You Can Lead A Horse To Hay But You Can’t Make It Eat

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Outline

- Energy and nutrient requirements
- Obesity/malnourishment
- Geriatric horse/poor dentition
- Equine metabolic syndrome
- Organ-related dysfunction (liver, kidney, muscle, GI tract)
- Enteral feeding for sick horses
- Take home message
Energy and Nutrient Requirement

- Tools to remember (550 kg horse)

  \[ \text{DE}_{\text{maintenance}} = (\text{kg BW} \times 0.03) + 1.4 = 17.9 \text{ Mcal} \]
  \[ = 33.3 \text{ kcal/kg} = 18.3 \text{ Mcal} \]

  \[ \text{DE}_{\text{resting}} = (\text{kg BW} \times 0.021) + 0.975 = 12.5 \text{ Mcal (70\% DE}_m) \]

  \[ \text{CP}_{\text{maintenance}} = 40 \times (\text{DE Mcal/d}) = 500 - 716 \text{ g/day} \]
  \[ = 1.36 \text{ g CP/kg} = 748 \text{ g/day} \]
Obese Horse

- Obesity is an under diagnosed condition
- Often seen in ponies, donkeys, small horse breeds
- Predisposition to laminitis, metabolic syndrome
- “Doc, my horse is overweight, what can I feed him?”
- Formulate a plan for overweight horse

[Image of an Obese Horse]
Obese Horse

- Overweight assessment (BCS 7-9)
- Identify performance level
- Assess current diet and feed selection
- Determine the energy requirement for horse
- Determine the cause of obesity
- Formulate dietary and exercise plan
Obese Horse

- Dietary plan
  Adjust caloric intake (80% of DE at ideal body weight)
  Example: 14 yo QH, BCS 8/9, 490 kg (ideal weight is 450 kg)
  Current diet provides 17.5 Mcal/day
  Weight loss needed 40 kg (88 lb)
  DE at 450 kg is 14.9 Mcal/day; 80% of 14.9 Mcal/day (12 Mcal/day)
  Formulate ration with forage
    Grass hay 0.86 Mcal/lb ⇒ 14 lbs
  Assess proper protein delivery
  Add trace mineral/vitamin supplement
Obese Horse

- **Exercise plan**
  - Encourage owner to actively exercise horse

- **Management factors**
  - Use of muzzle to prevent ingestion of grass
  - Feed several times a day, use hay net
  - Feed separated from other horses
  - Use unpalatable bedding in stall
  - Limit treats (low fat such as carrot/apple)

- Reassess diet once ideal weight is reached
Malnourished Horse

- Many causes for malnourishment
- Starvation due to ignorance and economic hardship
- Loss of body mass due to catabolic stage
- Starved horses have different responses to several diets
  - Alfalfa hay (high protein, low CH starch)
  - Oat hay (high fiber, low protein)
  - Complete feed (high CH)
  - best diet is frequent small amounts of alfalfa hay
Malnourished Horse

- Re-feeding recommendations
  - Day 1-3: one pound (1/6 flake) of alfalfa q 4hr
  - Day 4-10: slowly increase hay and decrease feeding times
    (by day 6 feed 4 lb TID)
  - Day ≥ 10: feed hay ad lib into two feedings
- Provide clean, fresh water at all times
- Provide access to a salt block
- Do not feed grain until the horse is well
Geriatric Horse

- 15% geriatric horses in the USA

- Chronically low BCS is common problem in older horses
  - Decreased intake (compromised ambulation, dentition)
  - Reduced digestibility (crude fiber/protein)
  - Environmental factors (weather)

- Ideally keep older horses in BCS 5/9

- Feeding recommendations
  - High quality forage (fiber/protein)
  - Supplement vitamins/trace minerals
Geriatric Horse

- Ration for geriatric horse

  Horse with good health and adequate dentition
  ⇒ ration similar to young mature horse

  Horse with various diseases or poor dentition
  ⇒ use processed complete feed
  ⇒ chopped hay/pellets/cubes/ensiled forage
  ⇒ dietary fat as energy source
  ⇒ mineral vitamin supplementation
Equine Metabolic Syndrome

- Fasting hyperinsulinemia, excessive insulin responses to ingested sugars and tissue insulin resistance $\Rightarrow$ risk of laminitis

- WSC in grasses vary with season, time of day, ambient temperature and grass species

- Ration goals
  - Improve insulin sensitivity
  - Diet low in NSC (WSC + starch) < 12%
  - Follow weight guidelines
  - Provide feed throughout the day (net, grazer)
## Equine Metabolic Syndrome

- **Feeding hay low in NSC**

<table>
<thead>
<tr>
<th>Nutrient content of hay</th>
<th>Legume</th>
<th>Oat</th>
<th>Wheat</th>
<th>Grass</th>
<th>Bermuda</th>
<th>Teff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digestible energy (Mcal/lb)</td>
<td>1.2</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.8</td>
</tr>
<tr>
<td>Crude protein (%)</td>
<td>21.3</td>
<td>8.7</td>
<td>10.6</td>
<td>10.8</td>
<td>10.6</td>
<td>10.8</td>
</tr>
<tr>
<td>Acid detergent fiber (%)</td>
<td>30.3</td>
<td>37.4</td>
<td>36.9</td>
<td>39.0</td>
<td>35.6</td>
<td>40.2</td>
</tr>
<tr>
<td>Neutral detergent fiber (%)</td>
<td>38.7</td>
<td>58.8</td>
<td>60.0</td>
<td>63.2</td>
<td>67.2</td>
<td>71.1</td>
</tr>
<tr>
<td>Starch (%)</td>
<td>1.9</td>
<td>5.1</td>
<td>4.3</td>
<td>2.3</td>
<td>5.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Ethanol soluble CHO (%)</td>
<td>7.4</td>
<td>11.9</td>
<td>12.5</td>
<td>7.5</td>
<td>7.4</td>
<td>4.3</td>
</tr>
<tr>
<td>Water soluble CHO (%)</td>
<td>9.1</td>
<td>16.8</td>
<td>16.5</td>
<td>10.9</td>
<td>7.4</td>
<td>6.1</td>
</tr>
<tr>
<td>NSC (WSC + starch) (%)</td>
<td>11.0</td>
<td>21.9</td>
<td>20.8</td>
<td>13.2</td>
<td>13.3</td>
<td>6.9</td>
</tr>
</tbody>
</table>
Equine Metabolic Syndrome

- Reducing the NSC in hay
  - Soaking hay before feeding
    - 30 min in hot water, 60 min in cold water
    - Wide range of NSC reduction (23-53%)
    - Supplement protein, vitamin and minerals
  - Steaming
    - 60 min at 212°F
    - Reduce molds, NSC and retains other nutrients
- Commercially available low NSC complete feed
Feeding Horse with Liver Disease

- Nutritional management depends on severity of clinical signs

- Horse w/o sign of HE
  Ration should be highly digestible
  Feed maintenance level of protein
    $\Rightarrow$ to high, $\uparrow$ nitrogenous waste products
    $\Rightarrow$ to low, $\uparrow$ endogenous protein catabolism
  Feed frequently small amounts
  Beet pulp, oat/grass hay, cracked/flaked corn
  (2 parts beet pulp + 1 part corn in molasses)
Feeding Horse with Liver Disease

- Horse with signs of HE
  - AAA promote increase of false neurotransmitters
  - Use feed high in BCAA (beet pulp, corn, milo, oats)
  - If hypophagia consider enteral/parenteral feeding

- Adequate vitamins and minerals
  - Antioxidants (vitamin E and C)
  - B vitamins
Feeding Horse with Renal Disease

- Goals of nutritional therapy
  - Meet patient’s energy and nutrient requirements
  - Dietary restriction of protein (10-11% CP)
  - Maintain electrolyte levels (avoid ↑ Ca and ↑ P)
  - Decrease progression of renal disease
  - Meet caloric requirements with fat

- Urinary stones (Ca-carbonate, alkaline pH)
  - Urinary acidifiers
  - Diet low in DCAB (< 500 MEq)
# Feeding Horse with Renal Disease

- **Diet and urinary pH**

<table>
<thead>
<tr>
<th>Diet</th>
<th>DCAB</th>
<th>Urinary pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oat hay</td>
<td>+ 4,316 MEq</td>
<td>7.71</td>
</tr>
<tr>
<td>Alfalfa hay</td>
<td>+ 1,406 MEq</td>
<td>7.79</td>
</tr>
<tr>
<td>Grass hay</td>
<td>+ 493 MEq</td>
<td>6.42</td>
</tr>
<tr>
<td>Grass hay pellets</td>
<td>- 79 MEq</td>
<td>6.75</td>
</tr>
</tbody>
</table>
Feeding Horse with Muscle Disease

- Polysaccharide storage myopathy
- QH, Paint Horse, Appaloosas, Warmbloods and draft breeds
- Glycogen storage disorder (abnormal polysaccharide)
- Evidence of heritability for PSSM in QH and draft breeds
- Horses display frequent onset of rhabdomyolysis after exercise
  (exercise intolerance, weakness, stiffness, muscle fasciculation, myalgia, gait abnormalities, back pain, muscle atrophy)
Feeding Horse with Muscle Disease

➤ Diet recommendation

Provide adequate calories

Reduce carbohydrate intake (hay low in NSC)

Fat-rich diet (vegetable oil, fat-rich commercial feed)

Use antioxidants (vitamin E/selenium)

➤ Exercise recommendations

➤ QH 1,200 lb maintenance (17.6 Mcal/day)

QH 1,200 lb light work (22 Mcal/day)

Draft 2,000 lb moderate work (48 Mcal/day)
Feeding Horse with GI Disease

- **Enterolithiasis**
  - Feed < 50% alfalfa diet, use vinegar, silage

- **Sand impaction**
  - Feed off the ground, use bulk laxatives

- **Gastric ulceration**
  - Feeding ad lib, remove grain, use vegetable oil

- **Colitis**
  - Reduced forage, complete pelleted diet, fat
Enteral Feeding for Sick Horses

- For patients with hypophagia/dysphagia and functional GI tract
- Use complete pelleted diets (equine adult/senior diet)
- Use small NGT and blend pelleted feed
- Start slow and gradually increase over 7 days
- Add vegetable oil for caloric content (1.6 Mcal/cup)
- Enteral diet for 500-kg horse (DEr 11.5 Mcal/day)
  7 lbs comp. feed (8.4 Mcal) + 2 cups oil (3.2 Mcal)
  Feed small amounts 2-3 times a day
Take Home Message

- Formulate a diet to meet energy requirement without exceeding it
- To avoid over-conditioning, feed by weight and not by volume
- EMS horses should be fed a diet low in NSC (< 12%)
- Provide horses with organ-related disorders with a diet that supports organ recovery and does not exacerbate pathology
- Be creative when dealing with sick horses
- Enteral feeding of blended feed and oil is a cost-effective way to support an anorectic horse
Contact Information

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