

# Feeding Horses Safely

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PROELITE



PROFORCE

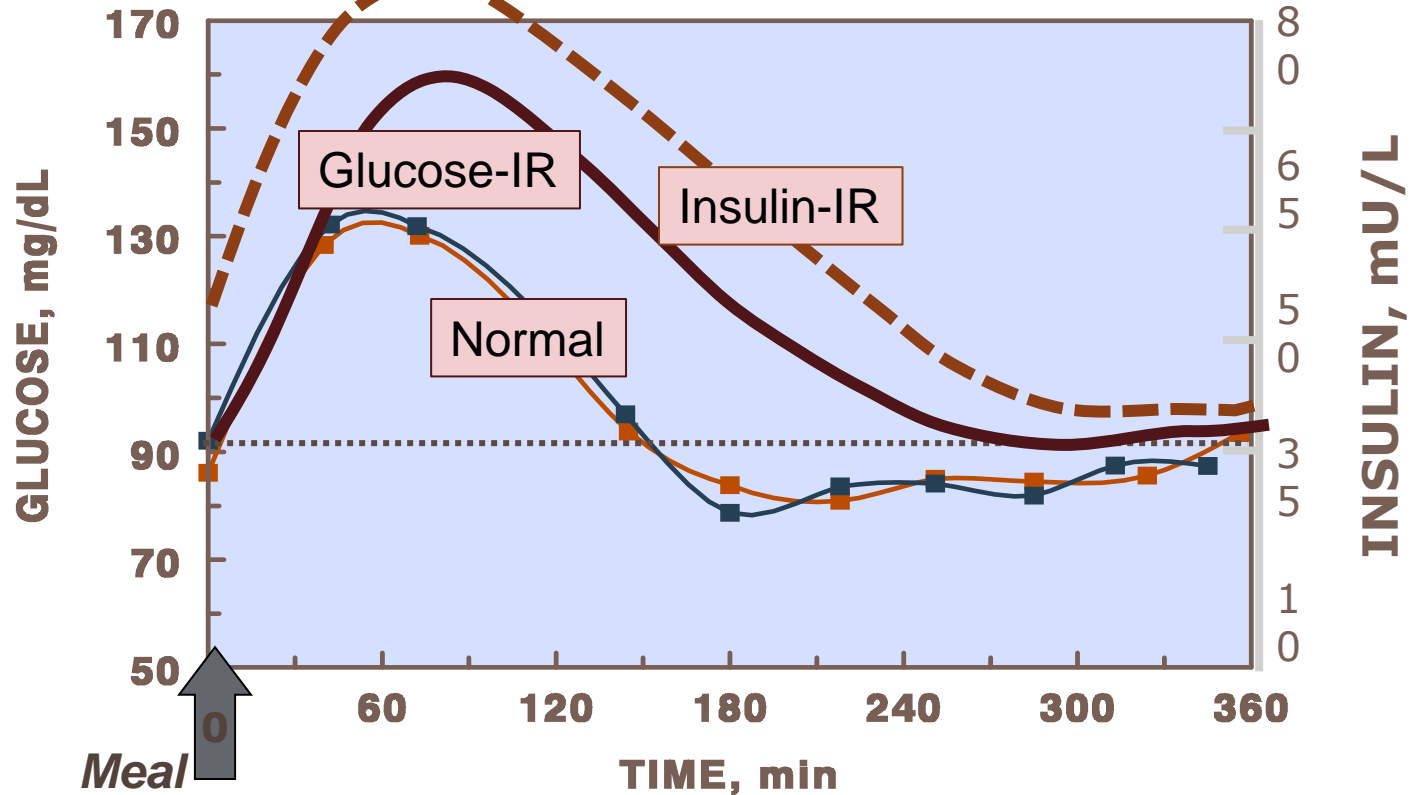
TRIUMPH  
HORSE FEEDS

# Effects of Nonstructural Carbohydrates

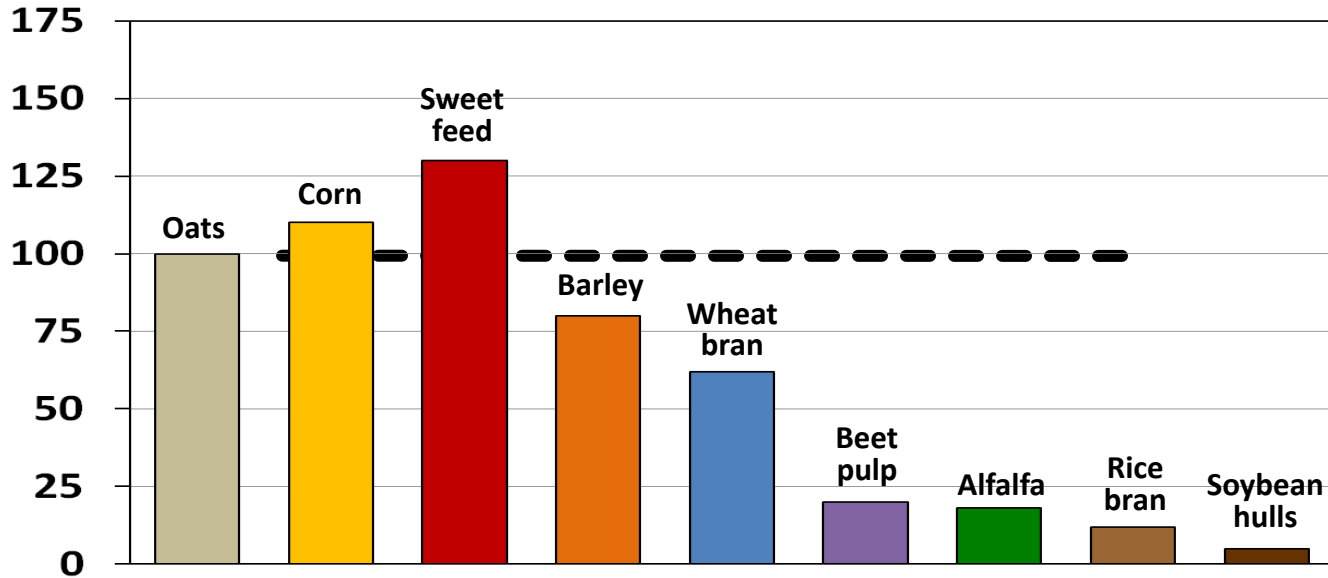
- Dietary nonstructural carbohydrates or NSC (starch and sugar) are causal factors for excitable behavior, insulin resistance, colic, laminitis and tying up diseases.
- NSC is defined as **Starch + ESC (simple sugars)** or Starch + WSC (simple sugars and fructans).



# Glycemic Response of Normal and Insulin Resistant Horses



# Glycemic Index of Selected Feedstuffs for the Horse



*Rodiek and Stull 2007 JEVS; feeds fed in iso-caloric amounts; comparisons made relative to oats (ie, % of oat's glycemic response)*

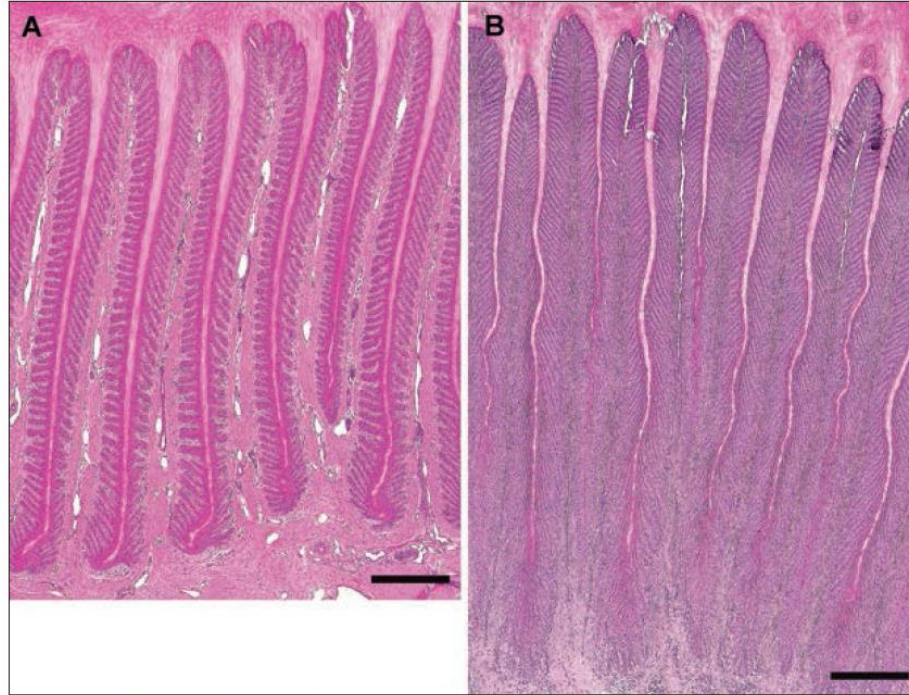
# Insulin and Laminitis

- Constant exposure to high insulin levels induces laminitis
- High insulin damages laminar tissues
  - Laminar cell death
  - Abnormal tissue repair and growth
  - Laminar elongation and weakening occurs
- Coffin bone rotates and/or sinks
- Crippling pain (can lead to euthanasia)
- Horses are at increased risk of clinical laminitis when blood levels of insulin are  $\geq 100$  micromoles/milliliter ( $\mu\text{m}/\text{ml}$ )
- Horses are diagnosed as IR when resting blood insulin is  $\geq 20$ - $30$   $\mu\text{m}/\text{ml}$



# Laminar damage and weakening

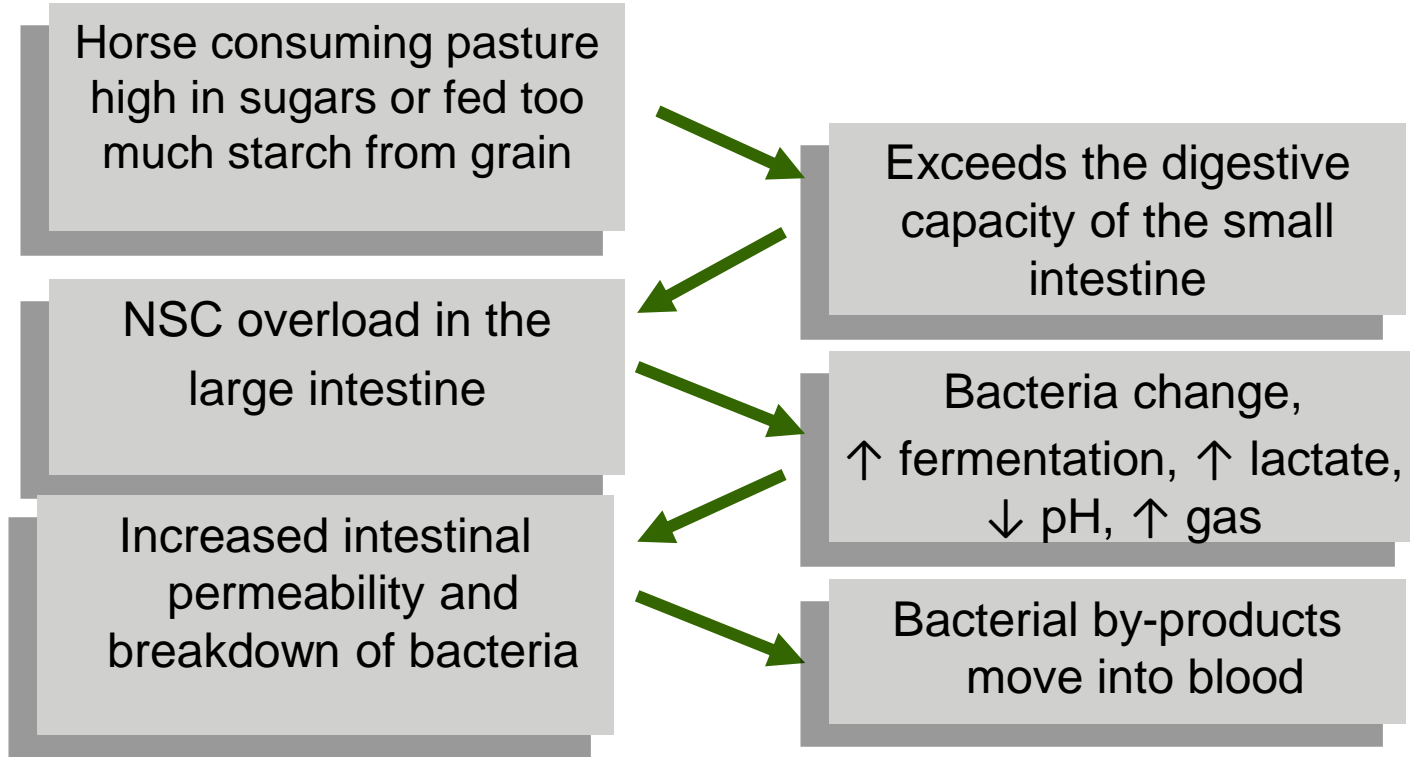
Normal



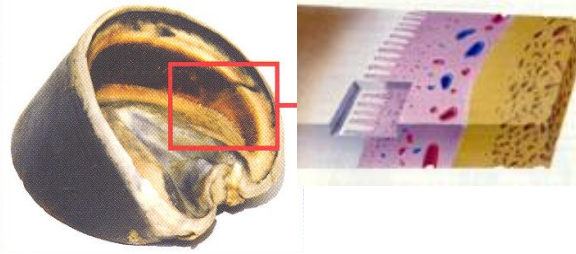
48 hours after IV  
insulin administration

Figure 4—Photomicrographs of laminar tissue of a control pony (A) and a pony with insulin-induced laminitis (B). Notice that the PEL (and associated SEL) of the laminitic pony are substantially longer than those of the control pony. H&E stain; bars = 500  $\mu$ m.

# Events Leading to Colic and Laminitis in the Horse



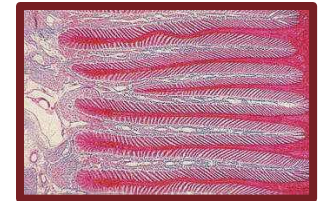
# Laminitis



- Clinical and subclinical stages
- Clinical laminitis also called “founder”
- Affects the attachments of the hoof capsule to the foot or coffin bone called laminae
- Release of endotoxins responsible for inflammation of laminae
- Finger-like laminae become inflamed and then detach from one another



**Inflamed or  
Damaged  
Laminae**

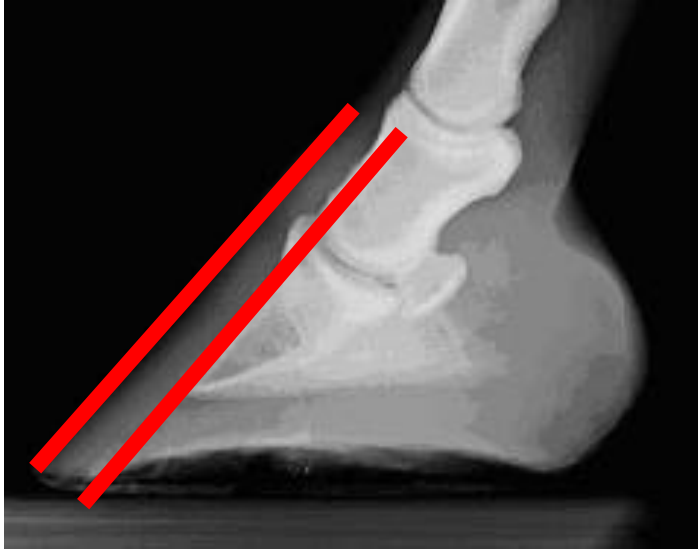


**Normal  
Laminae**



# Distal Phalanx Displacement

Normal



Clinical  
Laminitis



# Subclinical Laminitis



When the Farrier asks  
where the foundered  
horse is kept



## SPRING PASTURE TIME FOR HORSES!

Introducing horses to growing pasture is a welcome event each year, yet must be approached with caution. If done too soon in the season or for too long it can be bad for both the pasture and the horses.



### THE FOLLOWING ARE SOME GUIDELINES TO CONSIDER:



**1. DO NOT TURN THE HORSES OUT ON PASTURES TOO EARLY.**

- Grass needs time to recover from the stress of winter.
- Allow it to re-grow to 6 to 8 inches in height for roots to establish and to store some energy before being grazed.



**2. HORSES SHOULD BE FED HAY BEFORE GOING OUT ON PASTURE THE FIRST TIME. DO NOT TURN THEM OUT WITH EMPTY STOMACHS!**

- Initial grazing should be limited to 15 – 20 minutes.
- Gradually increase each day by 15 minutes until you've reached about 4 or 5 hours, then unrestricted grazing may be allowed.
- Too much initial grazing time increases the risk of digestive disturbances.



**3. DO NOT OVERGRAZE!**

- Pastures should not be grazed below 3-4 inches in grass length or you will quickly wind up with a lot full of dirt and weeds.



**4. REMEMBER THAT COOL SEASON GRASSES GROWING VERY RAPIDLY CAN BE HIGH IN PLANT SUGARS (FRUCTANS), SO USE CAUTION.**



**5. GRAZING MUZZLES ARE OPTIONAL FOR HELPING REDUCE RAPID INTAKE.**

# Equine Endocrine Disorders



## Equine Metabolic Syndrome (EMS)

- Young and middle-aged horses
- Chronic insulin resistance without PPID
- > Insulin, > Glucose

## Pituitary Pars Intermedia Dysfunction (PPID)

- Also called Equine Cushing's Disease
- Most common in older horses (>20 years)
- Hormonal imbalances (> ACTH, > Cortisol)
- Accompanied by insulin resistance in some cases

# Concentrate NSC<sup>1</sup> Feeding Guidelines

Type of Horse	Scientific Literature Based Guideline	Practical Feeding Based Guideline
Special Needs <sup>2</sup>	1 gram NSC/kg BW/meal	Maximum 20% NSC and maximum 0.5% BW/meal

<sup>1</sup>NSC = Starch + Sugars (Ethanol Soluble Carbohydrates).

<sup>2</sup>Insulin Resistance, Excitability, EMS, Gastric Ulcers, PPID, PSSM1, PSSM2 and RER.

**AAFCO doesn't recognize NSC as a legal definition for soluble carbohydrate content of horse feeds due to different laboratory analyses. They require "Dietary Starch" and "Sugar" on horse feeds making low starch claims. And "Sugar" refers to results from ESC analysis**



**FIRST NINE GUARANTEED NUTRIENTS FOR SAFECHOICE SPECIAL CARE HORSE FEED**

Crude Protein (min.) _____	14.00%
Lysine (min.) _____	0.85%
Methionine (min.) _____	0.35%
Threonine (min.) _____	0.55%
Crude Fat (min.) _____	7.00%
Crude Fiber (min.) _____	21.00%
Acid Detergent Fiber (ADF) (max.) _____	25.00%
Neutral Detergent Fiber (NDF) (max.) _____	40.00%
<b>Dietary Starch (max.) _____</b>	<b>7.00%</b>
<b>Sugar (max.) _____</b>	<b>3.00%</b>

# Feeding the Metabolic Horse

- If BCS > 6, feed low NSC diet balancer at 1-2 lbs/day and reduce hay to 1.5% BW/day, may need low NSC hay
- If BCS 5-6, select low NSC diet balancer or feed, limit hay and/or pasture
- With laminitis, at least temporarily hold horse off pasture, then limited pasture w/wo grazing muzzle or no pasture
- Prevent exposure to laminitis triggering events: spring and fall pasture, afternoon grazing, sunny day and cool night pasture, frozen grass
- Consider levothyroxine (Thyro-L) to increase weight loss and reduce blood glucose and insulin (consult with vet)
- Diet Balancer at 1-2 lbs/day (ProElite Grass Advantage Diet Balancer and Nutrena Empower Topline Balance)



# WHAT IS CRESTY NECK?

Neck crest fat in horses has been suggested to be associated with insulin resistance and increased risk for laminitis.

## WHAT IS THE "CRESTY NECK SCORING SYSTEM"?

It is on a scale of 0 to 5 where a score of zero equals no visual appearance of a crest and a score of five equals enormous and permanently drooping to one side.

0



No palpable crest.

1



No visual appearance of a crest, but slight filling felt with palpation.

2



Noticeable appearance of a crest, but fat deposited fairly evenly from poll to withers. Crest easily cupped in one hand and bent from side to side.

3



Crest enlarged and thickened, so fat is deposited more heavily in middle of the neck than toward poll and withers, giving a mounded appearance. Crest fills cupped hand and begins losing side to side flexibility.

4



Crest grossly enlarged and thickened and can no longer be cupped in one hand or easily bent from side to side. Crest may have wrinkles or creases perpendicular to the topline.

5



Crest is so large it permanently droops to one side.

## WHEN TO BE CONCERNED

For horses or ponies with a Cresty Neck Score (CNS) of 4 or 5, we must be cautious of feeding diets high in sugar and starch, as these may make any underlying risk for metabolic disease worse.

Scientific Reference:

Carter, R.A. & Geor, R.J. & Staniar, W.B. & Cubitt, T.A. & Harris, P.A. (2005). Apparent adiposity assessed by standardised scoring systems and morphometric measurements in horses and ponies. *The Veterinary Journal*. 179: 204-210.

# Dietary NSC Recommendations for Metabolic Horses

## • Insulin Resistant Horses

- Hay <10% NSC (**Starch + ESC**)
- Concentrate/Grain < 20% NSC (**Starch + ESC**) and feeding rate  $\leq$  0.5% BW/meal

## • Laminitic Horses

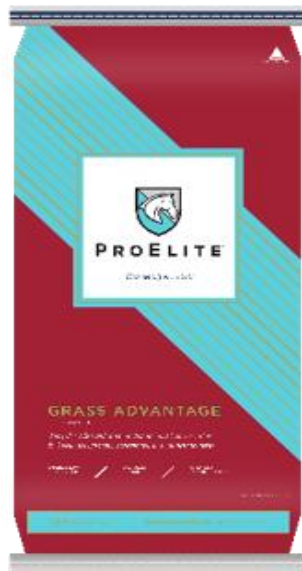
- Hay <12% NSC (**Starch + WSC**) if cool season grass hay
- Hay <12% NSC (**Starch + ESC**) if warm season or legume hay
- Concentrate/Grain <20% NSC (**Starch + ESC**) and feeding rate  $\leq$  0.5% BW/meal

## • Special Need Horses (Tying Up, Cushing's and Aged)

- Hay <12% NSC (**Starch + ESC**)
- Concentrate/Grain <20% NSC (**Starch + ESC**) and feeding rate  $\leq$  0.5% BW/meal

# Diet Balancers for Easy Keepers, Metabolic Issues and Weight Management

(Minimum Feeding Rate of 1-2 lbs/day)



**Max. NSC 13%**



**Max. NSC 14%**

# Low NSC Horse Feeds

<u>Guaranteed NSC</u>	<u>(max)</u>
SafeChoice Senior	18%
SafeChoice Senior Molasses Free	16.5%
SafeChoice Special Care	10%
SafeChoice All Life Stages	20%
SafeChoice Mare & Foal	20%
ProForce Senior	18%
ProForce Fuel	20%
ProForce Fuel XF	18%
ProElite Senior	12.9%
ProElite Performance	18.3%
ProElite Starch Wise	14.5%
ProElite Showman	15%

# Low NSC Diet Balancers & Supplements

<b>Guaranteed NSC</b>	<b>(max)</b>
<b>Empower Topline Balance</b>	<b>14%</b>
<b>Empower Boost</b>	<b>26%</b>
<b>Empower Digestive Balance</b>	<b>12%</b>
<b>ProElite Grass Advantage Diet Balancer</b>	<b>13%</b>
<b>ProElite Topline Advantage</b>	<b>8%</b>
<b>ProElite Omega Advantage</b>	<b>20%</b>

## **Low Nonstructural Carbohydrate Horse Feeds Recommended for:**

- Cushing's Disease or PPID
- Equine Metabolic Disease/Insulin Resistance
- Laminitis/Founder
- Tying Up Diseases (3 of 4)
- Senior (>20 years)
- Gastric Ulcers
- Excitability

# Feeding the Excitable Horse

- Research shows it is high levels of NSC and not protein that causes excitability in the horse.
- Select low NSC ( $\leq 20\%$ ) and high fat ( $\geq 10\%$ ) for best behavior and improved training.

## ProElite Performance

(NSC max. = 18.6%, Crude Fat min. = 12%)

## ProElite Senior

(NSC max. = 12.9%, Crude Fat min. = 10%)

## ProForce Fuel

(NSC max. = 20%, Crude Fat min. = 13%)

## ProForce Fuel XF

(NSC max. = 18%, Crude Fat min. = 13%)

## ProForce Senior

(NSC max. = 18%, Crude Fat min. = 11%)

# Example of Hay Analysis (front page)

**Mold Concern if Moisture >14%**

**NDF Values over 65% – chance of impaction colic**

WCS (includes fructans) + Starch = < 12 best for horses with, or prone to Laminitis

ESC + Starch = ≤ 10 best for Insulin Resistant horses; ≤12 best for Special Needs; ≥15 for Performance Horses

		Typical Range for Forage Type(DM BASIS)			RESULTS FOR YOUR HAY	
Method	PARAMETER	UNITS	LOW	HIGH	DM BASIS	As Is
C	Moisture	%	8.0	- 13.0	0.00	12.52
W	Dry Matter	%	87.00	- 92.00	100.00	87.48
N	Crude Protein	%	16.0	- 23.0	15.70	13.73
N	Heat Damaged Protein (ADICP)	%	1.60	- 2.30	1.31	1.14
C	Available Protein	%	14.40	20.70	14.39	12.59
C	Est. Lysine	%	0.80	- 1.15	0.76	0.66
N	Fat	%	2.6	- 3.0	1.62	1.42
N	Ash	%	7.8	- 9.2	8.73	7.63
N	ADF	%	27.0	- 36.0	41.96	36.71
N	NDF	%	36.0	- 50.0	55.77	48.79
C	RFV (Industry)		87.0	- 103.0	93.76	82.02
	<i>RFV GRADE</i>		See Page 2		3	
N	Calcium	%	1.2	- 1.8	0.66	0.58
N	Phosphorus	%	0.25	- 0.35	0.33	0.29
C	Ca/P Ratio		4:1	- 6:1	2.03	2.03
N	Potassium	%	2.00	- 3.50	3.21	2.80
N	Magnesium	%	0.2	- 0.4	0.13	0.12
N	Sodium	%	0.08	- 0.12	0.05	0.04
N	Chloride	%	0.3	- 1.0	0.47	0.41
N	Sulfur	%	0.25	- 0.35	0.17	0.15
W	Manganese	ppm	40.0	- 50.0	25.52	22.32
W	Selenium	ppm			0.05	0.04
W	Iron	ppm	60.0	- 200.0	65.33	57.15
W	Copper	ppm	4.00	- 10.00	9.19	8.04
W	Zinc	ppm	14.0	- 28.0	33.68	29.47
W	Molybdenum	ppm	3.00	- 6.00	2.04	1.79
N	Starch	%			0.93	0.81
N	WCS + Starch	%	*** See Below		7.52	6.58
N	ESC + Starch	%	*** See Below		7.08	6.20
C	DE (Horse)**	Mcal/kg	2.22	- 2.57	2.23	1.95
C	DE (Horse)**	kcal/lb	1010.0	- 1170.0	1014.55	887.73



# Nutrena<sup>®</sup> Nutritional Technology



Nutri-Bloom  
Advantage<sup>®</sup>





## Digestive Shield™

A precise blend of controlled starch, prebiotics, probiotics, postbiotics, and calcite to promote complete gut and immune health from beginning to end.

*\*Not included in SafeChoice® Maintenance\**

**Age: 4-Year-Old QH/Warmblood**

**Body Condition Score: 6**

**Body Weight: 1350 lbs**

**Situation: Just started light training under saddle. Grouchy attitude recently. Mild shifting lameness noticed. Lameness exam negative, no EGUS, resting blood insulin test was 100  $\mu\text{m}/\text{ml}$ . No elevated CK or AST, EMS is likely diagnosis and Thyro-L was prescribed.**

**Diet: Fed 5 lbs/day senior feed, cool season grass hay free choice, salt and joint supplement.**



# Current Feeding Program - Hay Analysis

Date Received :		6/15/2017		Cutting: Year: 2017		
Forage Type:		Hay - Grass				
Typical Range for Forage Type(DM BASIS)			RESULTS FOR YOUR HAY			
Method	PARAMETER	UNITS	LOW	HIGH	DM BASIS	As Is
C	Moisture	%	8.0	- 13.0	0.00	15.45
W	Dry Matter	%	87.0	- 92.0	100.00	84.55
N	Crude Protein	%	7.0	- 14.0	11.13	9.41
N	Heat Damaged Protein (ADICP)	%	0.70	- 1.40	1.04	0.88
C	Available Protein	%	6.30	- 12.60	10.09	8.53
C	Est. Lysine	%	0.24	- 0.48	0.54	0.46
N	Fat	%	2.0	- 2.4	1.85	1.56
N	Ash	%	7.0	- 8.6	8.32	7.03
N	ADF	%	31.0	- 41.0	33.08	27.97
N	NDF	%	50.0	- 65.0	55.72	47.12
C	RFV (Industry)		87.0	- 103.0	105.39	89.11
	RFV GRADE		See Page 2		2	
N	Calcium	%	0.3	- 0.8	0.31	0.26
N	Phosphorus	%	0.20	- 0.30	0.33	0.28
C	Ca/P Ratio		1:1	- 2.5:1	0.94	0.94
N	Potassium	%	0.80	- 1.50	1.84	1.55
N	Magnesium	%	0.2	- 0.3	0.24	0.20
N	Sodium	%	0.07	- 0.19	0.06	0.05
N	Chloride	%	0.1	- 0.8	1.34	1.14
N	Sulfur	%	0.15	- 0.30	0.20	0.16
C	*Est. Copper	ppm	2.0	- 10.0	6.00	5.07
C	*Est. Zinc	ppm	12.00	- 26.00	19.00	16.06
N	Starch	%			0.57	0.49
N	WSC + Starch	%	*** See Below		16.55	13.99
N	ESC + Starch	%	*** See Below		8.74	7.39
C	DE (Horse)**	Mcal/kg	1.80	- 2.09	2.27	1.92
C	DE (Horse)**	kcal/lb	820.0	- 950.0	1031.82	872.27

# Current Feeding Program – Grain/Concentrate

## Class of Horse (lb of feed per 100 lb of body weight)

- Mature, Maintenance (1.25 - 2)

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- Mature, Light Work (1.25 - 2)

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- Mature, Moderate Work (1.75 - 2)

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- Mature, Heavy Work (2 - 2.25)

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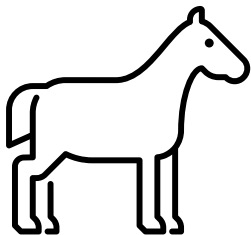
## GUARANTEED ANALYSIS

Crude Protein (min)	14 %
Lysine (min)	0.8 %
Methionine (min)	0.25 %
Crude Fat (min)	7.0 %
Crude Fiber (max)	12.0 %
Calcium (min)	0.75 %
Phosphorus (min)	0.60 %
Copper (min)	60 ppm
Selenium (min)	0.45 ppm
Zinc (min)	185 ppm
Vitamin A (min)	5,000 IU/lb
Vitamin D (min)	500 IU/lb
Vitamin E (min)	120 IU/lb
Biotin (min)	0.8 mg/lb
Typical NSC (max)	24 %

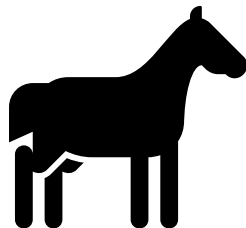
## New Feeding Program

- Hay is 8.74% ESC + Starch (NSC) - need <10% or <12% NSC - okay.
- Concentrate is 24% NSC - need  $\leq 20\%$  NSC - switch to SafeChoice Special Care at 5 lbs/day.
- Hay fed at 1.5% BW/day (1,300 lbs target weight based on BCS of 5, current BW is 1,350 lbs) = 20 lbs
- Five lbs/day SafeChoice Special Care (10% max. NSC)
- Total dietary NSC = (20 lbs x 8.74% NSC) + (5 lbs x 10% NSC) = (1.75 lbs + 0.5 lbs)  $\div$  25 lbs = **9.0% Total Dietary NSC.**

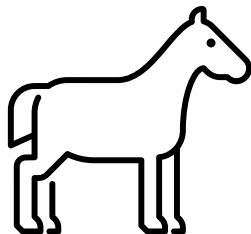
# How can we help you achieve the best feeding program for your horse?



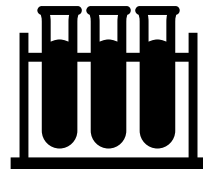
**Evaluate  
Body  
Condition**



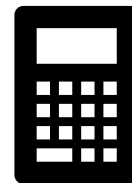
**Estimate  
Body  
Weight**



**Evaluate  
Topline**



**Hay  
Nutrient  
Analysis**



**Feeding  
Recommendations**

# Feeding horses can be scary!

Questions? We can help!

**Nutrena Helpline: 1-800-367-4894**

**ProElite Helpline: 1-800-247-8066**

Come to our websites at:

**[proelitehorsefeed.com](http://proelitehorsefeed.com)**

**[toplinebalance.com](http://toplinebalance.com)**

**[nutrenaworld.com](http://nutrenaworld.com)**



Contact me at [marty\\_adams@cargill.com](mailto:marty_adams@cargill.com).

Thanks for your attention!