# 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

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|---|---|
| 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