“It” Doesn’t Just Happen: What Manure Evaluation Can Tell Us About Cows and Rations

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What does manure have to do with forage?
Physical Form

Alfalfa silage
Corn silage
Wheat straw

Byproducts
Sugar beet pulp
Ground corn
Physically Effective Form

- Enhances rumen function
- Increases rumination
- Rumen retention & passage
- Reduces digestive upset risk
- Allows rations to work

Fine
Medium
Coarse
The larger forage particles can make a mat that holds feeds in the rumen. Longer time in the rumen gives more time for rumination and fermentation to digest feeds and break down particles. This affects the size of particles we see in manure.
Where Does Feed Digest?

- **Rumen (Fermentation)**
  - Crude Protein
  - Carbohydrates (NDF & NFC)

- **Cecum & Large Intestine (Fermentation)**
  - Crude Protein
  - Carbohydrates (NDF & NFC)

- **Small Intestine (Enzymic)**
  - True Protein
  - Starch
  - Lipids
Fates of Fermentation Products

Rumen Products

- Organic acids
  - Absorbed
  - Recycled

Hindgut

- Absorbed
- Feces

Microbial protein

Gas (CO₂ & methane)

Belch/Bloat

Feces
A shift in the site of digestion changes nutrient supply & causes some of the symptoms of ruminal acidosis and digestive upset.
All that affects what we see here.
For lactating cows, soft, but forms up.
Not Normal: Foamy

Excess fermentation in the hindgut created acid & gas.
Feed didn’t digest where it should have.
Not Normal: Diarrhea

A sign of ruminal acidosis/digestive upset or eating spoilage.
Can be caused by disease, as well.
Eaten does not mean digested.
Need a finer grind?
Is forage feeding / particle size adequate?
You’re not supposed to be able to ID feed that’s in the manure…whole linted cottonseed, citrus pulp, ....
Not Normal

Pasty

Splattered

Dry
Except for maybe 5% of the cows, cows eating the same diet should have similar manure. If not, are they sorting their feed? Go look.
Cows have very few hobbies, so they sort their feed.
Not Normal: Mucin Casts

Sign of a past injury to the large intestine. Can be brown, gray, or almost black.
Damaging the lining of the large intestine creates mucin casts.

This can happen due to too much hindgut fermentation.

Henrikson et al., 1989. Laboratory Investigation 60:72-87
Figure reproduced with permission, ©Nature, http://www.nature.com/
These are a lot tougher in texture than mucin casts, and rarer.

Still a sign of past damage to the large intestine.

*Not Normal: Fibrin Casts*

*Courtesy of Dr. Sheila McGuirk, UW School of Vet. Med.*
Looking at Particle Size
Fecal Particle Size

Good ruminal retention = better digestion, smaller particles

Reduced ruminal retention = less digestion, larger particles
Coarse, undigested feed 1

33.5% roughage:
19% corn silage
5.5% ctsd hulls
9% alfalfa hay
Coarse, undigested feed 2

Found in a pool of bubbly diarrhea.
Before corn processors were popular..... Milk production increased when ground corn was added to the ration.
Walking the cows

- Get an idea of the variation
  - In groups
  - Between groups
  - Between rations

- Sample 4-6 pies/group for particle size
- ~5% of manure will not look like the rest.
Qualitative Not Quantitative

- Manure probably varies somewhat over 24 h.
- No way to know amount produced to precisely quantify what you sampled.
Cows will eat more “dirt”, salt, or bicarbonate when they have digestive upset.
Uterine infection or gut irritation?
Heat Stress causes digestive upset.

- Panting
- Decreased rumination
- Drooling
- Slug feeding
- Sorting
Use these together to build a case as to what ration or management changes are needed.
Questions?

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