Beyond Water and Hay, What a Healthy Horse Needs to Meet Daily Nutritional Requirements

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UCDAVIS VETERINARY MEDICINE

Outline

- Nutritional facts of the adult horse
- Feeding practices
- Components of an equine diet
- Energy and nutrient requirements
- Body condition scoring
- Nutritional consultation
- Take home message

Nutrition Facts of the Adult Horse

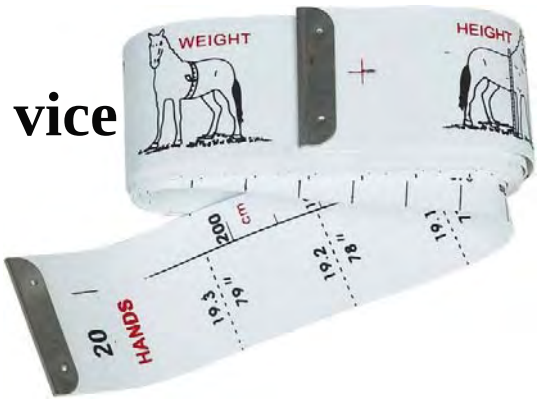
- **Three main items in horse's diet (water/forage/concentrate)**
- **Only water and forage are required**
- **Water requirement depends on environmental factors, exercise, production level and type of forage (30-60 ml/kg/day)**
- **Forage (hay, grass)**

  Fiber essential for GI pH, motility and function

  Inadequate forage causes colic, diarrhea, laminitis, vice

  Minimal forage recommended is 1.5% BWT/day

  (1,100 lbs horse ⇒ 16.5 lbs hay/day)



Feeding Practices

Feeding Practices

Equine Diet - Forage

- **Stems, leaves and stalks of plants (grass or hay)**
- **Good quality forage provides enough energy, protein, essential fatty acids, vitamins and minerals**
- **Always consider adding a vitamin/mineral supplement**
- **Nutritional quality of hay varies with type of hay**

  Legumes: protein 17-20%, C:P ratio 3-10:1, 0.99 Mcal/lb

  Grass hay: protein 6-14%, C:P ratio 1-2:1, 0.85 Mcal/lb

  Cereal hay: protein 9-10%, C:P ratio 1.5:1, 0.85 Mcal/lb

Equine Diet - Forage

- **Forage analysis when client purchases large amounts of hay**
- **Sample forage using core hay sampler or by hand**
  - **Randomly select 10 bales**
  - **Collect 2 samples/bale**
  - **Place all samples in bag**
  - **Label bag**
- **Send to laboratory for standard proximate analysis (Equi-Analytical Labs)**

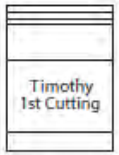
Equine Diet - Forage

Equi-Analytical Laboratories — Procedure for Sampling Hay

Tools Required:

Hay Probe — Hand Brace or Electric Drill — Sealable Plastic Bag (at least 1qt. size)

Step 1: Properly label plastic sample bags.

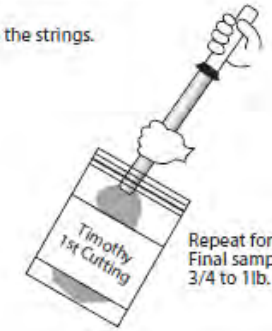


Step 2: Connect Probe to the Brace or Drill.

Step 3: For a truly represent ative sample, randomly select 12 - 20 bales to probe.

Step 4: Probe each bale in the center of the small end between the strings.

Step 5: After a bale is probed, separate the probe from the drill and plunge the core sample into the plastic bag.

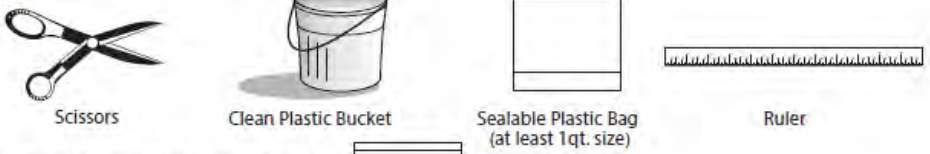


Repeat for all other probings. Final sample should weigh 3/4 to 1lb. (0.34 - .45 kg)

http://equi-analytical.com

Equi-Analytical Laboratories — Procedure for Sampling Pasture

Tools Required:



Scissors — Clean Plastic Bucket — Sealable Plastic Bag (at least 1qt. size) — Ruler

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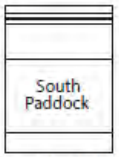

Step 2: Take tools to the pasture and determine grazing height. **Grazing Height = Height of Stubble Remaining After Grazing.** For example, if the height of the ungrazed grass is 10 inches (25.4cm) and the horses are consuming only the top 6 inches (15.2cm), then the grazing height is 4 inches (10.2cm). Thus, when you clip your sample, you should only be clipping the top 6 inches (15.2cm) for analysis.

Step 3: Randomly select 12 -20 sites in the pasture and clip a handful of forage at grazing height.

Clip the forage into 1 - 2 inch (2.54 - 5.08 cm) strips into the plastic bucket.

Step 4: When clipping is completed, mix the sample thoroughly in the bucket and pack the sample bag as full as possible. The sample should be at **least 1 pound** (0.45 kg).

Step 5: Freeze the sample overnight.

Equine Diet - Forage

Results				
% Moisture	14.1			
% Dry Matter	85.9			
		As Sampled		Dry Matter
Digestible Energy (DE), Mcal/lb		.89		1.04
	%	g/lb.	%	g/lb.
Crude Protein	9.6	43.5	11.2	50.6
Estimated Lysine	.33	1.5	.39	1.8
Lignin	3.3	14.8	3.8	17.2
Acid Detergent Fiber (ADF)	27.6	125.1	32.1	145.7
Neutral Detergent Fiber (aNDF)	45.3	205.4	52.7	239.2
WSC (Water Sol. Carbs.)	15.7	71.0	18.2	82.7
ESC (Simple Sugars)	7.1	32.2	8.3	37.5
Starch	.4	1.7	.4	2.0
Non Fiber Carb. (NFC)	20.1	91.3	23.5	106.4
Crude Fat	3.1	14.1	3.6	16.4
Ash	7.8	35.2	9.0	41.0
	%	g/lb.	%	g/lb.
Calcium	.46	2.08	.53	2.43
Phosphorus	.16	.72	.18	.84
Magnesium	.29	1.33	.34	1.55
Potassium	.75	3.38	.87	3.94
Sodium	.115	.519	.133	.605
	ppm	mg/lb.	ppm	mg/lb.
Iron	180	82	210	95
Zinc	27	12	31	14
Copper	6	3	7	3
Manganese	180	82	210	95
Molybdenum	.7	.3	.8	.4
	As Fed		100% Dry	

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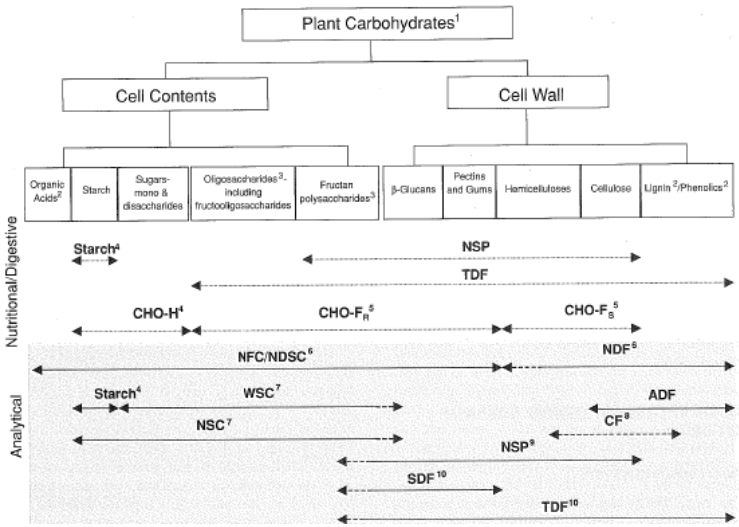

National Research Council, 2007

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Equine Diet – Grains

- **Cereal grains**

  Oats, corn, barley, wheat, rye, millet, milo

  High carbohydrate content, highly digestible

  For horses requiring supplemental calories

  Risk of enteritis, laminitis, obesity

	DE (Mcal/lb)	CProt (%)	CFat (%)	CFib(%)	Ca (%)	P (%)
Oats	**1.3**	**11.8**	**4.6**	**10.7**	**0.08**	**0.34**
Barley	**1.49**	**11.7**	**1.9**	**4.9**	**0.05**	**0.34**
Corn	**1.54**	**9.1**	**3.6**	**2.2**	**0.05**	**0.27**
Wheat	**1.55**	**11.4**	**1.6**	**2.4**	**0.03**	**0.36**

Equine Diet – Commercial Feed

- **Sweet feed**

Product	%CFib	%CProt	%CFat	Indication
Omolene 100	≤ 10	≥ 10	≥ 4.5	Active pleasure
Omolene 200	≤ 7.5	≥ 14	≥ 6	Performance
Omolene 300	≤ 7	≥ 16	≥ 6	Foals, lactating mare
Omolene 500	≤ 9	≥ 12	≥ 8	Competition

⇒ 1.5 – 1.6 Mcal/lb

- **Complete feed**

Product	%CFib	%CProt	%CFat	Indication
Equine Adult	≤ 25	≥ 11	≥ 3	Active middle year horse
Equine Senior	≤ 18	≥ 14	≥ 5.5	Older horse
Equine Junior	≤ 16	≥ 14.5	≥ 5.5	Weanling to yearling
Omolene 400	≤ 18	≥ 12	≥ 5.5	Competition, breeding

⇒ 1.1 – 1.4 Mcal/lb

Equine Diet – Commercial Feed

- **Fat**

Product	%CFib	%CProt	%CFat	Indication
Strategy	≤ 12.5	≥ 14	≥ 6	Performance/Brood mare/Young
Race Ready GT	≤ 12.5	≥ 12	≥ 9.5	Competing horses
Ultium Competition	≤ 18.5	≥ 11.7	≥ 12.4	Competing horses
Amplify	≥ 5.5	≥ 14.0	≥ 30.0	Competing horses

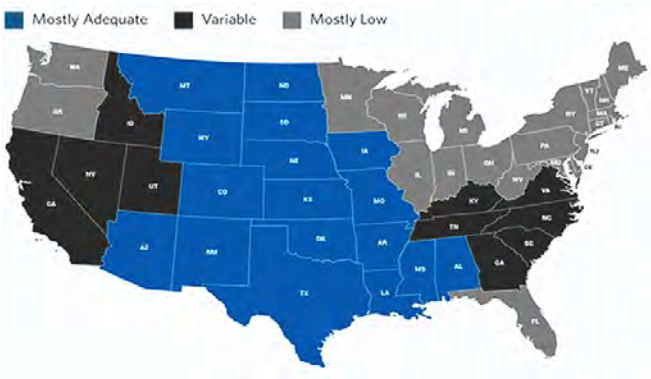
⇒ 1.5 – 2.0 Mcal/lb

- **Salt, trace minerals and vitamins**

  Free access to salt

  Blocks don't guarantee supplementation

  Evaluate supplements for concentration, safety



Energy and Nutrient Requirement

- **Digestible energy used to estimate daily caloric requirement**
- **DE expressed as kcal/lb of feed**
- **DE maintenance (Mcal) = (kg BW x 0.03) + 1.4**
- **DE resting (Mcal) = (kg BW x 0.021) + 0.975**
- **Daily crude protein (g/day) = 40 x (DE Mcal/d) or 1.36 g CP per kg BW**
- **Calculation of daily requirement important for healthy and sick horses**

Energy and Nutrient Requirement

- **Daily nutrients requirement based on BWT and production level**

Stage of Production	Forage (%)	Concentrate (%)
Maintenance	1.5-2.0	0-0.5
Light work	1.5-2.0	0.25-0.75
Moderate work	1.5-2.0	0.5-1
Intense work	1.5-2.0	0.75-1.5
Breeding stallion	1.5-2.0	0.25-0.75
Late gestation mare	1.5-1.75	0.5-0.75
Early lactation mare	1.5-2.0	0.75-1.5
Late lactation mare	1.5-2.0	0.5-1.0

Energy and Nutrient Requirement

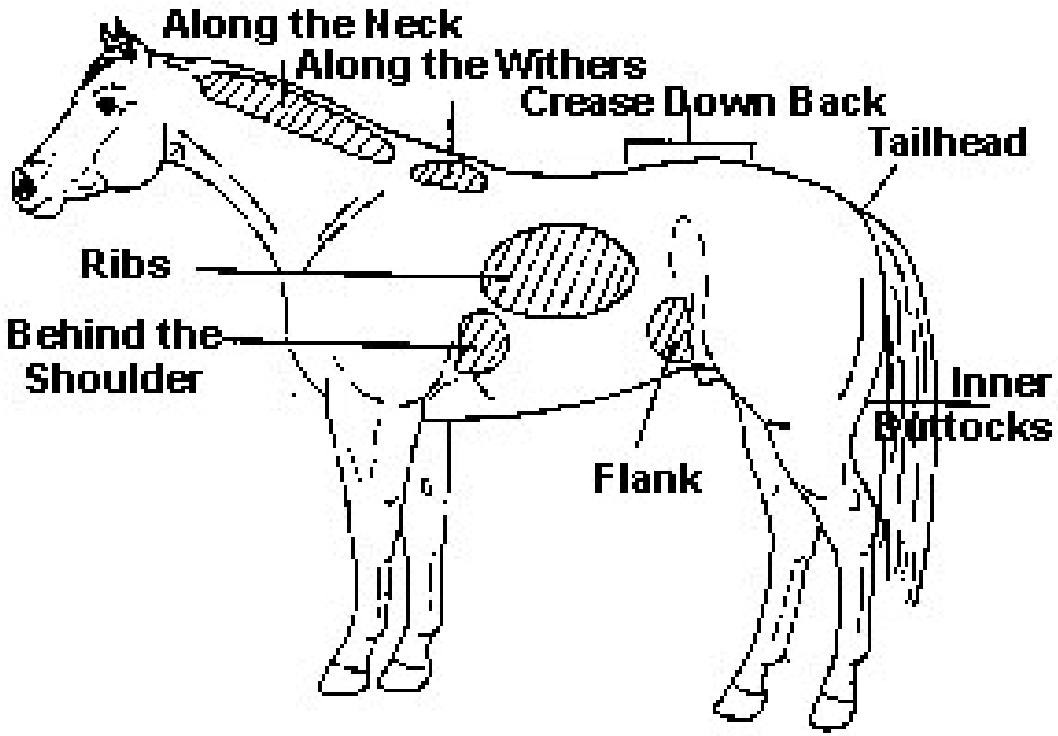
Mature weight
500 kg, (1102 lb)

Class / Measurement	Maintenance	Breeding Stallion	Pregnant Mare			Lactating Mares		Working Horses		
			9 months	10 months	11 months	Foaling to 3 months	3 months to weaning	Light work	Moderate work	Intense work
Weight, kg	500	500	500	500	500	500	500	500	500	500
Weight, lb	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102
DMI, kg	8.2	8.5	8.1	8.2	8.2	10.9	9.9	8.4	9.3	11.5
DMI, lb	18.1	18.7	17.9	18.1	18.1	24	21.8	18.5	20.5	25.4
DMI% BW	1.64	1.71	1.62	1.65	1.64	2.18	1.99	1.67	1.86	2.3
DE, Mcal	16.4	20.5	18.2	18.5	19.7	28.3	24.3	20.5	24.6	32.8
CP, g	656	820	801	815	866	1427	1049	820	984	1312
Lys, g	23	29	28	29	30	50	37	29	34	46
Ca, g	20	25	34.6	35.2	37.4	56	36	25	30	40
P, g	14	17.8	26.2	26.7	28.3	36.1	22.2	17.8	21.4	28.5
Mg, g	7.5	9.4	8.7	8.9	9.4	10.9	8.6	9.4	11.3	15.1
K, g	25	31	29	30	31	46	33	31	37	50
Na, g	8.2	8.5	8.1	8.2	8.2	10.9	9.9	25.1	27.8	34.5
S, g	12.3	12.8	12.1	12.4	12.3	16.3	14.9	12.6	13.9	17.3
Fe, mg	328	342	405	412	410	544	496	335	371	460
Zn, mg	328	342	324	329	328	435	397	335	371	460
Cu, mg	82	85	81	82	82	109	99	84	93	115
Mn, mg	328	342	324	329	328	435	397	335	371	460
I, mg	0.8	0.9	0.8	0.8	0.8	1.1	1	0.8	0.9	1.2
Co, mg	0.8	0.9	0.8	0.8	0.8	1.1	1	0.8	0.9	1.2
Se, mg	0.8	0.9	0.8	0.8	0.8	1.1	1	0.8	0.9	1.2
Vit A, IU	15000	22500	30000	30000	30000	30000	30000	22500	22500	22500
Vit D, IU	2460	2562	4854	4942	4920	6526	5956	2510	2785	3453
Vit E, IU	410	683	647	659	656	870	794	669	743	921

DMI = dry matter intake

National Research Council, 2007

Body Condition Scoring



1 BCS = 20 kg/44 lbs

1 = Poor

2 Very thin

3 Thin

4 Moderately thin

5 Moderate

6 Moderate-fleshy

7 Fleshy

8 Fat

9 Extremely fat

Body Condition Scoring

Nutritional Consultation

- **Perform clinical assessment and determine BCS**
- **Assess husbandry of horse and feeding practice**
- **Determine source and amount of forage**
- **Determine amount of grain/concentrate fed/supplements**
- **Calculate energy requirement of horses and digestible energy provided by various feeds**
- **Make nutritional adjustments (weight gain/loss)**
- **Reassess horse 6-8 weeks later**

Take Home Message

- **Keep the diet of horses simple (water/forage/grain/concentrate feed)**
- **Educate clients to feed by weight and not by volume**
- **Analyze forage to better refine diet**
- **Assess BCS as part of any physical assessment**
- **Calculate energy requirement/energy delivered**
- **Adjust diet of horse based on life stage and performance level**

Contact Information

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