Pasture-Induced Laminitis

- In early Spring during the lush growing phase, simple sugars or carbohydrates are plentiful
- This poses quite a danger to many horses at risk for laminitis
- How do we identify who is at risk?
  - The “easy keeper”
  - Most ponies
  - Horses/ponies with insulin resistance
  - Horses/ponies with Cushings’ disease

IR & Laminitis

Two broad mechanisms that can explain why IR could predispose horses to laminitis:

(1) insulin resistance might impair glucose delivery to hoof keratinocytes

(2) insulin resistance could alter blood flow to the foot

Identify those at risk

- Previous founder?
- “Easy keeper” breed (pony, Arabian, Morgan, etc)
- Overweight or obese horses
- Horses/ponies with Cushings’/PPID
- Then what?
  - Screening tests
    - Insulin/glucose
    - Combined Glucose-Insulin challenge

Evaluate Body Condition

Obese Horses

- Obesity has consequences to the endocrine system's ability to function properly or efficiently
- The extent to which obesity is detrimental to the health of horses and ponies is not completely understood
  - How come many fat ponies/horses "live forever" very fat and never founder?
  - Why do some who are only "a little fat" founder and are always at risk to do so?
  - Season of the year seems to affect metabolism?
- It is becoming clear that adipose tissue produces bioactive substances that influence insulin sensitivity and cause vascular injury.
- The two principal strategies for managing IR in horses are diet and exercise, but affected horses can be divided into 3 groups.
  1. obese horses with IR
  2. non-obese horses with regional adiposity (cresty neck) and IR [many horses with Cushings'/PPID fall into this category]
  3. severely affected horses from either group that are currently suffering from laminitis

Insulin resistance (IR)

- IR=failure of tissues to respond appropriately to insulin
  - increased body mass/fat decreases the efficiency of insulin & glucose interaction

- Insulin is a hormone secreted by the pancreas in response to the amount of glucose circulating in the bloodstream.
  - When glucose levels are high, insulin is released to lower glucose to the desired level.
  - Insulin stimulates the uptake of glucose by tissues when sugar/glucose is high (ie. After feeding).
  - Skeletal muscle and adipose tissue are the major sites of insulin-mediated glucose uptake, but the liver also responds to insulin's demand to remove glucose from the blood.

- Insulin plays an important role in the storage of energy by moving glucose into cells where it can be stored as glycogen or converted into fat

Management of IR in horses

- Obese horses with IR should be placed on a diet containing fewer calories & an exercise program to lower body weight and increase fitness.
    - LOW SUGAR FOODS ONLY no sweet feed
    - High fiber & high fat feeds will help to slow the absorption of the simple “sugars”
    - limit amount of grazing time on pasture (1 -2 h grazing per day, fencing in a smaller area, grazing muzzle)
    - Hay with NSC content <12% or soak hay in cold water to reduce the sugar content
    - daily exercise

Management of IR in Horses

- Non-obese horses with IR should be placed on a similar diet & exercise program to improve insulin sensitivity but with more calories provided, particularly when strenuously exercised.
    - [Cushings/PPID horses] High glycemic feeds (sweet feed) should be removed from diet and replaced with feed high in fat and fiber, up to 20% of calories can come from fat (veg oil, rice bran)
    - low starch or low NSC commercial feeds

- Severely affected horses with laminitis should be removed from pasture completely
    - Grass hay with low NSC should be fed with high fat, high fiber diet.
    - Consider: Thyroid supplement 48 mg levothyroxine/day until down to ideal wt then weaned off (24 mg for 2 week then 12 mg for 2 week)

Clinical signs of IR

- Regional adiposity or odd fat pads

- Periorbital fat

- Cresty Neck

Clinical Signs of IR

Equine Cushings' Disease

- Cushings' (Pituitary Pars Intermedia Dysfunction or PPID) is a cause of metabolic pathway disturbance in the body's regulation and response to normal hormonal signals
  - one of the most common diseases of horses and ponies over 15 yrs of age
  - long hair coat most common, easily recognizable symptom but adult *horses with unexplained laminitis should also be evaluated*
  - Frequent hoof abscesses, stiff gait, "sore feet"

- Diagnostic test – ACTH after mid-March (season affects result accuracy)
- "Early " PPID cases often have "negative" or normal test results

Long hair coat characteristic of Cushings' horses or ponies

Poor "thermostat" or thermoregulation

Pasture Management

- Pasture grasses and hays have variable amounts of simple carbohydrates/sugars and fructans
- Rapidly growing grass has more simple sugars

- Fructans = stored energy for plants
- Stressed grasses have more fructans (drought conditions)
- Stems have more fructans than leaves
- Weeds tend to have high levels of fructans

Pasture Management

- Under good conditions (adequate sunshine & moisture) photosynthesis produces more sugar than the plant can use during the day
  - sugar content increases during the day & is used up during the night
  - the lowest sugar content in grass is usually during the *early morning hours*
- Mature plants put the excess sugars in the form of starch into the seed heads
- Clover and alfalfa (legumes) have more starch
- Poorly managed pastures with over-grazed areas produce stressed grasses & increased weeds = higher fructans and starch content

Pasture Management

- Cool weather grasses have higher fructans than warm weather grasses

Higher fructans	Bluegrass
	Tall Fescue
Lower fructans	Timothy
	Orchard grass

- Remember this as you maintain your pastures but also as you make hay-purchasing decisions
- Soaking hay in cold water can decrease fructans and sugar content

Summary

- Maintain horses at adequate but not excessive body weights
- Managing pasture exposure is important to maintaining correct body weight
- Don’t forget the weeds and stressed grasses as sources of simple sugars
- Devise a program with your veterinarian to help evaluate your situation every year