

UNDERSTANDING THE HORSE INDUSTRY..... BMPS THAT WORK



Penn State **Extension**

Horses 101: Understanding Horses, Owners, and the Industry

- **The Equine Industry**
- **The Horse Owner**
- **Survey of Adopted Best Management Practices**
- **The Horse - Behavior and Health Considerations**
- **Grazing BMPs**
- **Utilizing ACAs**
- **Weed Management**
- **Manure Management**
- **Fencing Considerations**
- **Succeeding with Horse Owners**

The Horse Industry in Pennsylvania



Economic Impact of PA Equine Industry

- **Number of Horses:** **215,693**
- **Annual Sale of Horses & Related Activities:** **\$435 million**
- **Related Assets/Investments:** **\$8.27 billion**
- **Total taxes:** **\$53.2 million**
- **Employment Compensation:** **\$412.3 million**
- **Economic Impact of Industry:** **\$615.1 million**

** Based on 2003 Economic Impact Study*

Horse Population - Breed Numbers

Light Horse Breeds

- Quarter Horses – 40,110
- Standardbreds – 21,132
- Thoroughbreds – 21,117
- Arabians & Half Arabians – 11,154
- Morgans – 10,136
- Appaloosas – 7,985
- Other light horse breeds – 7,248



Draft Breeds

- Belgians – 6,202
- Percherons – 3,000
- Other draft horse breeds – 1,831

Horse Population -Racehorse Breeds



Racing Industry

Standardbreds -14,815

Thoroughbreds - 11,550

Non Racing

Standardbreds -6,317

Thoroughbreds - 9,567

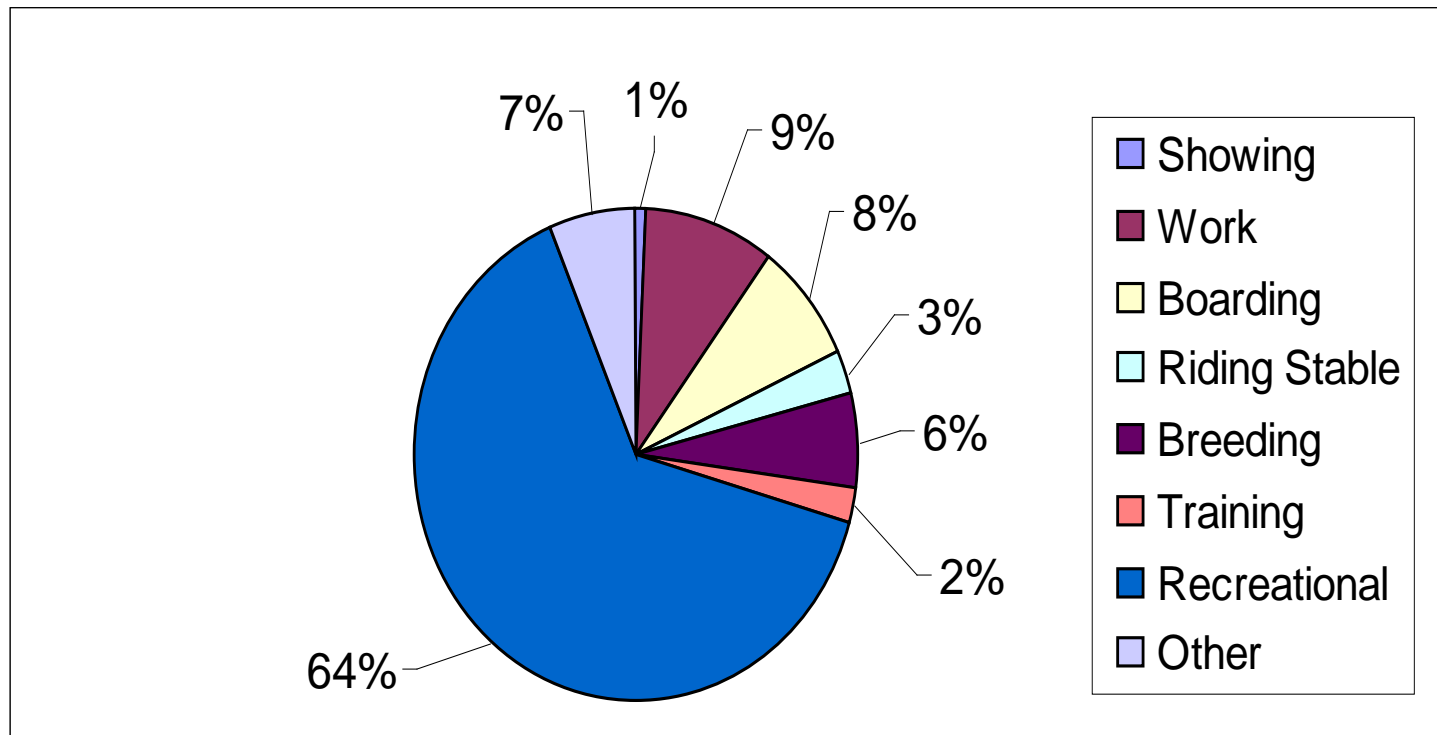
Use of Horses in Pennsylvania

- ✓ 38,000 households own horses
- ✓ 7,800 participate in activities without owning horses
- ✓ 27.0 %- Trail Riding/Recreation
- ✓ 22.0 %- Breeding
- ✓ 20.0 %- Shows, Events, Clinics



Types of Equine Operations

64% of horse farms are operated for recreational use.



Value of Horses by Region

Estimated value of Pennsylvania's Equine - \$1.3 billion.

(1998 - Not all horse farms reported county data)

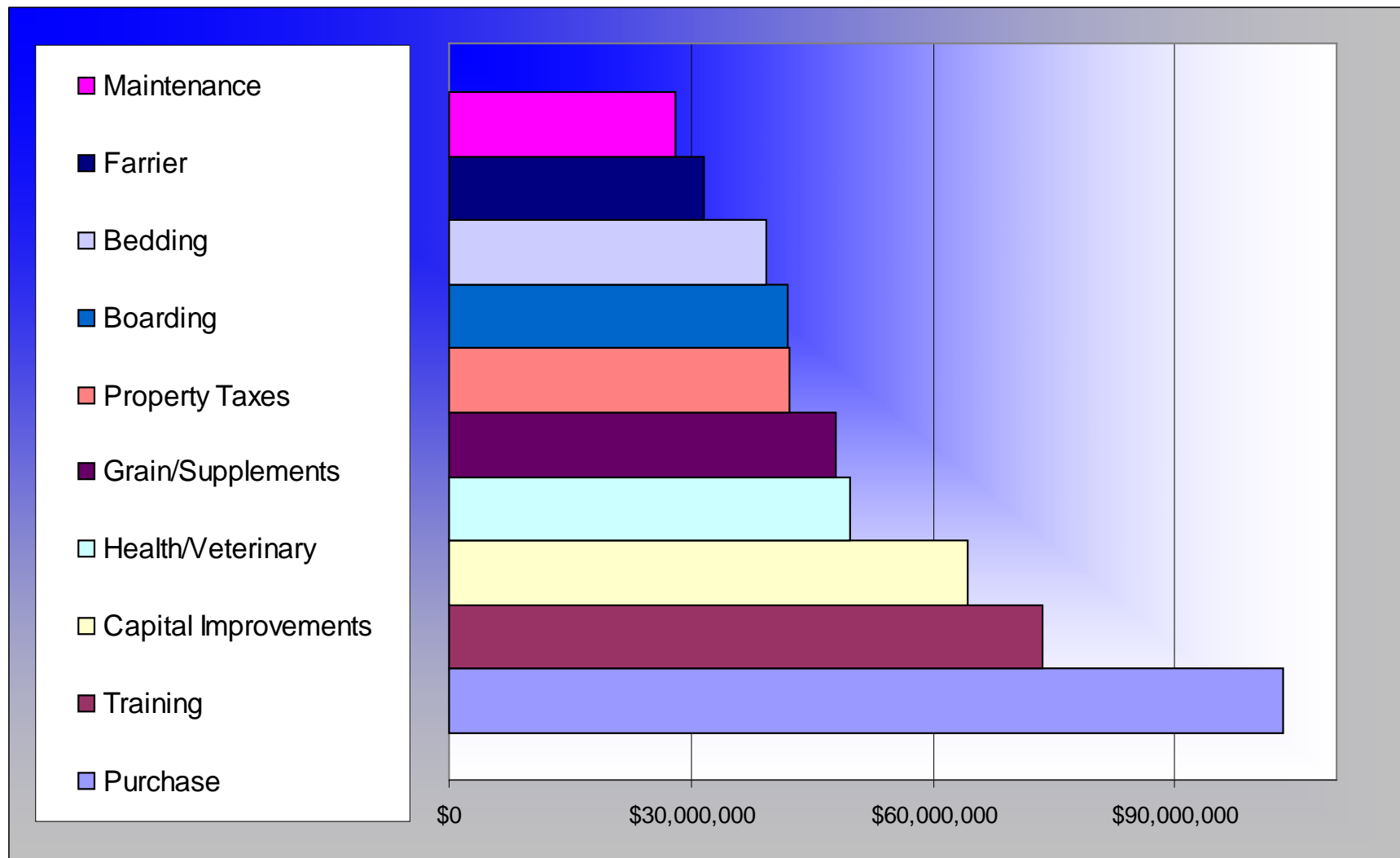
| <i>District</i> | <i>Total \$ Value</i> | <i>No. of Horses</i> | <i>Total \$ Value Per Head</i> |
|-----------------|-----------------------|----------------------|--------------------------------|
| Central | \$108,145,636 | 23,720 | \$4,559.26 |
| East Central | \$31,467,648 | 6,902 | \$4,559.21 |
| North Central | \$42,542,901 | 9,330 | \$4,559.80 |
| North Eastern | \$34,434,821 | 7,553 | \$4,559.09 |
| North Western | \$67,932,637 | 14,902 | \$4,558.63 |
| South Central | \$91,982,353 | 20,177 | \$4,558.77 |
| South Eastern | \$205,593,834 | 45,096 | \$4,559.03 |
| South Western | \$58,953,036 | 12,931 | \$4,559.05 |
| West Central | \$52,081,689 | 24,354 | \$2,138.53 |

Equine Related Income

Equine income, sales, and related equine and agricultural activities (1998)

| | | | |
|-----------------|--------------|-------------------|---------------|
| Show Winnings | \$8,977,772 | Training | \$51,610,565 |
| Racing Purses | \$69,936,916 | Sales Preparation | \$2,012,266 |
| Rodeo Winnings | \$417,430 | Boarding | \$64,824,184 |
| Tourism | \$514,650 | Sale of Horses | \$129,147,505 |
| Trail Riding | \$11,057,556 | Stallion Fees | \$10,956,259 |
| Manure Sales | \$930,615 | Mare Care | \$8,644,185 |
| Feed Sales | \$2,370,384 | Lessons | \$3,742,045 |
| Equipment Sales | 1,641,699 | Leasing Horses | \$8,564,507 |
| Other 1 | 43,923,841 | Judging | \$871,911 |

Equine Related Expenses



Horse Owners in Pennsylvania



The Horse Owner (source: HIA, 1997)



- ✓ Average age – 31 (getting older)
- ✓ 59% female, professional
- ✓ Average income – \$47,600
 - 34% less than \$50,000
 - 28% over \$100,000
- ✓ 97% ride for pleasure, 6% for competition
- ✓ Ride infrequently unless involved in competition
- ✓ No agricultural background

Results of a Penn State On-line Survey of Equine Industry's Best Management Practices

Pastures

- ✓ 65% used a rotation system
- ✓ 39% had a pasture management plan
- ✓ 25% continuously grazed
- ✓ 24% allowed grasses to recover to recommended heights
- ✓ 75% reported >80% canopy cover

Pastures continued

- ✓ 96% mowed at least 4 times a year
- ✓ 8% regularly use pasture herbicides; 25% sometimes use, 62% never used
- ✓ 50% never soil test
- ✓ 25% test every 3 years
- ✓ 46% apply lime without testing
- ✓ 37% never apply lime



Sacrifice Lots (ACAs)

✓ 54% did not use sacrifice lots

.....Of those that used sacrifice lots

✓ 68% used them to protect pastures during inclement weather

✓ 61% used them to prevent over eating

✓ 31% used them to restrict exercise



Manure Management

- ✓ 34% composted and used the manure; 8% disposed of compost off site
- ✓ 11% used fresh; 11% hauled fresh off site
- ✓ 2% had commercial contractors remove manure
- ✓ 52% stored manure on an unprepared site; 36% had a hard pack surface, 4% had a covered improved structure



Conservation Planning

- ✓ 51% did not have surface water on the farm
- ✓ 13% had an E & S or Conservation Plan
- ✓ 22% had a nutrient management plan
- ✓ 3% reported obvious soil erosion
- ✓ 25% indicated some erosion
- ✓ 76% had a water run-off system for buildings



Choosing BMPs for Equine Operations

Consider.....

- * Equine grazing behavior
- * Equine health
- * Equine “social” behavior
- * Farm manager and “customer” opinions and goals
- * Economics



Horse Health Considerations When Selecting BMPs



The equine digestive system is “unique” and designed for forage consumption. Management challenges may lead to colic and digestive upset

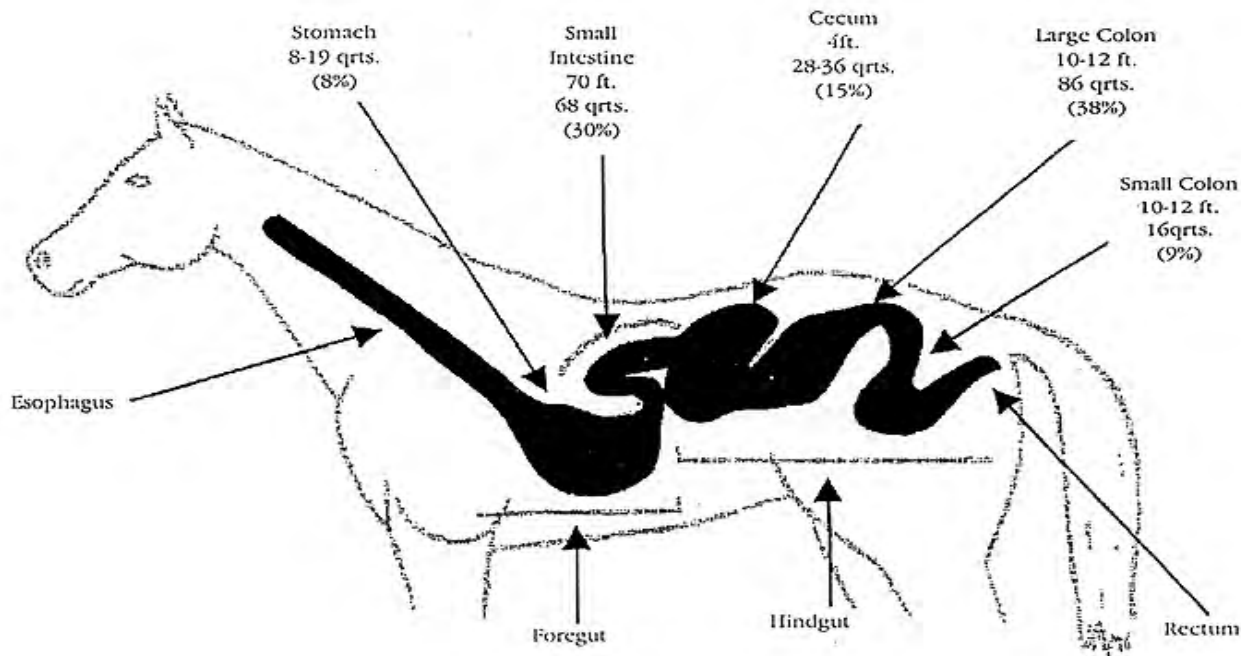
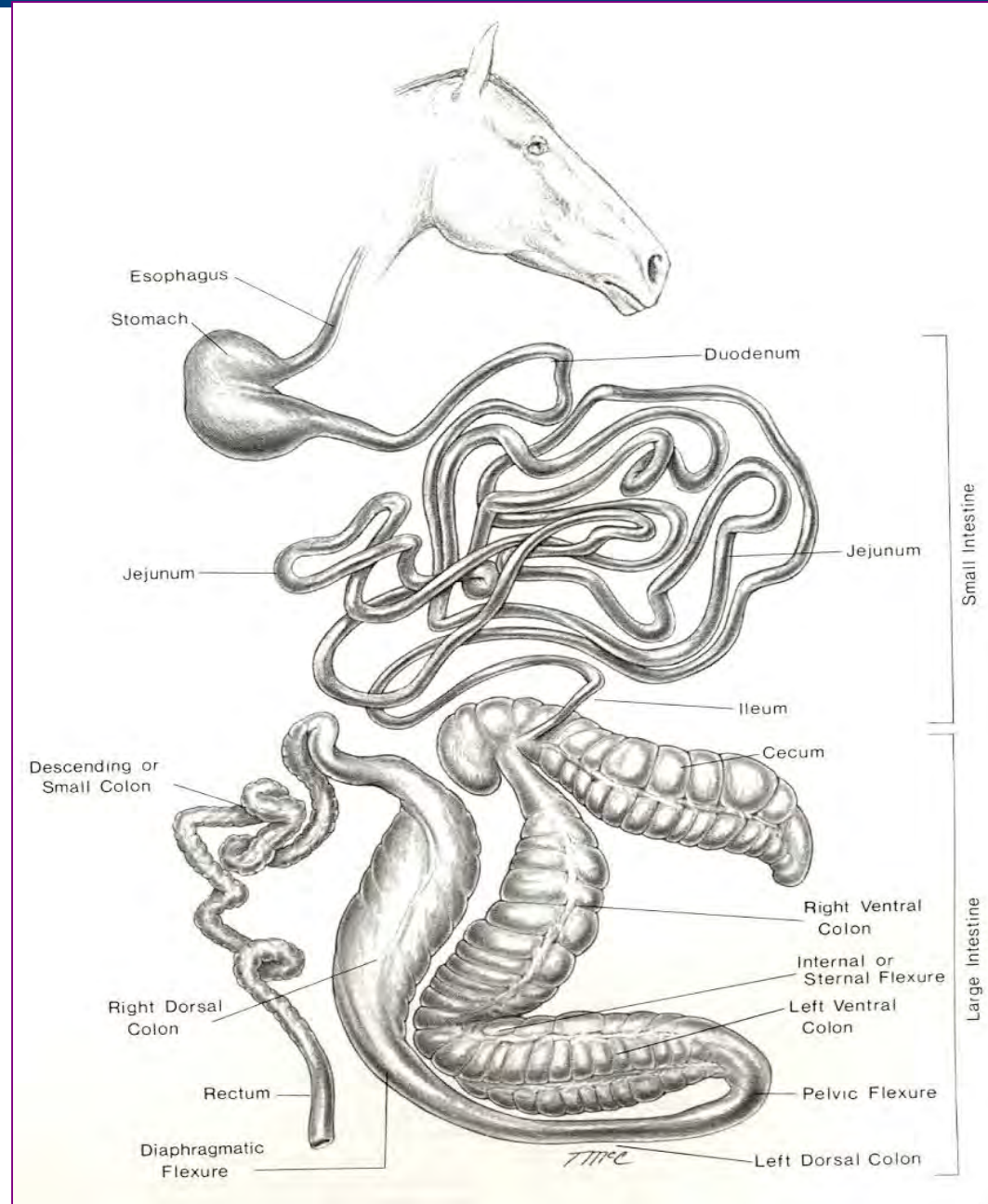


Figure 1: Digestive tract of the horse.

DIGESTIVE SYSTEM

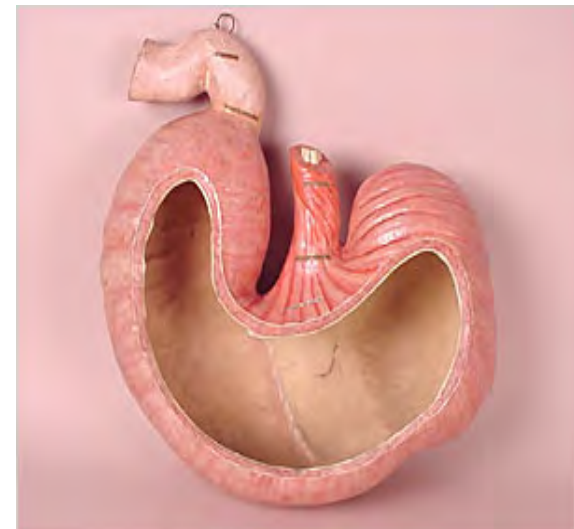
FOREGUT:

- Mouth
- Esophagus
- Stomach
- Small Intestine



Stomach

- Small stomach - 2-4 gallons for a 1100 lb horse
- Secretes hydrochloric acid and Pepsin to begin the breakdown of food
- Unable to regurgitate food - can't throw up!
- Functions best when $\frac{3}{4}$ full
- Food begins to leave the stomach in 15 minutes



Small Intestine

Small intestine is 50-70 ft long and holds 10-23 gallons

- Most of the nutrients (carbohydrates, protein, oils, fats) are digested here and enter the bloodstream.
- Most of the vitamins and mineral are absorbed here.
- Water is not absorbed but helps move the food.
- Anything that a horse eats that is toxic is absorbed here- horses are very susceptible to toxins.

Large Intestine (Hind Gut)

- Cecum
- Large and Small Colon
- Rectum



Cecum

- **The cecum, like a cow's rumen, contains bacteria and protozoa capable of digesting dietary fiber.**
- **Horses require fiber for the cecum to function normally.**
- **Microbes are specific to the food that the horse has been eating.**
- **Anything that disrupts the microbes sets the horse up for colic and digestive disaster.**

Large Colon

- **10-12 ft. long and holds 14-16 gallons.**
- **Flexures are a common place for impaction.**
- **Finishes digestion of fiber.**
- **Lots of gas production.**

The Horse – Health Considerations

- * Evolved as a grazing (perhaps browsing) animal!**
- * Forage species were not developed with the in mind**



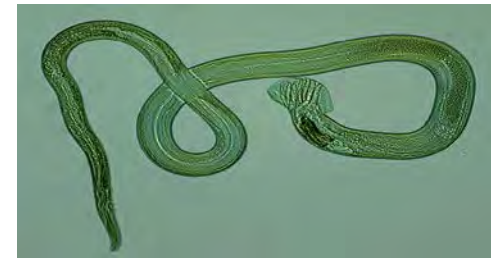
FIBER IS IMPORTANT!!!



Horses should consume 1.5 to 3% of their body weight in feed each day. At least 70% should be forage!

Pasture-related Health Issues:

- Excessive weight gain
- Colic
- Laminitis
- Insulin resistance
- Spread of gastrointestinal parasites
- Toxic plants



“EASY KEEPERS”

- ✓ Get fat on hay or pasture alone.
- ✓ Most (but not all!) more prone to laminitis and colic
- ✓ Most are insulin resistant (high insulin response to increases in blood glucose) that is often associated with obesity

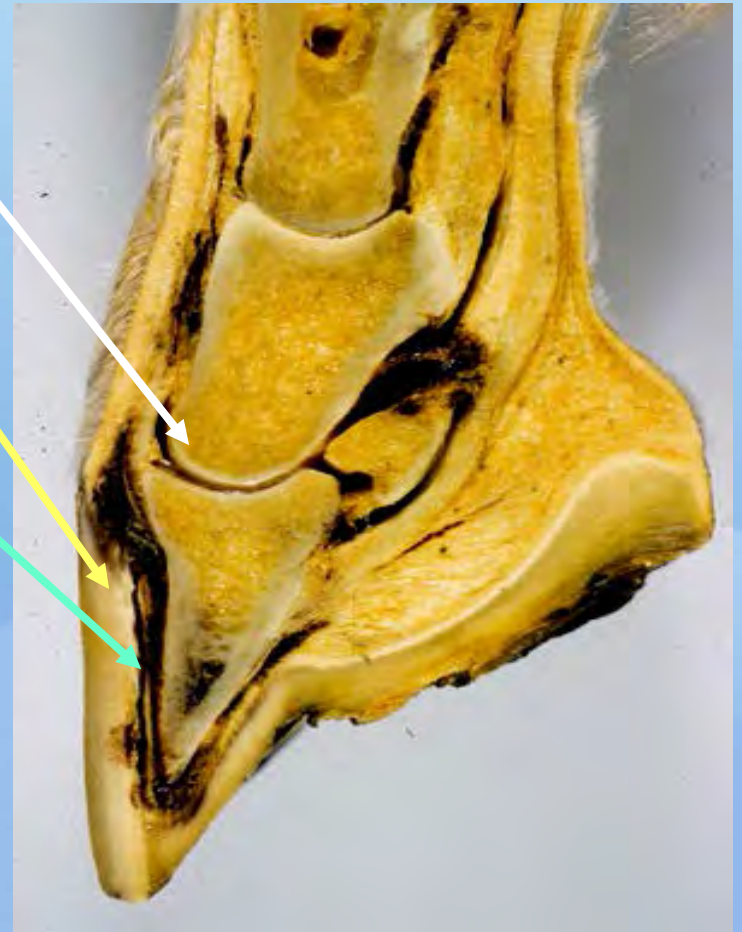
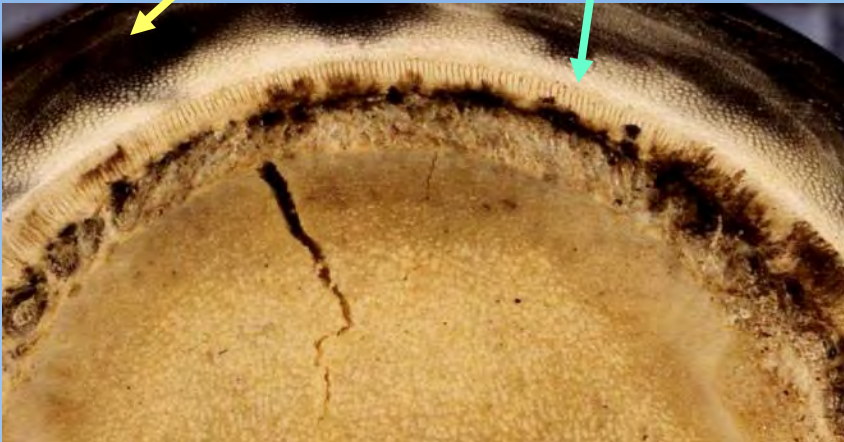


HOOF ANATOMY

Coffin bone

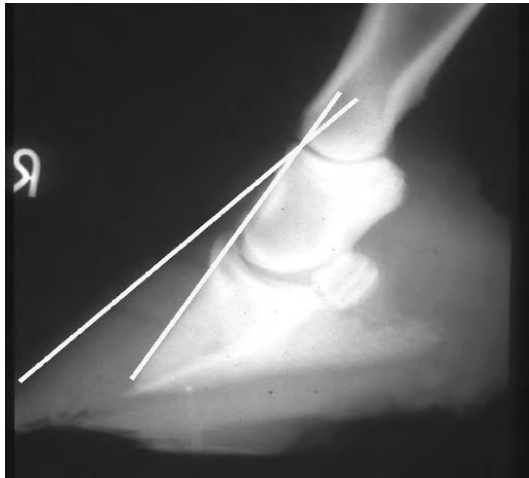
Hoof wall

Laminae



Laminitis

- A very real concern
- Subtle, easy to miss onset
- Excruciating pain
- Potential for laminar failure and hoof deformity
- Can result in permanent lameness



Causes of Laminitis

- 1. Inflammation in the hoof cause by acute catastrophic conditions:**
 - *System illness (salmonella, Potomac horse fever)**
 - *Sudden carbohydrate induced overload of the gut**
 - *Retained placenta**
 - *Pleuropneumonia**
 - *Black Walnut shavings**
- 2. Too much weight bearing on one leg due to injury of the other. (Barbaro)**

Causes of Laminitis

3. Endocrinopathic

- * Results from metabolic disorders (Cushings/insulin resistance)**
- * High insulin levels are responsible for the majority of laminitis cases**
- * Can develop when at risk horse grazes “lush” pasture**
- * Usually less severe- rarely catastrophic failure of the laminae**
- * Caused by a gradual build-up of high insulin levels over months and years**
- * Not a lot known – difficult to model**

Grazing BMPs for Equine Operations



Benefits Of Pastures for Horses

- * **Nutrition**
- * **Movement**
- * **Reduces stress**
- * **Recycles nutrients**
- * **Less labor**
- * **Reduces bedding costs**
- * **Enhances overall health**
- * **Reduces feed costs – more \$\$\$ to buy more horses!**



Grazing – Good for the Environment

A well managed pasture:

- ✓ **Recycles nutrients from dropped manure**
- ✓ **Reduces the need to deal with manure and bedding from stalls and dry lots.**
- ✓ **Generates good neighbor relations**



What is a Good Pasture?

Data Collected from farms in the Chesapeake Bay Watershed

A good plant canopy may not necessarily mean the pasture is high quality.

| Farm Number | % Canopy Cover | % Desirable Plant |
|-------------|----------------|-------------------|
| <i>1</i> | <i>80%</i> | <i>43%</i> |
| <i>2</i> | <i>83%</i> | <i>64%</i> |
| <i>10</i> | <i>98%</i> | <i>83%</i> |
| <i>13</i> | <i>90%</i> | <i>41%</i> |
| <i>17</i> | <i>97%</i> | <i>92%</i> |
| <i>19</i> | <i>53%</i> | <i>21%</i> |

Horse pastures consist of *grasses* such as timothy, brome, orchard grass, ryegrass, bluegrass, and fescue...

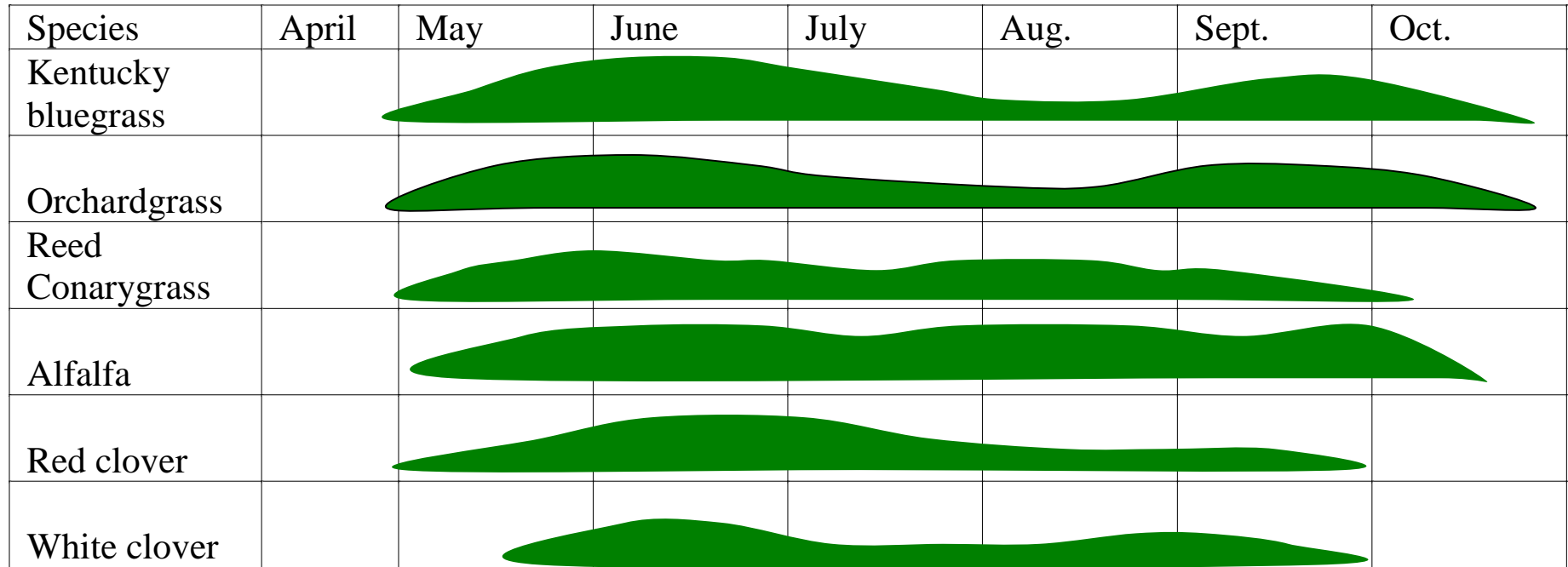


and *legumes* such as white clover, red clover, or alfalfa. What are legumes?

Cool Season Grasses

- ✓ Are the mainstay of most horse pastures
- ✓ Grow best at temperatures of 65° to 80° F.
- ✓ Growth slows in summer
- ✓ Will not effectively grow back if grazed close in hot dry weather

Seasonal Growth Patterns in Forages



Estimates of Acreage Required to Provide Forage Needs for One Animal Unit

| Pasture Species | Pasture Prod. | Annual Yield (T/ADM) | Acres required to provide forage needs for one animal unit ¹ | | | | | | |
|--------------------------------|---------------|----------------------|---|-----|-----|------|------|-----|-----|
| | | | Apr | May | Jun | Jul | Aug | Sep | Oct |
| Ky. Bluegrass/ white clover | Low | 1.0 | 10.7 | 1.2 | 2.7 | 11.1 | 11.1 | 4.5 | 6.9 |
| | Medium | 2.0 | 5.4 | 0.6 | 1.3 | 5.5 | 5.5 | 2.2 | 3.5 |
| | High | 3.0 | 3.6 | 0.4 | 0.9 | 3.7 | 3.7 | 1.5 | 2.3 |
| Alfalfa/grass | Low | 3.0 | - | 0.6 | 0.9 | 1.2 | 1.2 | 1.8 | 3.1 |
| | Medium | 4.5 | - | 0.4 | 0.6 | 0.8 | 0.8 | 1.2 | 2.1 |
| | High | 6.0 | - | 0.3 | 0.4 | 0.6 | 0.6 | 0.9 | 1.5 |
| Tall grass plus nitrogen | Low | 2.0 | 5.4 | 0.8 | 1.3 | 2.8 | 2.3 | 1.8 | 9.2 |
| | Medium | 3.0 | 3.6 | 0.5 | 0.9 | 1.8 | 1.5 | 1.2 | 6.2 |
| | High | 4.5 | 2.4 | 0.4 | 0.6 | 1.2 | 1.0 | 0.8 | 4.1 |
| Warm-season grass | Low | 3.0 | - | - | 0.9 | 0.6 | 0.6 | 1.2 | - |
| | Medium | 4.0 | - | - | 0.7 | 0.4 | 0.4 | 0.9 | - |
| | High | 5.0 | - | - | 0.5 | 0.3 | 0.3 | 0.7 | - |

¹Based on an animal unit consuming 25 lb dry matter (DM) forage per day with 70% of pasture utilized.

Acreage Required to Provide Forage for One Horse

Varies greatly with season

| | April | May | June | July | Aug. | Sept. |
|---|--------------|------------|-------------|-------------|-------------|--------------|
| White Clover / KBG 1 ton /acre | 10.7 | 1.2 | 2.7 | 11.1 | 11.1 | 4.5 |
| Mixed Tall Grass 2 tons /acre | 5.4 | .8 | 1.3 | 2.8 | 2.3 | 1.8 |

Basic Forage Biology

How Does Grass Grow?

Vegetative stage of growth - Non-reproductive stage which has higher nutritional value than mature reproductive stages. Why?



Reproductive Stage

- ✓ In early summer, grasses that are not mowed or grazed will develop a seed head.
- ✓ Once the seed head emerges, the grass will not produce additional leaves.
- ✓ Reproductive grasses are lower in nutritional quality than vegetative grasses.



Pastures should be Mowed Regularly

- ✓ Increases nutrition.
- ✓ Reduces weed pressure.
- ✓ Reduces stress caused by mowing when stems are elongating.
- ✓ Kentucky bluegrass and perennial ryegrass should be maintained at 2-3 inches in height.
- ✓ Tall grasses should be maintained at 4-5 inches.

Leaves and Sugar Production

- ✓ Leaf surface critical to healthy plants
- ✓ Site of “plant food” production which is called...
- ✓ Requires: CO₂, water, sunlight, minerals, favorable temperature.
- ✓ Produces simple sugars (glucose/fructans) and carbohydrates.



Sugar Use (Respiration)

- ✓ During night time hours, the sugars and carbohydrates supply energy for the synthesis of proteins and structural materials used for plant growth. Sugars are used in the process.
- ✓ Energy use and growth ceases when night time temperatures fall below 45°. Sugars may accumulate in plants when bright, sunny days precede cold nights.

Some sugar and starch is stored so that plants can initiate growth in spring and after clipping.

| <u>Species</u> | <u>Storage Site</u> |
|----------------|----------------------|
| Alfalfa | Tap root |
| Red clover | Tap root |
| White clover | Stolons and tap root |
| Bluegrass | Roots and rhizomes |
| Tall fescue | Lower stem (0"-3") |
| Orchard Grass | Lower stem |
| Timothy | Lower stem and corms |



Horses can damage pastures.....

- ✓ Graze plants at ground level.
- ✓ Graze favorite species and continually graze the same area.
- ✓ Forage species that store food above ground can be eliminated if grazing pressure is high.
- ✓ Hooves tear up sod and cause compaction.
- ✓ Will not graze plants in manured areas or mature plants.
- ✓ **Grazed plants must have time to recover !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!**