BLOAT (RUMEN TYMPANY)

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What is bloat?

- Distention of the rumen with fermentation gasses
  - Primary bloat
    - Persistent foam mixed with rumen contents
  - Secondary bloat
    - Free gas separated from rumen ingesta
- Bloat is more common in cattle than in other ruminants
- Certain individual cattle are more susceptible
Primary ruminal tympany

- **FROTHY BLOAT**
  - Often associated with dairy cows that have recently been turned out on lush new-growth pastures (alfalfa, clover)
  - Cause: Entrapment of rumen gas in a stable foam
  - Small gas bubbles cannot coalesce
  - Eructation cannot occur → Rumen pressure increases
Several animal and plant factors influence the formation of the stable foam.

- **Bloat-producing pastures (lush pastures)**
  - More rapid bacterial digestion and intra-ruminal particle suspension
  - Release chloroplasts that trap gas bubbles and create a very stable foam with high surface tension

- **Soluble leaf proteins, saponins, and hemicelloses form a monolayer around rumen gas bubbles**
  - Most stable at pH of 6.0
  - Normal rumen pH ranges from 5.5 – 7.0

- **Succulent forages decrease the production of salivary mucin (an anti-foaming agent)**
Leguminous bloat is most common when cattle are placed on lush pastures, but also occurs when very high quality hay is fed.
Physiology

- Bloat-causing forage and animal factors combine and result in an increased concentration of small feed particles in the rumen
  - Usually over a 24-hour period
- Small gas bubbles do not coalesce, foam collects in the cardia and forestomach, and the animal is unable to eructate
Feedlot animals

- High-carbohydrate/ finely ground grain diet
  - Slime-producing rumen bacteria create an insoluble mucoprotein slime that stabilizes the foam
- Froth is made more stable by:
  - Fine particulate matter (finely ground grain)
  - Low roughage intake
  - Low pH created by lactate and VFA production
  - Decreased salivation due to fine grain diet (lessens intra-ruminal buffering)
- Bloat is most common in cattle that have been on a grain diet for 1-2 months
Secondary ruminal tympany

- **FREE GAS BLOAT** – Failure of eructation
  - Physical obstruction of eructation
    - Esophageal obstruction
      - Foreign body – apple or potato
      - Stenosis
      - Pressure from surrounding structures outside the esophagus (ex: lymph nodes, abscess from perivascular injections, *Hypoderma lineatum* reactions, and cervical neoplasia)
  - Interference with esophageal groove function
    - Vagal indigestion
      - Chronic pneumonia, traumatic reticuloperitonitis, tumors, abomasal torsion
    - Diaphragmatic hernia
    - Tumors
  - Interference with the eructation reflex nerve pathways
  - Lesions of the wall of the reticulum
Secondary/other causes of gas bloat

- Acute onset of ruminal atony
  - Ex: Grain overload
  - Ex: Anaphylaxis
  - Causes a reduction in rumen pH
    - Esophagitis and/or rumenitis
    - Interfere with eructation

- Hypocalcemia (milk fever)

- Calves up to six months of age
  - Often of unknown cause
  - Can resolve spontaneously
In cows that are not frequently observed (dry dairy cows, feedlot, or pasture), sudden death is the most frequently observed clinical sign associated with bloat.
Clinical presentation

- Secondary gas bloat
  - Increased TPR
  - Salivation, anxiety, mouth-breathing
  - Unusual position, often lateral recumbency
  - Excess gas lies free on top of rumen ingesta and fluid
  - Tympanic resonance over dorsal abdomen, left of midline
  - Percussion: Higher pitched ping than with frothy bloat
  - Rumen distention detectable via rectal examination
  - Stomach tube/trocarization releases large quantities of gas and alleviates distention
Necropsy

- Congestion and hemorrhage of the lymph nodes of the head and neck, epicardium, and upper respiratory tract
- Compressed lungs +/- interbronchial hemorrhage
- Esophageal “bloat line”
  - Cervical esophagus is congested and hemorrhagic
  - Thoracic esophagus is pale and blanched
- Rumen distention
- Pale liver

Diagnosis

- Accurate history
- Clinical signs
- Passage of an orogastric tube
  - Tube cannot be passed
  - Free gas bloat due to obstruction
  - Tube is passed, rumen gas escapes
  - Free gas bloat with/without obstruction
  - Tube is passed, rumen gas does not readily escape
    - Frothy bloat
      - pH < 5.5
        - Feedlot bloat
      - pH > 5.5
        - Pasture bloat
Treatment

- Stomach tube
  - Move back and forth to locate rumen gas
  - Administer anti-foaming agent for frothy bloat
- Trocar and cannula
  - If unsuccessful, emergency rumenotomy
  - If the cannula provides some relief, administer anti-foaming agent in the case of frothy bloat
- Emergency rumenotomy
  - Life-threatening cases
  - Explosive release of rumen contents
- Rumen fistula
  - Temporary relief for acute free gas bloat due to an intraesophageal mass
  - Remove mass manually or with the aid of a wire loop to snare the object
  - Treat with post-surgical penicillin

Picture: http://www.shoof.co.nz/prdimages/206931.jpg
Anti-foaming agents

- Vegetable oil: 250 – 500mL PO
  - Peanut
  - Corn
  - Soybean
- Mineral Oil: 250 – 500mL PO
- Dioctyl Sodium Sulfosuccinate (Docusate)
  - Surfactant
  - Commonly incorporated into anti-bloat remedies
- Poloxalene: 25 – 50g PO
  - For legume bloat, but not feedlot bloat
Prognosis

- **Frothy bloat**: Favorable with rapid intervention
  - Simple indigestion may occur post-treatment
  - Feed quality hay for 1 – 2 days
  - Rarely there is development of peritonitis or cellulitis in animals that undergo a rumenotomy

- **Acute free gas bloat**: Excellent
  - If offending object is removed
  - If the object must be left in place to be swallowed, the complications may develop
  - Sequelae to trocarization or rumen fistula
  - Secondary esophageal stricture
Prevention

- Feed hay before turning cattle on pasture
- Hay must be at least 1/3 of the diet
- Feed mature pastures (immature rapidly growing pastures are more likely to result in bloat)
- Administer anti-foaming agent during high risk
  - Drench twice per day (ex: at milking)
  - Add to feed or water or feed blocks
  - Paint onto the flank of the animal – to be licked off
Anti-foaming agents

- Oils: 60 – 120mL/head/day
- Fats: 60 – 120mL/head/day
- Alcohol ethoxylate detergent
- Ionophores (ex: monensin, lasaloc)
- Synthetic nonionic surfactant
  - Poloxalene: 10 – 20g/head/day
Prevention (continued)

- Pasture consisting of clover and grasses in equal amounts will keep the incidence of bloat low while maintaining high production
- Alfalfa: Feed low initial rate of digestion (LIRD) cultivars (commercially available)
- Add legumes with high condensed tannins (10% sanfoin) to the pasture seeding mix
- Feedlot ration should contain 10 – 15% roughage
  - Cereal
  - Grain straw
  - Grass hay
  - Rolled or cracked, not finely ground
  - Avoid pelleted feed from finely ground grain
References

- The Merck Veterinary Manual
- Ogilvie, Timothy H. Large Animal Internal Medicine. The National Veterinary Medical Series for Independent Study. 1998 Lippencott Williams and Wilkins.