

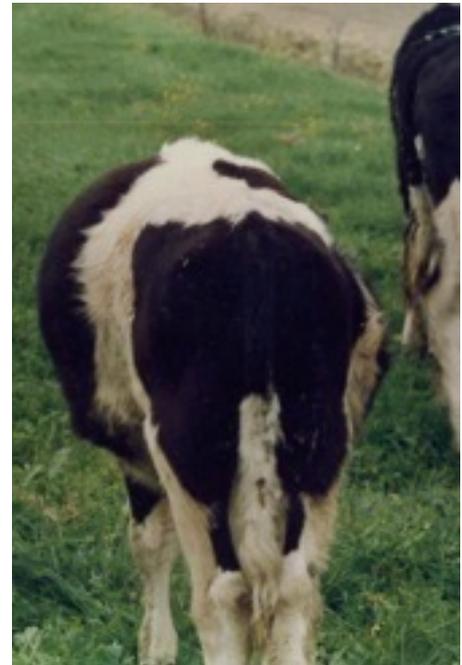
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There is only one thing certain about bloat, that is its uncertainty; however, there are ways of increasing bloat and ways of minimising it. As in most farming, it is seldom one factor causing the problem, it is usually a combination. Bloat prevention is not easy, but don't make it harder by ignoring the known management factors.

Bloat is mainly a cattle problem. Other ruminants seldom get bloat.

Causes

- What kills the animal is suffocation (choking) through paunch contents being forced up the throat, and/or causing pressure on the heart which then stops beating.
- Ruminants eating the following rapidly - legumes such as lucerne (alfalfa), clovers, grain based feeds, lush high nitrate ryegrasses, winter wheat, other succulent forages or brassicas. The latter are seldom fatal.
- Over-fertilising with potash.
- Anything that causes less saliva to be made and/or consumed. Saliva has bloat inhibitors (sodium and bicarbonate of soda) and is the first digestive juice, so is important for good digestion.
- Fast growing, damp, lush, low energy pasture (low fibre, causing acid, poor digestion).
- Fast eating by hungry cows.
- Moist pasture from dew, frost or showers reduces the amount of saliva produced.
- High potassium levels in pasture.
- Fertilising with any of the main growth elements may increase the likelihood of bloat, but not always. Potassium is the worst by far.
- Fertilising with poultry manure too many times and/or some fish products, both of which can grow lush high nitrate pasture. Many have reported bloat after applying poultry manure over several years.
- A lack of fibre in feed can cause bloat, because the rumen gets out of kilter when there is too much very short lush pasture, which sometimes is so short that it can't be regurgitated.
- Clovers certainly accentuate bloat, but some clover pastures cause hardly any bloat, and some grass-only pastures do cause bloat.
- Avoid grazing ryegrasses so hard that they don't stool. Trials here and in Britain have found that topping short reduces tillering of perennial ryegrass, because the new shoots come from stems, not from the base. Repeated extremely short grazing opens pastures up, then in spring clovers spread (provided Ca is not lacking) and cover the bare areas, increasing the percentage of clovers, which increases the chances of bloat.
- Grazing pastures short increases perennial ryegrass pulling, leaving patches which clovers fill, creating too much and aggravating bloat. Stocking rates which are too high to leave adequate cover encourage perennial ryegrasses and clovers, which are bloat species.
- Perennial ryegrass and high fertility grasses don't do well, or even survive, in soils with a low organic matter content, as occurs after growing maize for several years, so more clover grows in the gaps which can increase bloat. Read Forage Crops > Maize.
- Root damage from soil insects, over-grazing, insufficient lime, salt and/or correct fertilising can increase perennial ryegrass pulling, which opens up the sod and encourages white clover to



spread and become dominant.

- Over centuries of surface farming in many countries, the top 15 cm (6 inches) of soils have been depleted of minerals and what we don't even know about, but clovers and animals can suffer from the deficiencies. Some NZ AgResearch scientists know about this, but don't know why. If anyone does know, I'd like to be told please. The evidence is in Soils > Cultivating > Chisel ploughing.

- The low organic matter in soils referred to above, can be the hardest cause of bloat to control. After growing crops such as maize or potatoes for a few years, the organic matter percentage of the soil can drop to about 2%, which won't sustain perennial ryegrass. Grazing then pulls it out, leaving gaps which clovers fill. Clovers like the subsoil which gets brought up with chisel ploughing, and also thrive because the nematodes which attack clovers in old established pastures have reduced under cropping. After extended cropping it is best to fertilise with poultry or animal manure, and grow winter ryegrass and graze it, to return animal manure to the soil. Then grow a summer grazing crop such as Shirohie (best variety) of Japanese millet, which has a dense root system, so, with the animal manure returned when grazing, increases soil organic matter. In these conditions, fertilise with poultry and/or animal manure or artificial nitrogen to get high yields. Also after sowing the permanent pasture fertilise in the same way, until the clovers are established.

- Calves can get bloat on newly sown pastures where ryegrass is the only species long enough to consume, as the clovers are much too short to eat. A cause of this is the release of K and N which occur with cultivation, and sometimes because some farmers apply N (and K) to new pastures before it is needed. Also calves love newly sown grass so, if put in when hungry, they gorge. The result of a combination of all these is bloat, especially if grazed while there is still dew on the grass.

- Correct mixed pastures are always healthier, because they provide a better balance of energy and minerals. For example, Cocksfoot (Orchard grass) has less nitrogen, than perennial ryegrass, grown in the same paddock.

- Animals which are, or have been, stressed in some way, even with slight facial eczema, can die from bloat before the gas pressure gets very high. The reason for this is likely to be the double whammy and already stressed hearts and livers.

- Prolonged use of poultry manure has been found to be a cause of bloat, because of its high potassium level and nitrogen which grows sappy high nitrate grasses. Some ask why.

The 0.5% to 1.5% K level in poultry manure doesn't sound much, but because poultry manure is usually applied at several tonnes/ha, it adds up, and your soil might not need any K. Also, because poultry manure contains Ca and salt, both of which reduce K leaching, K levels can then increase.

A major cause of K leaching in NZ is the use of single superphosphate with its 11% sulphate sulphur, which leaches and takes K with it. Thank goodness sales of superphosphate and its mixes (15% potassic super and 30% potassic super) animals some 'Pasture' fertilisers in NZ have dropped from 90% of all fertilisers to 30%, and reactive phosphate sales have increased. Even the whole 800 ha (2,000 a) Whatawhata Hill Country Research Station has used reactive phosphate now since 1995 when Waikato Provincial Council asked them to change from superphosphate because being water soluble, it washed and leached in their many high country streams. Top hill country dry stock farmers have used it since the 1980's when some of them won the Fieldays most profitable farms of the year awards.

Correctly grazed pastures on all except sand and pumice (volcanic light sand) soils need very little K. Harvesting pasture too many times, removes K (and other elements). Applying animal effluent increases it.

If you keep applying poultry manure, you may have to harvest and sell hay to lower the K and nitrate levels.

A Matamata, Waikato, NZ, farmer with dreadful bloat had been using poultry manure for five years, as well as pig manure. Grasses were thriving, clovers were healthy, but being suppressed by

the dominant N fed grass, so clovers were not covering the bare patches which develop in pastures which are pugged in wet weather, and over-grazed in dry weather, and when clovers don't spread, weeds grow in the bare patches.

Pasture leaf K was 3.8% (it should be 2.8%) and sodium was 0.08% (should be 0.2%), so the K to Na ratio which some people work on was well out of balance. I prefer to work on optimum element levels because they mean more. K at 1% and Na at 0.2% is a good ratio, but won't grow pasture because K is too low.

His cows were getting bloat on mainly high nitrate ryegrass, hunger-accentuated. When pasture is high in nitrates, animals dislike it, so eat no more than they have to, especially down short, because the bottom few inches have nitrate levels up to ten times higher than the leaves. The result is cows going into milking hungry and coming out very hungry, into a new paddock of lush pasture, so guzzle the tops.

Stems of ryegrass plants can have 10,000 ppm nitrates while the leaves may have only 1,000 ppm, so don't allow animals to eat all the leaves and then come back to only stems after milking.

An upset rumen increases the chances of bloat. The physical cause is a build-up of wind that can't get out of the rumen and can cause death by pressure on the heart building up so high that it stops beating. The oesophagus of cattle join the paunch part way down, so gas can build up above it and can't escape.

It could be worth selecting and breeding from cattle whose oesophagus joins the paunch closer to the top.

When bloated, cattle like to stand on an uphill slope to belch and let gas escape. On flat land, pulling drain banks off creates a slope the whole length of the drain, and reduces mastitis infections. See Soils > Drainage. If a bloated animal lies down with its head lowered, it can choke and suffocate.

The control of bloat is an all year operation, with correct fertilising and good pasture management to avoiding killing out the grasses by pugging and over-grazing, and improving pastures by oversowing with the best grasses and legumes.

If this is not done, clovers spread and cover the gaps, or if clovers are not thriving, often because of insufficient lime, magnesium and/or boron, weed seeds land and germinate there. Good reactive phosphate (RP) fertilised ryegrasses pull out a lot less than water soluble superphosphate fertilised ryegrasses, and, according to many who changed from conventional AgResearch or fertiliser company fertilising using the antiquated soil test system, reduced the amount of bloat. See both Fertilisers, and Pastures > Grasses > Perennial ryegrass pulling. Note the better pasture on the left and the wilted pasture on the right on the same day.



Matangi, Waikato farmer Owen Baker, shown here in trials he did for me shows his strong clover based pasture after chisel ploughing on his right (photo's left) and weak clover in the mouldboard ploughed half of the paddock on his left and behind him. He later put a fence on the dividing line to measure the difference in yield, which was 100% more for chisel ploughing. He then found that his yearlings bloated on the mouldboard ploughed pasture, but not on the chisel ploughed pasture. This 'no bloat' doesn't work after maize has reduced the soil's organic matter content to about 2 or 4%. It has been known for ages that mouldboard ploughing the top 15 cm of soils depletes them (mines - hence the American dust bowl in the 1930s) and that subsoils have beneficial minerals that we don't



even know about. See Soils.

These two photos of soils on the same spade show how a chisel plough mixes subsoil into the top soil and mixes lime throughout the soil and makes a deeper



crumbly topsoil. The right photo, a few metres away, shows the tight mouldboard ploughed layer above the subsoil.

Surveys

A Ruakura, NZ survey by Dr James McIntosh in May 1987 revealed that 95% of farmers had a bloat problem, and more than half said that it was in the moderate to severe range. 90% used regular control systems, at least during part of the spring and autumn, with drenching the most common form of control. 74% of the 90% drenched, and 26% used bloat remedies through the water system in one way or another. They spent between nothing and \$8,000 a year on remedies, with the average at \$750 per year. Even with drenching, some cows still died. Those with herds of over 200 cows reported the worst bloat problems. Over-stocking, to cause hunger and then guzzling, aggravates bloat, but in the survey the highest stocking rates didn't always correspond with high bloat, so good overall management can reduce the problem.

Bloat was calculated to cost the New Zealand dairy industry about \$20 million a year in 1990 in deaths and material - without the cost of lost animal production, labour and stress. The national average death of cows from bloat was 0.7% pa, with some up to 1.2%, and 41% of farms losing some. At the same time, some farmers get no bloat.

There is no doubt that over-fertilising with potash accentuates bloat, and applying nitrogen in any form in small amounts, phosphorus and/or LimeMag can help reduce it. Many clients, after using correct fertilisers based on pasture tissue analyses and reactive phosphate fertiliser, have decreased bloat, showing that correct fertilising does help, partly because more grass is grown.

After I wrote the spreadsheet Dairy # Cows For Maximum Profit, which calculated the optimum number of cows to milk on farms, and that most showed that Waikato farmers milked too many per hectare, Ruakura stated in October 1991 in the NZ Dairy Exporter, that if stocking rate is decreased, production per cow will increase by even greater amounts than the figures I used in the spreadsheet. Later Ruakura research showed that correctly stocked farms made more net profit per hectare than highly stocked ones. It took a long time before LIC accepted this information, and some of their consultants still don't use it.

Tony Ashford, a client near Ngatea, Waikato, told me, "Bloat used to be a really bad problem, but since liming and fertilising with RP and trace elements including 40 kg per hectare of salt, and feeding DeLaval Solminix soluble minerals (salt based with nine soluble minerals) we've only had to add bloat oil to our in-line dispenser for a few weeks this year and have not lost a cow with bloat for years."

There were two adjacent peat farms in the Waikato. One stocked at normal rates, had almost no bloat and no stress. A neighbour stocked heavily and had bloat day and night. He ended up extremely stressed and unwell and gave up farming. Obviously neither name can be included. This does not mean that all low stocked farms have no bloat, however, vets have told many of my clients, that they get much more work of all kinds from highly stocked farms, than from correctly stocked ones.

Another bloat-free farmer at Gordonton suggested that bloat oil-protected cows, forget how to handle bloat and he could be right because we contract grazed heifers on our second farm share farmed by Ian Dobbs, our son-in-law. In 1984 he found that those from one farm never bloated while from another farm (both from Gordonton) always did. He made inquiries and found that the non-bloat ones came from a farm that had not drenched against bloat for 30 years, while the bloating herd had been drenched for longer.

Excess clover certainly increases the likelihood of bloat, but Ruakura research has shown that pastures with a high percentage of lush perennial ryegrass can also cause bloat, and, as we know, some clover pastures hardly blow at all. Dr Vicki Carruthers at Ruakura found that pastures with a high ryegrass content can cause bloat more than those with other grasses. This could be because high ryegrass pastures are high fertility pastures, and bloat goes with high fertility. Ryegrass is also more palatable than many, so would be eaten faster and upset the delicate rumen balance. It also takes less chewing, so less saliva is made, which increases bloat.

Prevention

Apply potassium only if the Pasture Tissue Analysis shows it is below 2.7% (see Potassium). Applying potassium, based on soil tests, is a major cause of bloat, because soil levels are inaccurate, causing too much K (and P) to be applied, and not enough lime.

Apply coarse agricultural salt at about 50 kg per hectare to maintain the pasture analysis optimum of about 0.2%.

Apply lime and balanced fertilisers based on pasture analyses.

Leaving a high pasture residual after grazings means animals will be less hungry so less inclined to blow. This also encourages grasses other than perennial ryegrass, which reduces bloat. Grass grows grass, so having animals leave plenty behind ensures faster regrowth, which means more pasture for the next grazing. A higher residual also leaves some ungrazed clumps which provide roughage, which bloating cows will sometimes select from the lush pasture. I have watched cows in a bloaty paddock select Massey Basyn Velvet Grass (Yorkshire Fog, *Holcus lanatus*) and longer grass to get some roughage.

Beef farmer Phil Taylor of Ngaroma, South Waikato, dairy farmer Gary Wilson near Matamata in the Waikato, and others, found that within a year, using pasture analysis, lime and the best reactive phosphate, with added trace elements, encouraged deeper rooting of pastures, achieved a more balanced mix of minerals in pasture herbage, reduced the incidence of bloat substantially. Gary Wilson had bloat so badly for years that their farm was a Ruakura bloat research farm. Two years after using my recommendations, his bloat disappeared completely, production increased and pastures improved, from open sparse ones with gaps, to dense ones. He often said to me he felt he was in a dream, and that he would wake up to find bloat back again. Ruakura gave up the farm because there was no bloat to monitor, but the scientist doing the survey didn't ask how he had achieved it, so that they could tell everyone. This is part of the jealous 'Not invented here' (NIH) syndrome that scientists suffer from and farmers pay for.

Lex Riddell of Gordonton, Waikato, had bloat reduce after liming the whole farm in 1984, when fertiliser and other costs rose so he had to economise, and applied lime instead of fertiliser. The extra pasture growth also surprised him.

Some farmers have said that bloat became a real problem after free-flow potassium chloride (muriate of potash) replaced potassium sulphate in the early 1950's.

Researchers have been debating whether salt or other minerals in the soil make any difference and some have been saying that, "If salt helps, then why do they still get bloat in Taranaki near the coast." The fact is that a Taranaki dairy farm that I investigated, right on the west coast, had no bloat for six years and had the same stocking rate as farms further inland which got bloat. The amount of salt necessary to control bloat is, in most cases, only dropped in rain close to the sea. I took herbage tests during the height of the bloat season from an Okato, Taranaki farm bordering the sea. The paddock nearest the sea had much higher Na levels than at the back of his 100 ha farm, and three times the sodium level of a central Waikato farm (50 km from the sea) where bloat can be bad. All minor elements, except boron, were also higher in the coastal sample. Switzerland, well away from the sea has the lowest Na levels I've seen. The salt theory is simple. Try to make froth with soap and salty water. See Elements > Sodium.

All year operation with correct fertilising

RP fertilised ryegrasses don't pull out by the roots as much as water soluble superphosphate fertilised ones do. More pulling of ryegrass means more clover growing in the bare patches. See Fertilisers, and Pastures > Pulling. A little poultry manure may be necessary to grow more grass and less clover, however too much N from an excess of clovers or artificially can cause nitrate bloat, especially with ryegrass.

- Avoid fertilising with potassium according to soil analyses, because most base their recommendations on K soil levels higher than is correct, so pasture leaf K levels get too high (above 2.8% K).

- Measure the pasture sodium level, and if below 0.2% apply about 50 kg/ha of coarse agricultural salt.

- Measure the boron level and apply 1 kg/ha for each ppm below 20 ppm (example 9 ppm apply 11 kg of OrganiBor (10% B) or Ulexite slow release B (11% B). Boron increases the sugar/energy content of pastures, which reduces the nitrate level and makes pasture more palatable.

- If pasture cobalt is much below 0.13 ppm apply 0.5 kg/ha of cobalt sulphate to bring it up to 0.13. Co is essential for rumen micro-organisms. A healthy rumen is less likely to blow.

- Don't fertilise with animal manure too many times, because K and N levels can build up.

- Sow mixed pastures. Just adding to the mix ¼ kg per hectare of Massey Basyn Velvet Grass (70 seeds per m²), 2kg of the best cocksfoot/orchard grass (200 seeds per m²) and 3 kg of low endophyte tall fescue (120 seeds per m²) can help. However, none will grow if too much ryegrass is sown and/or the new pasture is allowed to get too long (higher than 15 cm or 6 inches) each time before grazing, for the first year.

- Good fertilising and pasture management to avoid killing the grasses by pulling, pugging and over-grazing. Grazing pastures too short increases these.

- Repeated heavy grazing, which doesn't leave optimum pasture cover, encourages both perennial ryegrasses and clovers and discourages others. Ryegrass, when high in nitrates from excess applications of N in animal manure or artificially, can cause bloat.

- Over-sowing when required, to keep grasses thick and not have bare patches later covered in clover.

- Having pastures with a variety of grasses, not just ryegrasses.

- Grazing should include back fencing and on-off grazing when wet, dry or short of feed. Move animals to dry areas and paddocks which need improving with the animal manure.

- When grazing very short, lush, high nitrate pasture, feed hay or some roughage first, to reduce hunger-gorging and to make the rumen work properly.

- Feed a soluble mineral mix through the drinking water. It increases the production of saliva, the first bloat inhibitor.

- Drench with a bloat oil in the parlour during milking. There are many available based on alcohol or pluronics. If one doesn't work, try another. There are good and bad bloat oils.

- If feeding concentrates Rumensin™ can be added. It improves rumen efficiency and helps control bloat.

- Minimise bloat by full feeding, which means grazing longer pastures from, say, 2,600 kg DM/ha to 1,600 rather than from 2,400 to 1,400.

- Avoid hunger by keeping milking time short (large herds should be reduced to 200 or smaller mobs).

- Cut silage longer, because anything that causes more chewing reduces bloat, while short material, whatever it is, causes more bloat.

- A two year trial showed that bloat was not a problem where pasture mineral levels were correct from optimum fertiliser and trace element applications, energy intake was adequate (pasture was not too short), and salt based soluble minerals were fed in the drinking water.

- 24 hour grazing sometimes reduces bloat.

Preventing bloat on pastures sown in paddocks after maize or some other crop has been grown for a number of years and lowered the organic matter content of the soil can be difficult. Reduce clover dominant pastures by using nitrogen, drilling and/or over-sowing grasses as often as required, which can be annually until organic matter builds up in the soil to closer to 5%.

Most high producing farmers avoid pugging, unless for a purpose, and oversow bare patches as they occur, provided moisture and temperatures are appropriate (spring, and autumn or even winter in mild climates), with excellent results in maintaining dense pastures. In freezing areas, oversowing in late autumn won't work, but frost seeding works well in spring.

Proneness to bloat is inherited, so request semen from bulls which are from a bloat free herd. AI centres should be looking at more than just high production. A dead cow produces nothing. While one would think that bloat should have been bred out by the very fact of the affected ones dying, it has not happened; however Ruakura has bred up a herd of cows with a low susceptibility to bloat. Keep your replacements from bloat free cows, although a bloat free cow can suddenly be found dead, while those which bloat a little each day and in many cases don't die, but possibly learn when to stop eating and how to belch. Some cattle will stand with their front legs on a raised area, but these are not always available on a well levelled paddock. When shaping paddocks, pull drain banks off to make a slope (see Soils > Drainage) and mound soil around water troughs and gateways for belching areas, and to keep them well drained and mud-free.

Bloat can kill quickly, sometimes in an hour. Watch out for windy and drizzly days, when it occurs more. If bloat is occurring in the area, graze the cattle on hillsides. They can then stand with their heads uphill, which will assist them to burp.

A farmer wrote, "One thing I noticed when spraying bloat oil onto pasture to prevent bloat was the incidence of bloat went up if we missed a treatment, for example, during pouring rain."

I put this down to the fact that the cows were not used to a bloat challenge and grazed accordingly (flat out). The rapid intake of bloaty feed is a recipe for bloat problems.

So if you use bloat preventatives, make sure they are treated every day while bloat is likely.

Another way is to mow a third or half the paddock in the early or late afternoon (depending on the amount of sunshine and heat), when pasture sugars are higher and nitrates are lower, and graze it the next day. Use a mower, not a slasher type which can knock the pasture around too much, and mix dirt in with it. Erect an electric fence so that animals eat the mown area first. Again the amount mown will have to be increased if bloat occurs on the standing pasture. Graze it the next day. This also increases dry matter intake, dries out and freshens the bottom mouldy parts of long pasture, and keeps pastures fresh and more weed-free by reducing their seeding. Even when bloat has been severe, this has stopped it. This also works on lucerne (alfalfa). Mowing before grazing, rather than topping (clipping) afterwards, is cleaner, and doesn't pollute the pasture with dung and with the parasites in dung. Gradually increase the mown area to a maximum of a third of the paddock, so that there is always a third to be cut before subsequent grazings.

Once accustomed to it, cattle will usually eat the mown pasture first, so fencing them on to it is then not necessary, but watch in case some don't eat any wilted pasture.

Try to keep feed similar from day to day. Avoid making dry stock eat the base of plants with its high fibre content one day, then move them to lush pasture the next. Rumen microflora can't adapt to the sudden change, so bloat can occur. Once it starts, it is hard to stop. Many clients had bloat vanish after liming and applying balanced fertilising with the best RP. Most were on mineral soils, which seem to suffer more bloat than peats.

Many of my clients have done their own comparative trials before changing completely to ideas I have suggested, which seemed so opposite to what they had read and been told all their farming lives. I encouraged them to do their own trials and I suggest you do too. Once you have seen results on your own farm, you won't forget or give up an idea, even if peer pressure gets strong from those tied to the establishment.

Control

When bloat is a problem or likely to occur, aim to-

- Feed hay or silage before grazing bloat prone pastures. The quantity will have to be increased until the bloat stops. Maize silage can also improve cow fertility and body condition and the milk fat test, especially if grazing pasture shorter than 2,500 kg DM per hectare. Ensure that all animals eat some hay or silage. If none is available or they are too expensive, straw will help. They will usually eat it because cattle on bloaty pastures usually crave roughage. Dry roughage makes the animal release and swallow more saliva, and stimulates the rumen to work properly. Straw must be clean and fresh (not old, dusty or musty) so sweet, which means baled immediately after the combine. If you buy straw check that it has not been sprayed with something toxic or something you don't want to feed.
- Lengthen the rotation, so longer more mature pasture is being eaten, but don't go above 3,000 kg per hectare, and apply the Grazing 40% Rule (See Spreadsheets) to maintain high animal production.
- Give the animals the new paddock in the afternoon when nitrates are lower.
- Fully feed animals to avoid hunger and gorging.
- Avoid grazing frosted pastures. Dew covered pastures are also dangerous, but avoiding them is impractical. A shower of rain can cause animals to bloat in a paddock which they may have been in for hours, and were not bloating before the shower came, possibly because they eat and swallow wet pasture more quickly, and without taking down much saliva - a bloat preventer.
- Avoid frequent small feeds which encourages fast eating and increases the likelihood of bloat.
- Put milking cows into their next paddock for a while before afternoon milking, and use a 24 hour rotation during bloat periods to give animals a complete fill. Keep milking times short. Split the herd in two if necessary, so that they aren't out of the paddock for too long. Animals will then be less hungry so less inclined to gorge after milking. Walking to and from paddocks and milking taking much over two hours is too long.
- If sun has shone, photosynthesis will have increased the energy (carbohydrate) levels and lowered the nitrates in the afternoon.
- Close bad bloat paddocks for hay. This solves the immediate problem and allows the grasses to smother the clovers for a while and drop some seed to thicken up the pasture, which helps the long-term problem.
- If using drenches, be careful about mixing them, because some bloat products cancel the effects of others.
- It is obvious that the formation of saliva is important for the overall health of the animal and bloat control. In some countries, bentonite, an extremely fine powdery clay, is spread over damp pastures to reduce bloat by making the animals eat more slowly and release more saliva. Bentonite slows the movement of high protein pasture through the digestive tract.

Sundry

Some say that many frequent moves reduces the likelihood of bloat, but if animals are hungry because they have been removed before full, after getting the next feed they can gorge and get bloat. Getting them full to start with is not easy. Also some fill faster than others. I prefer other systems.

Many top farmers in the Waikato producing 1,200 kg/ha of milk solids, take care to avoid pugging, and oversow bare patches as they occur in autumn and early spring, and maintain balanced clover/grass pastures.

Many of my clients have seen bloat vanish after doing everything right, but have had animals die after becoming hungry through being left in the yard for the vet, artificial breeding or after being transported.

Owen Baker, at Matangi, who mouldboard ploughed some paddocks and chisel ploughed others deeply, got bad bloat on the shallow 17 cm (7") deep cultivated paddocks, and no bloat on the adjacent paddocks which were chisel ploughed to 25 cm (10"), despite the chisel ploughed paddocks

growing more and healthier looking and taller white clover and 40% more pasture, measured with his PastureGauge. White clover responds well to subsoil being brought up. See Cultivating for how chisel ploughing reduces bloat.

Salt is being used by many to reduce bloat. Some put salt into the drinking water as soon as bloat starts and claim that it stops it. Many have fertilised with salt for decades. Dr Max Turner of Massey Agricultural University showed how fertilising with salt helped reduce bloat. Sechura, being a marine product and washed with salt water, has two to three times more than other P fertilisers.

Sodium and calcium in ryegrass makes it softer to eat and break off. Do trials and try it. You may notice that the animals graze the salt and lime fertilised areas shorter, because they are softer and the cows prefer them. Potassium makes it harder. Some ryegrass cultivars are tougher. Salt discourages frothing while potassium salts encourage frothy bloat. The bloat foam is less adhesive when sodium is adequate in plants, while froth from high potassium plants is stronger, so harder to break down on its own and with drenches.

If the farm has a continuing bloat problem, and all preventions have been applied, oversow or drill the worst and pugged paddocks with non-bloat grasses such as Cocksfoot (Orchard grass) and Massey Basyn velvet grass (Yorkshire Fog), and with Plantain (Tonic for cattle and Lancelot for sheep), which should be sown in all mixes with the best chicory when appropriate (See Herbs).

Feeding grain can reduce bloat, but if ground very finely can cause more bloat than coarser ground grain, which helps balance the rumen.

Feeding ionophores such as Bovatec and Rumensin can reduce the incidence of bloat. Make sure they have been approved for use in dairy cows. Some farmer comments are that extra milk is produced while on Rumensin, but the whole year's production per cow has not increased. A cow which bloated most of the time stopped after getting a Rumensin bullet, and improved in condition. Some cattle bring up the capsules.

A farmer who gave all his cows Rumensin bullets had no bloat, and believes that the high cost gave a return because of no deaths, and saved the cost and work of drenching. His cows looked very healthy.

It must be powerful for such a small amount (32 g) to give control for so long (100 days). It has been used for years in US feedlots as a rumen modifier. It increases the efficiency of the rumen fermentation by altering the microbial population.

The fatty acids that are produced in the rumen are propionic, butyric, and acetic. Rumensin increases propionic acid production and depresses butyric and acetic, which is important, because propionic acid is more energy efficient, so gets more energy out of the feed. Another important reason is that, when suppressing butyric and acetic acids, their waste products, methane and carbon dioxide, the gases which contribute to bloat, are depressed. The more propionic acid produced, the more efficient energy-wise the cows are, and the less methane and carbon dioxide produced.

Legumes such as Lotuses (Birdsfoot trefoil) and Sulla have condensed tannins which prevent the forming of foam in the rumen so don't cause bloat, but at least 50% of the legumes must have tannin to prevent bloat. A problem at this stage is that plants containing condensed tannins are not very high producing, and are hard to keep in pastures under grazing. Australian and New Zealand scientists are endeavouring to breed condensed tannins into white clovers to counter their bloat effects.

Treating with bloat oils

The discovery in the 60's by Doug Philips, of Ruakura Animal Research Centre, of bloat control with pluronics was a major breakthrough.

All products have to be approved and registered for animal treatment by the NZ Animal Remedies Board, so don't try anything home made. Doing so can be illegal.

Cows drink a lot of water, so if it is the least bit dirty or toxic they'll drink less and produce less. Some cows are fussier than others, so those that don't drink enough when bloat oil is being used can suffer bloat. See Water.

Organic farmers should see their product list for approved products.

A combination of water-soluble surfactants, pluronic detergents and alcohol ethoxylate, developed in New Zealand as a preventative and treatment for pasture bloat, have been used to control bloat since the 70's. They are nontoxic to mature ruminants (but are to young calves - see below) when administered at recommended concentrations. Most are used for daily drenching, but some are used in drinking water or sprayed on pastures. Spray the amount required per animal, times the number of animals on the area to be grazed. To save having to spray a whole paddock, and to get better control, spray a small area and make the animals graze it first.

In 2000 scientist Dr. Tim McAllister of Lethbridge Research Centre, Canada, examined the effects of New Zealand Blocare dispensed through drinking water to cattle and sheep grazing alfalfa for short durations, and found that, if it is adequately consumed, it is 100% effective for controlling bloat, without reducing productivity.

Start watching for bloat before the beginning of the known danger period, and start control before rather than after it starts. Once bloat starts occurring it is harder to control because animals start a graze-and-stop-when-bloated regime, which encourages bloat.

If drenching with bloat products, follow the instructions on each drum, because they can vary. Normally they must be diluted at least six to one. However, eight to one can be better because it mixes more with the rumen contents. Some bloat drenches are better than others, so if you continue to get bloat, even when drenching correctly, and the water is not too cold, (see below), try another. Don't mix the different types of bloat oils. Doing so can reduce their effectiveness.

Some farmers use only 4 ml/cow/day of bloat oil, most 7, some 14. Don't exceed 14 ml. 30 ml has killed a 500 kg cow. Overdosing can depress production and damage livers.

If drenching with the amount on the instructions does not give good control, then, rather than increase the quantity of product, increase the amount of water, so that it is more dissolved, and has a bigger volume to mix with the paunch contents. Some bloat products when too concentrated can go to the bottom of the paunch, whereas when well diluted they mix with the paunch contents, so achieve their aim. Also try warming the water.

Bloat material by-passing the rumen (first stomach) can be a reason for some cows (especially nervous ones) bloating, despite being drenched. Drench the cows gently to avoid closing the reticular groove, thus causing the drench to bypass the rumen. Cold water can do this, so add hot water on cold mornings so it is just warm to the touch. A King Country (high altitude cold area) farmer phoned one cold spring and complained that he had tried several brands of drench without success. I asked him if his water was cold. It was, so I suggested warming it. He phoned back three days later, delighted.

The pumping and circulation necessary to keep the drench in suspension usually keeps it warm.

Don't drench cattle when they are ruminating. Wait for them to swallow the bolus. Don't force the head up and back too far because doing so can encourage the drench to bypass the rumen.

Some minerals can close the groove, especially if there is not enough water with them. Other causes can be nervousness, stress, and/or the gun pushed too far down the throat.

Bloat materials are highly toxic to young calves and can kill them, so don't use buckets for mixing bloat material that feed the calves. If using a water dispenser, don't allow non-ruminating calves under a month old to drink the water containing bloat oil.

If the cost of drenching looks like being greater than the cost of expected losses, then don't drench. Not drenching will help you breed up a comparatively bloat resistant herd, but beware of sudden calamities like those who go to the paddock and find large numbers dead. Also remember that bloating cows don't milk well.

Mixing the drench

Caution should be exercised when other materials are added to bloat drenches, because adverse reactions can occur.

Bloat materials are usually compatible with magnesium oxide and magnesium chloride in the correct proportions, in suitable water and if mixed correctly, but they have to be kept stirred.

Products such as Molvinate (a molasses base with vitamins, minerals and cider vinegar added) at

one litre per 10 kg of magnesium oxide can help keep some mixes in suspension in some waters. There are magnesium products with suspension agents in them.

Some farmers add small amounts of salt or soluble mineral mix to the drench to help keep materials in suspension.

Don't put bloat oil into the mixing container first, pour it into a container of water, mix it, and then pour it into the main container of water, to prevent the bloat material from sticking to the bottom. Start circulating the mixture, and then add more water until correctly diluted.

Some bloat products, some magnesiums and bicarbonate of soda in some waters can turn into a thick goo, which takes hours to remove.

Try the products you'd like to mix in an old tin at the same proportions, in case the mix goes hard.

If drenching is not possible, salt, paraffin oil in the drinking troughs, and/or sodium bicarbonate can help. Most bloat oils can be put in water troughs.

Bloat control with drinking water dispensers

Bloat preventers such as bloat oils (pluronic detergents and alcohol ethoxylate) can be fed in drinking water through a dispenser, but can have a damaging effect on some alkathene (black plastic) water piping, particularly low density pipe and if it has been heated when applying fittings, which weakens it. High density pipe is less affected, and PVC is not affected. Alkathene piping is less affected when bloat oils are used through tank dispensers because the concentration is high after adding it, usually at milking time, to control bloat when it is most needed, and reduces thereafter, ending up with clean water for the rest of the day. Metering dispensers feed the bloat oil into the line continuously, so pipes are subjected to it 24 hours a day.

Start adding the product well before bloat is expected, and build up gradually over two weeks, until the concentration is as recommended.

In severe bloat conditions, drenching is the most effective, but on-line tank dispensers are used satisfactorily by many to add bloat materials to drinking systems, provided the alkathene water piping on the farm is satisfactory. Damage to alkathene piping by some pluronics has limited the use of this system; however, some farmers, who were having problems with bloat material splitting alkathene pipes, found that it stopped after changing brands. There are a dozen brands in New Zealand.

If rainfall is excessive, dispensing in drinking water can fail, because animals will drink less and from puddles. Adding a good soluble mineral mix encourages animals to drink from troughs, because they like the salt and the minerals.

When to stop bloat treatment

Never stop bloat treatment suddenly just because there are no signs of bloat. Decrease the rate gradually, and observe the effect.

There are those who drench most of the year, and neighbours who never drench, so choose which you'd like to do long term and aim for it.

Treating bloated animals

Systems of controlling bloat include -

Walking

Keeping an animal moving makes it belch and prevents it from lying down. A good dog can be trained to do this. Sometimes a whole mob has to be moved steadily along a lane or taken to a yard for drenching.

Drenching

Mix bloat oil in warm water because this relaxes the muscles at the point of entry (reticular groove) into the rumen. Use a drenching bottle and don't lift the animal's head too high, Most dairy

cows can be drenched in the paddock, but wild animals will have to be taken to a stock yard. Drench slowly to avoid choking.

Stabbing

Always be prepared to stab an animal to save its life. A trocar or knife inserted into the left flank at the most protruding point can be used as a last resort.

Syringe needles

Large ones of these can be used to ease pressure of bloated stock not about to die, but they are slow at releasing pressure and have to be watched to clear any blockages. This is best carried out in a race.

If an animal goes down, keep its head up on a small bale of hay or similar. If there are two of you and no bale, one should hold the head up while the other goes for a bale, or until the animal is better, otherwise choking can occur.

Successful farming is about insurance. In the case of bloat on flat land this means having raised areas around water troughs and gates, where they can stand with their head up, a trocar with you all the time, and one litre bottles dotted at gateways around the farm. These can be filled with cow dung and water for drenching. Cattle hate it so start belching.

Storage

Check the bloat preventer for storage life, and prevent rain water from entering drums (loose bungs) and diluting the material.

False diagnoses

This is necessary under the heading of bloat because many deaths get blamed on bloat, when it may not be the direct cause. Cast ruminants can blow up a bit before death, and ruminants dead for any reason, can blow up within hours of dying, so most when first seen are blown.

A question to investigate is, was bloat the killer? It could be liver damage from facial eczema causing a weakening of the system and the heart to stop beating (death) if a secondary stress factor occurs - even slight bloat, as found by farmers and vets in Taranaki after a bad facial eczema summer.

More recently the prolonged feeding of palm kernel extract (PKE) has increased liver copper level to three times the normal which is dangerous resulting in cows dying from milk fever and another sickness (double whammy). If feeding more than 2 kg per cow per day of PKE, never feed extra copper in any form. See Elements > Copper. PKE is also very high in manganese which is a stress element, needed in very few countries, but toxic in many. See Elements > Manganese.

What is the mineral analysis of the hay? If the feed, and so the cows, are low in Na, P, Ca, Zn and/or Mg cattle can go down and be too weak to stand up on their own. Low Mg causes the blood to draw it from muscles. The heart is a muscle, so if Mg is drawn from it, it can stop beating.

Was the hay made from fast growing N (including poultry manure or compost) boosted Italian type ryegrass with little or no legumes? If you fed a dry hay-based diet, what else was fed? Hay on its own to in-calf cows, even if good hay, is asking for trouble.

Is there mould in the hay or silage? Mould can be a killer.

Were you adding urea to the hay or feeding any high N or protein? Excess N and/or urea in drinking water can be a killer.

After a cow goes down through low Mg, the Mg level in blood increases because the muscles are not using it, so, if vets don't know this, they can measure the blood and say that Mg was not deficient.

There are other killers, such as high nitrates, poisoning from lead and hardware (wire, nails, etc.).

See Animal Health > Symptoms & Causes.

Where paddocks are rough or uneven with hollows, animals sick or weak from any metabolic problem and lying down in a hollow, can have difficulty rising again.