Spring Into Action! What to Watch Out For: Metabolic Disease Prevention and Management

PHN
PERFORMANCE HORSE NUTRITION

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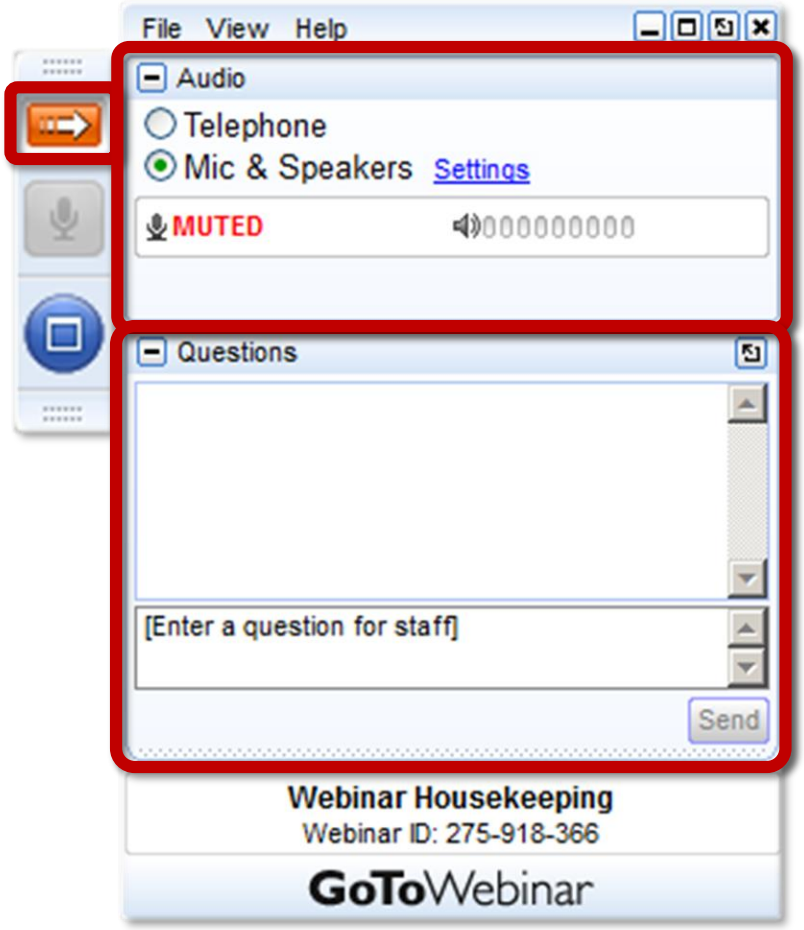


Your Participation

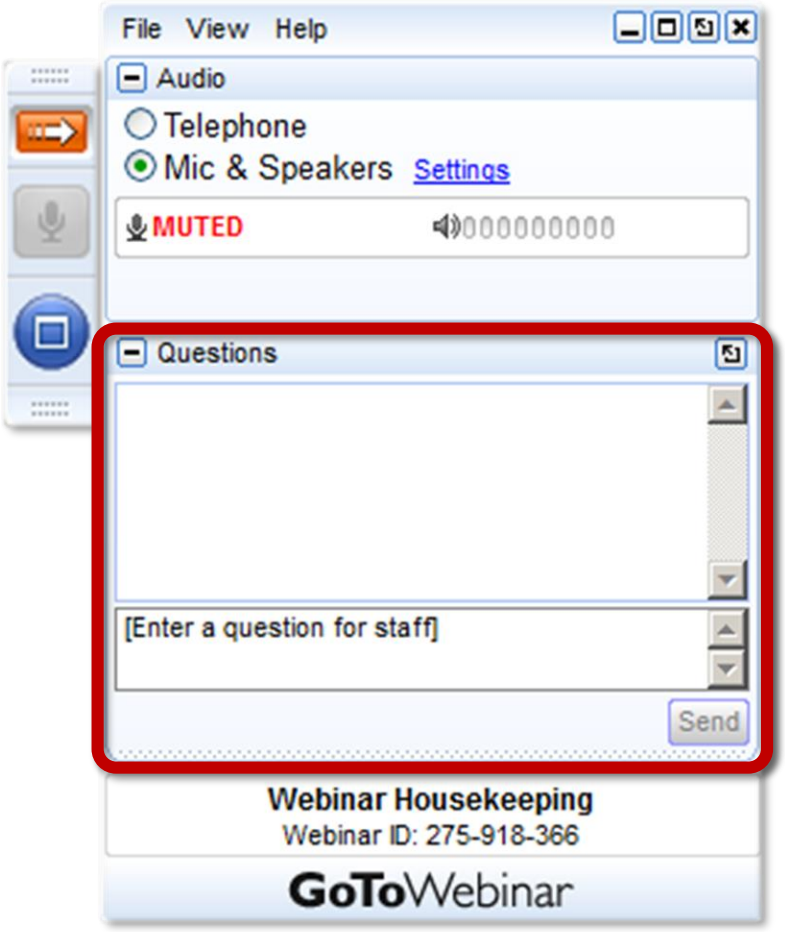
Open and close your control panel

Join audio:

- Choose **Mic & Speakers** to use VoIP
- Choose **Telephone** and dial using the information provided

Submit questions and comments via the Questions panel

Note: Today's presentation is being recorded and will be provided within 48 hours.



Your Participation

- Please continue to submit your text questions and comments using the Questions panel

For more information, please contact kstarr@standleeforage.com.

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DR TANIA CUBITT

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Outline

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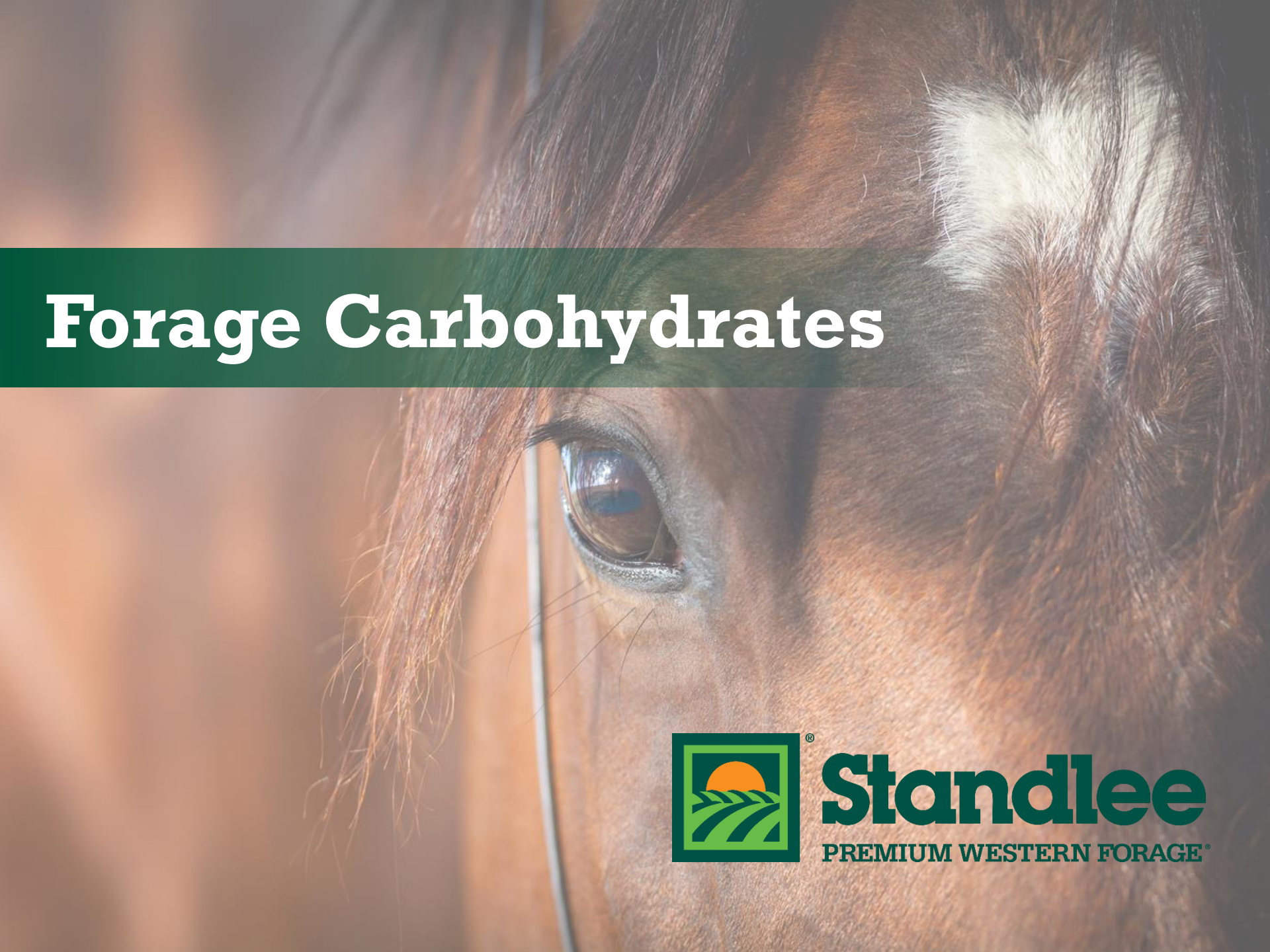
"Nutrition is the key to success"

- Forage Carbohydrates
- Plant Growth
- Forage Types
- Metabolic Disorders
- Forage Management
- Questions

Forage Carbohydrates



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Carbohydrate Breakdown

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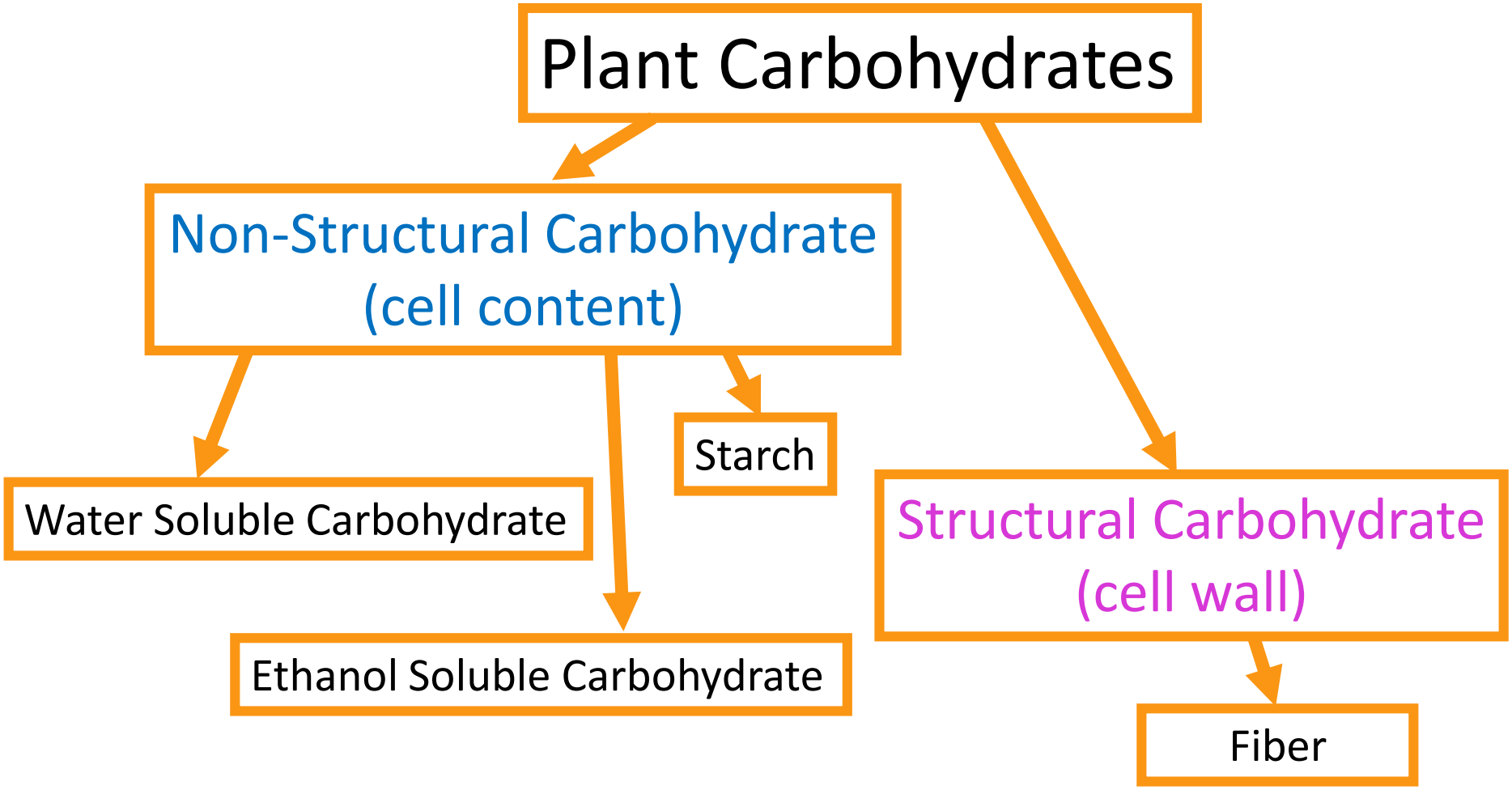

Carbohydrate Breakdown

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Water Soluble Carbohydrate "WSC"

→ Simple Sugars + Fructans

Ethanol Soluble Carbohydrate "ESC"

→ Simple Sugars

Non Structural Carbohydrate Calculation = WSC + Starch

NSC in Forages and Feeds

"Nutrition is the key to success"

Starches

Cereal Grains

Legumes

Warm Season Grasses

Sugars and Fructan

Cool Season Grasses

Cool (C_3) vs Warm (C_4)

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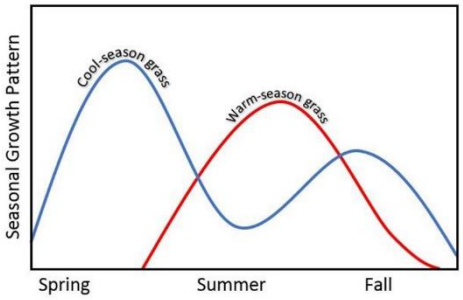
Cool

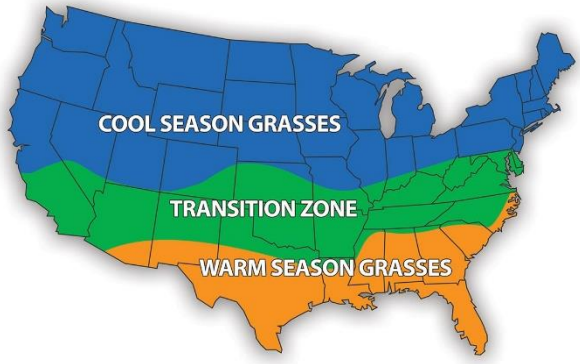
- Kentucky Bluegrass
- Orchardgrass
- Timothygrass
- Fescue

Warm

- Bermuda
- Crabgrass
- Teff
- Bluestem



GRASSES			
PERENNIALS		ANNUALS	
Warm-season	Cool-season	Warm-season	Cool-season
Bermudagrass Switchgrass	Orchardgrass Timothy Tall fescue Kentucky bluegrass Perennial ryegrass Smooth bromegrass	Teff	Oat Annual ryegrass
LEGUMES			
PERENNIALS		ANNUALS	
Warm-season	Cool-season	Warm-season	Cool-season
Sericea lespedeza	Alfalfa Red clover White clover	Striate lespedeza	Arrowleaf clover Crimson clover



Cool (C_3) vs Warm (C_4)

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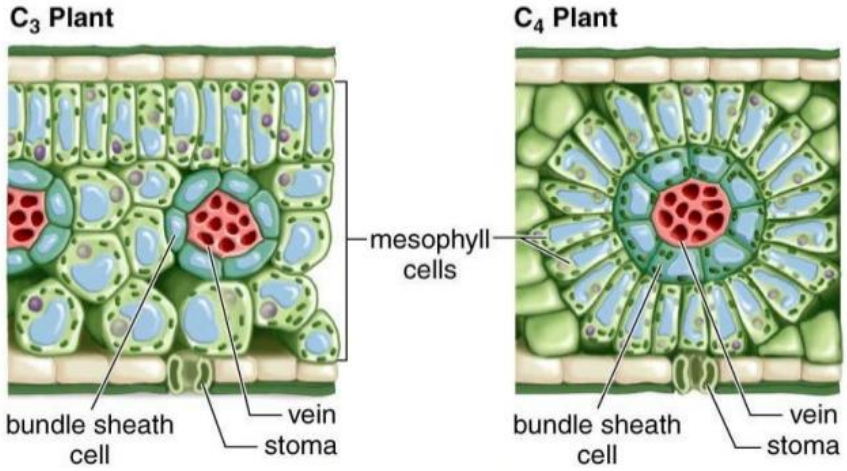
- C4, warm season grass, should average lower in NSC than most C3, cool season grasses because C4's do not have the ability to form long chain fructan. C4 grasses form starch as a storage carbohydrate, and starch formation is self limiting, whereas fructan formation is not.



Plant Growth

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Plant Growth

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Photosynthesis
+
Slow Growth
=
↑ Sugar
Concentration

Photosynthesis
+
Fast Growth
=
↓ Sugar
Concentration

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Where growing forage is a science

Hay Production

"Nutrition is the key to success"

- NSC content reflects amount when it was cut
- Cut in AM = lower NSC
- Forages respire & lose sugars after cut until moisture is < 40%
  - Fast dry, sunny = high NSC
  - Slow dry, humid = low NSC

CONSISTENCY

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Estimated forage losses from different storage methods

Storage method	Estimated % loss
Bare ground with no cover	28
On gravel with no cover	24
Bare ground under tarp	13
On gravel under tarp	9
Under roof with no sides	8
Inside building	5
Bare ground with plastic wrap (round bale silage)	5

Collins, M. 1995. Hay preservation effects on yield and quality. In: D. M. Kral, et al. (eds.) Postharvest physiology and preservation of forages. CSSA Spec. Publ. 22. pp. 67-89.

Poll Question

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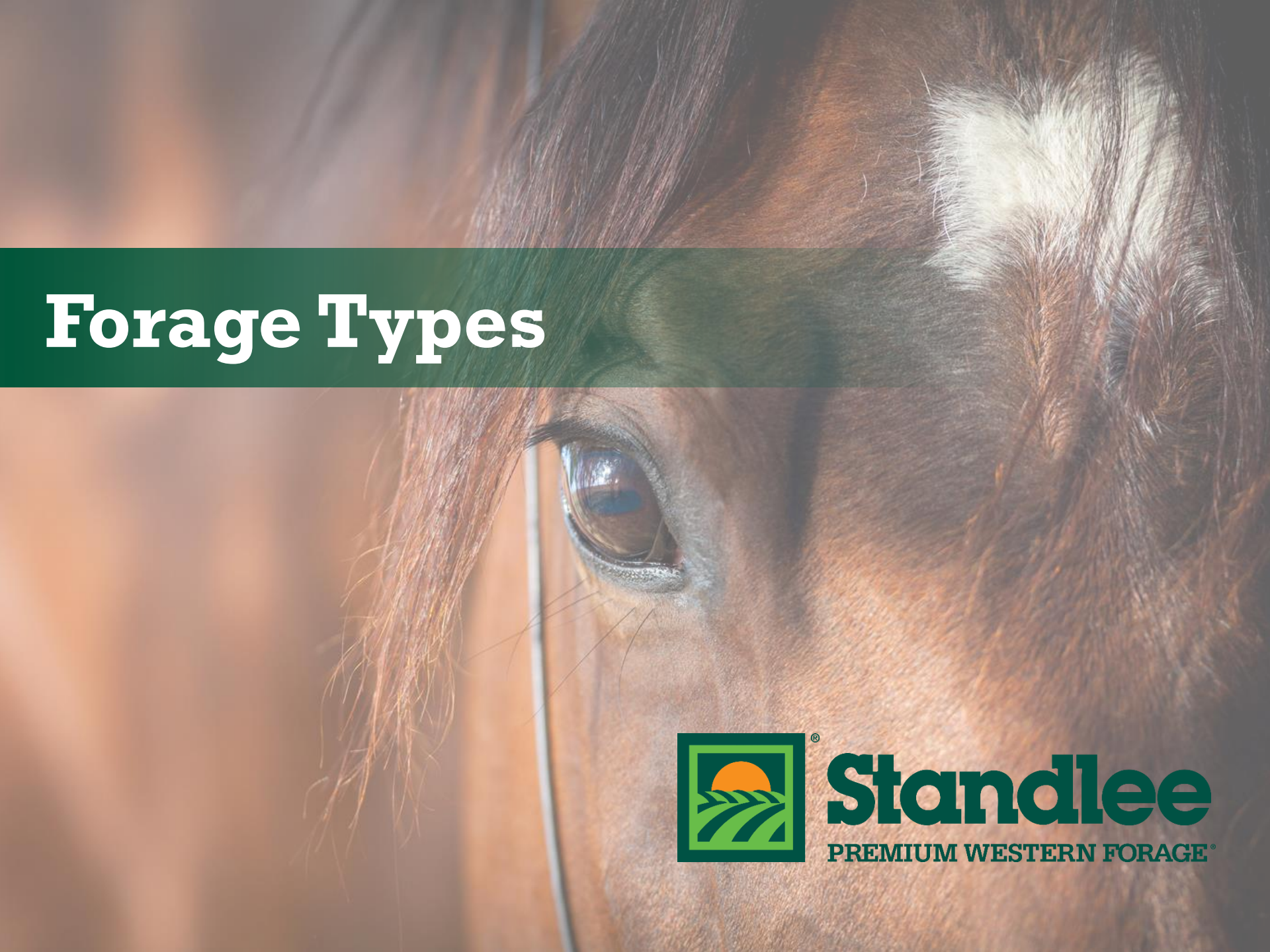
Forage Types



Nutrient Content

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- Typical Alfalfa Forage
  - High Protein
  - High Energy
  - High Ca
  - Moderate P
  - Moderate Fiber
  - Low Starch
  - Low WSC
  - Low ESC
  - Legume
  - Perennial

Nutrient Content

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- Typical Timothy Grass Forage
  - Moderate Protein
  - Moderate Energy
  - Low Ca
  - Low P
  - High Fiber
  - Low Starch
  - High WSC
  - High ESC
  - Cool Season
  - Perennial

Nutrient Content

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- Typical Orchard Grass Forage
  - Moderate Protein
  - Moderate Energy
  - Low Ca
  - Low P
  - High Fiber
  - Low Starch
  - High WSC
  - High ESC
  - Cool Season
  - Perennial

- Higher nutrient value compared to Timothy

Nutrient Content

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- Typical Bermuda Grass Forage
  - Warm season Perennial
    - Seeded, improved, Hybrids
    - Common Seeded
      - Common "Wiregrass"
      - Giant (similar to common)
    - Improved Seeded
      - X of coastal and winter hardy varieties
    - Hybrids
      - Coastal
      - Tifton 44
      - Tifton 85
      - Midland 99
      - Ozark
    - Coastal bermudagrass leaves are more sharply angled to the stem. Coastal bermudagrass produces fewer seed heads than common bermudagrass, and the seeds are sterile. In sandy soils, Coastal bermudagrass roots extend as deep as eight feet.
    - Cross between common and an introduced species

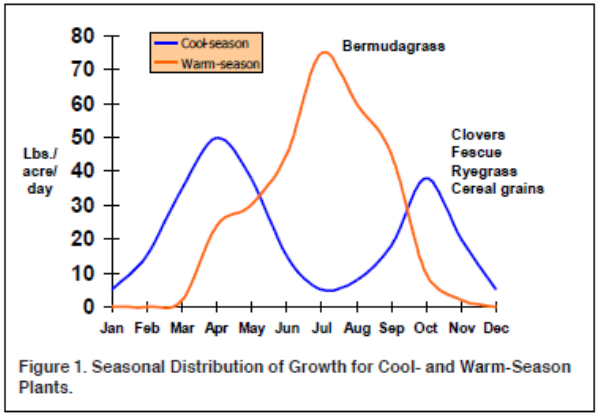

Figure 1. Seasonal Distribution of Growth for Cool- and Warm-Season Plants.

Nutrient Content

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- Typical Teff Grass Forage
  - Native to Ethiopia
  - Fine stems
  - Moderate Protein
  - Moderate Energy
  - Low Ca
  - Low P
  - High Fiber
  - Low Starch
  - Low to mod WSC
  - Low to mod ESC
  - Warm Season
  - Annual

Other

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"Nutrition is the key to success"

Poll Question

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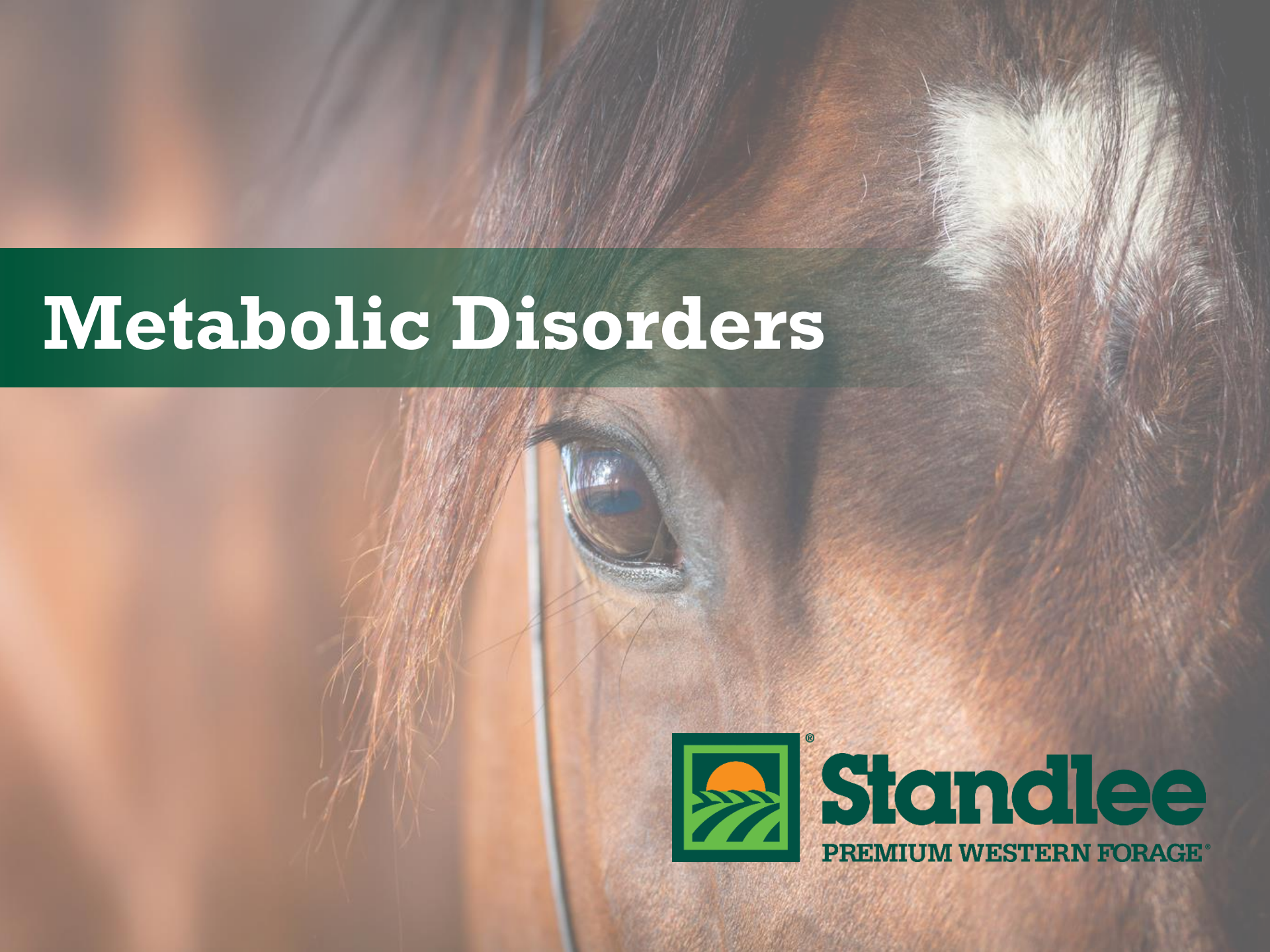
Metabolic Disorders



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Cresty Neck Scoring

- Does not consider fatness of the rest of the body
- Score of the amount of fat deposited along the ridge of the neck

Carter, 2009

Cresty Neck Score (CNS) - Scale 0 to 5

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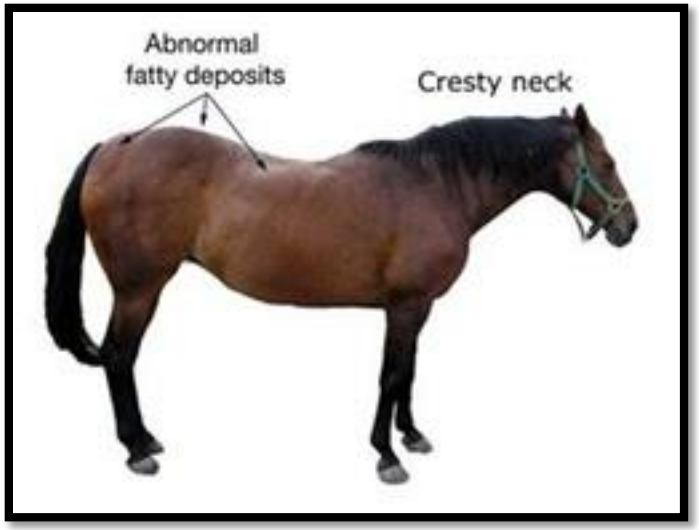
Insulin Resistance

- Insulin = a hormone secreted by pancreas to control blood glucose
- Insulin resistance= tissues do not respond to insulin
  - Obesity
  - Regional adiposity
  - Laminitis



LAMINITIS

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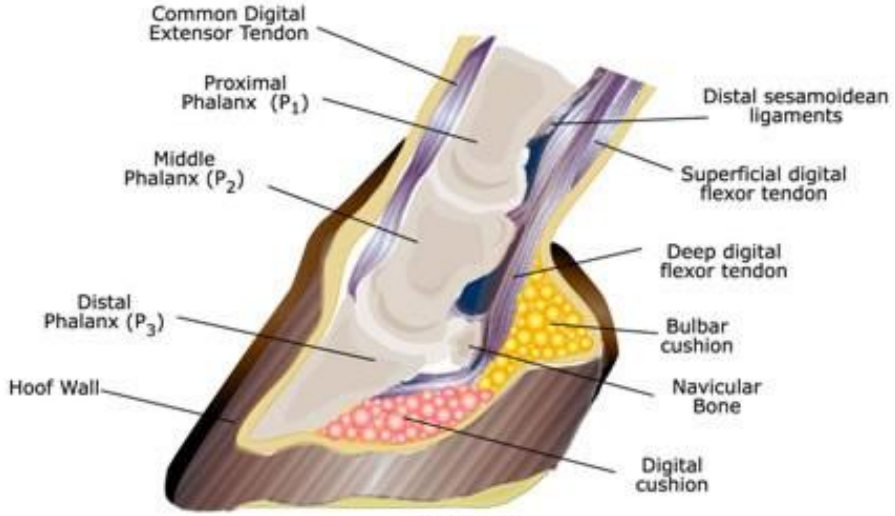
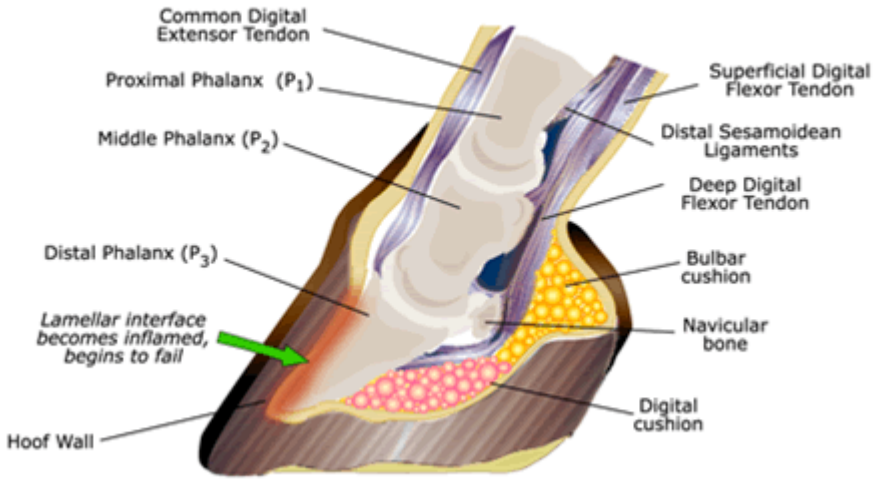
Normal Foot

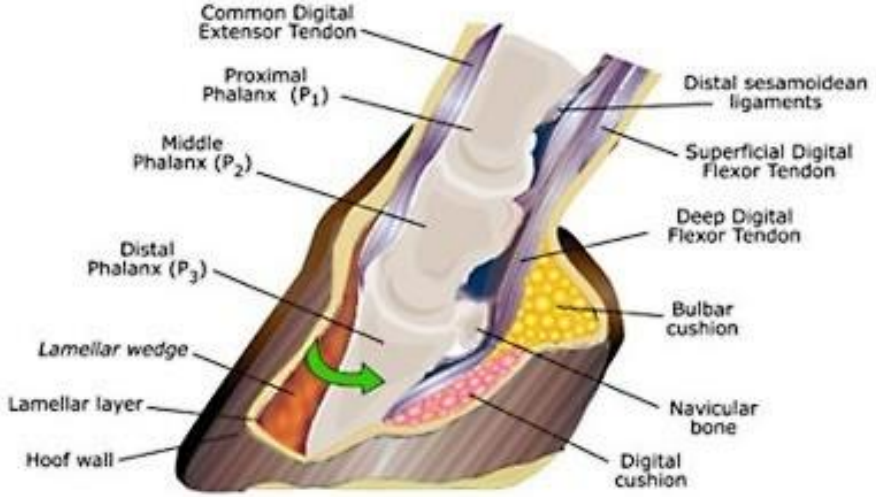


Acute Phase



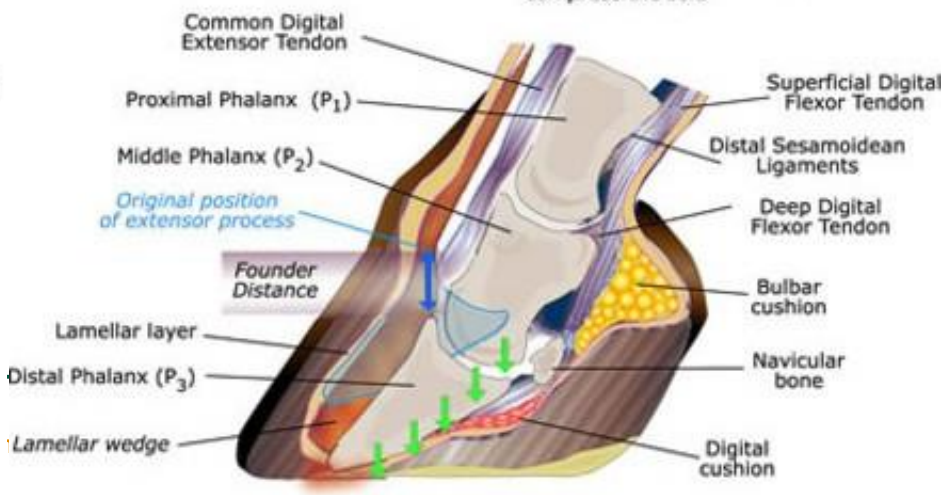
Rotation

Detached distal phalanx rotates and disrupts weight distribution



Sinking

Detatched distal phalanx is forced downward under weight to eventually compress the sole



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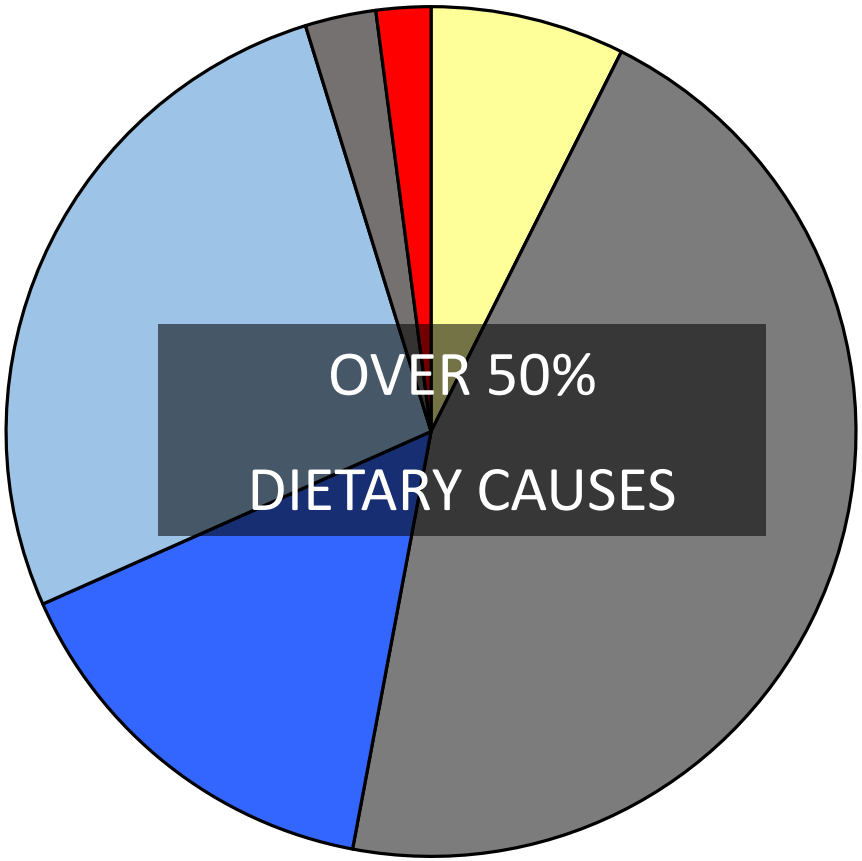

- Grain Overload (7.4%)
- Lush Pasture (45.6)
- Unknown (15.4%)
- Other known (26.9%)
- Colic/Diarrhea (2.7%)
- Retained Placenta (2.1%)

Kane AJ, Traub-Dargatz J, Losinger WC, et al. The occurrence and causes of lameness and laminitis in the U.S. horse population. In: Proceedings of the 46th Annual American Association of Equine Practitioners Convention. San Antonio (TX), November 26–29, 2000.

Pituitary pars intermedia dysfunction (PPID) - "Cushing's Syndrome"

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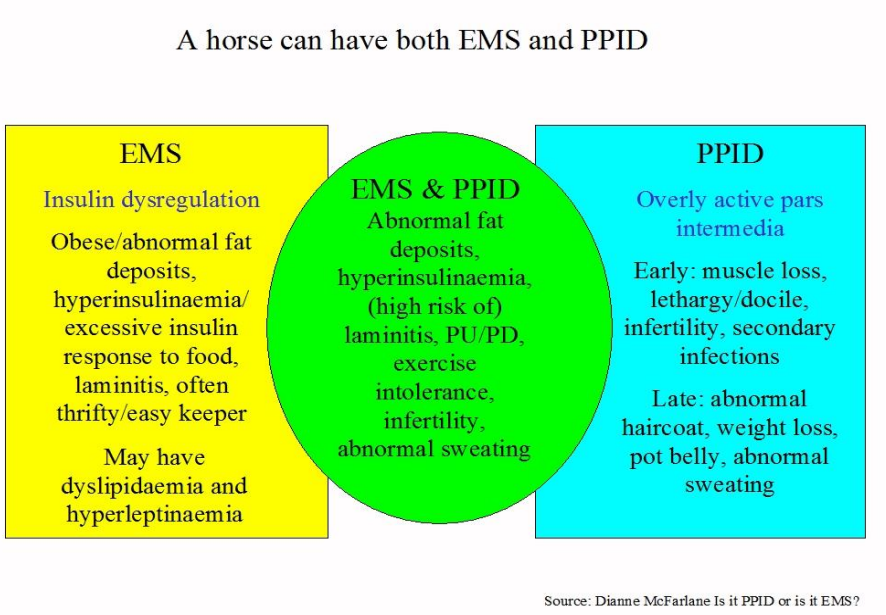
- Age, obesity and insulin resistance contribute to PPID
- Pituitary gland tumor or enlargement at the base of the brain
- Uncontrolled ACTH & cortisol production
- Can lead to insulin resistant (IR) & laminitis
- Long curly hair coat, increased drinking and urinating



Forage Management

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Grazing Management

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- Manage turn out
  - Restricted grazing regimes
    - Avoid cold nights followed by sunny days
    - Early AM vs. afternoon
    - Overcast days best
    - Shaded pasture
    - Avoid stressed forages
    - Consider dry-lot when risks
      - Feed low NSC feed to meet nutrient requirements

Grazing Muzzles

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- Reduce forage intake
- Allow for exercise

Forage Amount

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- Absolute minimum = 1% of B.W. 1000 lb horse = 10 lbs forage (DM)
- Weight Loss = 1.2% of B.W. 1000 lb horse = 12 lbs forage (DM)
- Recommended minimum = 1.5% of B.W. 1000 lb horse = 15 lbs forage (DM)
- Normal forage intake = 1.8 to 2.5% of B.W. (DM)
- Maximum intake = 3 to 3.5% of B.W. (DM)

Forage Management

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- Feed by weight not volume

Forage amount

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- Fiber digestibility decreases with low intake levels
- Fed ponies at 4 levels of hay intake
  - Ad lib ~ 1.9% BW
  - 75g/kg$^{0.75}$/day ~ 1.58% BW
  - 55g/kg$^{0.75}$/day ~ 1.1% BW
  - 30g/kg$^{0.75}$/day ~ 0.6% BW

Intake level	DM Apparent digestibility %
Ad libitum	48 ± 2[a]
1.5% BW	50 ± 3[a]
1.1% BW	49 ± 2[a]
0.6% BW	34 ± 5[b]

- Below a certain food intake, the major digestive constraint is not fermentation time but absolute nutrient supply to gut bacteria. Ponies needed a food intake level above 30g/kg $^{0.75}$ /day to maintain proper gut function.

Clauss, et al., (2014). The effect of very low food intake on digestive physiology and forage digestibility in horses. J. Anim. Phys. & Anim. Nutr. 98: 107-118

Forage Management: hay

"Nutrition is the key to success"

- Important to mimic grazing behavior
- **Hay** – Extend meal time

Management Reduces Risk

- Decrease NSC Intake
- Select low NSC forages & Forage analysis
- Grazing management to avoid high NSC
- Quality grower provides consistency
- Consistency is key

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Questions


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