

Science Vs. Sales Pitch

Equine global sales market, including supplement sales, has been valued at over \$26.6 billion (Transparency Market Research, 2014)

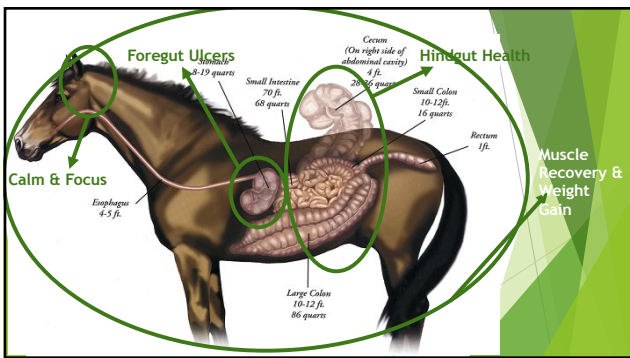
58% of owners report spending \$30 or more per month per horse on supplements (Sarisley et al., 2017)

Reasons for supplementation: treat or prevent behavior issues, joint issues, hoof issues, skin or coat issues, colic issues, digestive issues other than colic, provide nutrients not provided in other feedstuffs

84% of owners reported giving at least one dietary supplement

Median of 3 supplements fed (Hoffman et al., 2017)

The Numbers On Supplements



Quick Outline

Supplement use in horses

The research...what we know works, what doesn't work, and supplements backed by research

- Gastric Health Supplements
 - Ulcers
 - Hindgut Ulcers and colitis
 - Metabolic
- Vitamin E/Selenium Supplements
- Calming Supplements
- Joint Supplements

Wrap Up

Ulcers

Low density mat, pH 6-7

High density liquid pH 1-2

- Risk Factors:
 - Stress
 - Competition
 - Hauling
 - Intensity of exercise
 - Age
 - Training?
 - Management
 - Diet
 - High grain
 - Intermittent feeding
 - Drugs
 - NSAIDs
 - Anti-prostaglandin activity
 - Supplements and nutraceuticals

Ulcers

- Impacts on Performance
 - Feed intake
 - Weight loss
 - Unthriftiness
 - Hair coat, hooves
 - Diarrhea
 - Acute or chronic colic
 - Behavioral issues
 - Biting the abdomen or stretching after meal consumption
 - Poor performance
- Options:
 - Diet
 - Drugs
 - Nutraceuticals and supplements

Ulcer severity scoring

- Grade 0 Ulcer**
Intact mucosal epithelium (may have reddening and/or hyperkeratosis)
- Grade 1 Ulcer**
Small single or multiple ulcers
- Grade 2 Ulcer**
Large single or multiple ulcers
- Grade 3 Ulcer**
Extensive (often coalescing) ulcers with areas of deep ulceration

Photos courtesy of MJ Murray.

Dietary Options

Feeding	Feeding less grain if possible
Providing	Providing free-forage and frequent, smaller meals
Prolonging	Prolonging hay ingestion through use of slow-feeders and/or hay nets
Adding	Adding alfalfa to the diet, which has been shown to aid in gastric buffering

Drugs



- ▶ GastroGard (the gold-standard ulcer treatment) and UlcerGard are the only two U.S. Food and Drug Administration-approved products to treat and prevent gastric ulcers in horses
- ▶ GastroGard (omeprazole) for Equine ulcers
- ▶ UlcerGard (omeprazole)
 - ▶ Also reduces stomach acid production
 - ▶ Same action as GastroGard

Nutraceuticals and supplements

- ▶ Sulfachloropyridazine: broad spectrum for prevention and treatment of gastric ulcers in stressed horses
 - ▶ Beneficial to non-gastric ulcers. But may have toxicity
 - ▶ But no effect on ulceration
- ▶ High Ca reduces ulceration probably through gastric buffering
 - ▶ But no effect on ulceration
- ▶ No significant differences in gastric ulcer scores, but gastric juice pH remained low for 3 hours after feeding in horses fed alfalfa hay. However, this may be due to higher pH in the rumen.
- ▶ Farnesol reduces gastric acidity 2 hours after administration

Hall et al., 2012



Nutraceuticals and supplements




- ▶ Smart-Gut Ultra reduced ulcer severity and number of lesions in a gastric stress model (Andrews et al., 2014, 2015)
- ▶ Gastro-Well reduced ulcer severity and number of lesions
 - ▶ 6 months of prevention research
- ▶ Wagner et al., unpublished
 - ▶ Shown to work in university-led study
 - ▶ For horses with occasional gastric issues

Hindgut ulcers/colitis

<p>▶ Causes:</p> <ul style="list-style-type: none"> ▶ Microbial imbalance: <ul style="list-style-type: none"> ▶ <i>Clostridium difficile</i> ▶ <i>Salmonella</i> spp. ▶ <i>Clostridium perfringens</i> ▶ <i>Neorickettsia risticii</i> ▶ Non-species specific gut dysbiosis ▶ Overproduction of acid 	<p>▶ Symptoms</p> <ul style="list-style-type: none"> ▶ Weight loss ▶ Unthriftiness ▶ Behavior <ul style="list-style-type: none"> ▶ Irritability ▶ Painful-stretching, pawing, girthing, side sensitivities, increased recumbency ▶ Lack of energy ▶ Feed intake ▶ Low-grade anemia ▶ Impaired performance
--	---

Hindgut ulcers/colitis...supplements?



• Helps buffer the hindgut
• For horses at risk for hindgut issues

LOOK

▶ Acid

- ▶ Hindgut buffers!
 - ▶ Buffer the pH by providing basic components
 - ▶ HOWEVER.....MUST reach the hindgut
- ▶ Low NSC diet
- ▶ Alter the microbial activity
- ▶ Supplements????

FECAL PH OF HORSES	
Forage/Low NSC	7.0-8.0
High NSC	5.0-6.0

Adapted from (Biddle et al., 2013)

Hindgut ulcers/colitis Microbial imbalances

- ▶ Colitis
- ▶ Chronic and acute diarrhea
 - ▶ Reduced performance
 - ▶ Unthriftiness
 - ▶ Weight loss
 - ▶ Discomfort
- ▶ Antibiotics
- ▶ Behavior

Hindgut ulcers/colitis: Hindgut ulcer/colitis

Strains	Sensitivity to Gastro-MFR
<i>Streptococcus equi</i>	*****
<i>Escherichia coli</i> *	****
<i>Rhodococcus equi</i>	*****
<i>Salmonella</i> *	****
<i>Clostridium perfringens</i> *	***
*equine strains	

- ▶ SmartDigest Ultra
 - ▶ Feeds the 'good' bugs, but does nothing for the 'bad' bugs
- ▶ Gastro-MFR
 - ▶ Changing the hindgut to a healthier balance

*Researched ingredients for digestive health
 *Backed by up to \$700 colic surgery reimbursement



Probiotics AKA Direct Fed Microbials

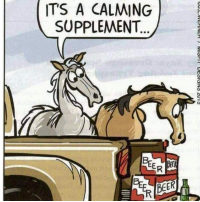
- ▶ Direct fed microbials—designed to provide live colonies of lactic acid and other bacteria for optimal gut or animal health
 - ▶ Do DFMs reach the hindgut in a viable state?
 - ▶ (Wense 2002) showed only 2 of 13 commercially available DFM products tested met label claims
 - ▶ (Saul, 2012) demonstrated no benefits of DFMs on gastrointestinal microflora, cortisol response to transport stress, or antibody response
 - ▶ Further, author communicated that multiple commercial products claiming to have live cultures were found to be sterile upon testing



And...probiotics!



Supplements for behavioral correction "Calming Supplements"

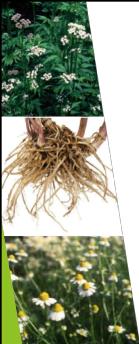


- Herbal
- Magnesium-based
- Essential Oils
- Tryptophan
- Vitamin B
- Gastrointestinal supporting ingredients

Herbal Supplements

- ▶ Little to no research in horses—effects are extrapolated from humans or other species
- ▶ Common ingredients include valerian, vervain, ginseng, hops, chamomile, peppermint...
- ▶ Important to note: active ingredients of herbs are affected by unpredictable parameters, unlike synthetic drugs
 - ▶ Growing conditions, harvesting and storage procedures, contamination

Hothersall and Nicol, 2009



Herbal Supplements

Little to no research in horses

- ▶ Valerian
 - ▶ Used as a sedative in humans
 - ▶ Shares properties similar to phenobarbital
 - ▶ Prohibited in FEI competition
 - ▶ Research:
 - ▶ In pigs, significantly reduced increases in heart rate in response to vibration stress (Peeters et al., 2004)
- ▶ *Withania somnifera* (Indian ginseng)
 - ▶ Research:
 - ▶ In rats, produced anxiolytic and antidepressant effects similar to benzodiazepine lorazepam and the antidepressant imipramine, respectively (Bhattacharya et al., 2000)



• Herbs to maintain a balanced temperament
• Ideal for anxious horses

Magnesium-Based Supplements

The Research

- ▶ Nielsen and O'Connor-Robison, 2014 (long term)
 - ▶ Moving object reactivity test and handling reactivity test in 14 2-year old Arabians with magnesium- and calcium-rich supplement
 - ▶ No significant differences in reactivity between control and treatment groups
- ▶ Pearson and MacNicol, 2017 (short term)
 - ▶ Tested effects of an oral single-dose magnesium- and thiamine-based nutraceutical paste and ace on stressed horses
 - ▶ Only difference was during first task within 30 minutes of dosage

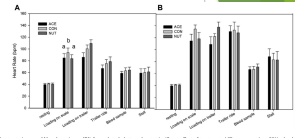


Fig. 4. Heart rate (average [A] and maximum [B]) for each task. Letters denote significance effect of treatment: ACE, nutraceutical; CON, placebo; MIT, nutraceutical product.

Magnesium-Based Supplements

• Multi-faceted approach to calming
• Ideal for sensitive horses



Tryptophan-Based Supplements

The Research

- ▶ In rats:
 - ▶ Evidence that tryptophan depletion causes anxious behavior (Blokland et al., 2002)
- ▶ Conflicting research in horses
- ▶ Davis et al., 2017
- ▶ Noble et al., 2016



• Comprehensive approach to calming
• Ideal for spooky horses

Essential Oil-Based Supplements

Sweet Orange Essential Oil




Calming—the gut approach

- ▶ Hops: Inhibition of fructan-fermenting equine faecal bacteria and streptococcus bovis by hops (*humulus lupulus L.*) B-acid



• Herbs to maintain a balanced temperament
• Ideal for anxious horses

Vitamin E and Selenium

Important antioxidants

Deficiencies are associated with several muscular and neurological diseases and conditions

Vitamin E is abundant in fresh pasture, but not as available in hay

Many soils are deficient in Selenium

Vitamin E and Selenium Natural/Organic Sources vs. Synthetic

Item	Day		
	0	28	56
Plasma Se, µg/mL			
CTRL ²	0.108	0.114 ^{ns}	0.096 ^{ns}
INORG ²	0.128 [*]	0.154 ^{ns}	0.151 ^{ns}
ORG ²	0.110 [*]	0.173 ^{ns}	0.169 ^{ns}
SEM	0.008	0.008	0.008

- Synthetic sources of vitamin E (dl-alpha tocopherol) are absorbed by the horse
- Natural sources of vitamin E (d-alpha tocopherol) have been proven to be more biologically active
- Inorganic and organic forms of Se are metabolized differently
 - Active transport versus passive diffusion (little retained in tissue reserves)

Fagan et al., 2018; Richardson et al., 2014; Calamari et al., 2009

Vitamin E and Selenium Supplements with natural and organic sources

Joint Supplements

- Our options:
 - Drugs
 - Injections
 - Oral Supplements

Joint Supplements Injections

Joint Supplements Oral Joint Supplements

Conclusions...

- ▶ Check the research!
 - ▶ Ulcers
 - ▶ Hindgut health
 - ▶ Metabolic aids
 - ▶ Vitamin E/Selenium
 - ▶ Joint
- ▶ So many options, have to look through the hype!

Questions?

