Hay-based diets for horses: Matching horse type to hay type

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Topics

- Horse biology and diversity within the species
- Importance of forage in a horse’s diet
- Types of hays
- Matching hay with nutrient needs

Digestive tract

- Spends more time chewing than pre-gastric fermentors
- Feedstuffs reach hindgut within 4 hours
- Hindgut retention time 24-48 hours

Grazing behavior

- Foraging
  - Consuming forage
  - Seeking out forage
- 12-14 hours per day, when access unlimited

The horse as a grazer

Breed diversity
Work level diversity

- Companions
- Competing horses

Needs of today's horse

- Calorie requirement
- Protein requirement
- Micronutrient requirements
- Fiber requirement
- Minimum time spent eating/ % of bodyweight

Selecting a diet

- What we feed a horse is important not only to nutrition but also to mental and digestive health
- If the horse could choose his lifestyle, what would it be?
  - To eat at least 14 hours a day
  - To be able to forage

Time spent eating

- Horses with free choice forage access
  - Grazed on average 14 hours per day
  - Consume 2.5% of bodyweight in dry matter
- Horses fed a mixture of hay and concentrate
  - 4.5 hours per feeding- 9 hours per day
  - Consume 1.5% bodyweight forage, 0.5% of bodyweight concentrate
  - Greater than 6 hours between meals increases gastric ulcer risk
  - Luthersson, 2009, Equine Vet J

Selecting a diet

- What does the horse actually have?
- Lack of space for foraging behaviors
- Match forage type to horse type to maximize time

Effect on behavior

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**The bottom line**

- Feed a forage based diet and use supplemental concentrates to balance protein and micronutrients.
- A few examples to follow

**Hay quality - nutritional factors**

- Digestible energy (DE) Mcal/lb: 0.7 – 1.3
- Crude protein: 7-20%
- NDF:
  - 40% mostly alfalfa, immature grasses
  - 41-46% immature grasses, some alfalfa
  - 46-53% mid maturity grass hay
  - 54-65% grass hay
  - >66% very mature grass hay
- What is one horse’s low quality is another’s best choice

**Types of equids**

**Hay quality**

- Low dust
- No mold
- Bright color
- Smells fresh

**Hays**

- Grass hay - first cutting
  - 0.83 Mcal/lb
  - 7.35% crude protein
  - 70.15% NDF

- Grass hay - second cutting
  - 1 Mcal/lb
  - 10.5% crude protein
  - 54.1% NDF

- Mixed grass/alfalfa - third cutting
  - 1.2 Mcal/lb
  - 19.27% crude protein
  - 40.22% NDF

- Alfalfa
  - 1.3 Mcal/lb
  - 24% crude protein
  - 34% NDF

**Average horse requirements**

- Requirements
  - 15.2 Mcal per day
  - 690 grams of protein
  - 0.91 – 2.275 kg NDF minimum (Wolter, 1993, Pratique Veterinaire Equine)
- Concerns
  - Feeding enough forage
### Average horse hay options

<table>
<thead>
<tr>
<th>690 grams of protein</th>
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<tbody>
<tr>
<td>0.01 - 2.27% kg NDF</td>
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**Grass hay - first cutting**
- 9.2 kg, 1.8% of bodyweight
- 634 grams of protein
- 5.86 kg of NDF

**Mixed grass/alfalfa - second cutting**
- 7.4 kg, 2.5% of bodyweight
- 777 grams of protein
- 4.0 kg of NDF

**Mixed grass/alfalfa - third cutting**
- 2.3 kg, 1.5% of bodyweight
- 1115 grams of protein
- 1.8 kg of NDF

**Alfalfa**
- 5.9 kg, 1.2% of bodyweight
- 1274 grams of protein
- 1.9 kg of NDF

### The easy keeper

- No good estimate on calorie/day requirement
- Anecdotal: 1% of bodyweight, low calorie grass hay
  - NRC: 11 Mcal for 800 pound pony, actual: 6.6 Mcal
  - Consumption time <4 hours
  - 0.8% of bodyweight to induce weight loss (Van Weyenberg, 2008, J Anim Physiol et al., 2012, Animal)
- Higher NDF/lower calorie hay, straw mixture
- Protein requirements met with forage balancer

### The hard keeper

- Usually have higher calorie requirements, but not a corresponding increase in protein
  - Most higher calorie hays are alfalfa based
  - Immature grass hays can reach ~3 Mcal/lb
  - Haylage
  - Owners have to test...
  - Other fiber sources
  - Beet pulp
  - Additional concentrate or fat

### Racehorse requirements

- Major concerns
  - Lack of time
  - Poor appetite
  - High rate of gastric ulcers
  - 24 hour/day confinement
- Requirements
  - 32 Mcal/day
  - 932 g CP/day
  - 2.84 kg - 5.68 kg NDF

### Racehorse hay options

- 32 Mcal/day
- 932 g CP/day
- 2.84 kg - 5.68 kg NDF
Lactating broodmare

Requirements
- 32 Mcal per day
- 1500 grams of protein

Concerns
- Lysine requirement is much higher
- Mineral requirements are much higher
- Voluntary intake at 2.5% of bodyweight
- Some amount of concentrate will be necessary to prevent loss of condition

Broodmare hay options

- Grass hay- first cutting
  - 19.4 kg of hay, 3.9% of bodyweight
  - 1294 grams of protein
  - 12.4 kg NDF

- Grass hay- second cutting
  - 15.6 kg of hay, 3.1% of bodyweight
  - 1638 grams of protein
  - 8.4 kg NDF

- Mixed grass/alfalfa- third cutting
  - 12 kg of hay, 2.6% of bodyweight
  - 2339 grams of protein
  - 4.9 kg NDF

- Alfalfa
  - 12.4 kg of hay, 2.5% of bodyweight
  - 2678 grams of protein
  - 3.8 kg of NDF

Summary

- Every type of horse needs a different type of hay
- There is a place in the horse world for low calorie, low protein hays
- Length of time to consume forage is critical for equine health and welfare