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

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

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

<table>
<thead>
<tr>
<th>Activity</th>
<th>Income</th>
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</thead>
<tbody>
<tr>
<td>Show Winnings</td>
<td>$8,977,772</td>
</tr>
<tr>
<td>Racing Purses</td>
<td>$69,936,916</td>
</tr>
<tr>
<td>Rodeo Winnings</td>
<td>$417,430</td>
</tr>
<tr>
<td>Tourism</td>
<td>$514,650</td>
</tr>
<tr>
<td>Trail Riding</td>
<td>$11,057,556</td>
</tr>
<tr>
<td>Manure Sales</td>
<td>$930,615</td>
</tr>
<tr>
<td>Feed Sales</td>
<td>$2,370,384</td>
</tr>
<tr>
<td>Equipment Sales</td>
<td>1,641,699</td>
</tr>
<tr>
<td>Other 1</td>
<td>43,923,841</td>
</tr>
<tr>
<td>Training</td>
<td>$51,610,565</td>
</tr>
<tr>
<td>Sales Preparation</td>
<td>$2,012,266</td>
</tr>
<tr>
<td>Boarding</td>
<td>$64,824,184</td>
</tr>
<tr>
<td>Sale of Horses</td>
<td>$129,147,505</td>
</tr>
<tr>
<td>Stallion Fees</td>
<td>$10,956,259</td>
</tr>
<tr>
<td>Mare Care</td>
<td>$8,644,185</td>
</tr>
<tr>
<td>Lessons</td>
<td>$3,742,045</td>
</tr>
<tr>
<td>Leasing Horses</td>
<td>$8,564,507</td>
</tr>
<tr>
<td>Judging</td>
<td>$871,911</td>
</tr>
</tbody>
</table>
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 ¾ 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 caused 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.

<table>
<thead>
<tr>
<th>Farm Number</th>
<th>% Canopy Cover</th>
<th>% Desirable Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>80%</td>
<td>43%</td>
</tr>
<tr>
<td>2</td>
<td>83%</td>
<td>64%</td>
</tr>
<tr>
<td>10</td>
<td>98%</td>
<td>83%</td>
</tr>
<tr>
<td>13</td>
<td>90%</td>
<td>41%</td>
</tr>
<tr>
<td>17</td>
<td>97%</td>
<td>92%</td>
</tr>
<tr>
<td>19</td>
<td>53%</td>
<td>21%</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kentucky bluegrass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orchardgrass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reed Conarygrass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfalfa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red clover</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White clover</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Estimates of Acreage Required to Provide Forage Needs for One Animal Unit

<table>
<thead>
<tr>
<th>Pasture Species</th>
<th>Pasture Prod</th>
<th>Annual Yield (T/ADM)</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ky. Bluegrass/white clover</td>
<td>Low</td>
<td>1.0</td>
<td>10.7</td>
<td>1.2</td>
<td>2.7</td>
<td>11.1</td>
<td>11.1</td>
<td>4.5</td>
<td>6.9</td>
</tr>
<tr>
<td>Medium</td>
<td>2.0</td>
<td>5.4</td>
<td>0.6</td>
<td>1.3</td>
<td>5.5</td>
<td>5.5</td>
<td>2.2</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>3.0</td>
<td>3.6</td>
<td>0.4</td>
<td>0.9</td>
<td>3.7</td>
<td>3.7</td>
<td>1.5</td>
<td>2.3</td>
<td></td>
</tr>
<tr>
<td>Alfalfa/grass</td>
<td>Low</td>
<td>3.0</td>
<td>-</td>
<td>0.6</td>
<td>0.9</td>
<td>1.2</td>
<td>1.2</td>
<td>1.8</td>
<td>3.1</td>
</tr>
<tr>
<td>Medium</td>
<td>4.5</td>
<td>-</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>0.8</td>
<td>1.2</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>6.0</td>
<td>-</td>
<td>0.3</td>
<td>0.4</td>
<td>0.6</td>
<td>0.6</td>
<td>0.9</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Tall grass plus nitrogen</td>
<td>Low</td>
<td>2.0</td>
<td>5.4</td>
<td>0.8</td>
<td>1.3</td>
<td>2.8</td>
<td>2.3</td>
<td>1.8</td>
<td>9.2</td>
</tr>
<tr>
<td>Medium</td>
<td>3.0</td>
<td>3.6</td>
<td>0.5</td>
<td>0.9</td>
<td>1.8</td>
<td>1.5</td>
<td>1.2</td>
<td>6.2</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>4.5</td>
<td>2.4</td>
<td>0.4</td>
<td>0.6</td>
<td>1.2</td>
<td>1.0</td>
<td>0.8</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td>Warm-season grass</td>
<td>Low</td>
<td>3.0</td>
<td>-</td>
<td>-</td>
<td>0.9</td>
<td>0.6</td>
<td>0.6</td>
<td>1.2</td>
<td>-</td>
</tr>
<tr>
<td>Medium</td>
<td>4.0</td>
<td>-</td>
<td>-</td>
<td>0.7</td>
<td>0.4</td>
<td>0.4</td>
<td>0.9</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>5.0</td>
<td>-</td>
<td>-</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.7</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

1 Based 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

<table>
<thead>
<tr>
<th></th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug.</th>
<th>Sept.</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Clover / KBG</td>
<td>10.7</td>
<td>1.2</td>
<td>2.7</td>
<td>11.1</td>
<td>11.1</td>
<td>4.5</td>
</tr>
<tr>
<td>1 ton /acre</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed Tall Grass</td>
<td>5.4</td>
<td>.8</td>
<td>1.3</td>
<td>2.8</td>
<td>2.3</td>
<td>1.8</td>
</tr>
<tr>
<td>2 tons /acre</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Basic Forage Biology
How Does Grass Grow?

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

<table>
<thead>
<tr>
<th>Species</th>
<th>Storage Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>Tap root</td>
</tr>
<tr>
<td>Red clover</td>
<td>Tap root</td>
</tr>
<tr>
<td>White clover</td>
<td>Stolons and tap root</td>
</tr>
<tr>
<td>Bluegrass</td>
<td>Roots and rhizomes</td>
</tr>
<tr>
<td>Tall fescue</td>
<td>Lower stem (0”-3”)</td>
</tr>
<tr>
<td>Orchard Grass</td>
<td>Lower stem</td>
</tr>
<tr>
<td>Timothy</td>
<td>Lower stem and corms</td>
</tr>
</tbody>
</table>
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 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!