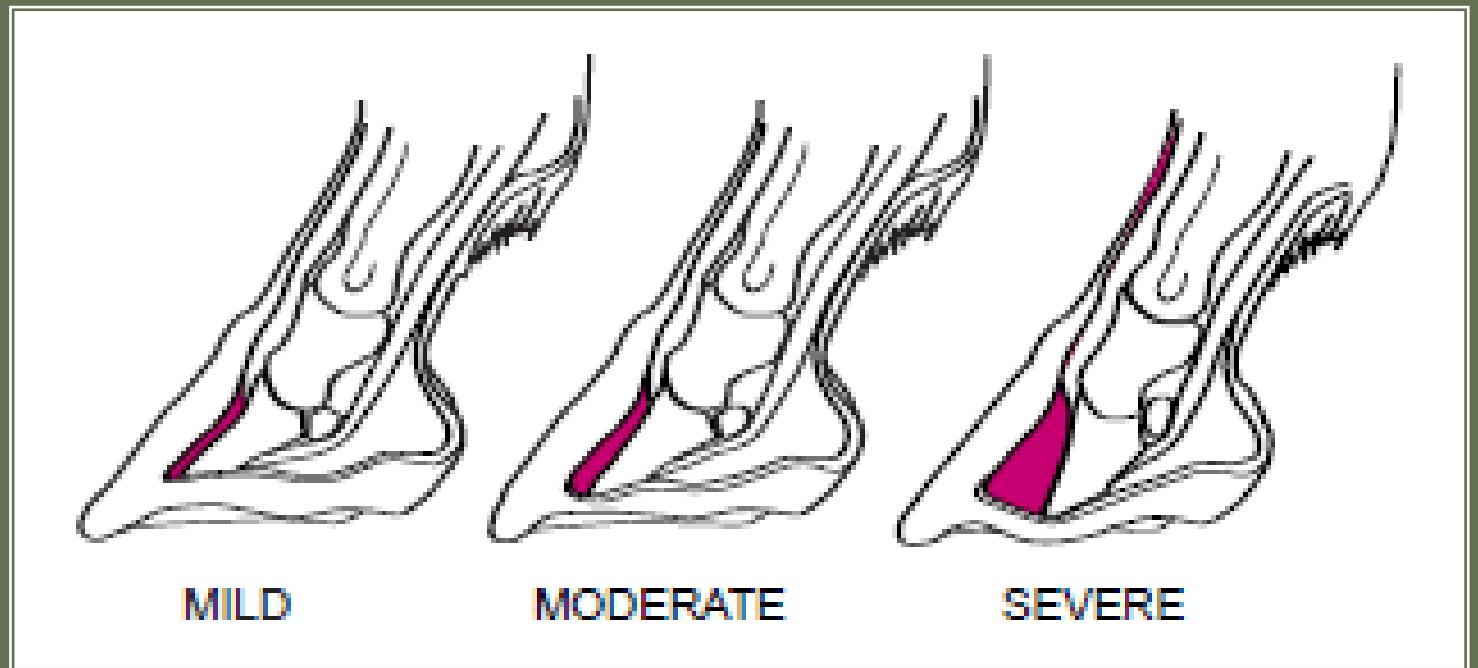
## Prevention & Management

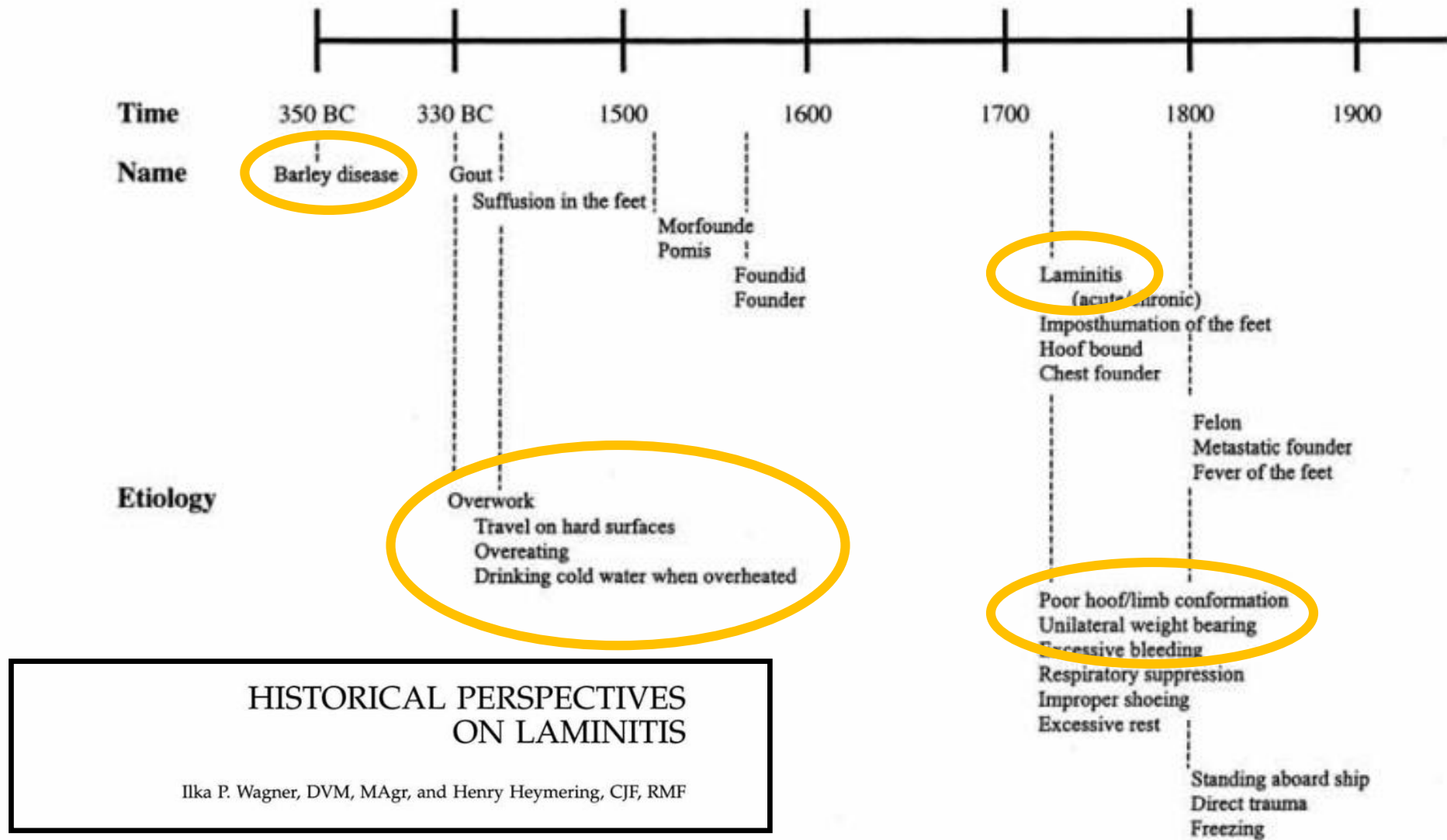


LAMINITIS =  
INFLAMMATION  
("ITIS") OF THE  
LAMINAE IN THE  
HOOF

Disease that has been recognised for centuries

Still struggling to fully understand, treat and prevent  
laminitis





**Figure 1.** Time line of nomenclature and etiologies of laminitis.





## CLASSIC CLINICAL SIGNS

### Acute

- Lameness in one or multiple hooves
- Weight shifting
- “Saw horse” stance & reluctance to move
- Increased digital pulse & heat in the feet
- Sensitive to hoof testers at the toe

### Chronic

- Hoof rings
- Stretched white line
- Vague tender footedness



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## CAUSES

Until recently laminitis thought to be caused by

- Systemic inflammation → sepsis or sudden grain overload

OR

- Mechanical → hard surfaces or supporting limb

THEN

- Metabolic issues started to be linked to laminitic ponies...



## AND NOW?

Laminitis is not a single DISEASE, it is a clinical SYNDROME (symptoms that can result from multiple systemic issues)

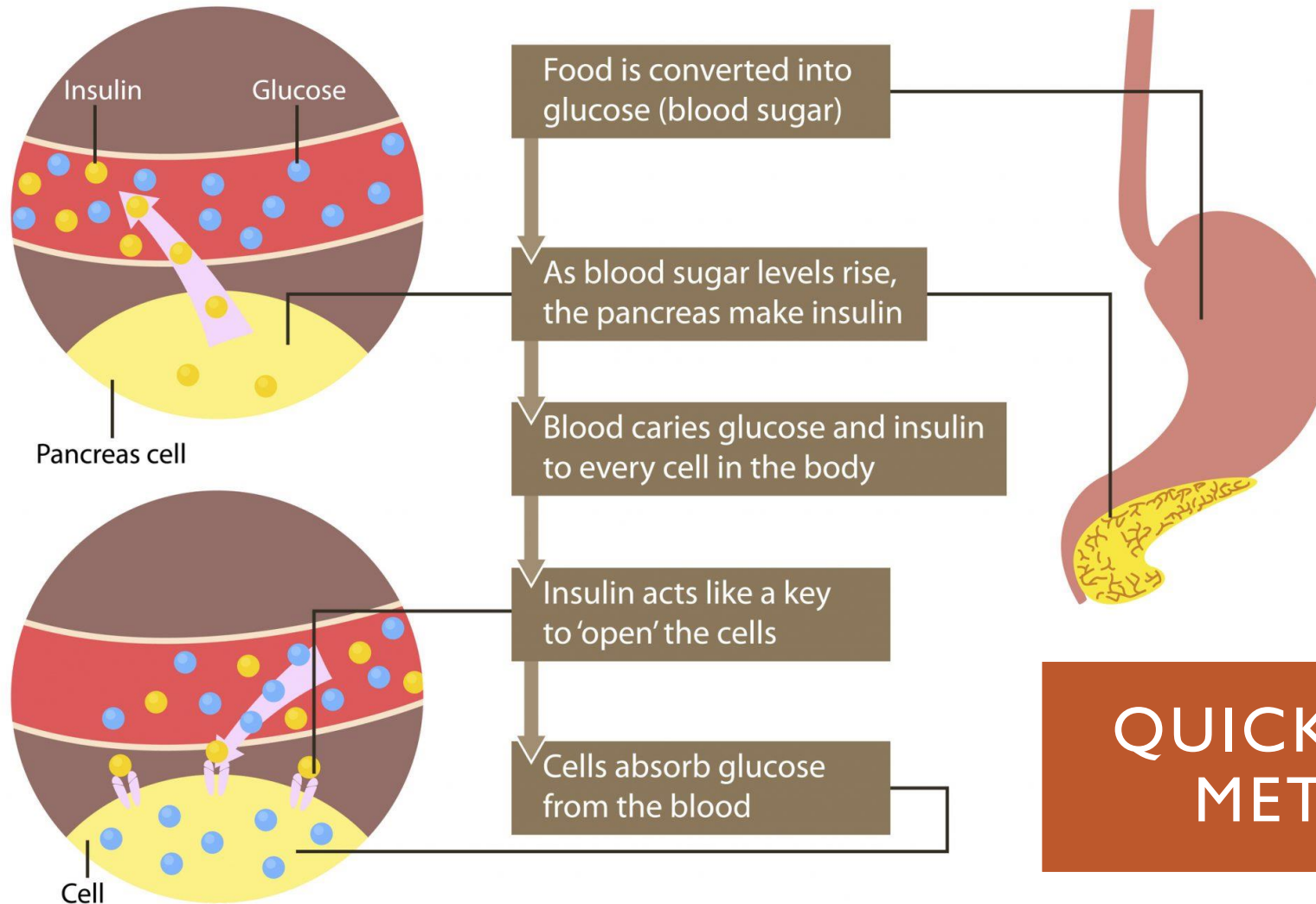
**90%** of laminitis = endocrinopathic (metabolic syndrome, insulin resistance, PPID/Cushings)

High insulin levels damage lamellar structures – inflammation less important than was previously thought

*Exact mechanisms are still being researched...*



# How body controls blood sugar levels



QUICK GLUCOSE/INSULIN  
METABOLISM LESSON



# HORSES ARE FERMENTERS

Horses evolved to eat low quality, fibrous forage at a continuous rate

Majority of energy comes from fermented fibre

Cellulose → glucose BUT the bacteria consume it, produce volatile fatty acids

Horse absorbs the VFAs and converts them to glucose, or ATP (direct fuel for cells)

LONG process, does not produce high blood glucose levels

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LESS FIBRE, MORE SUGAR?

High quality young forage and seeds  
were scarce in the horse's evolution

Now – abundant!

Improved soils, plant breeding and  
modern husbandry

Horses are able to consume much  
more simple sugars and starch  
(enzymatically broken down to  
glucose)



## RESULT?

Horses end up with higher blood glucose levels

Spikes after a hard feed

Continuously elevated from eating high sugar forage

More insulin is produced to absorb the glucose

Some horses do this very well – TBs, STBs

Some horses do this very badly – ponies, drafts, baroque breeds etc

**INSULIN RESISTANCE**



# WHY ARE SOME HORSES INSULIN RESISTANT?

Genetics

Management

Extract lots of energy from poor feed

Store energy as fat

Adapted to harsh environments

Lack of exercise

High sugar/starch diets (even in "normal" breeds)

# A PERFECT STORM?

Genetics + inappropriate diet + lack of movement + poor hoof trim  
= high risk of laminitis



## DIET – PREVENTION & MANAGEMENT

- High forage!
- Low sugar and starch

Non-structural carbohydrates  
– outdated term

Ethanol soluble carbohydrates  
– simple sugars

Water soluble carbohydrates  
- simple sugars + fructans

Starch (breaks down to  
glucose)

*ESC + starch needs to be  
less than 10%*



## DURING ACUTE LAMINITIS...



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Pasture risky – don't know exact ESC+starch in grass at all times

Feed min 2% bodyweight in low sugar hay – should be tested or soaked

Rhodes grass hay, teff hay, Lucerne are generally safe

NO oaten/wheaten or rye (unless one of the specially grown varieties)

Meadow/grassy hay MAY be OK, but should be tested or soaked

Balanced minerals, including magnesium and salt

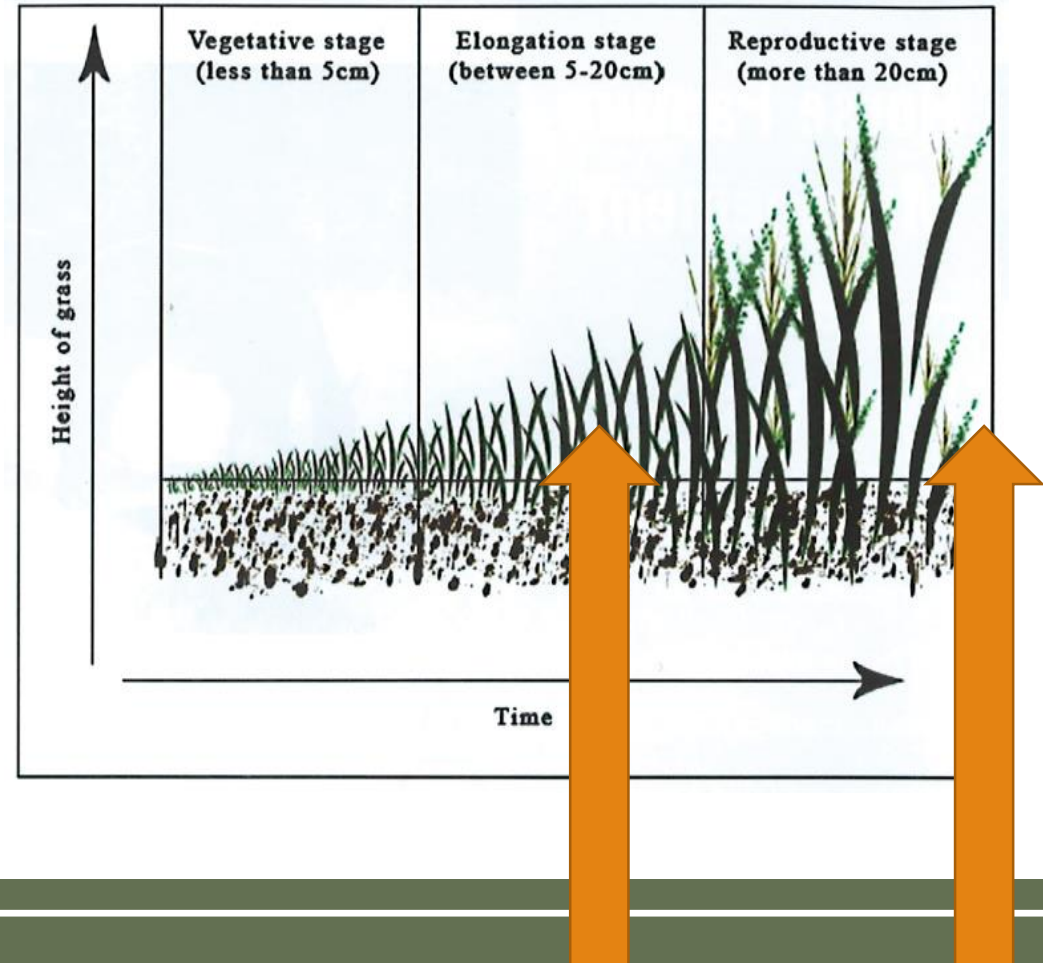
Vitamin E, omega 3 fatty acids – no pasture

MSM – anti inflammatory



## PREVENTION/MANAGEMENT OF CHRONIC LAMINITIS

- Test your pasture – ideally across seasons.
- Allow careful grazing IF the horse can tolerate it – grass is the BEST feed
- “Safest” grazing time is pre-dawn to midday
- Allow grazing on fast growing grass – using its sugar stores OR very mature grass





EXERCISE!

Weight loss through calories in/calories out AND lowers insulin levels

Encourage movement day-to-day – between hay nets, water, grass etc, keep horses together

Daily exercise, start gentle (especially if still sore), slowly increase intensity (e.g. cantering, use hills etc)



# EXTRAS



- Sufficient protein
  - low sugar, mature forage can be lacking, the hoof needs protein/amino acids to heal
  - Lucerne is an easy addition \*if horse is not sensitive\*
- Balanced minerals & vitamins
  - Magnesium anecdotally beneficial, study did not show improvement
  - Replacing vitamins lost in hay – vitamin E and omega 3 fatty acids (also insulin lowering)
  - MSM – anti-inflammatory & strengthening

# LAMINITIS/IR SUPPLEMENTS

- Antibiotics – Founderguard
  - Based on the grain overload theory, not relevant to majority of laminitis
- Hindgut buffers – EquiShure
  - Based on acidosis, maybe be helpful for laminitics with sensitive guts – not helpful for IR

Hoof supplements, containing copper, zinc, biotin etc – may help hoof quality, but properly balancing the minerals is better!





## TEFF HAY – THE GOOD, THE BAD & THE UGLY!

*Eragrostis tef*

- Warm season (C4) grass from Africa
- “Teffa” = “lost” in Ethiopian, very small grain
- Major cereal crop in Africa
- High yield, high quality forage
- Fed as hay since 19<sup>th</sup> century in South Africa
- Not frost tolerant, but quite tolerant of soil type, rainfall, drought etc

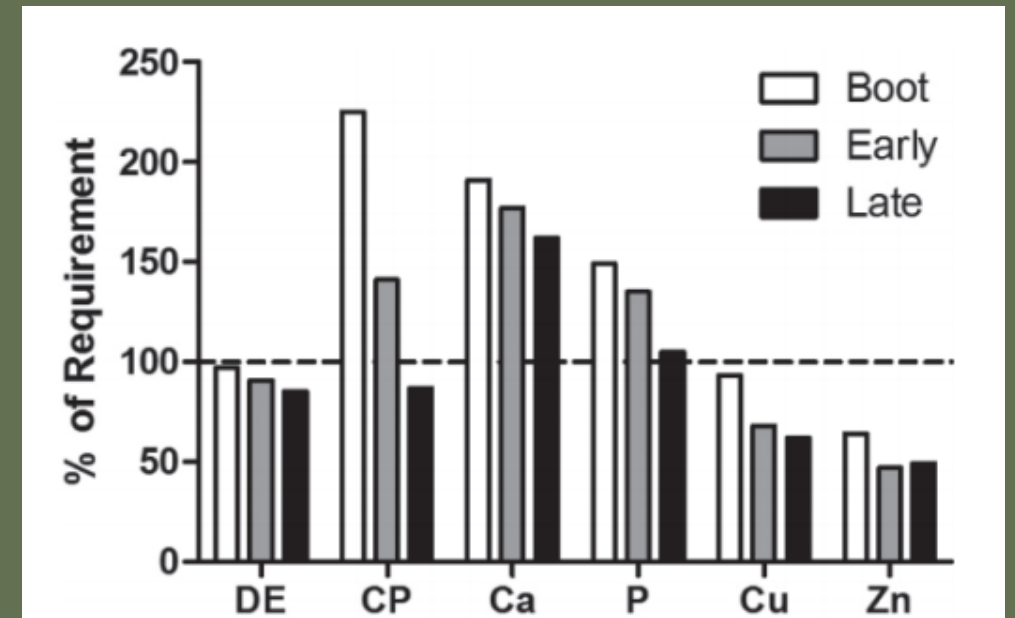
## Voluntary intake and digestibility of teff hay fed to horses

W. B. Stanier ✉, J. R. Bussard, N. M. Repard, M. H. Hall, A. O. Burk

*Journal of Animal Science*, Volume 88, Issue 10, 1 October 2010, Pages 3296–3303,

- 3 maturities, fed ad lib to stabled horses
- Voluntary intake was between 1.5-1.8% BW
- Met between 85-97% of digestible energy requirements
- Protein between 7-16%
- Calcium:phosphorus ratio 2:1

In general, all nutrients decrease as the maturity increased



**Figure 2.** Depiction of the percentage of the recommended DE or nutrient requirement met by teff hay at the boot (Boot), early-heading (Early), or late-heading (Late) stage of maturity based on the average intake of each and the initial BW during the voluntary DMI period of the study. The requirement used was the high maintenance requirement.



## ...AND THE SUGAR?

- ESC + starch was below 9% for all stages of maturity IN THIS STUDY
- Correlates well with the samples I have tested – I have seen between 3-9%

### VERDICT?

Nutritious and relatively palatable for all types of horse

AND SAFE FOR LAMINITIC/METABOLIC horses!






## THE BAD?



Tropical grass = oxalates????

- Very little public data on this – but no reports of oxalate toxicity in stock
- Related species have no reported issues
- 15 samples have been tested for “available calcium” by Southern Scientific Services P/L
  - Samples have all come back **no or low oxalate**.





## THE UGLY – “*TEFFGATE*”

### THE FACTS

Synephrine found in one sample of teff hay fed to a race horse

Synephrine is a very mild stimulant

Reports that this hay contained weeds

Weeds such as common rush are known to contain synephrine

Blanket warning issued by Racing NSW and echoed by EA to avoid teff hay due to risk of testing positive

A dynamic photograph of a herd of horses galloping across a dry, dusty landscape. The horses are in motion, kicking up a thick cloud of dust that fills the lower half of the frame. The sky is a clear, vibrant blue. The horses have various coat colors, including chestnut, bay, and white. The overall mood is one of intense energy and movement.

# PANIC ENSUES



## THE REALITY?

- More testing is being done – highly likely that teff in general DOES NOT contain synephrine
  - Positive swabs have been traced back to contaminated feed (Lucerne) before
- Teff hay is SAFE to feed from a health perspective
- Only concern is (a very small risk) positive swabs for official competition until further samples are tested

