

# Equine Gastric Ulcer Syndrome

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presented in part with:  
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## The Plan

- Anatomy and physiology of the equine stomach
- What is EGUS?
- Diagnosis of EGUS
- Treatment of EGUS
- Questions and Snacks
- Gastroscopy Demonstration

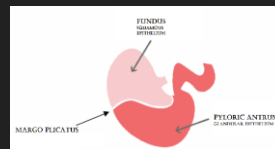


## Anatomy and Physiology of the Equine Stomach

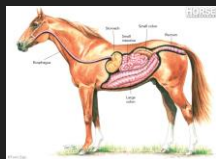
the condensed version

## Anatomy of the Equine Stomach

- The stomach of an average-sized horse can hold 10-15L of fluid/feed
- **Fundus** – the upper portion
  - squamous epithelium
  - minimal protections against acid
- **Pyloric antrum** – the lower portion
  - glandular epithelium
  - well developed protections against acid
- Divided by the **margo plicatus**
- Lesser curvature and greater curvature



## Physiology of the Equine Stomach



- Horses are **monogastric** animals
  - One stomach, similar to humans, dogs, cats
- **Continuous secretion** of acidic digestive juices
  - ~1.5L per hour
  - Contain hydrochloric acid, digestive enzymes
- Liquid meal empties in ~30 min
- Hay meal can take up to 24hrs to empty

<http://www.horsechannel.com/images/horse-rear-article-images/equine-digestive-system.jpg>

## Physiology of the Equine Stomach

- pH varies within the stomach:
  - Near esophagus –pH 7.0 (neutral)
  - At margo plicatus –pH 3.0- 6.0 (mild to moderately acidic)
  - At pylorus –pH 1.5- 4.0 (moderately to extremely acidic)
- Low pH is important for digestion of feed material and serves as a defence mechanism against ingested bacteria, viruses, parasites

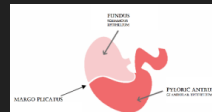


## What is EGUS?

And why do I care?

## EGUS: Equine Gastric Ulcer Syndrome

- Syndrome, not a disease
  - Multiple causes and presentations
- Ulceration of the gastric mucosa
- Two sub-conditions recognized under the same title:
  - Equine **Squamous** Gastric Ulcer Syndrome (ESGUS)
  - Equine **Glandular** Gastric Ulcer Syndrome (EGGUS)



## Symptoms of EGUS

- Decreased appetite, particularly for grain
- Recurrent colic episodes
- Poor weight gain, or weight loss
- Diarrhea
- Low-grade anemia
- Teeth grinding
- Cribbing
- Lack of energy
- Poor hair coat
- Change in attitude
- "Girthy" behaviour
- Poor performance
- Bucking
- Refusing jumps
- Irritation at leg aids

○ Asymptomatic

## Causes of EGUS

- Stress
- Non-steroidal anti-inflammatories (bute or banamine) – high doses or long-term use
- High grain, low forage diets
- Chronic pain
- Systemic diseases
- Being a horse

## Questions So Far?



## Diagnosing EGUS

Picture time!

## Diagnosis of EGUS



- Gastroscopy
- Treatment trials
- Fecal occult blood tests
- Sucrose permeability testing

## Gastroscopy

- 3 meter endoscope
  - portable options make on-farm diagnosis possible
- Standing, sedated procedure
- Endoscope passed via the nose into the esophagus to the stomach

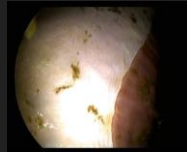
## Grading Gastric Ulcers

	Squamous mucosa	Glandular mucosa
Grade 0	The epithelium is intact and there is no appearance of hyperkeratosis (yellowing of the mucosa)	The epithelium is intact and there is no evidence of hyperaemia
Grade 1	The mucosa is intact but there are areas of hyperkeratosis	The mucosa is intact but there are areas of hyperaemia
Grade 2	Small, single, or multifocal (<5) superficial lesions	Small, single or multifocal (<5) superficial lesions
Grade 3	Large single deep, or multiple (≥5) focal superficial lesions	Large single deep or multiple (≥5) focal superficial lesions
Grade 4	Extensive lesions with areas of apparent deep ulceration	Extensive lesions with areas of apparent deep ulceration

Sikes, BW, & JM Jokalo (2014) Rethinking equine gastric ulcer syndrome: Part 1 – Terminology, clinical signs and diagnosis. *Equine Veterinary Education* 26(10): 543-547.

## Grading Gastric Ulcers

- Squamous Epithelium
  - Grade 0 (Healthy epithelium)
- Glandular Epithelium
  - Grade 0 (Healthy epithelium)



<https://iStockphoto.com/Photo1248789646/stockphoto1248789646/1248789646-Photo1248789646-4048971292>



[http://www.bwepetvet.nl/uk/Uploads/Services/Gastric\\_Ulcers\\_Ulcer\\_00\\_00\\_00y\\_Hoeding.jpg](http://www.bwepetvet.nl/uk/Uploads/Services/Gastric_Ulcers_Ulcer_00_00_00y_Hoeding.jpg)

## Grading Gastric Ulcers

- Squamous Epithelium
  - Grade 1 (Hyperkeratinized)
- Glandular Epithelium
  - Grade 1 (Hyperemic)

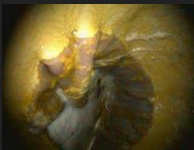
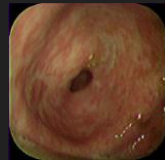


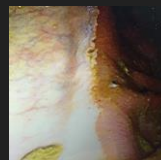
Photo courtesy Dr. Christine Coccyf



[http://www.bwepetvet.nl/uk/Uploads/Services/Gastric\\_Ulcers\\_Ulcer\\_01\\_01\\_01y\\_Hoeding.jpg](http://www.bwepetvet.nl/uk/Uploads/Services/Gastric_Ulcers_Ulcer_01_01_01y_Hoeding.jpg)

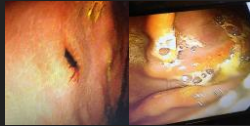
## Grading Gastric Ulcers

- Squamous Epithelium
  - Grade 2 (<5 small, superficial ulcers)
- Glandular Epithelium
  - Grade 2 (<5 small, superficial ulcers)



## Grading Gastric Ulcers

- Squamous Epithelium
  - Grade 3 (Deep ulcers or >5 superficial ulcers)
- Glandular Epithelium
  - Grade 3 (Deep ulcers or >5 superficial ulcers)



## Grading Gastric Ulcers

- Squamous Epithelium
  - Grade 4 (Extensive ulcers with deep, possibly bleeding ulcers)
- Glandular Epithelium
  - Grade 4 (Extensive ulcers with deep, possibly bleeding ulcers)



## Treatment Options

## Goals of Treatment

- Increase comfort
- Decrease acidity
- Promote healing
- Prevent recurrence



## Decreasing Acidity

- Diet changes
  - Increased time chewing
    - Why?
  - Alfalfa
  - Decreased grain rations, or smaller volumes per meal



<https://www.123horse.com/stock-photo/2069574440/stock-photo/2145487/2-el-d66e4072a93228f8b1472d578111/buddy-with-hay-rack-10a.jpg>

## Decreasing Acidity

- Proton pump inhibitors
  - Omeprazole (GastroGard)
    - Once daily dosing
    - 28 day treatment course recommended
- H2 histamine receptor antagonists
  - Ranitidine (Zantac)
  - Cimetidine (Tagamet)
    - Three times daily dosing




# Omeprazole

You get what you pay for

- ## Omeprazole
- **Gastrogard**
    - Guaranteed concentration of drug
    - In buffered paste
      - Omeprazole is acid sensitive
    - Numerous studies to show efficacy
  - **Compounded omeprazole**
    - Variable concentration of drug
    - Some forms have no buffers
    - May work for some horses, not for others

## Case-in-Point

- Teenaged school horse
- Suspect EGUS (no gastroscopy to confirm)
- Long-term treatment with compounded omeprazole
  - 1 month of full treatment dose
  - 14 months maintenance on half treatment dose



## Case-in-Point

- Teenaged school horse
- Suspect EGUS (no gastroscopy to confirm)
- Long-term treatment with compounded omeprazole
  - 1 month of full treatment dose
  - 14 months maintenance on half treatment dose




## Case-in-Point

- Cost of compounded omeprazole for duration of treatment: ~\$1700
- Cost of Gastrogard for 28 day treatment course: ~\$1400

## Increasing Comfort

- Short-term
  - Sucralfate
  - Antacids (tums, acid-ix, etc)
- Long-term
  - Healing
  - Preventing recurrence



[http://www.petnetpharmacy.com/images/products/10377\\_20111201\\_14436307\\_mls.jpg](http://www.petnetpharmacy.com/images/products/10377_20111201_14436307_mls.jpg)

## Promote Healing



- Decreasing acidity
- Misoprostol
  - Synthetic prostaglandin
  - Stimulates protective and regenerative aspects of **glandular** epithelium
- Corn oil
  - Increases mucous production of **glandular** epithelium

## Prevent Recurrence



- Diet changes
- Modifying stress triggers or intense exercise where possible
- Antacids prior to exercise
- Preventative acid suppression
  - ¼ treatment dose of omeprazole

Thank you!



Questions?

