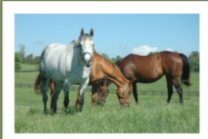


## PASTURE BASED NUTRITION FOR HORSES



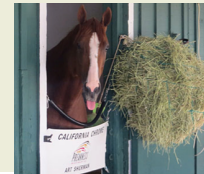
DR. BRIDGETT MCINTOSH  
DEPARTMENT OF ANIMAL SCIENCE  
M.A.R.E. CENTER  
MIDDLEBURG, VA

Virginia State  
Feed  
Association  
&  
Nutritional  
Management  
"Cow" College

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Life Sciences

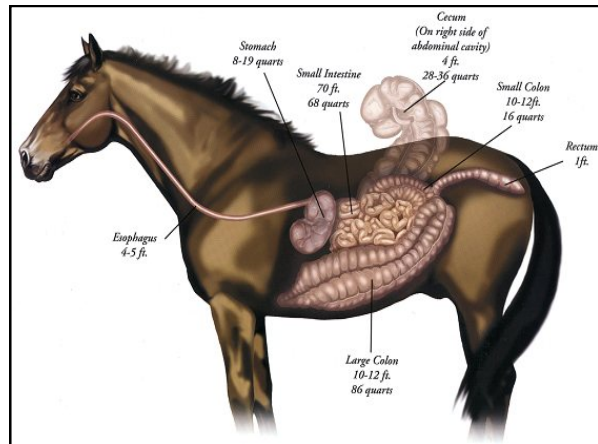
## FORAGE IS THE FOUNDATION

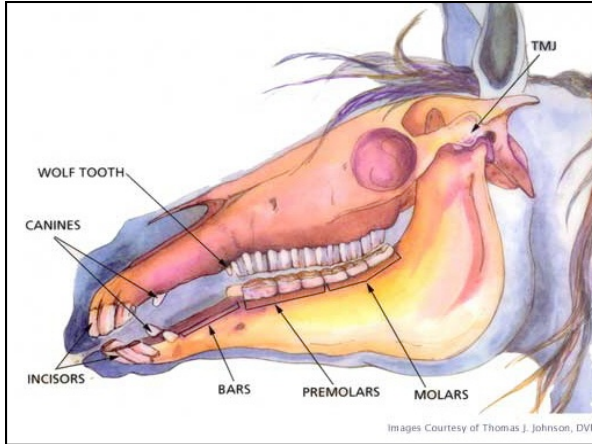
- Horses are non-ruminant herbivores
- Forage based diet important for ALL classes of horses
- Digestive system designed to utilize fiber from forage via microbial fermentation in hindgut



## WHY IS PASTURE IMPORTANT?

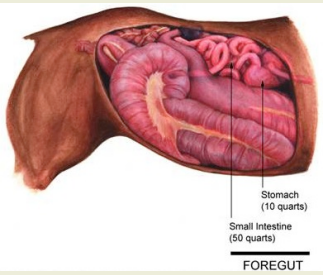
- Horses need 1.5% to 3% of their body weight in forage each day:
  - 17 to 33 lb/day for the average horse
- Graze 14-18 hrs/day
- Move 10 miles/day





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## The Foregut

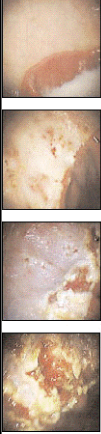


- **Stomach**
  - Small
  - Little digestion
  - Continuous gastric acid secretion
- **Small Intestine**
  - Digestion and absorption of sugars, starch, protein, fat
  - Vitamin/mineral absorption

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## GASTRIC ULCERS IN HORSES

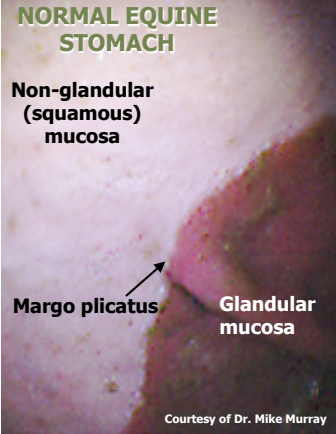
- Continuous secretion of gastric acid
  - **Free choice forage: Stomach pH 4**
  - **Feed withheld: Stomach pH 1.6**
- Withholding feed causes gastric ulcers
- Gastric Ulcers occur in at least 40% of horses, other studies show 90%
- Feed composition, meal size, management also affect incidence
- Pastures reduce incidence of ulcers



- Grade 0 Ulcer**  
Intact mucosal epithelium (may have reddening and/or hyperkeratosis)
- Grade 1 Ulcer**  
Small single or multiple ulcers
- Grade 2 Ulcer**  
Large single or multiple ulcers
- Grade 3 Ulcer**  
Extensive (often coalescing) ulcers with areas of deep ulceration

### NORMAL EQUINE STOMACH

**Non-glandular (squamous) mucosa**

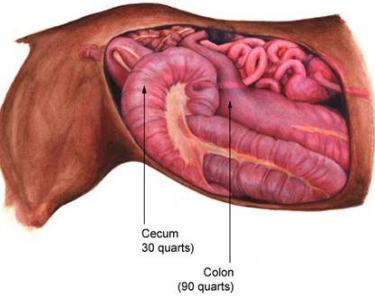


**Margo plicatus**      **Glandular mucosa**

Courtesy of Dr. Mike Murray

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## THE HINDGUT



Cecum  
30 quarts

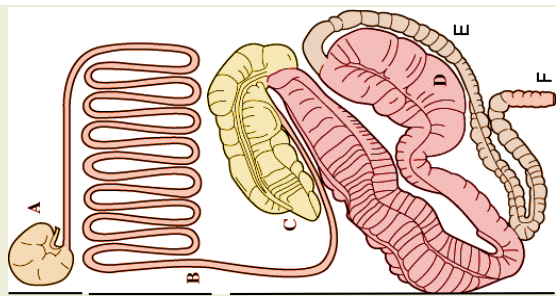
Colon  
(90 quarts)

HINDGUT

- **Cecum & Colon**
  - Houses millions of microbes that break down fiber (fermentation)
  - Production of VFA's
  - VFAs used for energy
  - Synthesis of B-complex vitamins

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## TOTAL DIGESTIVE PROCESS TAKES 65 TO 75 HOURS




< 1 hr      1 to 3 hours      64 to 72 hours

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## TYPES OF NUTRIENTS

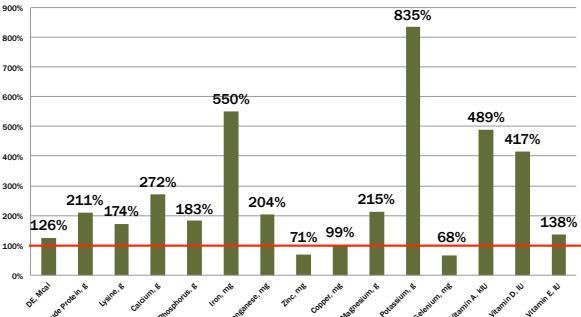
- Water
- Carbohydrates
- Fats
- Protein
- Vitamins
- Minerals



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## PASTURE GRASS ALONE EXCEEDS MOST NUTRIENT REQUIREMENTS

Light Exercise (assuming intake at 2% BW)

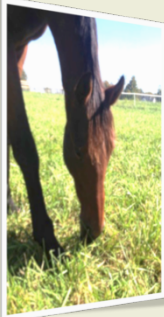


Nutrient	Requirement (%)
Dt. Mol	126%
Cruce Protein %	211%
Lysine %	174%
Calcium %	272%
Phosphorus %	183%
Iron, mg	550%
Manganese, mg	204%
Zinc, mg	71%
Copper, mg	99%
Magnesium %	215%
Potassium %	835%
Selenium, mg	68%
Vitamin A, IU	489%
Vitamin D, IU	417%
Vitamin E, IU	138%

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## BENEFITS OF PASTURE

- Provides optimal nutrition
- Reduces colic and digestive disorders
- Reduces gastric ulcers
- Reduces respiratory disease
- Increases bone mineral content in young growing horses
- Promotes normal healthy behavior
- Reduces costs



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## MANAGEMENT PROBLEMS


- Overstocking
- Overgrazing
- Manure management
- Mud management



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## PROBLEM GRAZERS

- Selective grazers= uneven grazing
- Biting top grazers = leaf removal
- Large & heavy = soil compaction & trampling
- Manure distribution = uneven grazing & parasites




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## KEYS TO A HEALTHY PASTURE

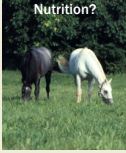
- What is purpose of pasture?
  - Exercise
  - Nutrition
  - Both?
- Size of usable acreage
- Stocking rate
- Pasture species selection
- Proper planting
- Soil testing
- Grazing management

Turnout for exercise?



**OR**

Nutrition?



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## STOCKING RATES

- Depends on characteristics of your pasture
- Maintain at least 70% vegetative cover regardless of time of year
- 2 acres per horse minimum




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## HOW MUCH PASTURE?

Turnout Time (d)	Acres	
<b>&lt; 3 h</b>	<b>0.5</b>	Stocking rates can be increased with elevated levels of management: Mowing Rotational grazing Irrigating Fertilizing Overseeding
<b>3-8 h</b>	<b>1</b>	
<b>8-12 h</b>	<b>1.5</b>	
<b>24 h</b>	<b>2 +</b>	

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## FORAGE SPECIES SELECTION

- Several species make good horse pastures
- Cool Season
  - Tall Fescue\*
  - Orchardgrass
  - Kentucky Bluegrass
- Warm Season
  - Bermudagrass
  - Crabgrass
- Legumes
  - Clover
  - Alfalfa

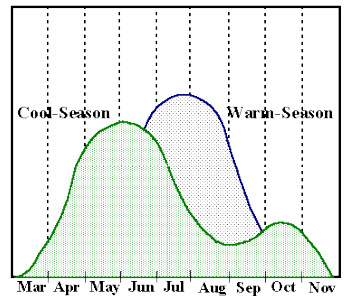


\* Ky 31 Tall fescue is toxic to broodmares but perfectly safe for all other classes of horses

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## COOL SEASON VS WARM SEASON GRASSES

Seasonal Distribution

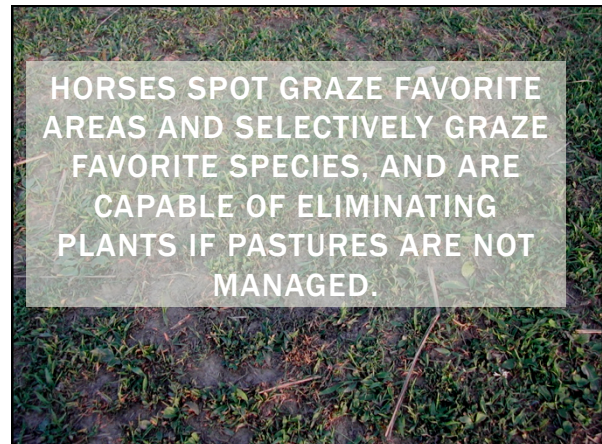




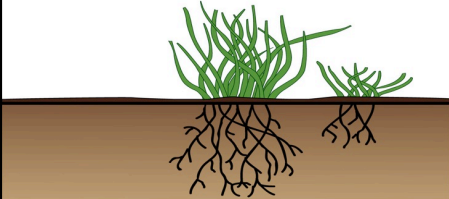
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## RENOVATE OR START OVER?

- Continue current management if:
  - 75% or more desirable plants
- Improve Management or overseed:
  - 40-75% desirable plants left
- Start over if:
  - Less than 40% desirable plants

## TAKE HALF / LEAVE HALF



Percent leaf volume removed	Percent root growth stopped
10%	0%
20%	0%
30%	0%
40%	0%
50%	2-4%
60%	50%
70%	78%
80%	100%
90%	100%

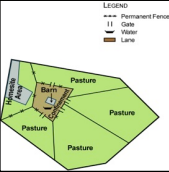
SERIOUS DAMAGE TO THE ROOT SYSTEM OF THE PLANT CAN OCCUR IF AS LITTLE AS 10 PERCENT ADDITIONAL PLANT LEAF VOLUME IS REMOVED

Adapted from NRCS, Bozeman, MT

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## ROTATIONAL GRAZING FOR OPTIMAL PASTURE PRODUCTION

- Key point: REST the pastures
- Graze for a short time then allow forage to regrow
- Need to rotate between several fields
- Ideally, first field is ready to be grazed when horses are done on last field
- How many fields? How long between rotation? Depends!
  - Size of fields
  - Stocking density
  - Available forage



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## INTERNAL PADDOCK FENCING

- Temporary electric fencing works great!
- One-strand if separating paddocks only
- Avoid metal t-posts




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## REST & RECOVER

Remove at  
3-4"

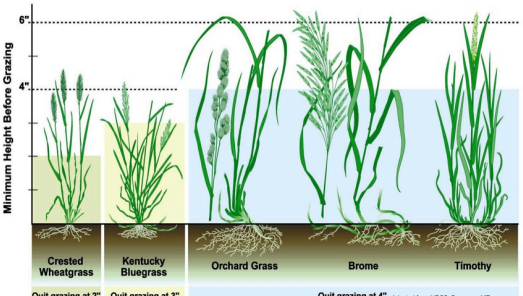


Graze at  
6 - 12"  
(cool season  
grasses)

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## CONSIDER THE SPECIES

Minimum Height Before Grazing



Adapted from NRCS, Bozeman, MT

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## GRAZING GUIDELINES

Cool season Grasses		Warm Season Grasses	
Time of Year	Recovery Time	Time of Year	Recovery Time
First rotation (late March/April)	14-16 days	Early fast growth	14-21 days
Fast Growth (May-June and Fall)	20-30 days	Normal growth conditions	21-28 days
Summer/Winter	30 to 40 days	Slower growth	35 to 45 days

- Recovery time will depend on how short the forage was grazed, growing conditions, soil fertility etc.
- Separate paddocks by cool season and warm season if possible.

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## BENEFITS OF ROTATIONAL GRAZING

<p>■ <b>For the Plants &amp; Environment</b></p> <ul style="list-style-type: none"> <li>■ Increased forage production</li> <li>■ Plants remain young &amp; vegetative</li> <li>■ Uniform grazing</li> <li>■ Erosion reduced</li> <li>■ NPS pollution reduced</li> </ul>	<p>■ <b>For the Horse</b></p> <ul style="list-style-type: none"> <li>■ Improved nutrition</li> <li>■ Exercise &amp; grazing reduce risk for colic, bad behavior</li> <li>■ Grazing increases mineral bone density in young horses</li> <li>■ Decreases mud and erosion</li> <li>■ Improve skin and hoof condition</li> </ul>
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## HEALTH CONSIDERATIONS FOR GRAZING

- Pastures provide optimal nutrition for most horses BUT...
- Sometimes healthy pasture not healthy for all horses!
- Metabolic Syndrome
  - Obesity
  - Insulin resistance
  - Laminitis/Founder

Insulin, mIU/L

Time, hr

Legend: SS (red), FF (blue), Pasture (green)

Stanjar et al, 2004



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## BODY CONDITION SCORE (BCS)

- Maintain Optimal BCS
- Score of overall body fatness
- Scale 1-9
- Average scores from six body regions
- Suggested scores
  - Athlete: 4-5
  - Maintenance: 5-6
  - Broodmare: ~6




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## BODY CONDITION SCORING (BCS)



**< 4**  
underweight



**4 ≤ BCS < 7** moderate




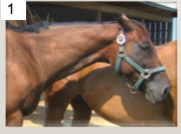

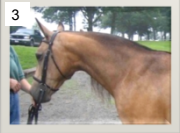
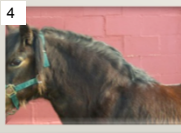

**7 ≤ BCS < 8** overweight  
**BCS ≥ 8** obese

Henneke et al., 1983

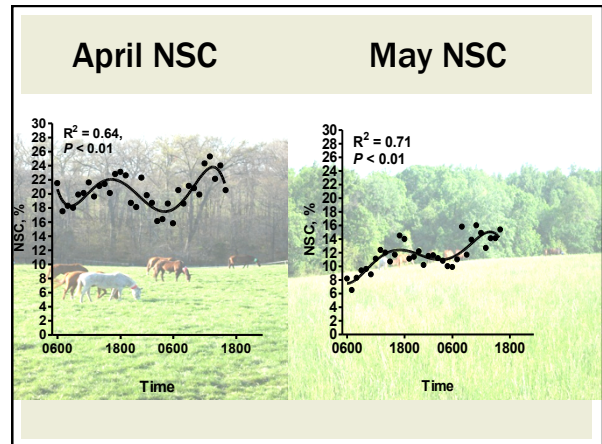
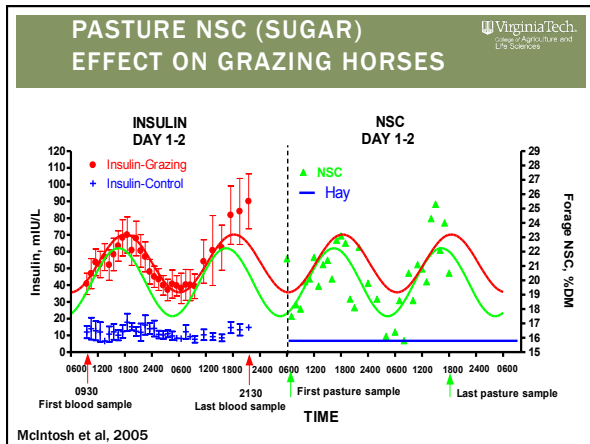
Score of overall body fatness

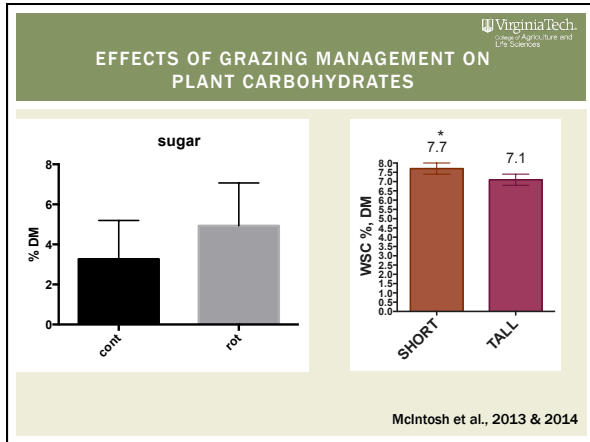
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## CRESTY NECK SCORE (CNS) SCALE 0 TO 5

Carter, 2009





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### GRAZING MUZZLES

DRY LOTS

Reduce NSC intake

Allow for exercise

Turnout in early am

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### HEAVY USE AREAS OR DRY LOTS

- Mud Management
- High stocking rates
- Wet conditions
- Drought or slow forage growth
- Restrict grazing
  - Disease avoidance
  - Weight loss
- 300 ft<sup>2</sup> per horse

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### HEALTHY PASTURES MAKE HEALTHY HORSES

- Pastures provide optimal nutrition
- A good grazing system is healthy for horses & environment
- Grazing reduces feed/ labor costs

THANK YOU



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