

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

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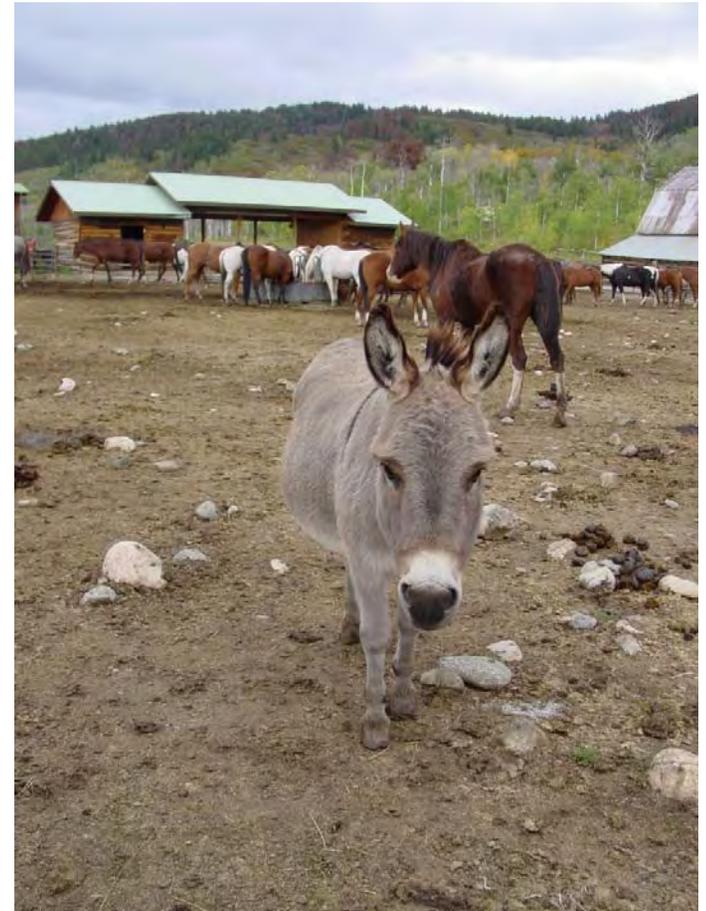
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Outline

- **Energy and nutrient requirements**
- **Obesity/malnutrition**
- **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)

$$\begin{aligned} \text{DE}_{\text{maintenance}} &= (\text{kg BW} \times 0.03) + 1.4 = 17.9 \text{ Mcal} \\ &= 33.3 \text{ kcal/kg} = 18.3 \text{ Mcal} \end{aligned}$$

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

$$\begin{aligned} \text{CP}_{\text{maintenance}} &= 40 \times (\text{DE Mcal/d}) = 500 - 716 \text{ g/day} \\ &= 1.36 \text{ g CP/kg} = 748 \text{ g/day} \end{aligned}$$



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**



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 \Rightarrow 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 \geq 10: feed hay ad lib into two feedings

- **Provide clean, fresh water at all times**

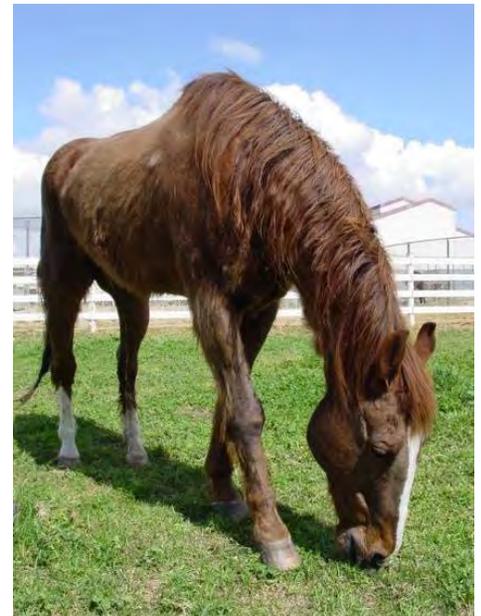
- **Provide access to a salt block**

- **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**



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

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

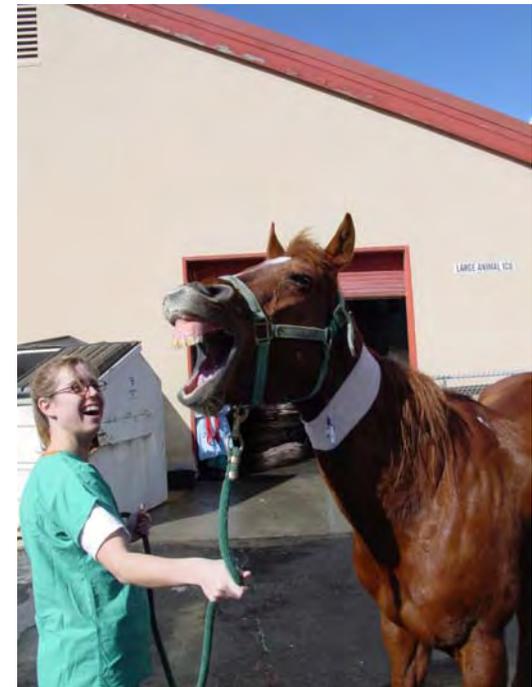
⇒ to high, ↑ nitrogenous waste products

⇒ to low, ↑ 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

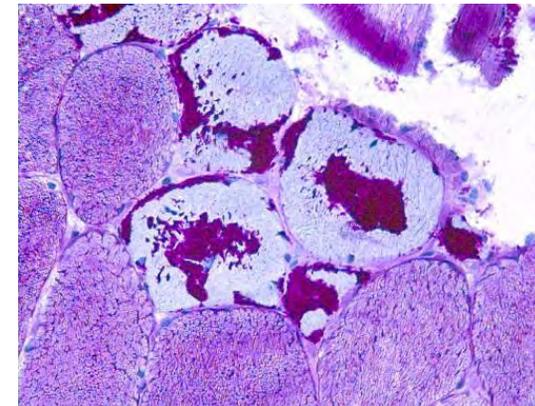
➤ Diet and urinary pH

Diet	DCAB	Urinary pH
Oat hay	+ 4,316 MEq	7.71
Alfalfa hay	+ 1,406 MEq	7.79
Grass hay	+ 493 MEq	6.42
Grass hay pellets	- 79 MEq	6.75



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**

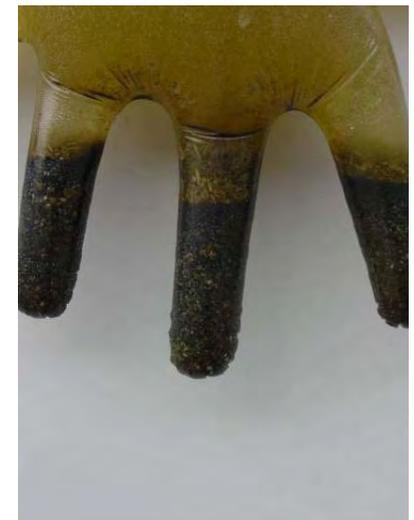
Feed off the ground, use bulk laxatives

➤ **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**



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