Nutritional Management of the Racehorse

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Considerations

- Meet nutrient requirements
- Maintain normal GI tract

Feeding the Racehorse

- Excellent quality hay
  - Low dust
  - High nutrient density
- Commercially manufactured fortified concentrate
  - Formulated for performance horses
  - **Usually cereal-grain based**
- High level of feed intake
  - **Depends on a healthy GI tract**

The Equine GI tract

1. Mouth
2. Stomach
3. Small intestine
4. Large Intestine (hindgut)
   - Cecum
   - Colon
   - Rectum

GI Tract: *1. The Mouth*

Lips:

- **Select feeds**

Teeth:

- **Crack hard seeds**
- **Reduce particle size**

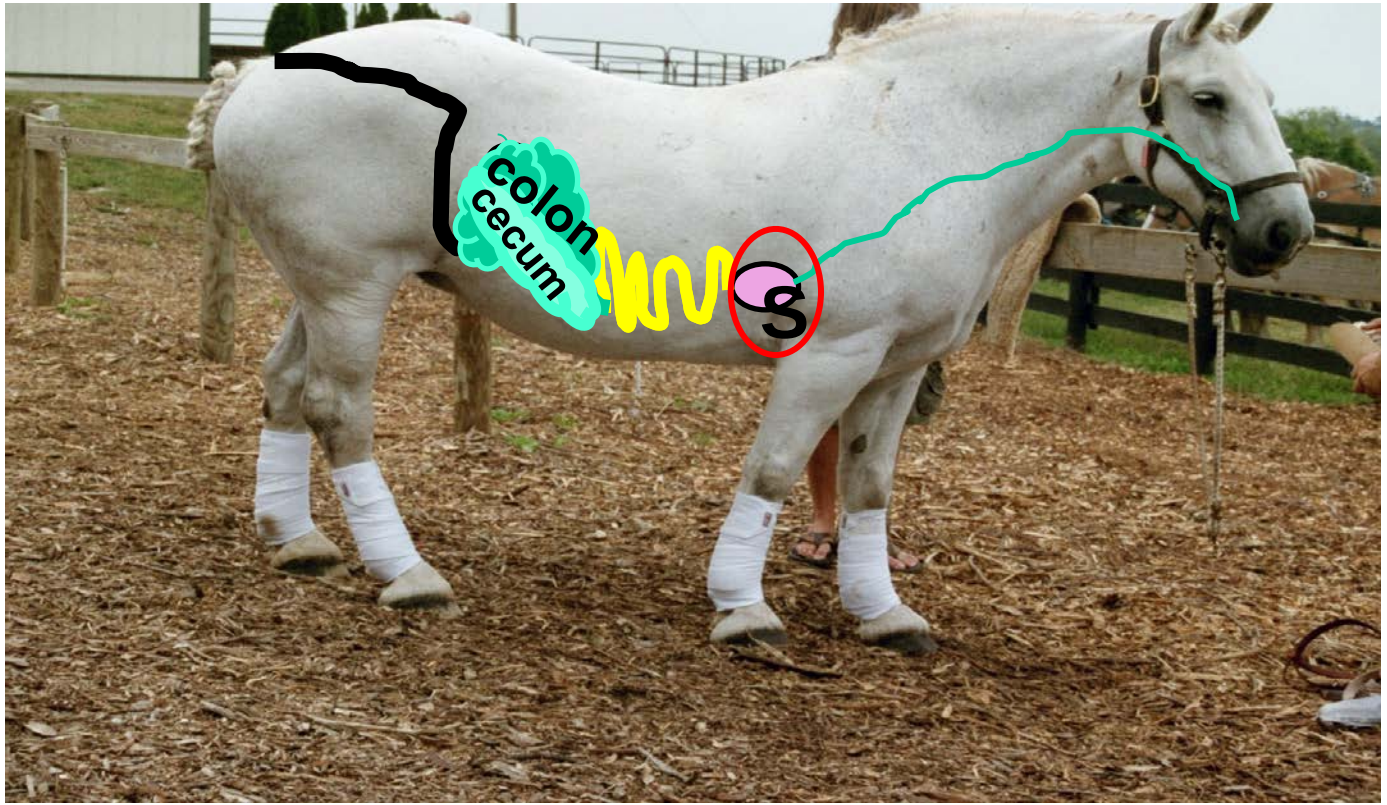
Saliva

wets the food
contains some enzymes
contains some buffers

More saliva…more buffers

More chewing.. more saliva

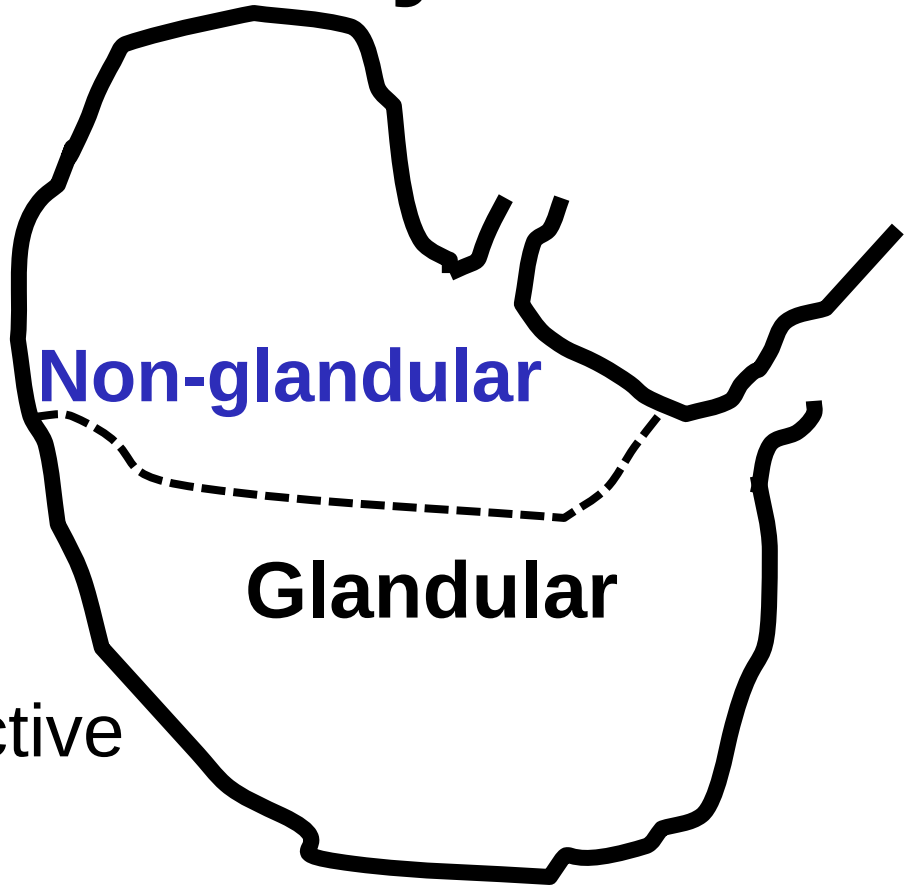
GI tract: *2. The Stomach*



Several characteristics are important to GI health

Gastric Anatomy

- Glandular portion:
  - Acid secretion
  - Enzyme secretion
  - Coated in mucus
  - Bicarbonate
- Non-glandular portion:
  - Lower levels of protective mucus, bicarbonate



The Stomach

Relatively small

Better suited to small meals …nibbling

The Stomach

Constant secretion of gastric acid

The Stomach

Some microbial fermentation of carbohydrates

Gastric Anatomy

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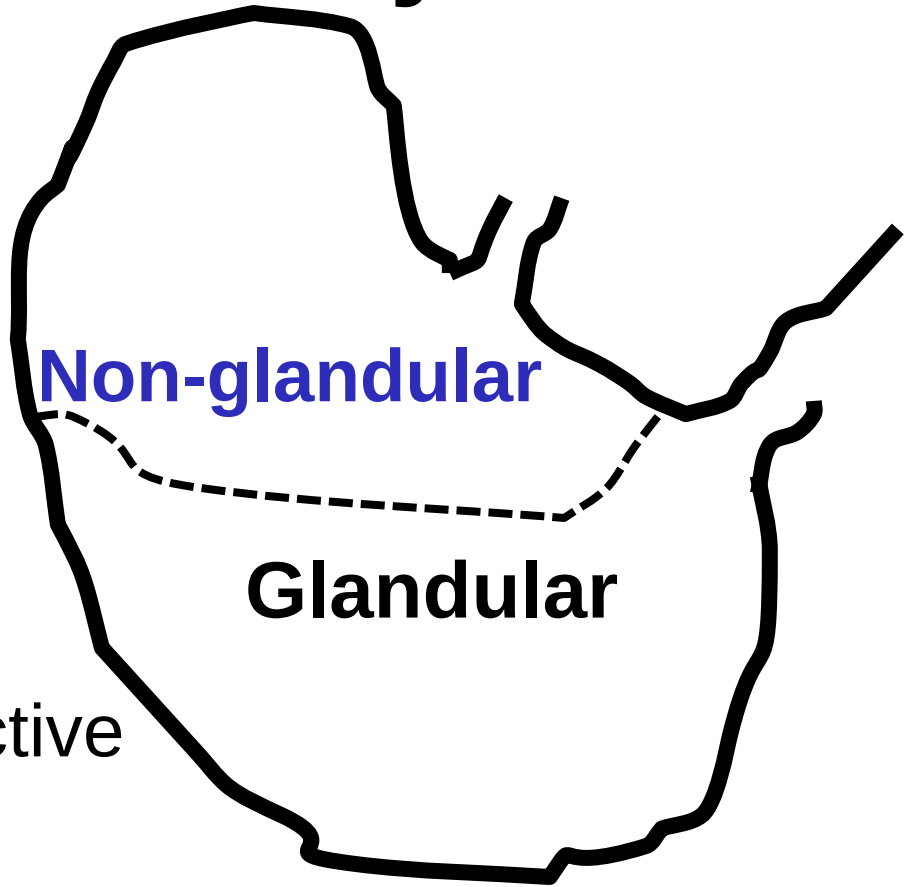


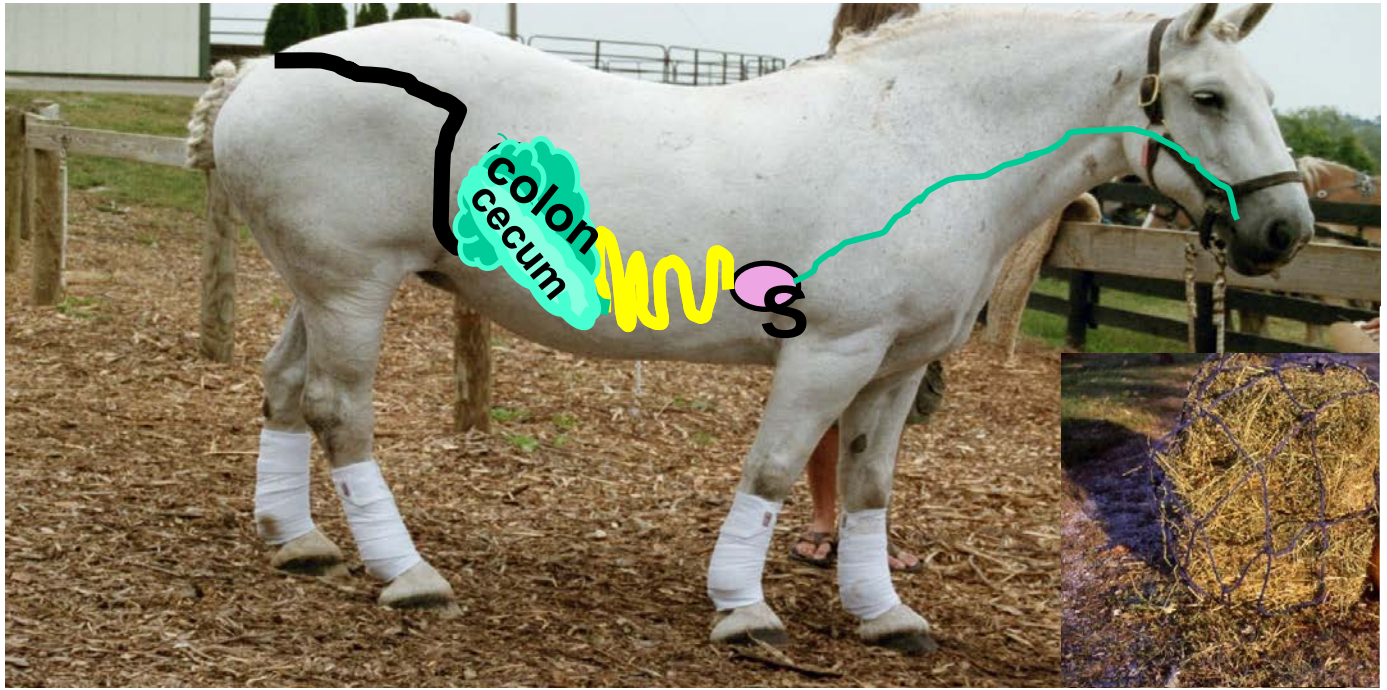
The Stomach

Gastric ulcers are common in racehorses

Contributing factors?

- Long intervals between meals
- Less hay, more concentrate (less chewing; more microbial fermentation of carbohydrates)

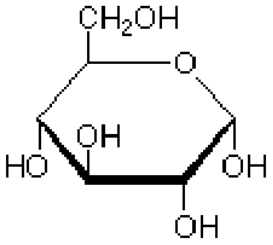
GI Tract. *3. The small intestine*



Enzymatic digestion of protein, fats and starch….but there can be limitations.

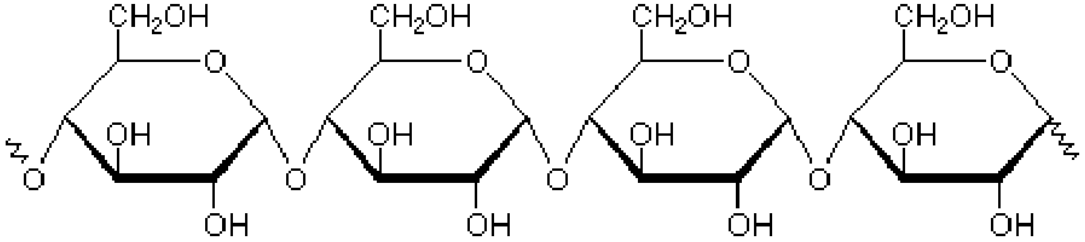
What is starch?

- A storage carbohydrate in grains and seeds



glucose (a monosaccharide)

A polysaccharide of many glucose units



amylose (a polysaccharide/starch)

Starch digestion in the small intestine

Small amounts of starch are well digested but large amounts of starch are not.

Starch digestion in the small intestine

Some starch sources are more digestible than others.

Starch digestion in the small intestine

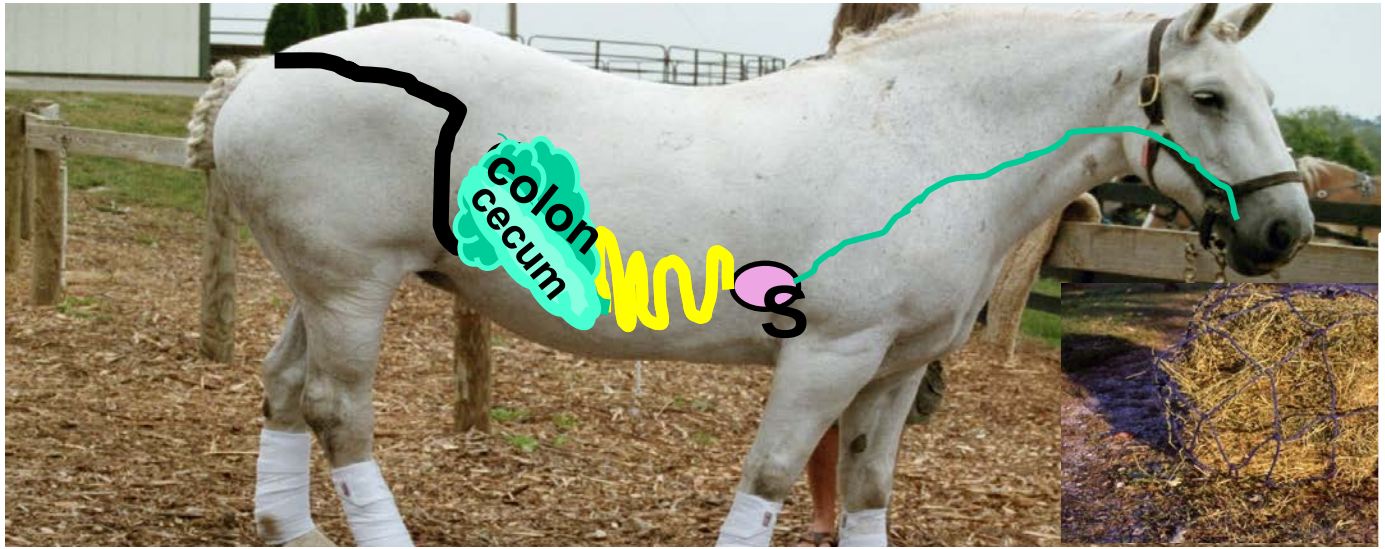
Grinding grains makes the starch more digestible.

Starch Digestion in the Small Intestine

- Why is it important?

  –Better small intestinal starch digestion… More usable calories

GI tract: *4.The Large Intestine*



A diverse microbial ecosystem:

ferment fiber (from forage)

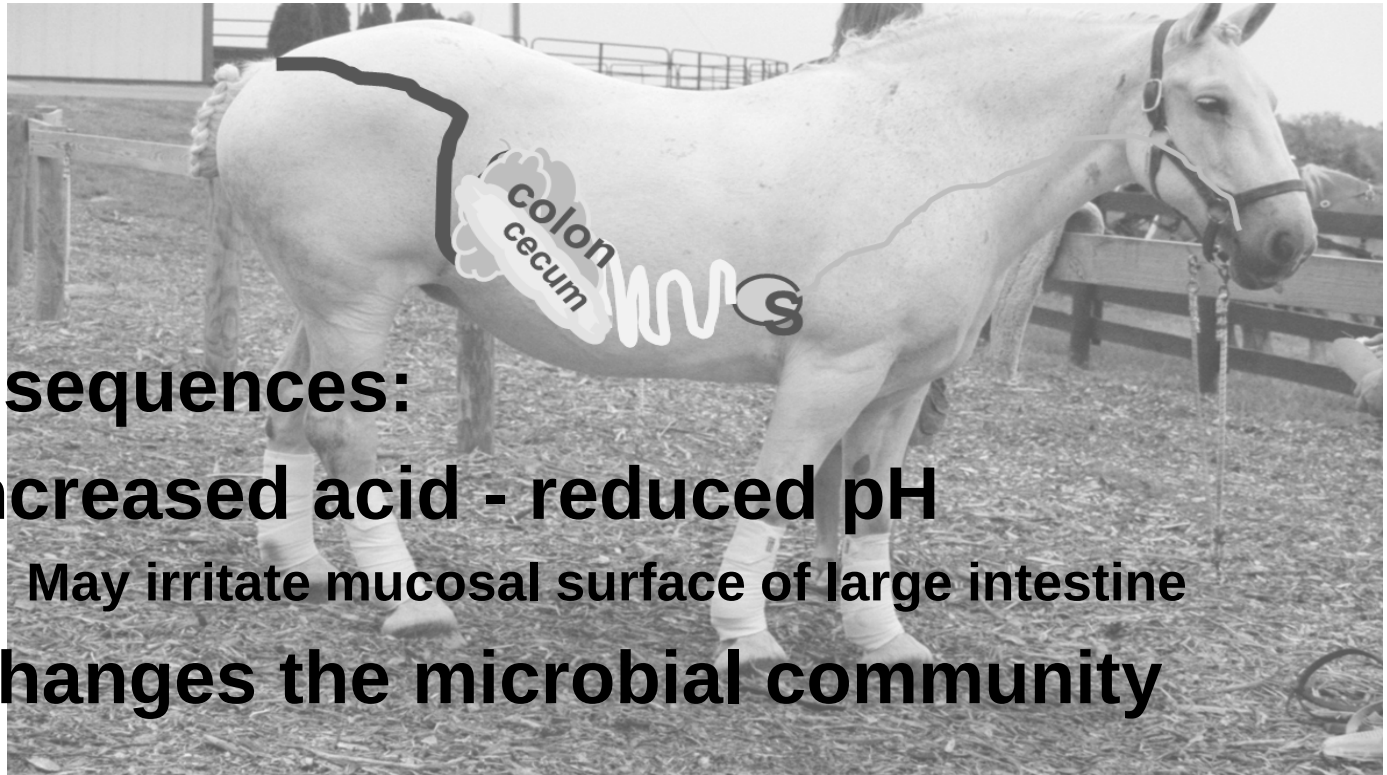
produce products useful to horse

The Large Intestine

But starch can also be fermented if it escapes the small intestine

Concerns with starch in the LI

- **Promotes acid production by bacteria**



- **Consequences:**
  - **Increased acid - reduced pH**
    - **May irritate mucosal surface of large intestine**
  - **Changes the microbial community**

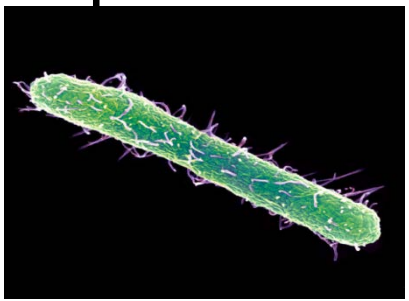
Role of the Gastrointestinal Microbial Community

- **Digests substrates otherwise not useful to horse**
  - **Contributes to calorie balance**

- **Synthesizes some vitamins**

Role of the Gastrointestinal Microbial Community

- **Pathogen defense**
  - Beneficial organisms compete with pathogens
    - *Substrates, binding sites on the GI mucosa*
  - Beneficial organisms may produce compounds to impair the growth of pathogens



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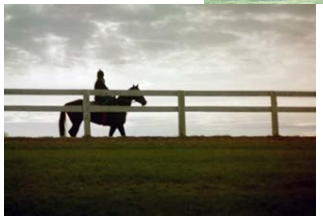
Which horses eat the most starch?

Mostly forage, some concentrate



Even with very good forage must feed large amounts of concentrate (and starch)

Feeding Strategies for Racehorses

- Replace some starch with fat
  - fat contains more than twice as many digestible calories as starch
  - horses digest fat well, but at high levels of inclusion, palatability may decrease.

Feeding Strategies for Racehorses

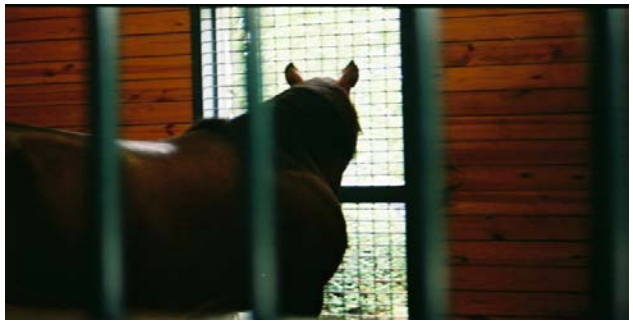
- Replace starch with highly digestible fiber in concentrate (beet pulp/soy hulls)
  - weight for weight, beet pulp has ~ 90% of the digestible calories of oats
  - replace some starch with fiber ***and*** fat; get similar DE content as in traditional mix, but less total starch
  - Adding fiber may increase chewing

Feeding Strategies for Racehorses

- Use starch sources that are well digested in the small intestine
  - There are differences among grains
    - Oats better than corn
  - Processing affects starch digestibility
    - Processed better than whole
    - But processing may affect chewing

Feeding Strategies for Racehorses

- Divide daily concentrate into several small meals instead of 2 big meals
  - Small meals are digested better than big meals
  - Reduces the interval between meals and prevents long period of empty stomach



Feeding Strategies for Racehorses

- **Use very good quality hay**
  - Early maturity; more digestible calories, more palatable
  - With better hay, less concentrate will be needed!
  - With more hay, horses will spend more time chewing.
  - More hay, more continuous food in stomach

Feeding the Racehorse

- Maintaining a normal GI tract
  - Promotes efficient digestion of nutrients
  - Maintains feed intake
  - Normal bacteria out-compete pathogens