How to navigate the world of equine supplements?

Ela Misuno DVM MVSc DACVIM

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EQUISTRO®

Equine supplements

EQUISTRO

Horse Feeding: basic requirements

Vitamins+
Trace minerals

+

+

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Horse Feeding: additional supplementation

+

+

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Compare

Outline

- “First, do not harm”
- Legal registration
- Price vs. cost
- Price vs. value
  - → Guaranteed analysis
  - → Bioavailability
  - → Adequate amounts of ingredients
- Evidence based approach
  - → Placebo
  - → Proven Efficacy
- “too good to be true”

“*Primum non nocere*”

First, do not harm

FOX NEWS

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Florida Pharmacy Reportedly Admits Medication Mistake in Death of 21 Polo Ponies

Published April 23, 2009 · Associated Press

WEST PALM BEACH, Fla. – A Florida pharmacy said Thursday that it incorrectly prepared a supplement given to 21 polo horses that died over the weekend while preparing to play in a championship match.

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Cargill Admits to Trace Amounts of Ractopamine in Soothing Pink Supplement

Fri, 05/05/2017 - 12:55

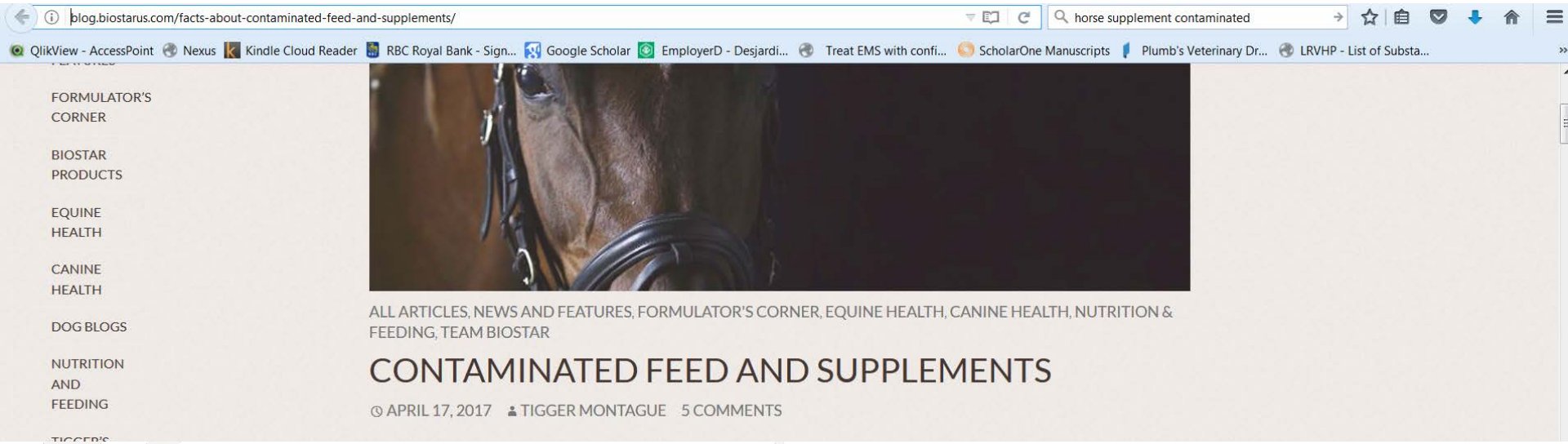
American Dressage News

Cargill, the feed company that produces the Soothing Pink supplement, has found trace amounts of ractopamine in their product. The U.S. horses Horizon and Don Principe were fed with this product and tested positive to the banned substance.

Statement from Cargill – Trace amounts of ractopamine found in Soothing Pink product

Last month, two U.S. equestrian competitors - Adrienne Lyle and Kaitlin Blythe -- were provisionally suspended by the Fédération Equestre Internationale (FEI) after their horses tested positive for ractopamine, an additive used in cattle and swine feed to promote leanness. Although the ingredient presents no health risks for horses, it is a banned

Cargill's Progressive Nutrition Soothing Pink supplement is used to prevent gastric upset



*"From 2013 to 2016 there has been a total of **221** reported deaths, injuries, and positive drug tests from contaminated equine feeds, not including the positive drug tests from several Canadian provinces whose precise numbers I was unable to locate."*

Registration in Canada

- NN program by Health Canada
  - → The Interim Notification Program for Low-Risk Veterinary Health Products
  - → **Safety** and **quality** criteria
  - → Mandatory **adverse event reporting**
- Feed registration
  - → No active ingredient with health claims
- **No disease treatment claims** are allowed on supplements and nutraceutical

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Price vs cost

Supplement 1

- 375g jar, powder
- $27
- Feed 6g daily
- 810,667mcg biotin/kg

Supplement 2

- 1kg jar, powder
- $68
- Feed 15g daily
- 1.3mg biotin/g

Price vs. value: Guaranteed analysis?

EQUINE VETERINARY JOURNAL
Equine vet. J. (2006) **38** (1) 93-95

Evaluation of glucosamine levels in commercial equine oral supplements for joints

S. OKE*, A. AGHAZADEH-HABASHI†, J. S. WEESE‡ and **F. JAMALI†**

- Levels of glucosamine between:

  0% to 222% of claimed amount

The Efficacy of Equine Oral Joint Supplements

E. M. Wooten,* J. M. Mehaffey,* D. Perritt,* S. C. Canterberry,° K. E. Riggs,§ S. R. Appleton,‡ D. Grant†
*Department of Agriculture, Stephen F. Austin State University, Nacogdoches, TX 75962;

Table 3: Label Guarantee vs. Analyzed Quantity

Product	HA Guarantee (mg/g)	HA Analysis (mg/g)	CS Guarantee (mg/g)	CS Analysis (mg/g)	Glucosamine Guarantee (mg/g)	Glucosamine Analysis (mg/g)
Supplement A	1.06	22.95	29.98	16.1985	88.18	7.74
Supplement B	2.94	.	70.59	47.5414	423.53	5.268
Supplement C	1.06	9.29	17.64	9.205	264.55	4.784
Supplement D	1.76	.	73.19	156.335	176.37	3.548
Supplement E	2	.	16	26.627	133.33	4.694
Supplement F	0.59	11.80	11.76	16.568	58.78	1.791

Price vs cost: Bioavailability

- Glucosamine

2.5- 6%

- Chondroitin sulphate

22%

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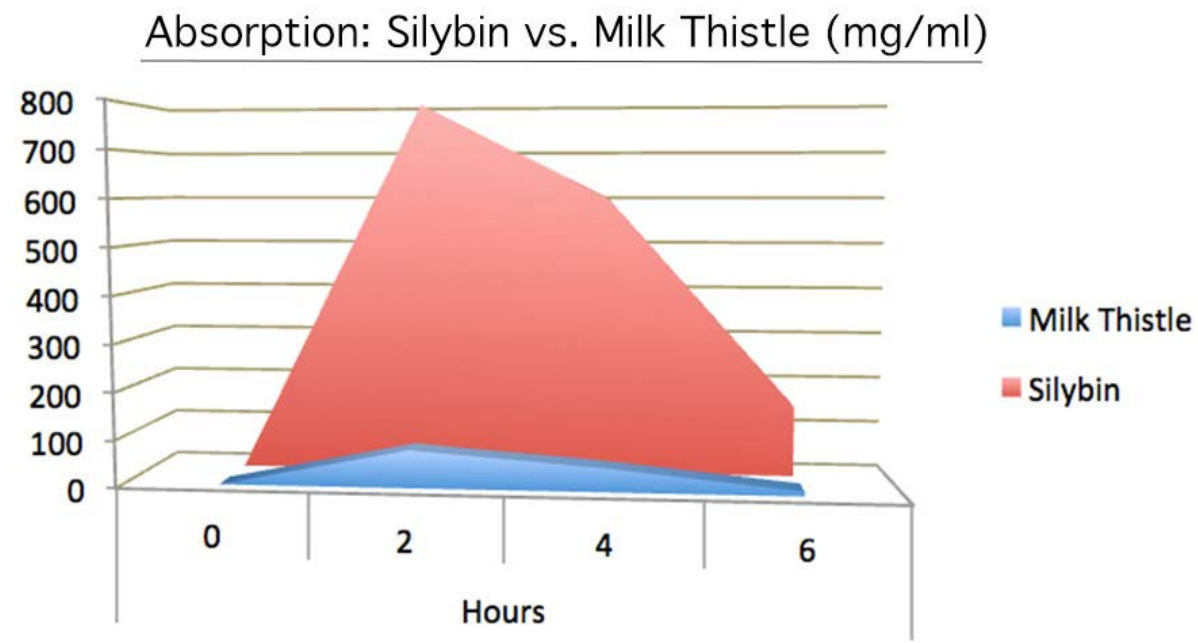
Price vs cost: Bioavailability



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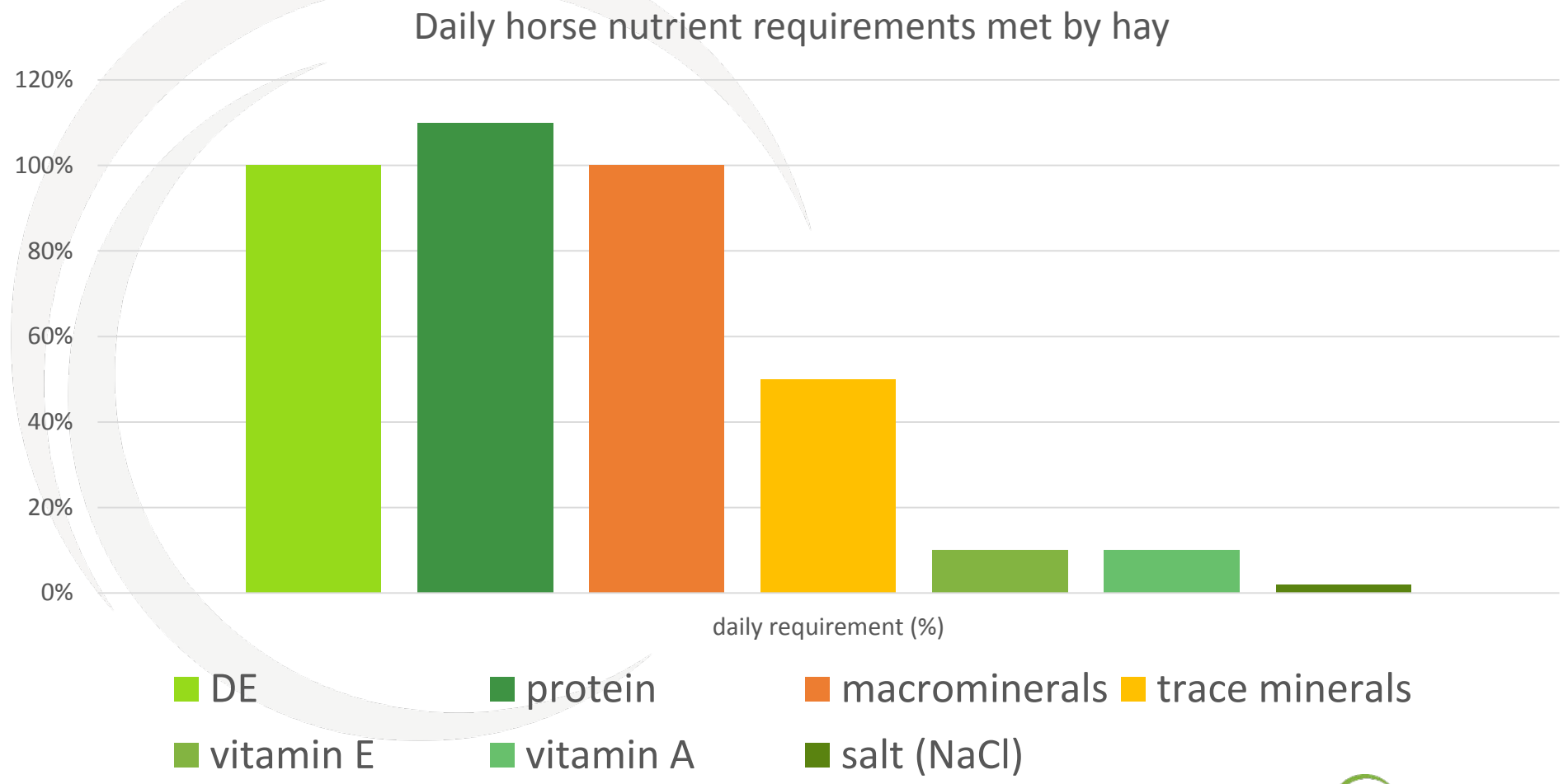
Adequate amount of ingredients?

		132g dose	156g dose	per dose 150g	per 100g	30g
N/A	Sodium acetate					
20,000	Calcium (Min)	400	400	12	9.36	45
14,000	Phosphorus (Min)	792	750	6.9	4.52	
10,000	Sodium (Min)	140	125	3.45		
7,500-15,000	Magnesium (Min)	435	450	2.85	0.06	
25,000	Potassium (Min)	1254	2000			
40,000	Chloride (Min)	514	1450			

Hay


Daily horse nutrient requirements met by hay
120%
100%
80%
60%
40%
20%
0%
daily requirement (%)
DE
protein
macrominerals
trace minerals
vitamin E
vitamin A
salt (NaCl)

Minerals in hay

10kg (22lb) of average quality grass hay provides:

100% of daily requirement for:
Calcium
Magnesium
Potassium

Evidence based: placebo

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Abstract

Journal of the American Veterinary Medical Association
November 15, 2012, Vol. 241, No. 10, Pages 1314-1319
https://doi.org/10.2460/javma.241.10.1314

Caregiver placebo effect for dogs with lameness from osteoarthritis

Michael G. Conzemius, DVM, PhD, DACVS; Richard B. Evans, PhD

- **Results**—A **caregiver placebo effect** for owners evaluating their dog's lameness occurred **39.7%** of the time. A caregiver placebo effect occurred 44.8% of the time **when veterinarians examined dogs** for lameness at a walk, **44.8%** of the time when veterinarians examined dogs for lameness at a trot, and 43.1% of the time when veterinarians evaluated dogs for signs of pain on palpation of the joint. **This effect was significantly enhanced with time.**

Journal of Veterinary Internal Medicine
Open Access
ACVIM
Explore this journal >

Open Access

Placebo Effect in Canine Epilepsy Trials

K.R. Muñana, D. Zhang, E.E. Patterson

- **Results:** Twenty-two of 28 **(79%)** dogs in the study that received **placebo demonstrated a decrease in seizure frequency** compared with baseline, and 8 (29%) could be considered responders, with a 50% or greater reduction in seizures.

Before and after 1.5 month

Palatability

- Pellets> powders

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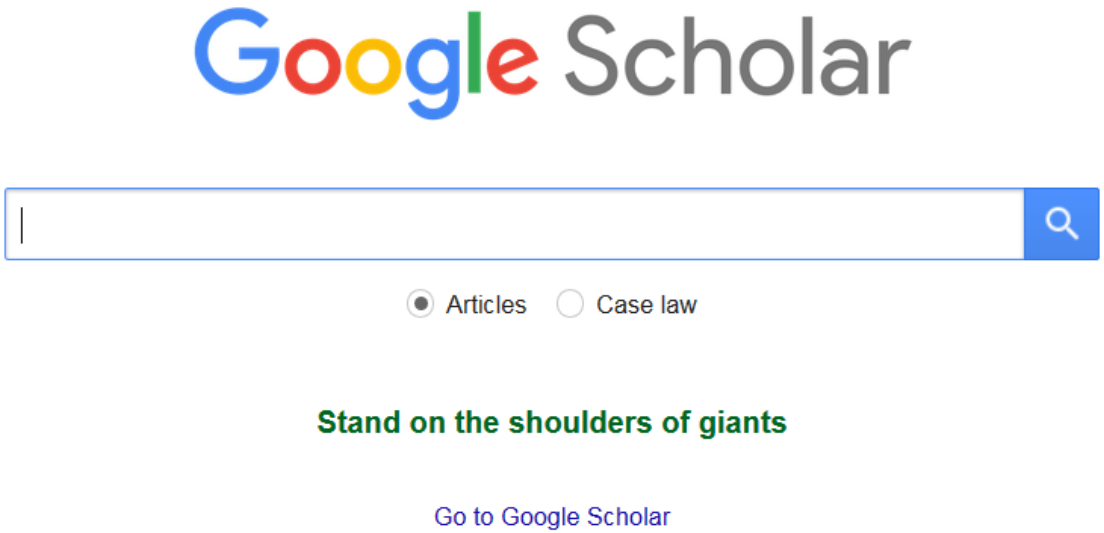
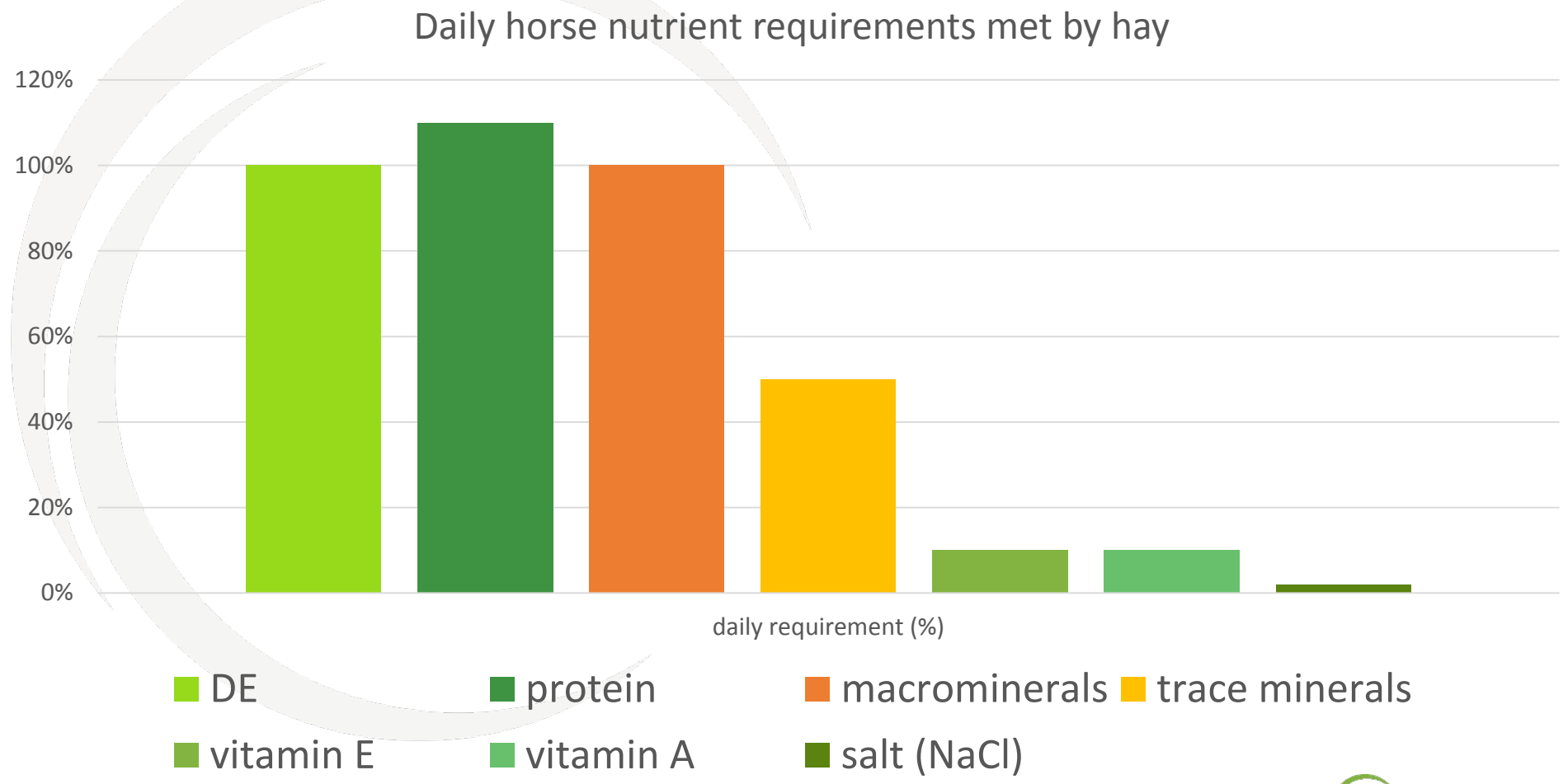
Evidence based: efficacy

- Vitamins + minerals
- Joint supplements
- Muscle support
- Gastric ulcers
- Calming product


Google Scholar
Articles
Case law
Stand on the shoulders of giants
Go to Google Scholar

Hay


Daily horse nutrient requirements met by hay
120%
100%
80%
60%
40%
20%
0%
daily requirement (%)
DE
protein
macrominerals
trace minerals
vitamin E
vitamin A
salt (NaCl)

Increasing recommended vitamin E intake in mares from 80 to 160 mg/kg DM (**800->1600mg**) resulted in higher colostral immunoglobulin G content, as well as foal serum IgG concentration

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Vitamin E forms

Name	Form	Strength
dl-alpha tocopheryl acetate **dl-** alpha tocopherol **all- rac** alpha tocopheryl acetate **all-rac** alpha tocopherol	synthetic acetate synthetic alcohol	1mg= 1IU
d-alpha tocopheryl acetate	natural acetate	1mg= 1.36-2 IU
d-alpha tocopherol	natural alcohol	1mg= 1.49 IU

Supplemental oils have small amounts of gamma-tocopherol – not studied in horses

Vitamin E

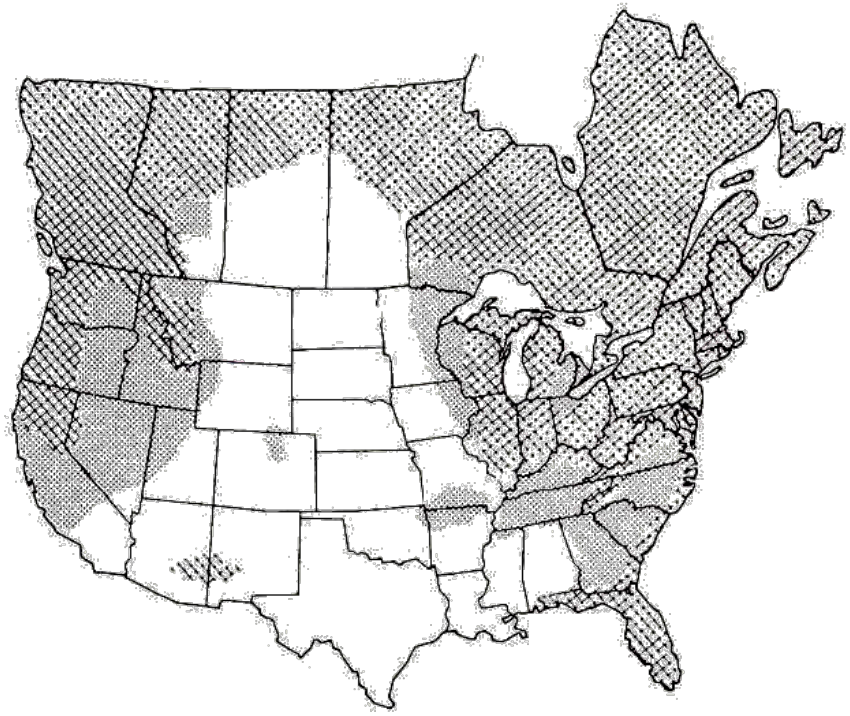
- Vitamin E is highly susceptible to destruction
  - → Processing and contact with oxygen cause loss of vitamin E
  - → Unstable in many feeds and supplements
- Pasture provides 110 IU/2.2lb DM
- Hay has close to zero vitamin E
  - → One month of storage decreases vitamin E content by 50%

- **Requirement:**
  - → **Maintenance** 250 IU natural or **500 IU** synthetic
  - → **Sport horses** 750 IU natural or **1500 IU** synthetic
  - → **High fat diets**: additional **1IU per 1ml of oil**.

Selenium

- Antioxidant: Selenium-dependant enzyme glutathione peroxidase
- Very important for proper **muscle** function
- **Immune system**
- Requirement: **1-3 mg/horse/day**

Selenium distribution in North American soils



Low: ~80% of all forages and grains contain <0.10 ppm Se
Variable: ~50% of all forages and grains contain >0.10 ppm Se
Adequate: 80% of all forages and grains contain >0.10 ppm Se

From: Miller, 1979.

Vitamin E and Se deficiency in horses

- Vitamin E deficient myopathy
- White muscle disease in foals (Nutritional myodystrophy)
  - → Primarily vit E
  - → Skeletal and cardiac form
- Equine motor neuron disease
- Equine degenerative myeloencephalopathy
- Tying-up (no clear link)
- Masseter myopathy
- Idiopathic dilated cardiomyopathy

Equine motor neuron disease

- 18 months vitamin E deficiency; excess Copper

http://www.horsedvm.com/disease/equine-motor-neuron-disease/

Testing, treatment and toxicity

- Vitamin E toxicity
  - → Bleeding
  - → Do not exceed **10,000IU** of natural form a day
- Selenium toxicity:
  - → “poison belt” high soil selenium
  - → Wyoming, South Dakota and some areas of western Canada
  - → Lethal dose of selenium is1500 mg/horse
  - → Chronic toxicity at **15mg**/ horse/ day

Selenium toxicosis

Testing

Neonatal foal: 180 to 200 ug/dL
10 day to 1 month old foal: 120 to 800 ug/dL
1 month to 2 years old: 150 to 1000 ug/dL
Mature horse: 200 to 1000 ug/dL

- Vitamin E
  - → Blood- daily fluctuations in levels, specially in deficient horses
  - → Normal range >2 mcg/ml
    - ◗ Normal range result may happen in deficient horse
    - ◗ Samples sensitive to light, storage conditions, rubber stopper contact etc.
  - → Adipose or muscle tissue samples may be required
- Selenium
  - → Blood test sufficient
  - → Normal range: 0.14-0.25 mcg/ml
  - → Below 0.06 mcg/ml= white muscle disease

1-9 days: 9.80 to 13.5 ug/dL
10-30 days: 11.2 to 15.0 ug/dL
1 mo-1 year: 12.6 to 16.5 ug/dL
Greater than 1 year: 14.0 to 24.0 ug/dL.

Osteoarthritis prevention and treatment options:

- **Anti inflammatory:**
  - NSAID's
  - Steroids
  - Omega- 3 fatty acids: **DHA**
- **Providing proteoglycan building blocks**:
  - Hyaluronic acid: IA or IV
  - Chondroitin sulphate: IA or IM
  - HA, chondroitin and glucosamine as IM, IV and IA
  - Glucosamine, chondroitin, MSM as oral supplements
  - Green lipped mussle
  - Undenatured collagen UCII
- **Biologicals:**
  - IRAP (Interleukin-1 Receptor Antagonist Protein)
  - PRP (Platelet Rich Plasma)
  - Stem cell therapy

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J Vet Pharmacol Ther. 2009 Dec;32(6):577-84. doi: 10.1111/j.1365-2885.2009.01079.x.

Therapeutic efficacy of undenatured type-II collagen (UC-II) in comparison to glucosamine and chondroitin in arthritic horses.

Gupta RC[1], Canerdy TD, Skaggs P, Stocker A, Zyrkowski G, Burke R, Wegford K, Goad JT, Rohde K, Barnett D, DeWee

Author information

Abstract

The present investigation evaluated arthritic pain in horses receiving daily placebo, undenatured type II c 640 mg (providing 80, 120, and 160 mg active UC-II, respectively), and glucosamine and chondroitin (5.4 an first month, and thereafter once daily) for 150 days. Horses were evaluated for overall pain, pain upon limb m on, and liver and kidney functions. Evaluation of overall pain was based upon a consistent observation of all t in the same pattern on the same surface. Pain upon limb manipulation was conducted after the walk and tr ected joint in severe flexion for a period of 60 sec. The limb was then placed to the ground and the animal trott on test was then noted with the first couple of strides the animal took. Flexion test was consistent with deter osteoarthritis in a joint. Horses receiving placebo showed no change in arthritic condition, while those re C-II exhibited significant reduction in arthritic pain ($P < 0.05$). UC-II at 480 or 640 mg dose provided equal eff e was considered optimal. With this dose, reduction in overall pain was from 5.7 +/- 0.42 (100%) to 0.7 +/- 0.42 (12%); and in pain upon limb manipulation from 2.35 +/- 0.37 (100%) to 0.52 +/- 0.18 (22%). Although glucosamine and chondroitin treated group showed significant ($P < 0.05$) reduction in pain compared with pretreated values, the efficacy was less compared with that observed with UC-II. In fact, UC-II at 480 or 640 mg dose was found to be more effective than glucosamine and chondroitin in arthritic horses. Clinical condition (body weight, body temperature, respiration rate, and pulse rate), and liver (bilirubin, GGT, and ALP) and kidney (BUN and creatinine) functions remained unchanged, suggesting that these supplements were well tolerated.

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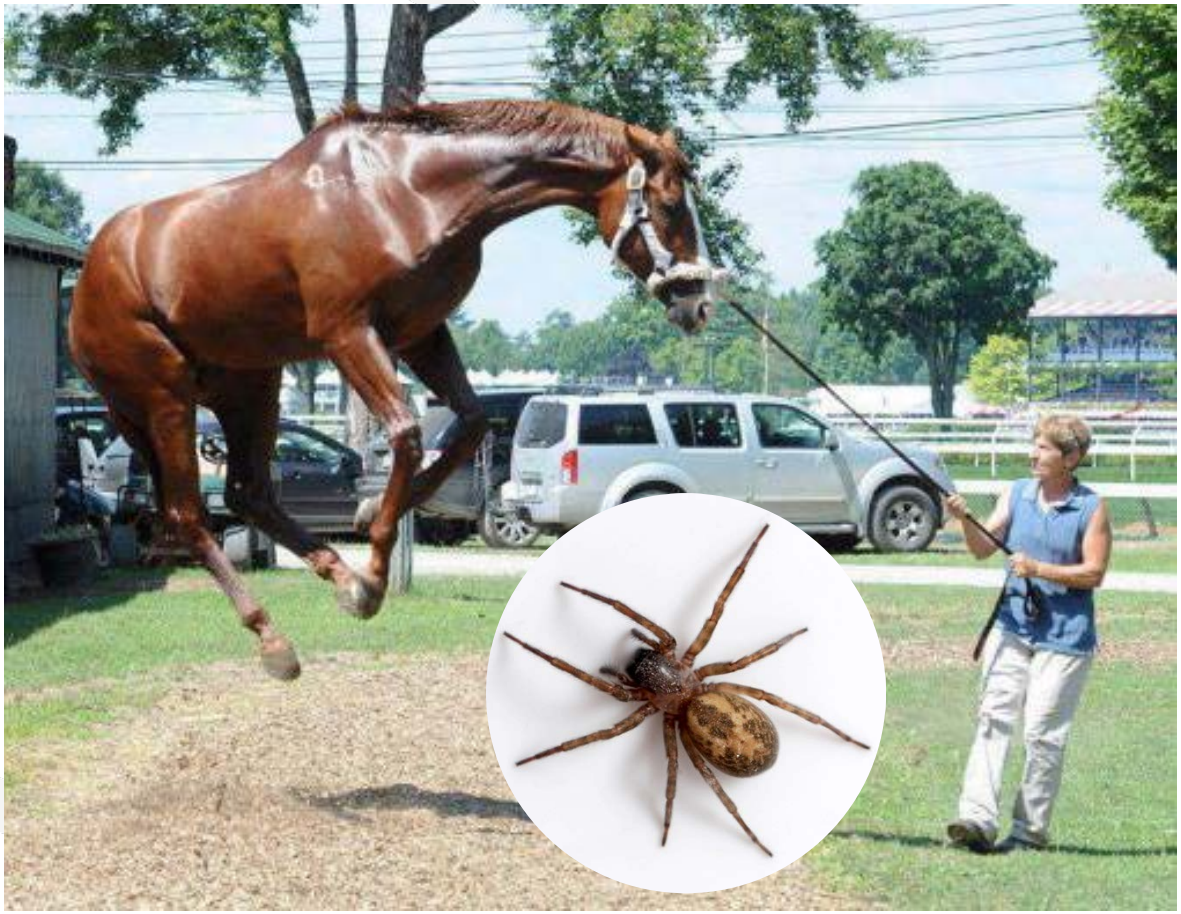
Evidence based: Calming supplements

BEFORE



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Evidence based: efficacy?

ELSEVIER

The Veterinary Journal 170 (2005) 24–32

www.elsevier.com/locate/tvjl

Review

Calmatives for the excitable horse: A review of L-tryptophan

A. Grimmett, M.N. Sillence *

Preparations that contain tryptophan are marketed world wide as calmative agents to treat excitable horses. Tryptophan is the amino acid precursor for serotonin, a neurotransmitter implicated in sedation, inhibition of aggression, fear and stress, in various animal species and humans. Experiments have shown that tryptophan supplementation decreases aggression in humans, dogs, pigs, poultry, and fish, and that it may reduce fearfulness and stress in calves, vixens and poultry. However, behavioural characteristics more closely linked to excitement, such as hyperactivity in dogs, are not modified by tryptophan supplementation. Research using a variety of animals other than horses, has shown that the behavioural response to tryptophan supplementation varies with age, breed and gender, and can be modified by diet, exercise, social status, and level of arousal. Significantly, the response is species-dependent, and there are no scientific publications that confirm the efficacy of tryptophan as a calmative in excitable horses. The few studies where tryptophan has been administered to horses suggest that low doses (relative to those contained in commercial preparations) cause mild excitement, whereas high doses reduce endurance capacity, and cause acute haemolytic anaemia if given orally, due to a toxic hindgut metabolite. As tryptophan continues to be used as an equine calmative, there is an urgent need for research to confirm its efficacy in horses, and to establish a safe therapeutic dose range. In the meantime, available data suggest that it would be imprudent to rely on tryptophan to calm the excitable horse, and instead, that a greater effort should be made to identify the underlying causes of excitability, and to explore more appropriate non-pharmacological remedies.

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Evidence based: efficacy

< Previous Article | May 2015 Volume 35, Issue 5, Pages 401–402 | Next Articl

41 Magnesium aspartate supplementation and reaction speed response in horses

J.A. Dodd, G. Doran, P. Harris, G.K. Noble

- **10 grams** of magnesium
  - → horses' mean response time was 5.3 meters per second; with the supplement it slowed to 3.1 meters per second.
  - → No significant difference for 2.5g
- Daily requirement: 7.5-10g

Zylkène Equine published studies in horses

Calming Benefit of Short-Term Alpha-Casozepine Supplementation During Acclimation to Domestic Environment and Basic Ground Training of Adult Semi-Feral Ponies

MCDONNELL, Sue M., Jaime MILLER et Wendy VAALA

Journal of Equine Veterinary Science, Vol. 33, Issue 2, p101–106

Published online: July 6 2012

Modestly Improved Compliance and Apparent Comfort of Horses With Aversions to Mildly Aversive Routine Health Care Procedures Following Short-Term Alpha-Casozepine Supplementation

MCDONNELL, Sue M., Jaime MILLER et Wendy VAALA

Journal of Equine Veterinary Science, Vol. 34, Issue 8, p1016–1020

Published online: June 26 2014

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Evidence based: omega fatty acids

Omega

Omega-6

Linoleic Acid
(LA)

↓

Arachidonic Acid
(AA)

Omega-3

α–Linolenic Acid
(ALA)

Desaturases
Elongases

↓

Eicosapentaenoic acid
(EPA)

Desaturases
Elongases

↓

Docosahexaenoic acid
(DHA)

Cyclooxygenases
Lipoxygenases

Pro-Inflammatory:
Eicosanoids
Prostaglandins,
Leukotrienes,
Thromboxanes

Minimally Inflammatory:
Eicosanoids
Inflammation Resolving:
Resolvins, Protectins

ELSEVIER

Journal of Equine Veterinary Science

Volume 34, Issue 6, June 2014, Pages 779-783

Original Research

Effects of Omega-3 Long Chain Polyunsaturated Fatty Acid Supplementation on Equine Synovial Fluid Fatty Acid Composition and Prostaglandin E_2 ☆

Journal of Veterinary Internal Medicine

Open Access

J Vet Intern Med 2015;29:299–306

Omega-3 Fatty Acid Supplementation Provides an Additional Benefit to a Low-Dust Diet in the Management of Horses with Chronic Lower Airway Inflammatory Disease

N. Nogradi, L.L. Couetil, J. Messick, M.A. Stochelski, and J.R. Burgess

Oils and omegas

Type of feed	Amount	Omega 3 (g)	Omega 6 (g)	tocopherol (IU)
Pasture	22lb	100-150	25	1100
Hay	22lb	18-100	5	0
Ground flax	100g	22	5	20
Flax oil	15 ml (tbsp)	8	2	75 (y-)
Hemp oil	15 ml (tbsp)	3	7.5	15 (y-)
Camelina oil	15 ml (tbsp)	4	3	15 (y-)
Canola oil	15 ml (tbsp)	1.35	2.8	
Coconut oil	15 ml (tbsp)	0	0	
Avocado oil	15 ml (tbsp)	0.15	1.9	
Olive oil	15 ml (tbsp)	0.1	1.4	

Weight gain protocol

- 450 ml of oil per day day
  - = approx. 4 Mcal

- Starting at 50ml/ day
- Divide in 2-3 servings

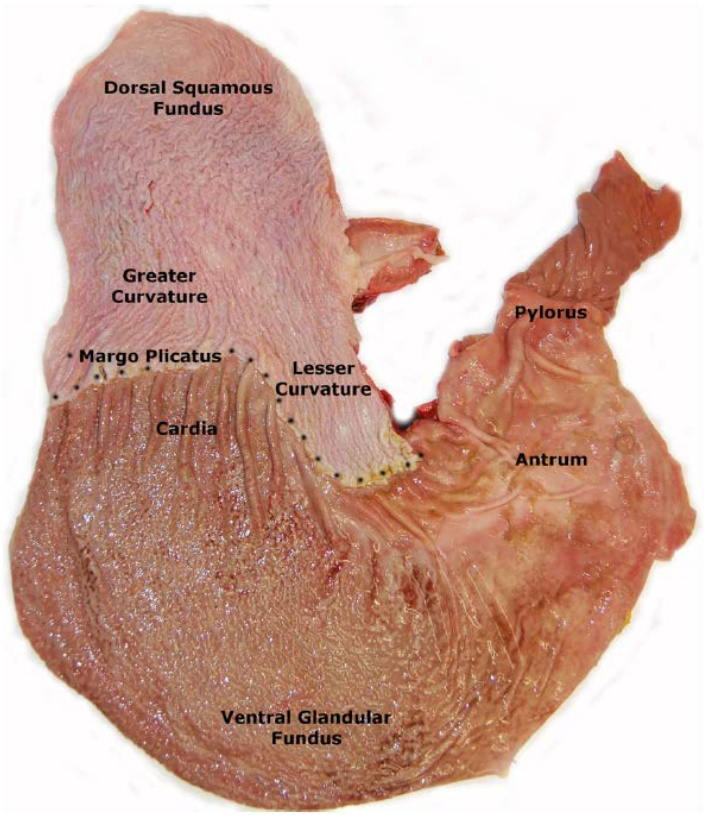
Supplements and EMS: from AAEP 2016

Magnesium	Inconsistent results
Chromium	Inconsistent results
Zinc	No scientific data
L-carnitine	No effect
Cinnamon	No effect
Coriander	No effect
Aloe vera	No scientific data
Garlic	Toxic?
Ginger	No scientific data
Celery	No scientific data

Source: Ingrid Vervuert, DVM ; Institute of Animal Nutrition, Nutrition Diseases and Dietetics; Faculty of Veterinary Medicine, University of Leipzig. Presented at AAEP conference 2016

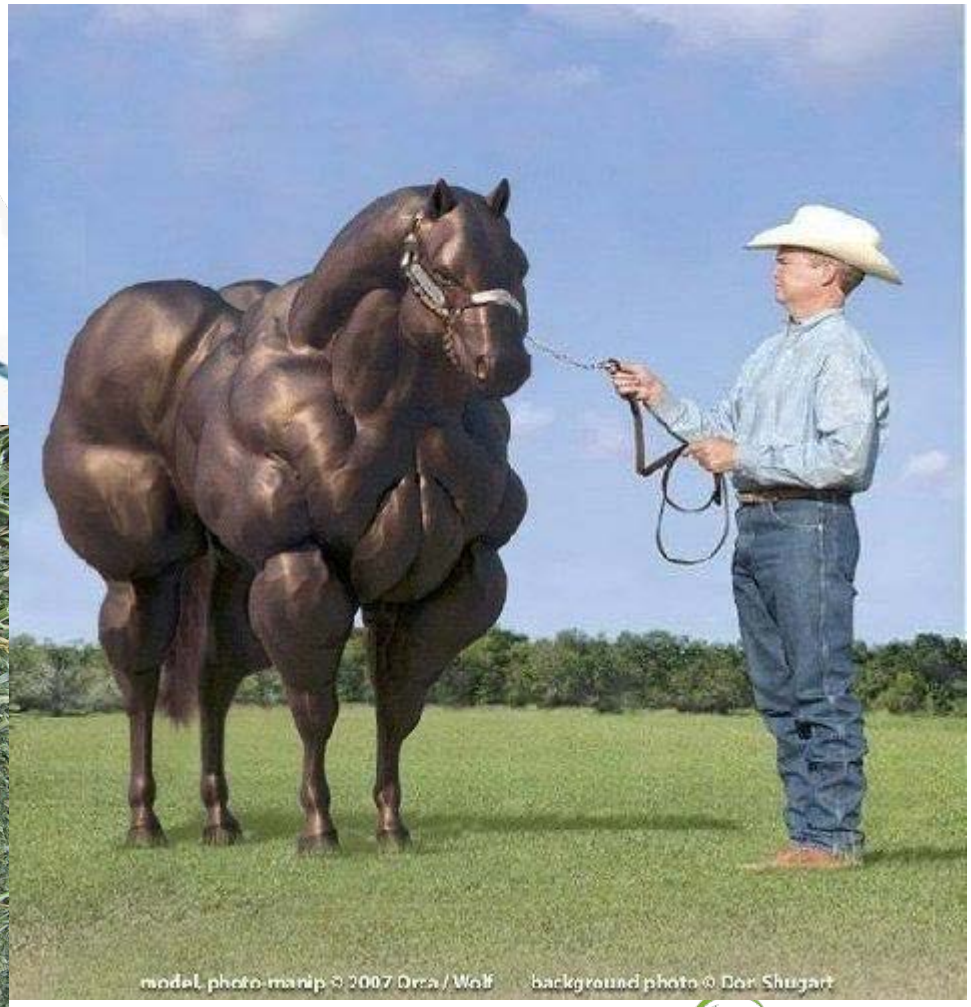
Evidence based: gastric ulcers

EGUS: **ESGD** and EGGD



- **Free choice hay/grass**
  - → <6 hr in between meals
  - → alfalfa hay
  - → Limit grain/concentrates
  - → Vegetable oil (45ml/horse?)
- **omeprazole**
- Sucralfate
- Antacids:
  - → Magnesium oxide
  - → Magnesium hydrochloride
  - → Calcium carbonate
- Pectin- lecithin +/-

Evidence based: Muscle builders



Protein requirements

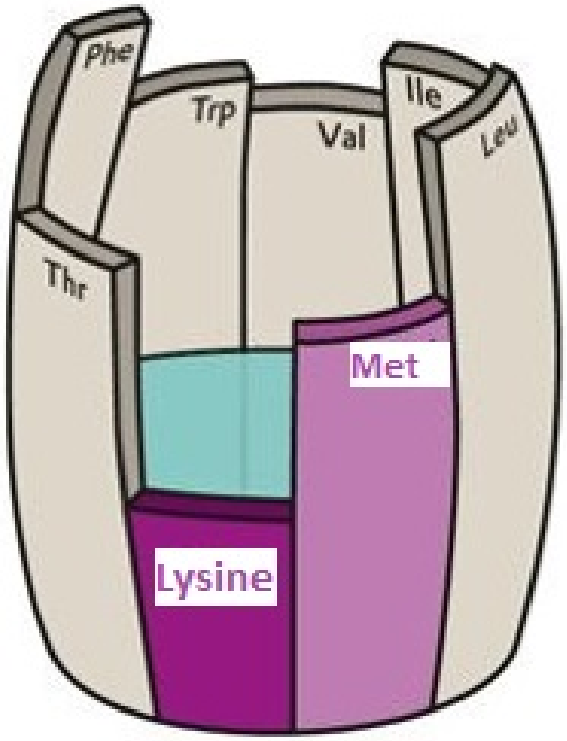
- Quantity: 630g to 1.3kg/500kg horse/day
  - → Age
  - → Work
  - → Pregnant/ lactating/ growing
- Quality:
  - → Amino- acid composition
  - → Digestibility

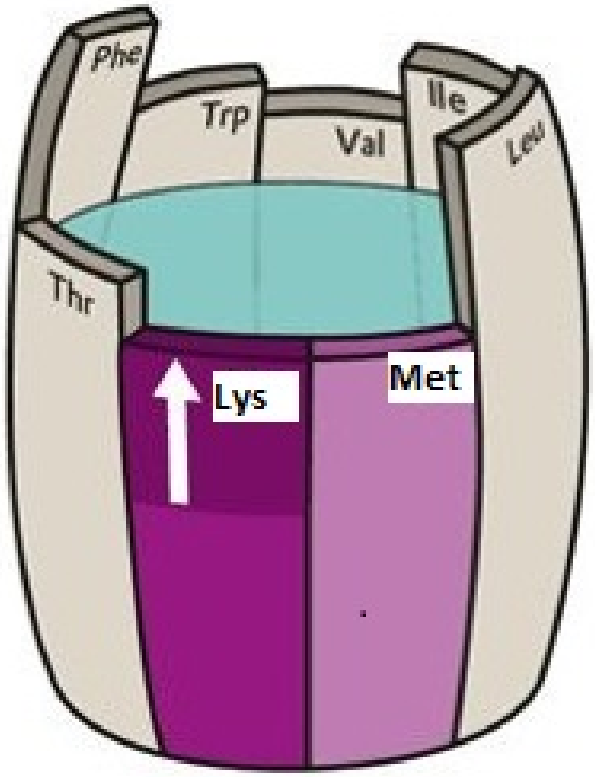
Protein in hay

10kg (22lb) of average quality grass hay provides:

1 kg protein

First limiting amino acid: Lysine (Lys)





http://feed-additives.evonik.com/product/feed-additives/en/about/healthy-nutrition/animal-nutrition/Pages/default.aspx

How to choose a supplement? Checklist!

- ✓ Need
  - ✓ Evidence- based efficacy
- ✓ Manufactured by trusted company
  - ✓ Know how and why
  - ✓ Legally registered
    - ✓ Adverse reaction reporting
  - ✓ GMP standards, Health Canada control
  - ✓ Transparency of information, Customer service
- ✓ Complete, and adequate dose of ingredients
- ✓ Stability of ingredients, expiry date, properly mixed
- ✓ Bioavailability
- ✓ Palatability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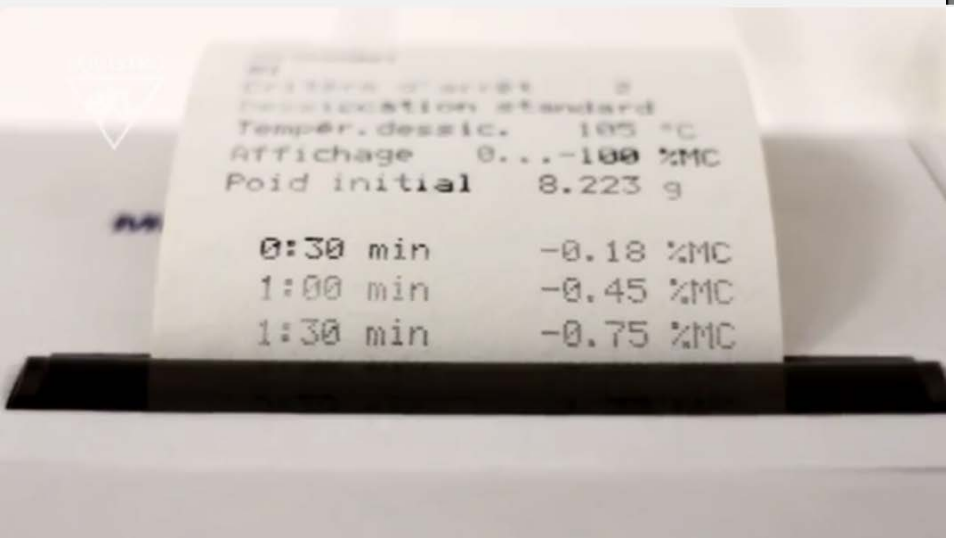
QHN

https://www.youtube.com/watch?v=u_0qB3CWrII



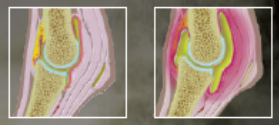
Equistro and competing regulations

Sponsorships

NO JOINTS NO HORSE!

Horse athletes experience strenuous daily training. The intensity and specificity of certain movements such as fence jumping or sliding stops puts extensive strain on joint structures. Over time this can trigger inflammation, called synovitis. A destructive cascade begins, and if left untreated will progress to irreversible osteoarthritis.

Using supplements that support joint health are vital to keep your horse performing to its highest ability.



Healthy Joint

Joint with Synovitis

WHEN IT COMES TO JOINT SUPPLEMENTS, EQUISTRO OFFERS THREE UNIQUE AND MODERN SOLUTIONS:

BIO-ISO-G

Bio-Iso-G® is a joint supplement with cutting edge technology.

For increased bioavailability Bio-Iso-G® contains active components of:

- Glucosamine (glutamine)
- Chondroitin (proline, glutamate, glycine and glucoronate)
- MSM (sulfur)

Bio-Iso-G® can help combat early joint disease by:

- Providing building blocks for joint cartilage.
- Providing lubricating ingredients for joint fluid.
- Providing anti-inflammatory and antioxidant properties.

Bio-Iso-G Plus®: All the benefits of Bio-Iso-G® plus Devil's Claw and Yucca, known for their anti-inflammatory and free radical scavenging properties.

DID YOU KNOW, THAT:
Bioavailability of glucosamine in the horse is only 2%.
Active isolate technology bypasses this issue.

FLEXADIN® UCII

Flexadin UCII is a novel product with a unique ingredient, undenatured type II collagen, with the capability to protect the joint cartilage from damage by modulating immune system response to inflammation. Flexadin UCII has added MSM (anti-inflammatory) and chelated Manganese, which is necessary for proper formation and turnover of joint cartilage.

- Type II collagen is major structural molecule responsible for elastic properties of joint cartilage
- Only the undenatured form of collagen has shown a unique immune modulating effect in multiple human and animal studies.
- In a study on horses with osteoarthritis, UCII has decreased lameness scores and pain upon flexion test, within 150 days of supplementation.
- Equistro Flexadin UCII is the only product on the market registered for horses containing undenatured type II collagen.

Due to its specific mechanism of action, Flexadin UCII can be used in combination with other products such as Bio-Iso-G® or Cartiflex. Each of them provide different building blocks for joint cartilage and joint fluid, as well as target different pathways of inflammation. Together they offer a multilevel approach to joint health and disease prevention.

HELP YOUR HORSES' JOINTS DEAL
WITH INCREASED IMPACT!

CARTIFLEX

Cartiflex is a synergistic combination of green lipped mussels, brown seaweed extract, omega-3 fatty acids, and anti-oxidants Vitamin E and Selenium.

- Green lipped mussel (Perna canaliculus) were consumed by Maori, the indigenous people of New Zealand, to help keep them healthy and pain-free.
- Studies in humans with mild to moderate osteoarthritis showed improvement in their pain and mobility scores as soon as two months into therapy with Perna canaliculus extract.
- Brown seaweed extract (marine algae) is loaded with macro- and micronutrients, but its main benefit in osteoarthritis is due to two powerful antioxidants: fucoidans and algal polyphenols.
- Vitamin E and Selenium act in symphony to combat constant formation of free radicals, which is increased in times of strenuous exercise.

vetoquinol ACHIEVE MORE TOGETHER

VETOQUINOL BEST PRACTICES

- **Know how**: formula development
- **Know how**: high manufacturing standards
  - Best quality ingredients
  - Carefully sourced raw materials
  - Guaranteed analysis
  - **No cross-contamination**
  - Prioritising **highly bioavailable ingredients**
- **NN certification in Canada**

Thank you!

5 Steps to Greater Happiness

1. Get a horse.
2. Get a second horse. If one horse makes you happy imagine how happy you will be with two
3. Get a third horse. The more to love right?
4. Declare - No more horses. You're not a crazy person.
5. Give in & get that fourth horse. It was going to happen anyway & who are you to stand in the way of fate?

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