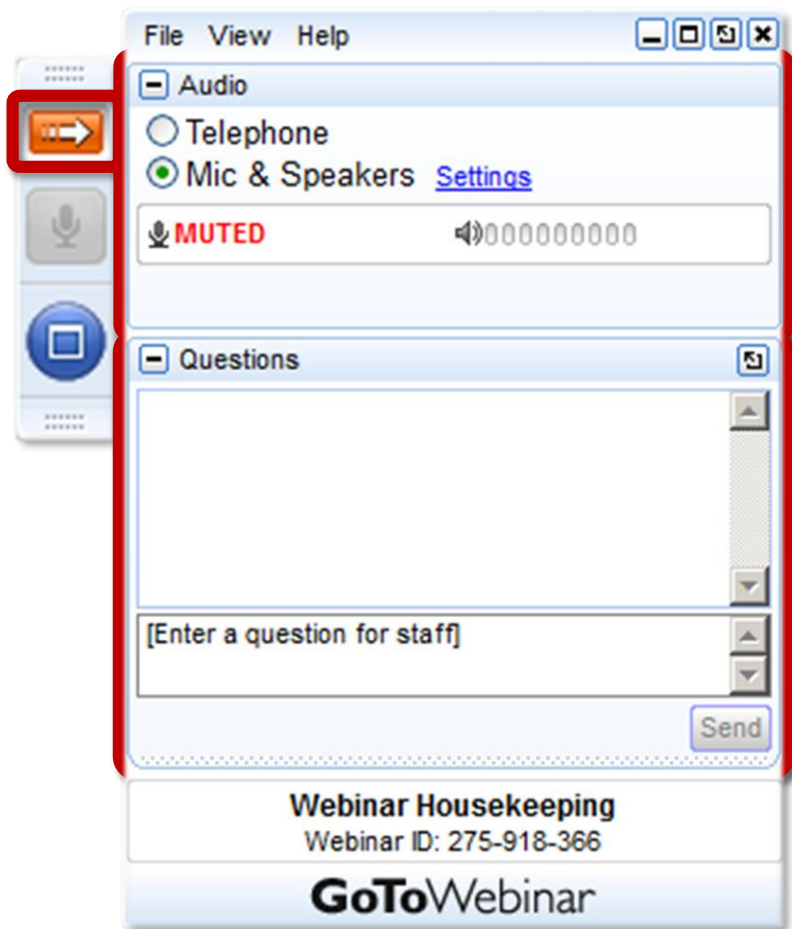


A WINDOW INTO YOUR HORSE'S DIGESTIVE SYSTEM: HOW IT WORKS & HOW IT CAN FAIL



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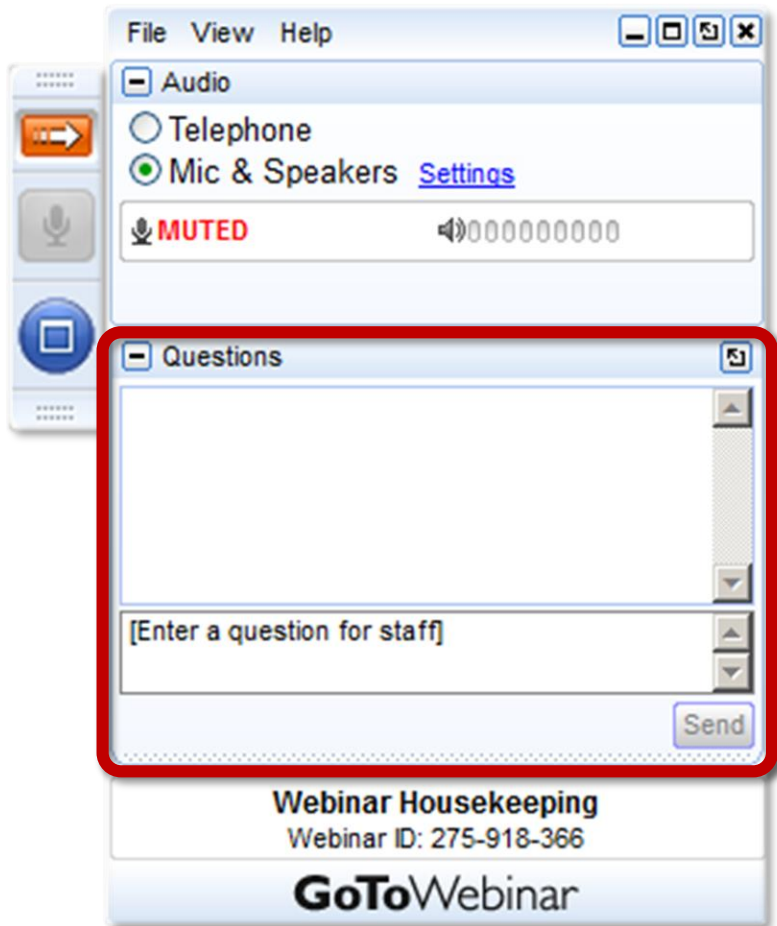
Open and close your control panel

Join audio:

- Choose **Mic & Speakers** to use VoIP
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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.

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

A Window Into Your Horse's Digestive System: How It Works & How It Can Fail

DR TANIA CUBITT
PERFORMANCE HORSE NUTRITION



OUTLINE

"Nutrition is the key to success"



- Evolution
- Digestive Anatomy
- Digestive Function
- Failures?
- Nutrient Absorption
- Questions



EVOLUTION

“Nutrition is the key to success”

NATURAL DIET

- Fiber based
- Wide variety of forages
- Nibbler – small amounts
- Continuous grazing
- Moving while eating
- Herd



MODERN DIET

- Cereal grain based
- Rapid intake
- Increased acidity of GI tract
- Frustration due to confinement
- Lack of socialization
- Exercise level



DIGESTIVE ANATOMY & FUNCTION



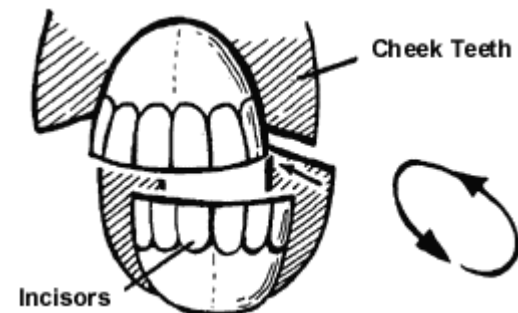
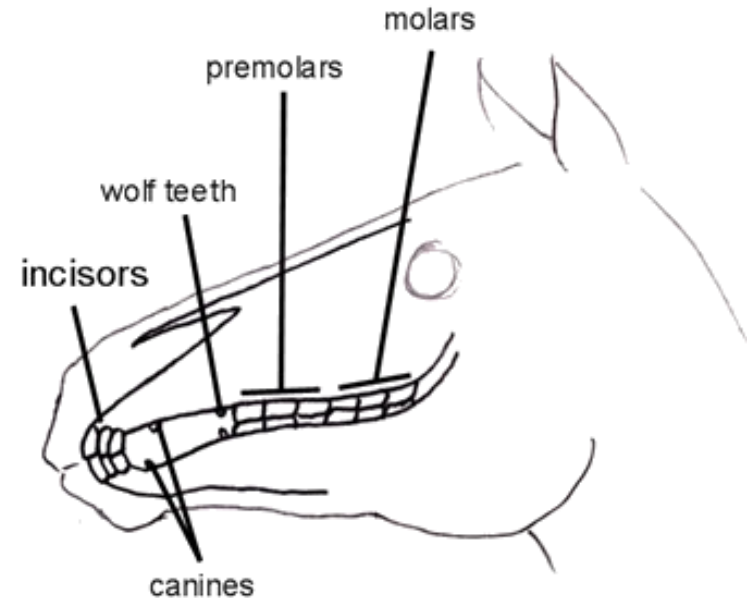
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TEETH

"Nutrition is the key to success"



- Very important in maintaining a healthy horse
- Chew in a sideways circular motion using cheek teeth to grind food
- Signs of problems:
 - Head is sideways to chew
 - Dropping of feed
 - Refusing feed
 - Weight loss

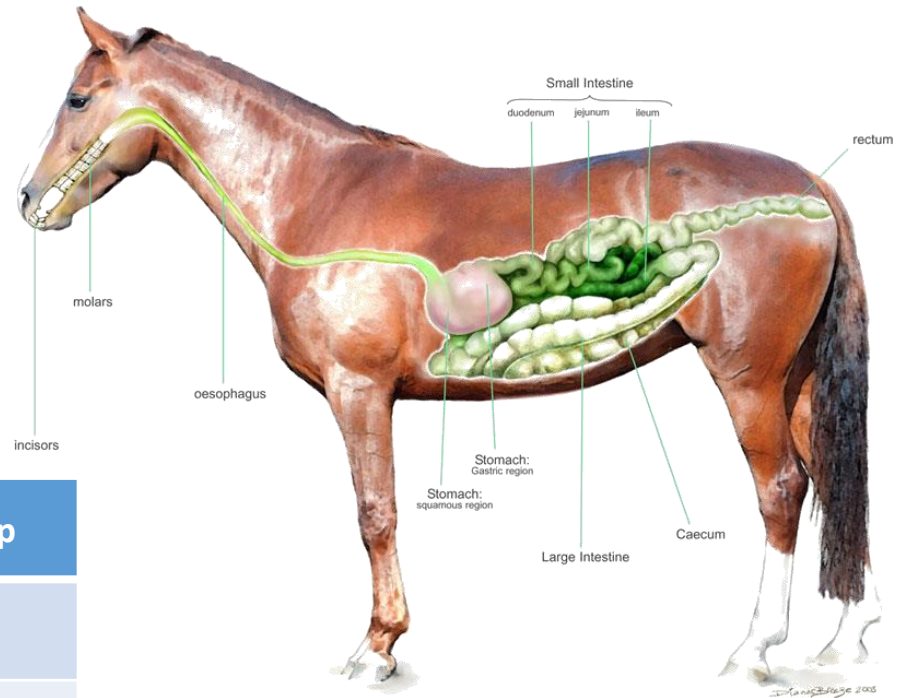


SALIVA IS A BUFFER

“Nutrition is the key to success”



Saliva helps buffer stomach acid – the more time chewing the more saliva is produced

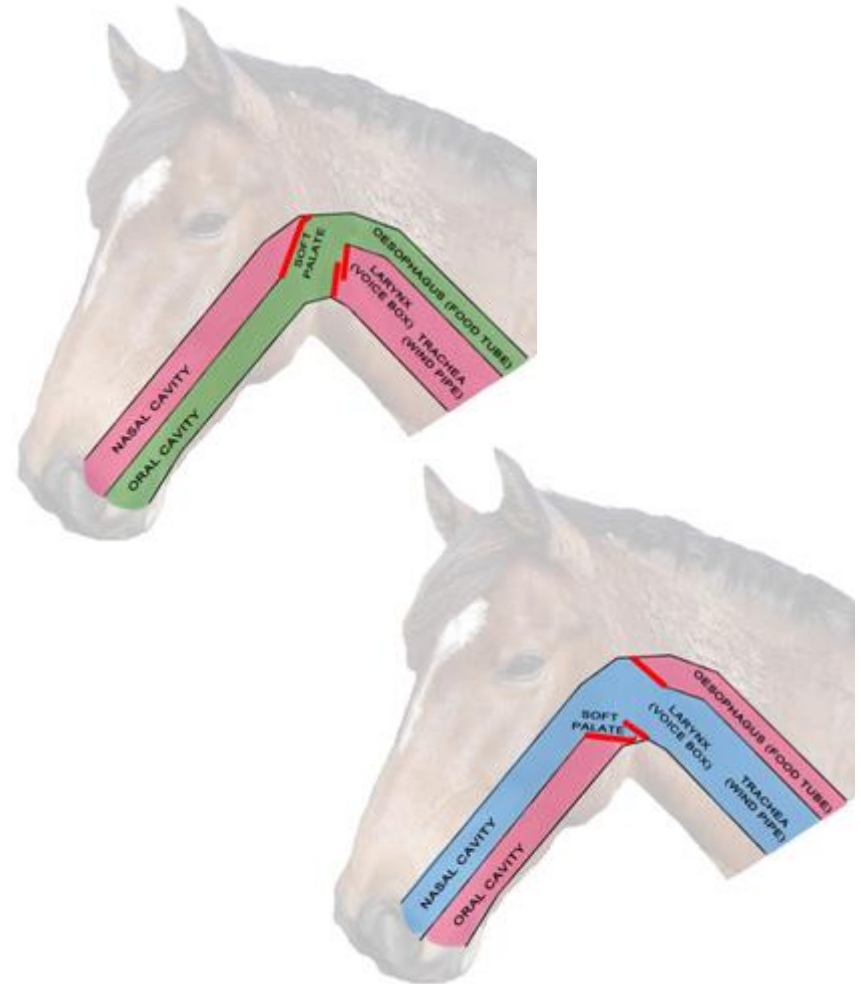


Ingredient	Chew or Jaw Sweep
2lb of oats	1000 times
2lb of hay	2000 times
2lb sweet feed (chest height)	350-500 times

ESOPHAGUS

“Nutrition is the key to success”

- Muscular tube leads from mouth to the stomach
- 4-5 ft. for an average sized horse
- Choke
 - Obstruction within esophagus
 - Fast eaters
 - Not chewing feed

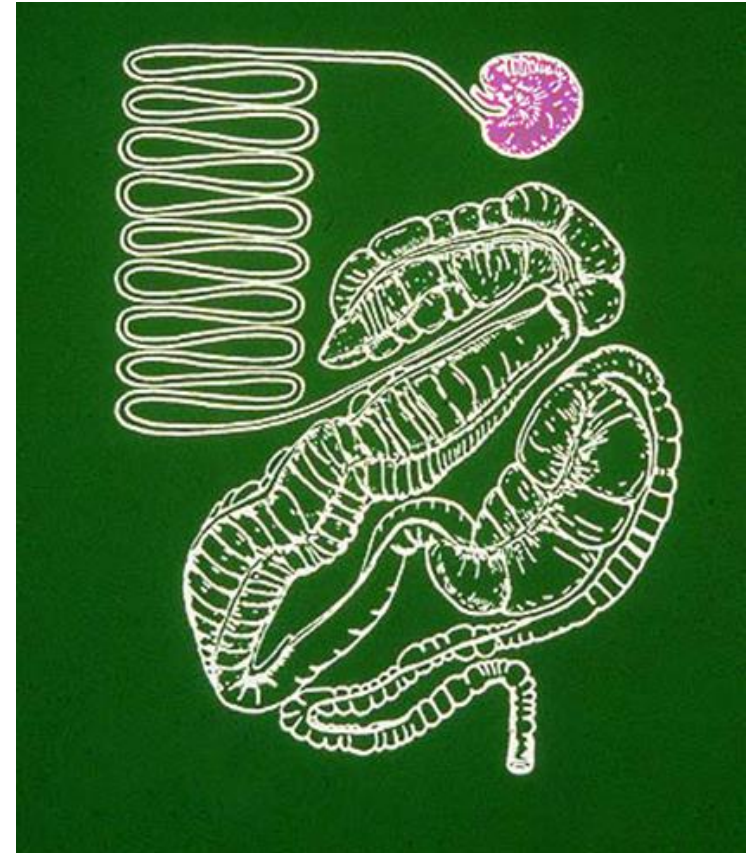


STOMACH

"Nutrition is the key to success"

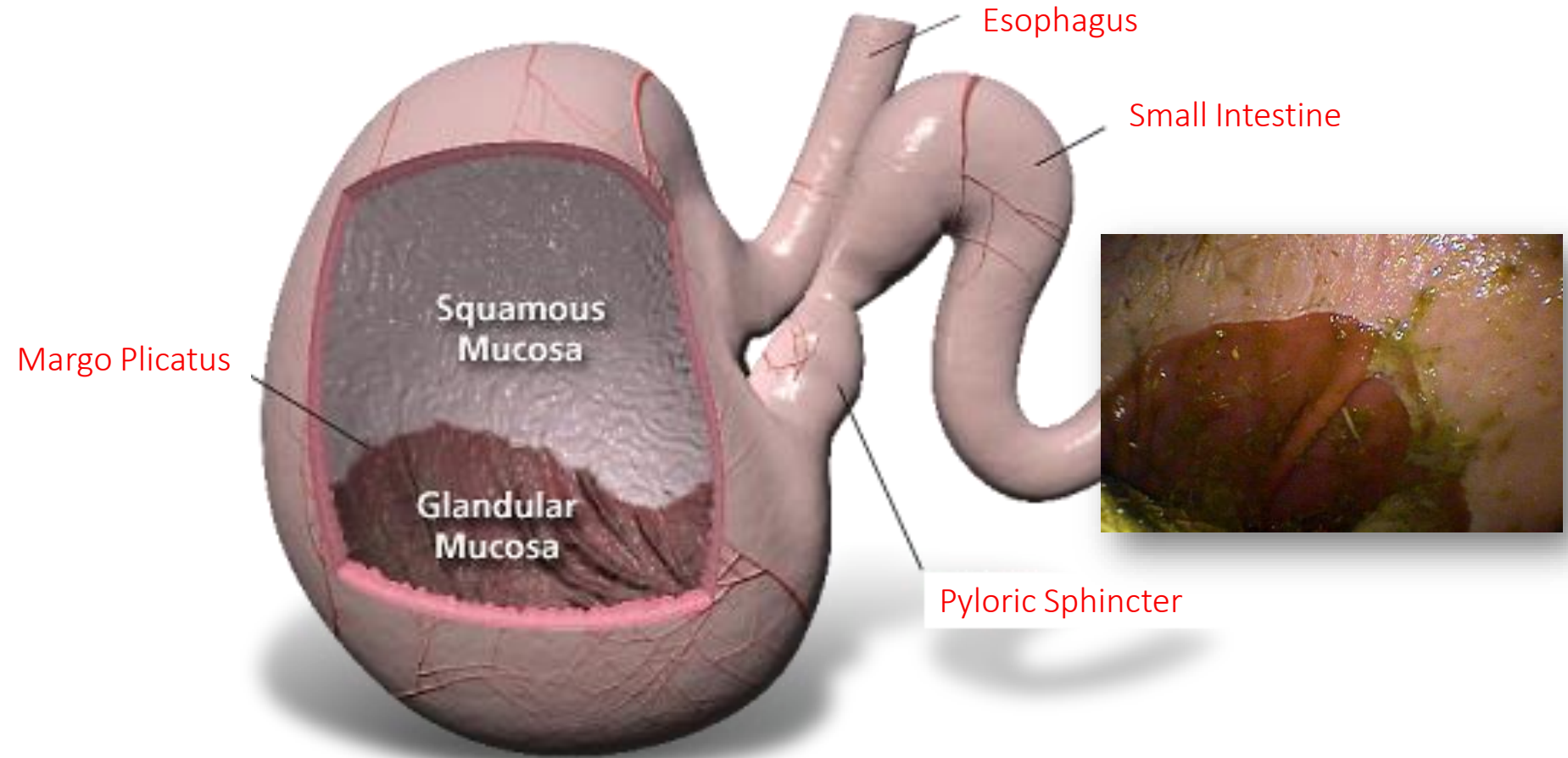


- One small compartment
- 9% of capacity
- Dictates meal size
- Acid, pepsin
- Protein digestion
- Meal size
 - No more than 3-4lbs



DIGESTIVE FUNCTION - STOMACH

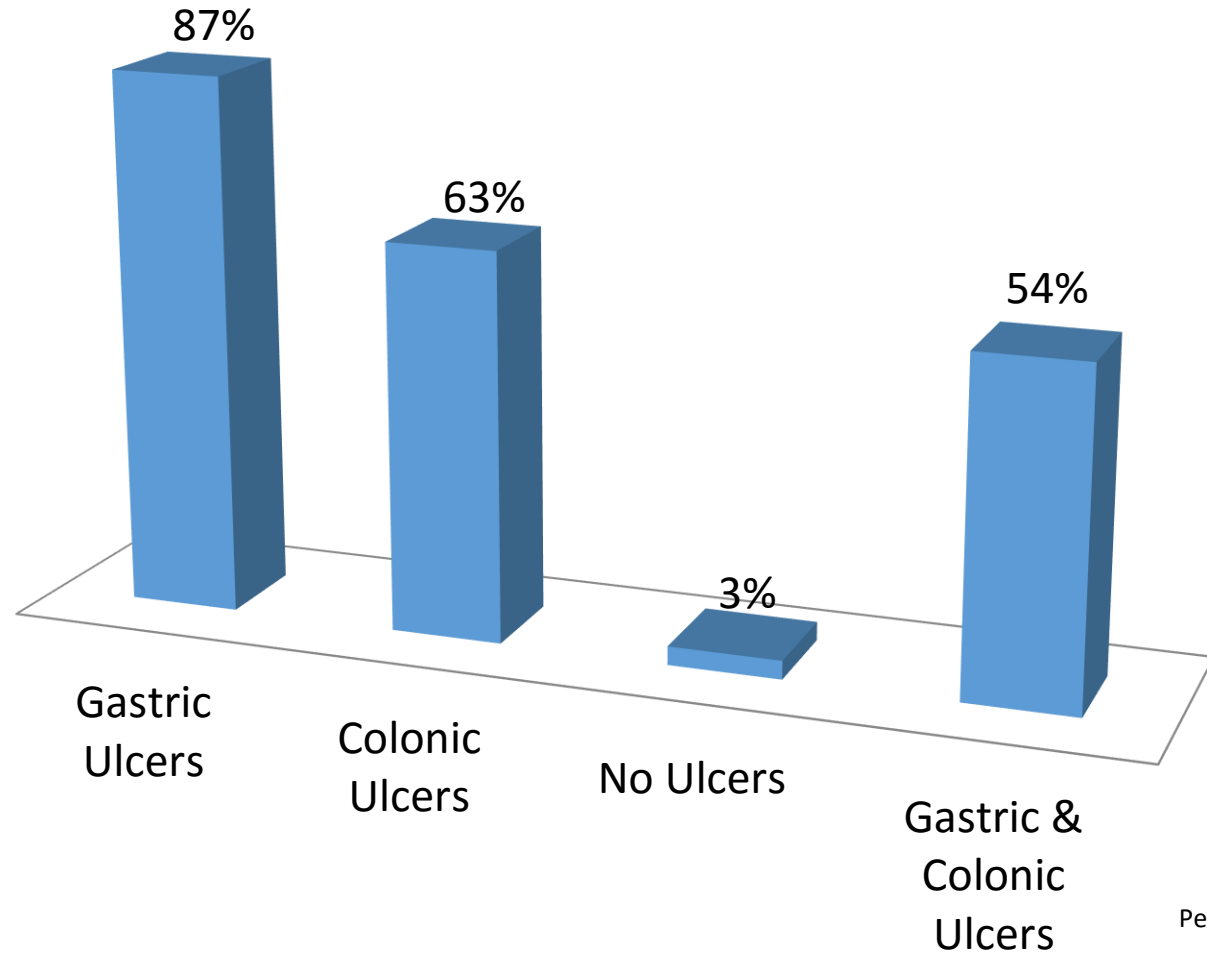
"Nutrition is the key to success"



ULCERS – PERFORMANCE HORSES



"Nutrition is the key to success"

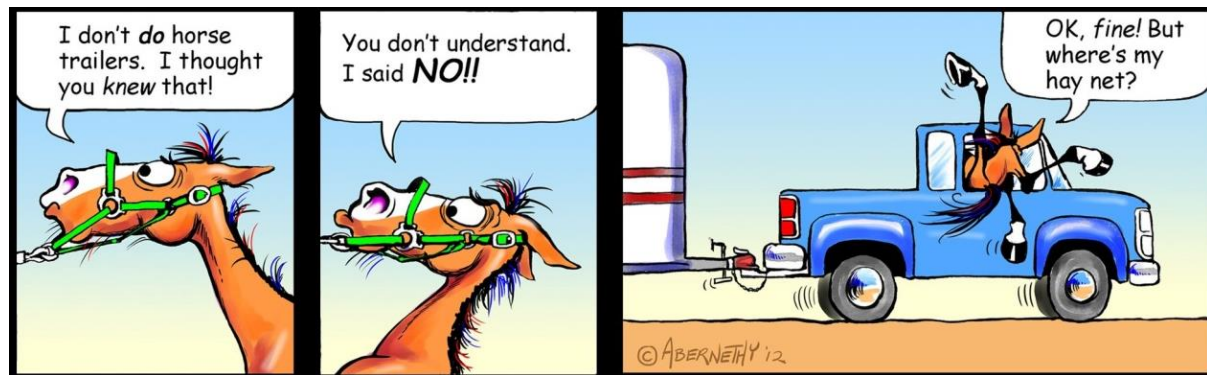


Pellegrini, 2005

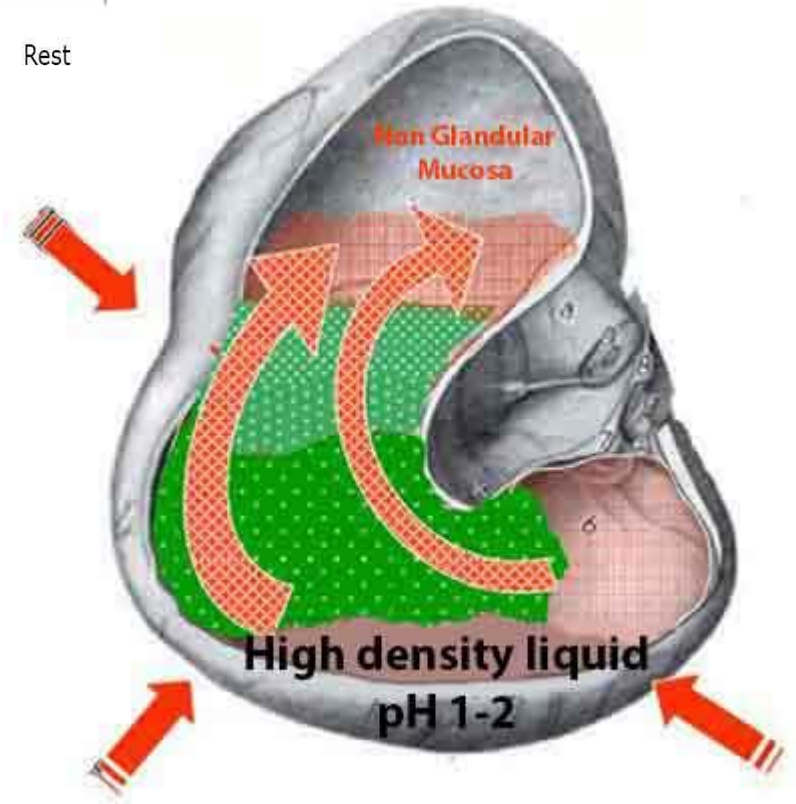
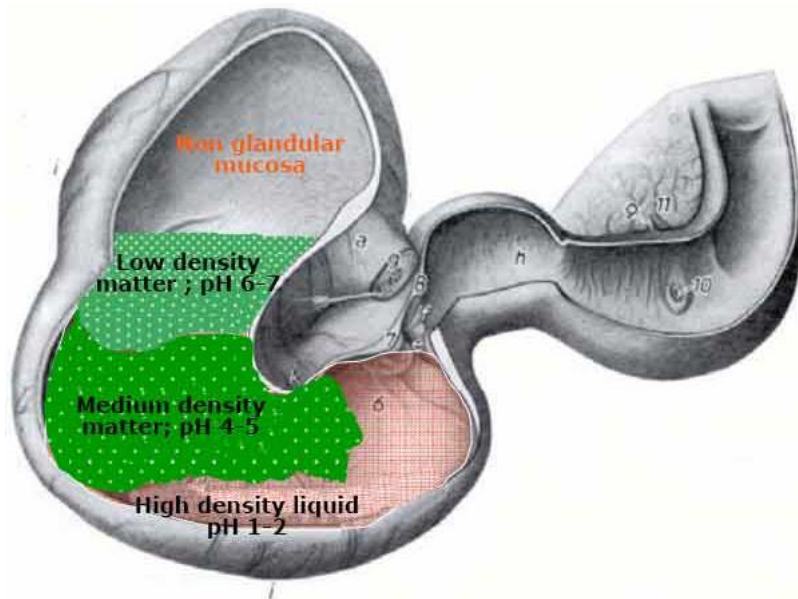
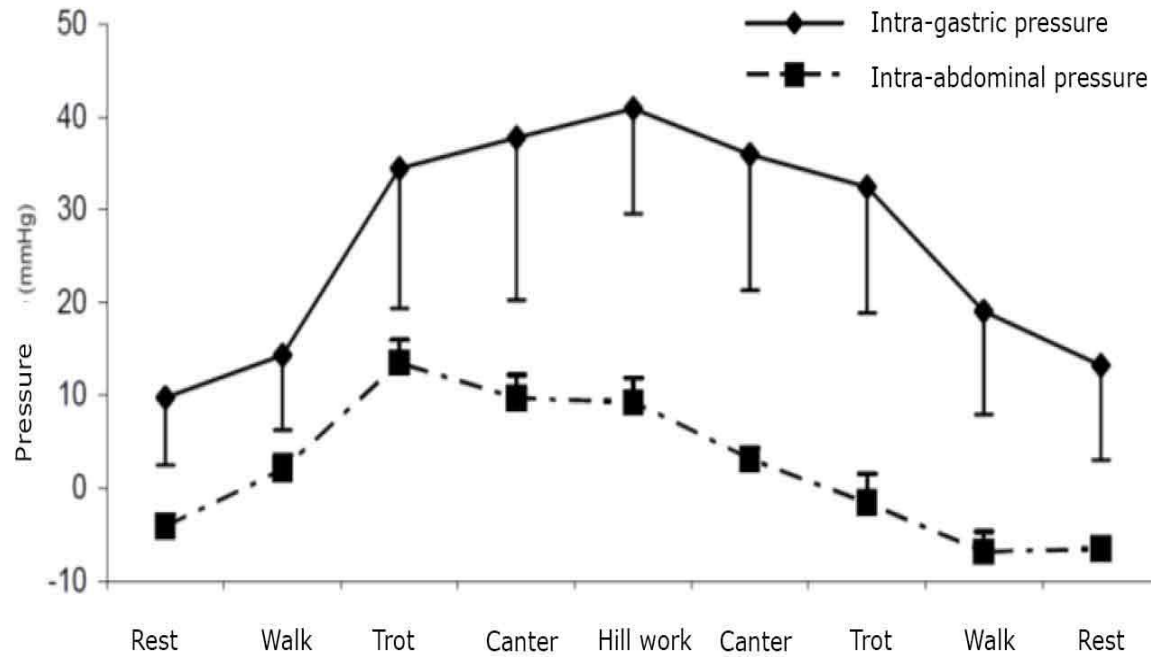
ULCERS - CAUSES

"Nutrition is the key to success"

- Increased acidity
- Exercise - acid splash
- Intermittent feeding
- Transport stress
- NSAID's
- High starch
 - VFA's, pH



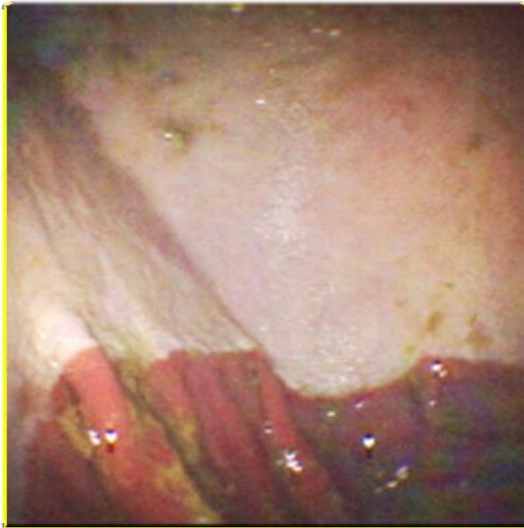
Gastric Pressure



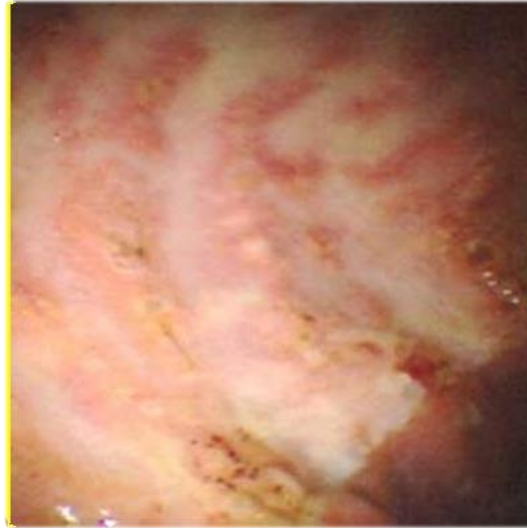
MEAL FEEDING

"Nutrition is the key to success"

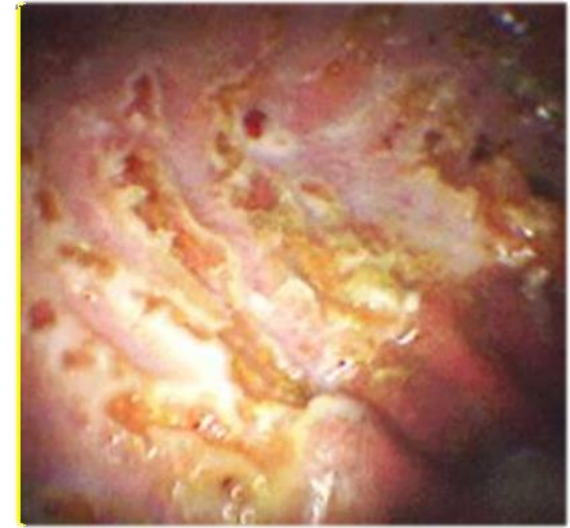
- Not enough forage
- Stomach is very acidic when empty



Day 0



Day 2



Day 4

Murray & Schusser, Equine Vet J, 1993; Murray & Eichorn, Am J Vet Res, 1996.

GASTRIC ULCERS

"Nutrition is the key to success"

- Poor appetite
- Poor body condition
- Behavioral changes
- Decrease in performance
- Mild to moderate colic



POLL QUESTION

"Nutrition is the key to success"



SOLUTIONS - ALFALFA

"Nutrition is the key to success"



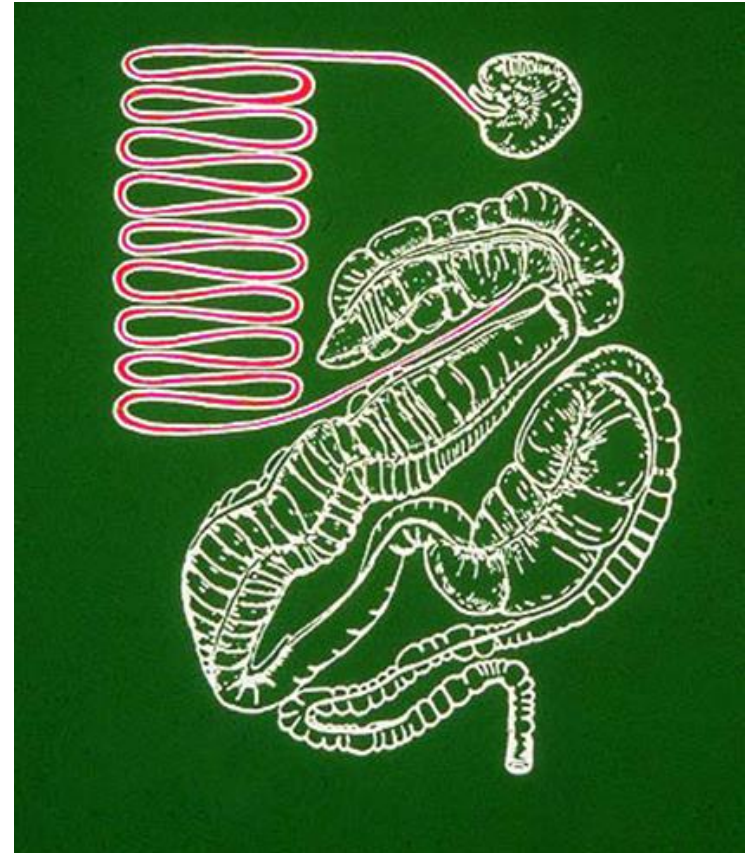
- Alfalfa
- Research Texas A&M University, USA
- Alfalfa was a natural buffer to acidity in the stomach (Calcium)
- Feeding alfalfa was more effective at reducing the incidence of gastric ulcers than grass hay



SMALL INTESTINE

"Nutrition is the key to success"

- 25% capacity
- 70 ft
- 3-4 inches diameter
- 10-12 gal
- 30-40 mins to 3-4 hrs
- Enzymatic digestion
 - CHO
 - Protein
 - Fat
 - Minerals
 - Vitamins

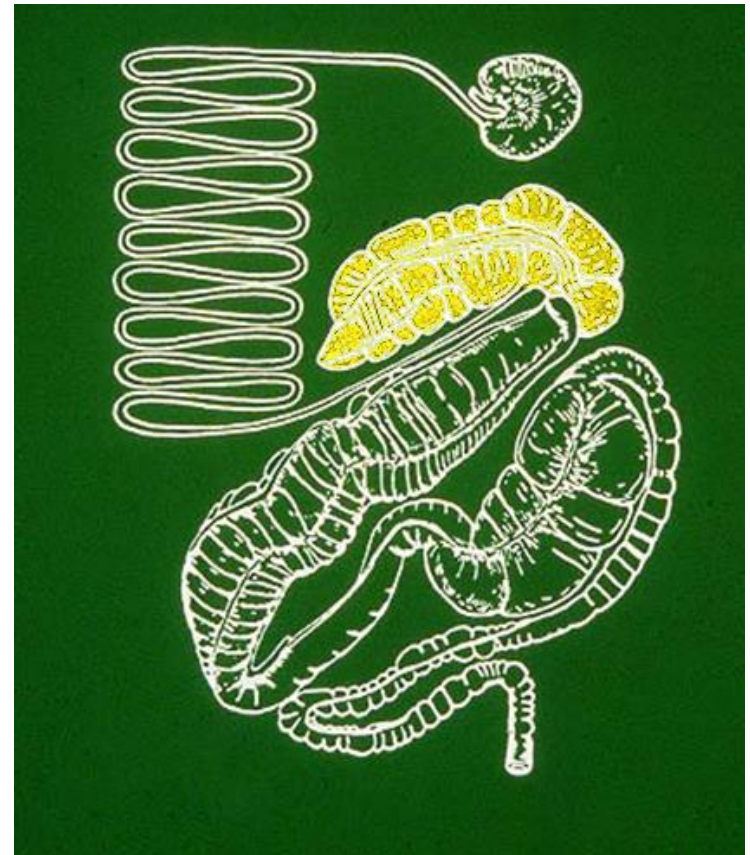


CECUM

"Nutrition is the key to success"



- Cecum
 - 4 ft.
 - 9-12 in diameter
 - 7-8 gal
 - Entrance and exit at the top
 - 7 hrs rate of passage
- Enlargement to promote fermentation

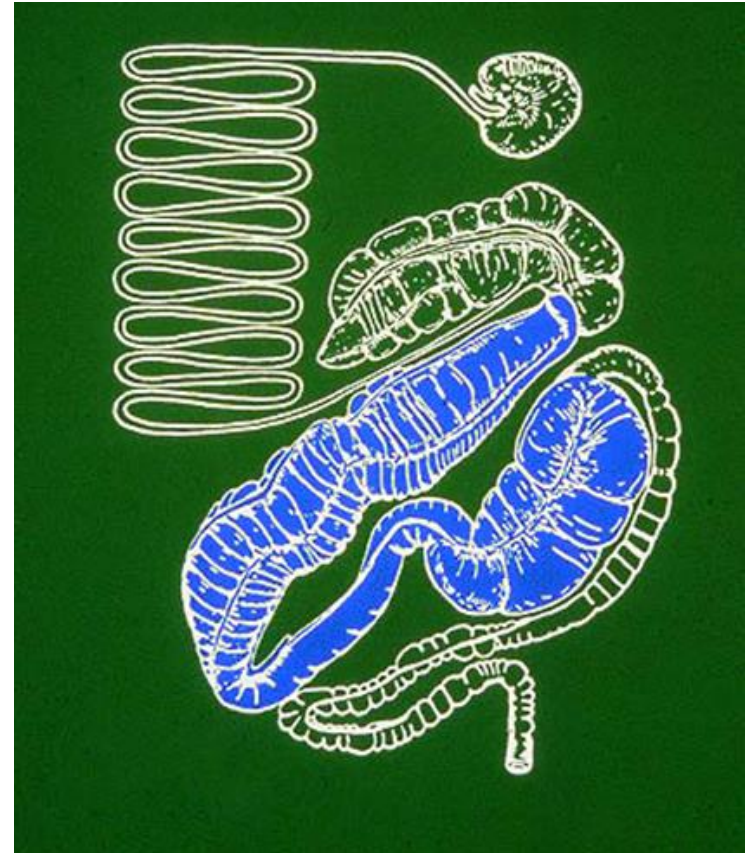


LARGE COLON

"Nutrition is the key to success"



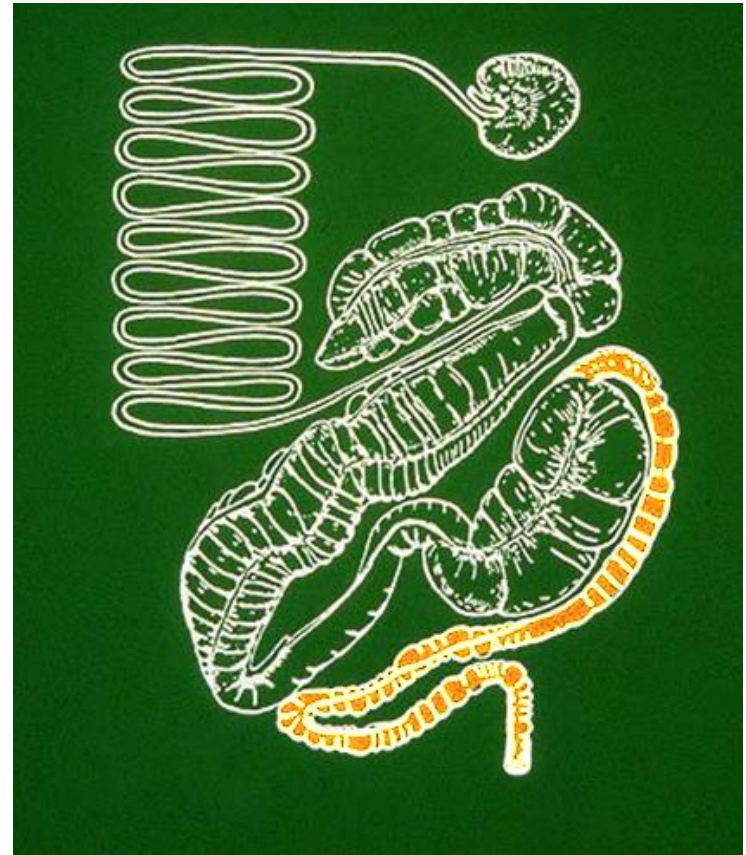
- 10-12 ft
- 8-10 in diameter
- 15-23 gallons
- Pouches can easily become twisted and fill with gas
- 35 -65 hours rate of passage



SMALL COLON

"Nutrition is the key to success"

- 10-12 ft
- 3-4 in diameter
- 5 gallons
- Reclaim excess moisture and return it to the body
- Form fecal balls



WATER

"Nutrition is the key to success"



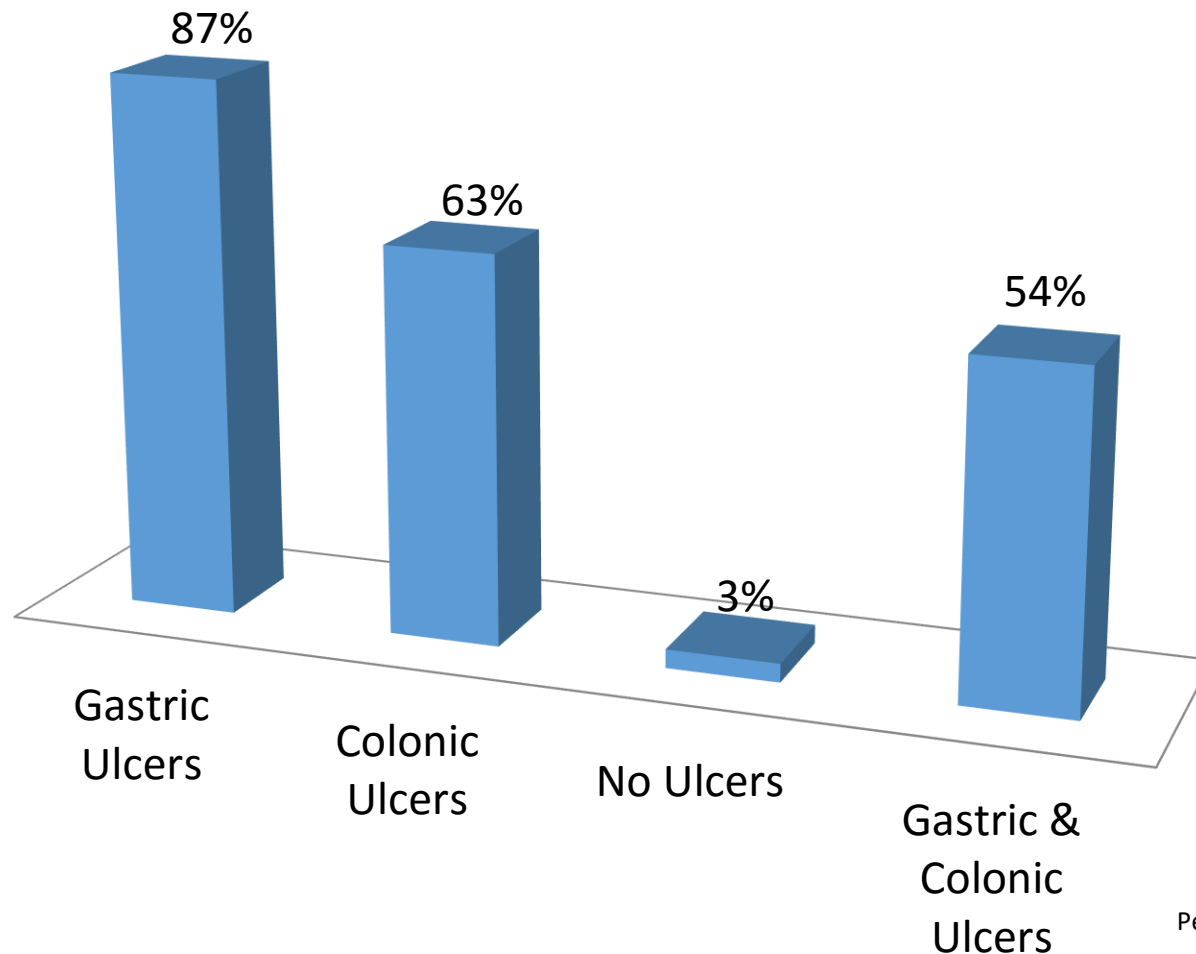
- Cool weather 10-12 gallons
- Hot weather 20-25 gallons
- Increases with lactation, heat, exercise
- Usually drink $\frac{1}{4}$ - $\frac{1}{2}$ gallon / 1 lb hay



ULCERS – PERFORMANCE HORSES



"Nutrition is the key to success"

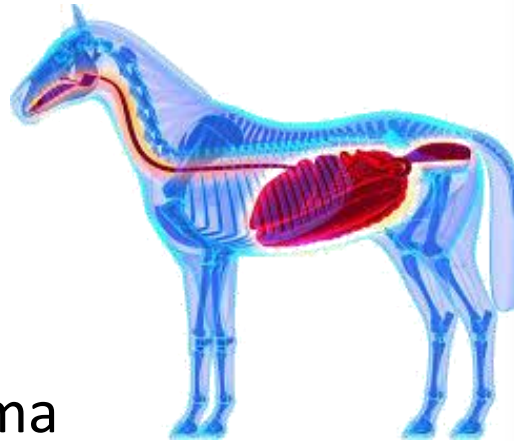


Pellegrini, 2005

ULCERS - COLONIC

"Nutrition is the key to success"

- Less frequent but more severe than gastric ulcers
- Symptoms
 - Intermittent colic
 - Lethargy
 - Anorexia
 - Fever
 - Diarrhea
 - Dehydration
 - Ventral edema



COLIC

"Nutrition is the key to success"



- Impaction Colic
 - Dehydrated digestive tract
 - Fall weather shift
- Gas Colic
 - Gas build up – pain, most common
 - Microbial gas production



POLL QUESTION

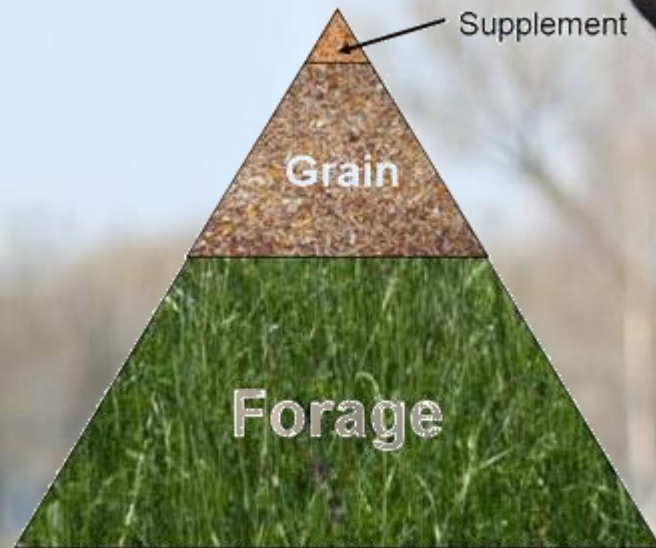
"Nutrition is the key to success"



START WITH FORAGE



- Absolute Requirement 1% of Body Weight Minimum
- Weight loss 1.2% BW
- 1.5% of Body Weight is Recommended
- Normal Intake 1.8 – 2.2%
- Maximum Intake 3 – 3.5%



Feed Pyramid for Equine



FORAGE – NOT ENOUGH



Can Result In:

- Hindgut acidosis
- Colic
- Gastric ulcers

- Cribbing
- Wood chewing
- Behavior issues
- Weaving, aggression

NUTRIENTS ARE ABSORBED WHERE?



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NUTRIENT ABSORPTION



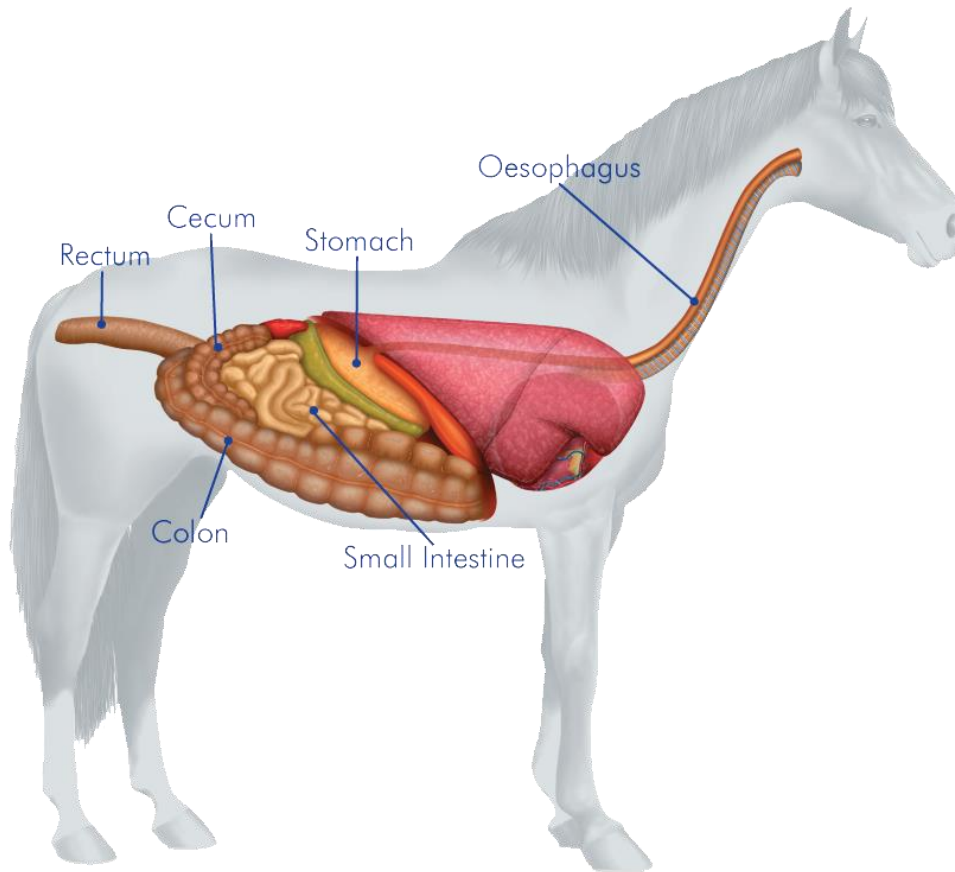
"Nutrition is the key to success"

- **Protein**--60-70% absorbed in the small intestine and 30-40% in the hindgut
- **Soluble carbohydrates**--65-75% in the small intestine and 25-35% in the hindgut
- **Fiber**--15-25% in the small intestine and 75-85% in the hindgut
- **Fats**--Though no specific percentages were listed as being available, the primary absorption site is the small intestine
- **Calcium**--95-99% in the small intestine and 1-5% in the hindgut
- **Magnesium**--90-95% in the small intestine and 5-10% in the hindgut
- **Phosphorus**--20-50% in the small intestine and 50-80% in the hindgut
- **Vitamins**--Though no specific percentages are listed as being available, the primary absorption site is the small intestine and hindgut

TAKE HOME MESSAGE



"Nutrition is the key to success"



- Fiber from pasture or hay is necessary for a healthy digestive system
 - Horses are anatomically designed to digest and utilize fiber
 - 65% of digestive capacity dedicated to fiber digestion

Questions



PHN
PERFORMANCE HORSE NUTRITION



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