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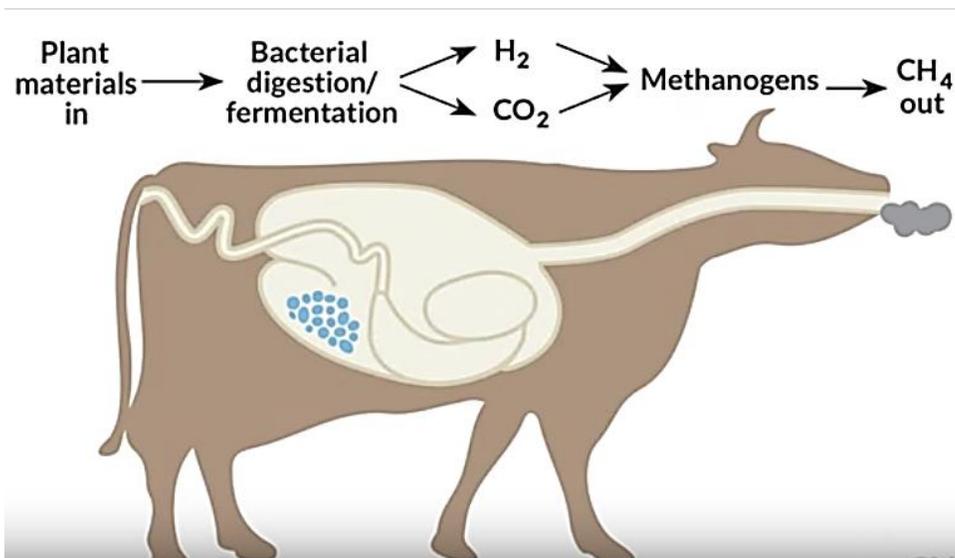
Symptoms and Causes of Foamy Bloat in Cattle

Zachary Christman, M.S., Agronomy

Overview

The bovine stomach normally produces gases such as ammonia, carbon dioxide and methane. However when these gases become trapped in the bovine stomach because of a thick, frothy or foamy liquid it is called bloat. Cattle bloat is a very old condition and goes by many names but is primarily trapped gas within the bovine stomach. Readily digested feedstuff such as highly processed grain diets or an overabundance of fresh immature alfalfa often leads to a vast amount of small particles and carbohydrates in the rumen; this is the major cause of foamy bloat. Severe bloat causes death by suffocation within 2 to 4 hours since the rumen compresses the diaphragm.²

Methane - a critical component of cattle gas



[What's the fuss about cow burps?](#)

Video used with permission from Science News
[Society for Science & the Public](#)

Methane is a natural by-product occurring from the organisms within the bovine digestive system. Methanogens perform the important task of reducing the pH in the rumen and lower digestive tract by combining hydrogen gas with carbon dioxide forming methane. If this reaction does not occur there is an overall reduction in feed digestibility that leads to a loss of animal productivity.¹ However, methane is also a powerful greenhouse gas that needs to be regulated. Also, methane makes up a significant portion of the gas that is found within a bloating animal. Some of the factors that lead to higher methane production are listed below.

The quantity of methane produced is dependent on these factors:¹

- 1.) Amount of carbohydrates consumed
- 2.) Chemical composition of the carbohydrates
- 3.) Retention time in the rumen
- 4.) The speed of ruminal fermentation that leads to the production of acetate and butyrate which releases hydrogen
- 5.) The ability for methanogens to convert the hydrogen and carbon dioxide to methane

Cattle Bloat

Bloat is a disease that has been written about since at least 60 A.D. Throughout the years bloat has been given many other names such as hoven, tympany, and blown. In French speaking regions this disease is known as me'te'rorisation or ballooning. Bloat occurs when the amount of gas to be expelled exceeds the ability of the stomach to release it. . This can be due to an injury of the esophagus or the gas becoming trapped in the rumen fluid. The digestion process in animals naturally generates methane as well as other kinds of gases. During normal periods of digestion the gas produced rises to the top of the rumen where it collects. When there is sufficient pressure the esophagus opens and the animal belches out the gas. Cattle with moderate bloat have reduced milk production and have low feed intake.²

Bloat can occur quickly since the average bovine stomach produces 2 liters of gas a minute when fed some diets, as an example, fresh alfalfa. Visible signs of bloat can occur within 30 minutes to an hour after exposure to bloat promoting forage (Figure 1). However, some animals will not be found to have bloat until 24 to 48 hours after the initial occurrence. Cattle bloat is one of the top four causes of sudden cattle death or death without any sign of illness.²



Figure 1 This photo is of the same cow before (left) and while it has the condition of cattle bloat (right). Note the large abdominal distension on either side of the cow (right). ([Photo credit: The Lannie family cow, ProBoards](#))

Table 1 [Characteristics of cattle bloat in reference to forage](#)²

Feature	Feedlot bloat	Alfalfa pasture bloat	Function
Readily digested feedstuff	High grain ration	Fresh immature alfalfa	Energy source for bacterial growth and rapid slime and gas production
Small particles in rumen content	Fine grain particles	Alfalfa chloroplast particles	Small particles add to slime matrix
Viscous rumen contents	Microbial slime	Microbial slime	Matrix to trap particles and gas

Table 1 is a good illustration of the different practices that increase the risk for microbial slime. Once the slime is produced, the gas from the various microbial populations becomes trapped and cannot be belched out. One or more of these processes could be occurring at the same time depending on the feed practices.

Small particles and microbial activity from rapidly digested forage is the primary cause of cattle bloat. Finely ground grain or pelleted feed are good examples of bloat promoting feed sources (Table 1). These kinds of cattle feed cause a large formation of gas and bacterial slime to form (Figure 2). Calves are more susceptible to this condition than older animals; this may be because the system to belch large volumes of gas has not completely developed.² Symptoms of cattle bloat include: ²

- Getting up, down and rolling frequently
- Defecate often as soft almost liquid fecal material
- Projectile vomiting
- 60 breathing cycles per minute

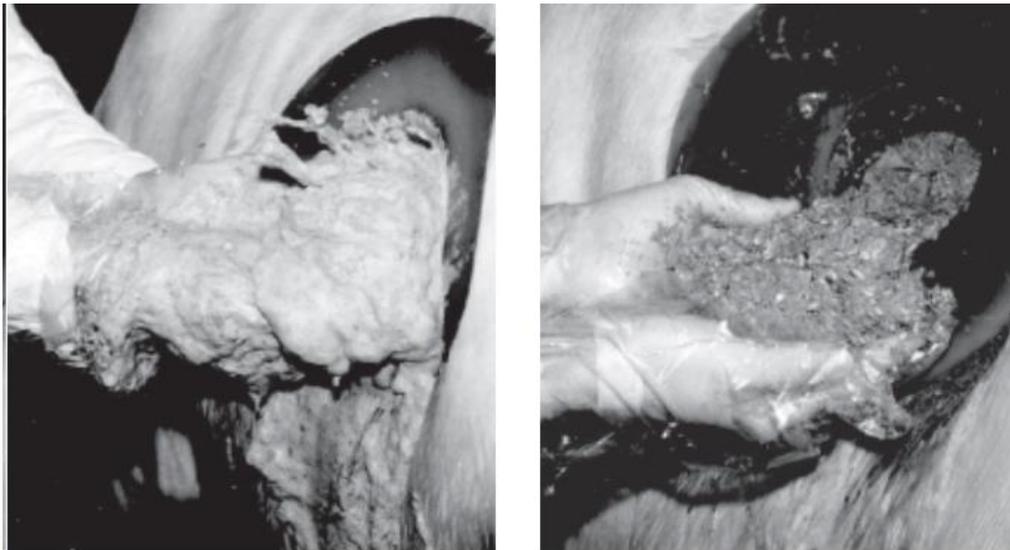


Figure 2 Fistulated cows showing foamy rumen material after being fed small particulate forage (left) and normal rumen material after coarse particle forage (right). ([Photo credit: Bloat in Cattle. Alberta Agriculture and Rural Development](#))

Some bloat safe characteristics is to have forages with thicker cell walls and a high mechanical strength. When processing grain it is recommended that the rollers should be set so that each kernel is cracked, not pressed into a flat disc. Another practice to reduce foam is to slowly acclimatize the cattle between different batches of forage by mixing the old feed with the new batch of feed over the first five days of change.²

Bloat safe forages contain tannins at a concentration that reduce microbial activity without decreasing the ability of the animal to absorb nutrients. Tannins are polyphenolic compounds of plant origin whose hydroxyl groups bind to proteins. The proteins that bind with tannins precipitate out and prevent the ruminal fluid foam from having any structural integrity. This slows down the digestive process and allows the ruminant to absorb more of the nutrient value of the feed.³ There have been many studies conducted that show condensed tannins inhibit the processes leading up to methane production.

1. Beauchemin Karen A., Tim A. McAllister and Sean M. McGinn
Dietary mitigation of enteric methane from cattle
CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources 2009 4 , No. 035
https://www.researchgate.net/profile/Karen_Beauchemin/publication/285089037_Dietary_mitigation_of_enteric_methane_from_cattle_CAB_Reviews_perspectives_in_agriculture_veterinary_science/links/565dc42308aefe619b26aacd.pdf
2. Majak, W., T. A. McAlliste, D. McCartney, K. Stanford, K-J Cheng.
Bloat in Cattle. *Alberta Agriculture and Rural Development*, Printed May 2003 Updated April 2008.
[http://www1.foragebeef.ca/\\$department/deptdocs.nsf/ba3468a2a8681f69872569d60073fde1/c147cb84919a6fd487256d430057b2cd/\\$FILE/420_60-1.pdf](http://www1.foragebeef.ca/$department/deptdocs.nsf/ba3468a2a8681f69872569d60073fde1/c147cb84919a6fd487256d430057b2cd/$FILE/420_60-1.pdf)
3. Tanner Greg, Peter J Moate, LH Davis, YG Li
Proanthocyanidins (condensed tannin) destabilise plant protein foams in a dose dependent manner
Australian Journal of Agricultural Research 1995 46(6) 1101-9
https://www.researchgate.net/publication/248896858_Proanthocyanidins_condensed_tannin_destabilise_plant_protein_foams_in_a_dose_dependent_manner