

Using Actisaf[®] Sc 47 at grass



What is Actisaf®?

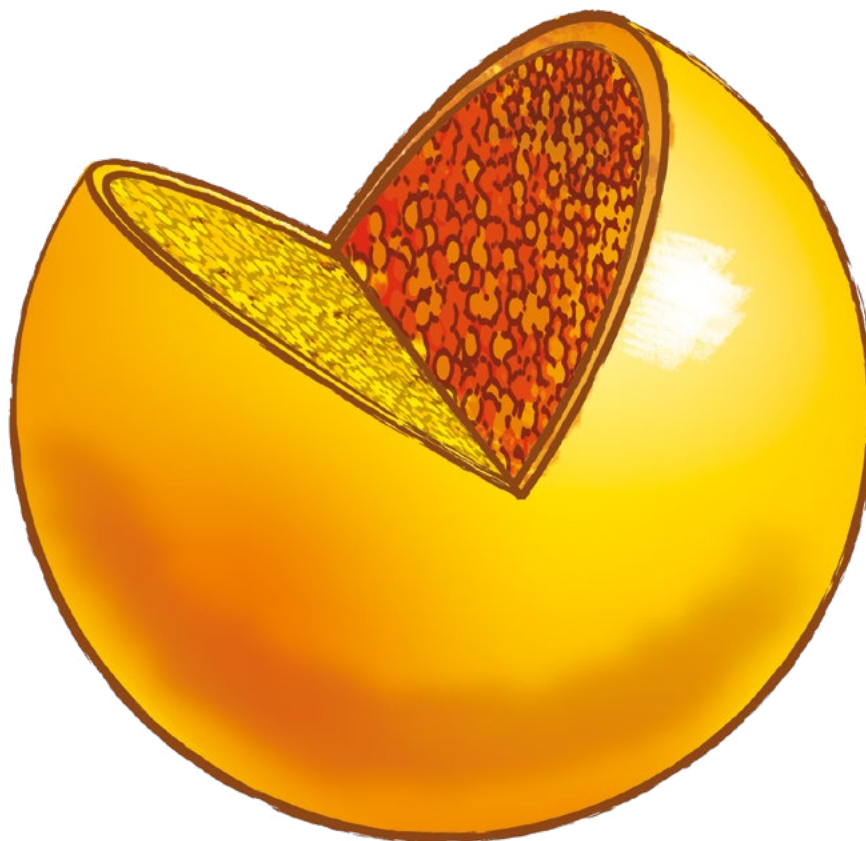
- Actisaf® is a **live yeast** of the species *Saccharomyces cerevisiae*.
- Yeast are **single cell organisms** which are classified as fungi.
- The most common use of live yeast is in the **making of bread**.
- Yeast ferments carbohydrates to **produce carbon dioxide** and it is this process that is so useful - by respiring oxygen, and producing carbon dioxide it causes the bread to rise.
- It is this same property of yeast - **the consumption of oxygen** - that makes it so useful when feeding ruminants such as dairy cows and beef animals.





One gram of Actisaf contains **10 billion live cells**.

An Actisaf yeast prill is a bit like a Malteser - **the unique drying process results in a layer of dead cells** around the edge of the prill (like the chocolate on the Malteser!) that **protect the live yeast cells** within.



The stability afforded by the coating of dead cells ensures that Actisaf is the **most heat stable live yeast** available, making it ideal for incorporation into pelleted feed through a mill.

- Actisaf is produced by Phileo Lesaffre Animal Care, part of Lesaffre, the world's largest manufacturer of yeast. Around **40% of the world's yeast** is made by Lesaffre!
- Actisaf is produced by a **fermentation process** in the production plant in Lille.



Why feed grass?



The nutritional benefits of spring grass

Grass analysis - May

	Sample 1	Sample 2
Dry matter %	22.0	17.7
D-Value	76	74
ME-MJ/kg	11.8	11.5
NDF %	42.6	38.5
Sugar %	21.4	14.3

Taking the average digestibility of the above samples, for a cow consuming 17 kg DM of grazed grass she will consume sufficient energy to support maintenance plus a milk yield of 26 litres



The digestion of spring grass in the rumen

- The rumen is a **large fermentation chamber** (similar to an anaerobic digester) that is packed **full of microbes**.
- These rumen microbes digest grass, forages and cereals **to make energy available to the cow**, as well as **synthesising microbial protein from ammonia**, which is essential for milk production, fertility and maintenance.
- The rumen microbes **require a low oxygen environment** and rumen pH to be kept between 6.0 - 7.0 so that they can **optimise feed digestion** and hence the production of energy and the creation of microbial protein.



The rumen is around 120 litres in size - about the same as a wheelie bin!

The financial benefit of spring grass

Dietary cost to sustain maintenance plus 30 litres (spring 2016)

	Indoor	Grazing plus buffer and parlour feed	Grazing & parlour feed
Grass silage (11.0 MJ / kg DM)	12		
Blend (13.0 MJ / kg DM)	6		
Compound (13.3 MJ / kg DM)	1.7	5.2	5.7
Maize silage (11.5 MJ / kg DM)		4.5	
Grazed grass (11.5 MJ / kg DM)		10	14
Total DM intake	19.7	19.7	19.7
Diet cost / hd / £ / day	2.82 (€3.58)	2.47 (€3.14)	2.28 (€2.90)
Diet cost £ / day / 100 cow herd	282 (€358)	247 (€314)	228 (€290)

Each day spent grazing represents a dietary saving of £0.54 / cow / day or £54 / day for a 100 cow herd

Grazed grass @ £70/tonne DM (€89/t)
 Grass silage @ £100/tonne DM (€127/t)
 Maize silage @ £130/tonne DM (€165/t)
 Blend @ £180/tonne fresh (€229/t)
 Compound @ £200/tonne fresh (€254/t)

But grazed grass has its limitations!

- The dry matter and nutrient analysis of grass is **highly unpredictable** and can fluctuate from morning to evening, let alone over the course of a week.
- This variability makes it **extremely difficult to predict dry matter intake** from grass and the intake of essential nutrients such as energy, protein, oil and fibre.
- **Lush spring grass can contain relatively high levels of crude protein (25%+)**. Protein is degraded to ammonia in the rumen and the microbes use it to create microbial protein. **Excess ammonia breakdown in the rumen increases:**
 - Energy deficit in early lactation
 - Body condition loss
 - Ketosis
 - Embryo mortality



But grazed grass has its limitations!

- Grass swards can also contain a high sugar %, which is beneficial for milk yield and solids.
- Excess sugar in the grass, coupled with low effective fibre (stem) can adversely impact on rumen health and function. Also, continuously grazing wet grass can pose problems for dairy cows.
- For example a cow consuming 15 kg DM of grass at 13% sugars would be consuming 1.95 kg of sugar which is the equivalent of feeding 17 kg fresh weight of fodder beet:

Amount of grass fed	% sugar	kg sugar/day	Equivalent fodder beet (kg) fresh
15kg DM	13.00	1.95	17





- Grass high in sugars is rapidly fermented by the rumen microbes, which can contribute to a sharp decrease in rumen pH.
- Low grass fibre levels limit rumen scratch factor leading to reduced rumination, saliva flow and ultimately rumen buffering, which also contributes to a decline in rumen pH

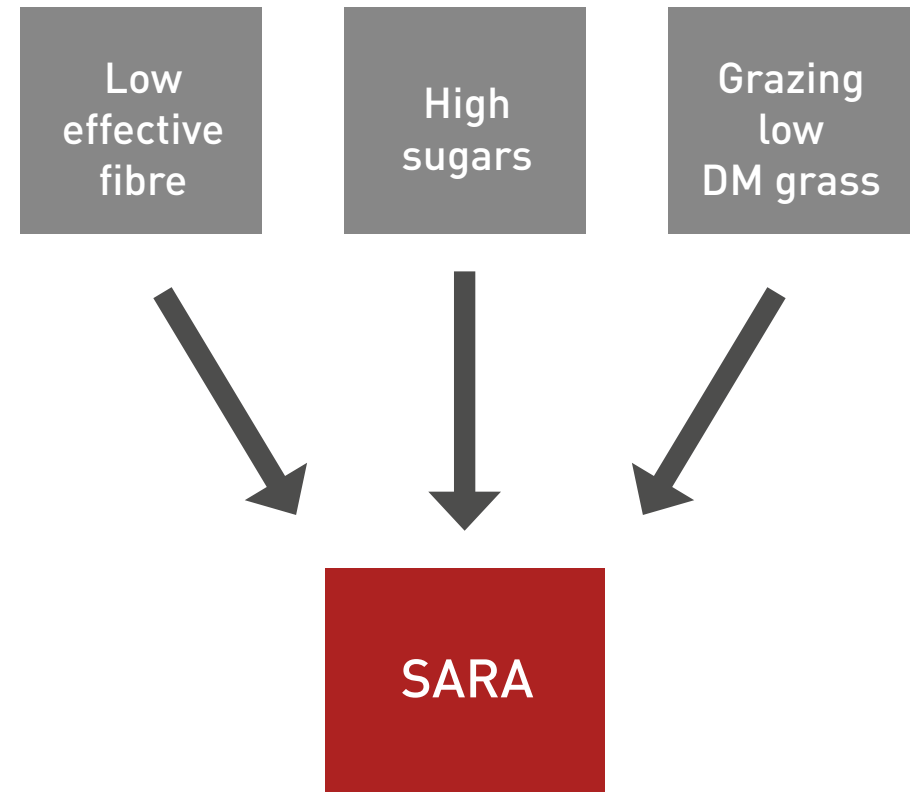


Sub optimal rumen pH leads to the development of acidosis



Sub-Acute Rumen Acidosis (SARA) at grass

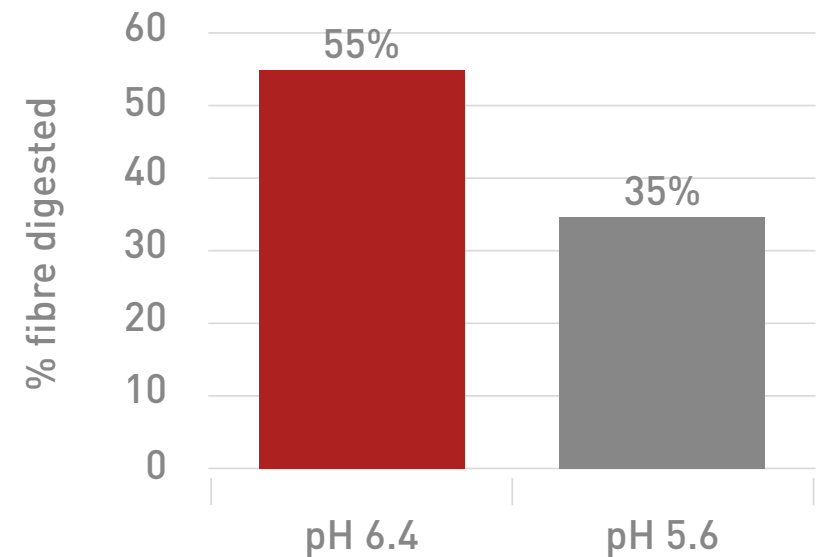
- The rapid fermentation of grass high in sugars, with low effective fibre content causes lactic acid to build up in the rumen. This accumulation of lactic acid causes rumen pH to decrease and when it drops into the range of pH 6.0 down to 5.0 sub-acute rumen acidosis, more commonly termed SARA, develops.
- SARA is a common occurrence at grass where rumen pH dips below pH 6.0 for a prolonged period of time after the ingestion of leafy grass, thereby killing fibre- and starch-digesting bacteria, which has the knock-on effect of reducing feed digestion and energy output from the rumen.



Supporting published trial work

Trial work carried out by Wales et al. 2001

- Dairy cows grazing 15.6kg DM of a ryegrass and clover sward were found to have a mean rumen pH of 5.9.
- At a pH of 6.4 the rumen bacteria digest about 55% of the fibre, whereas at a pH of 5.6 this falls to around 35%.



Supporting published trial work

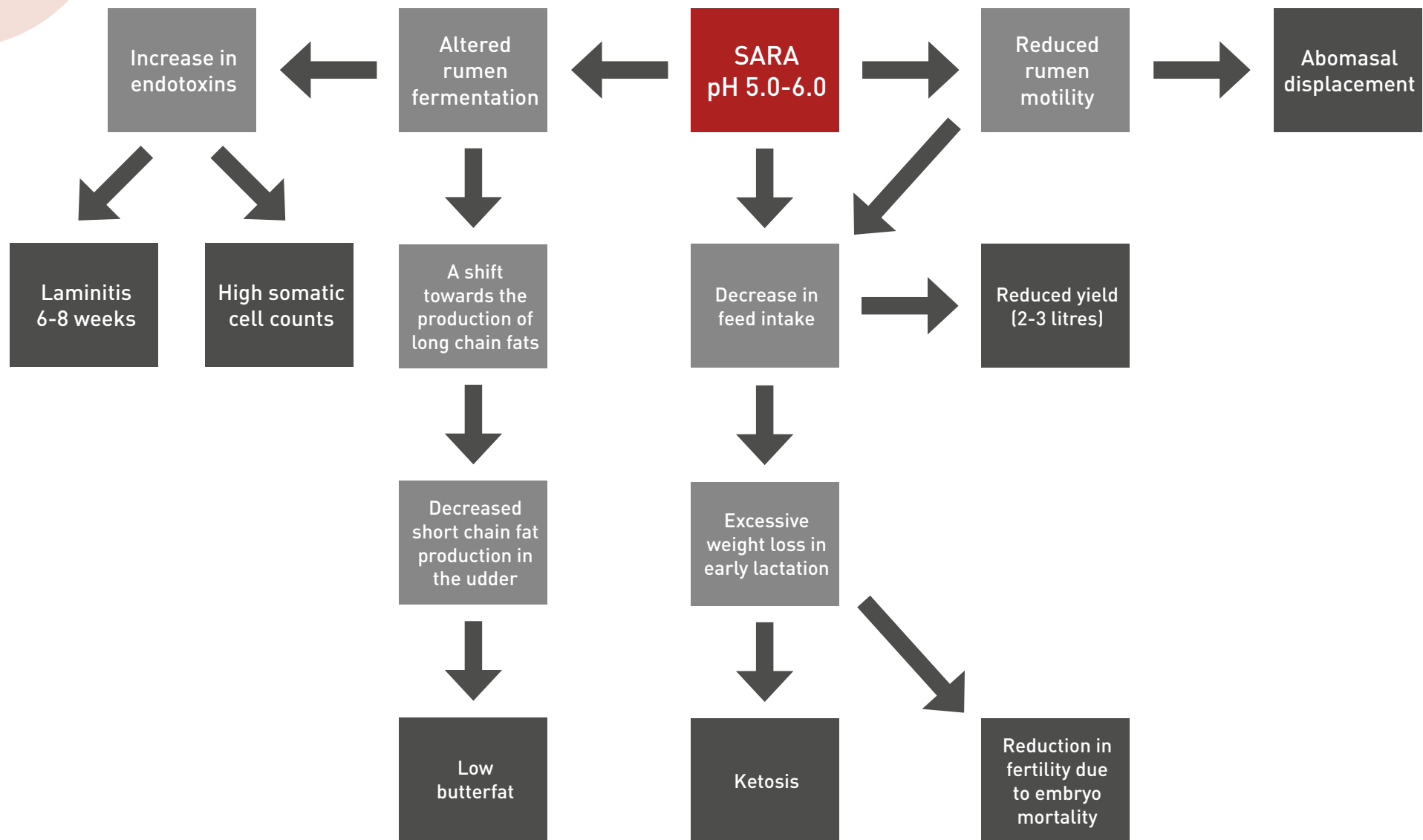
In a study conducted at UCD in 2006 on 12 spring calving herds at grass:

- 11% of cows had a rumen pH of less than 5.5 (SARA)
- 53% of cows had a rumen pH less than 5.8 - too low for optimal feed digestion and intake

These cows were fed grazed grass, containing sugar levels in the range of 10.1-12.7% and cows fed less than 2kg of concentrate/cow/day.

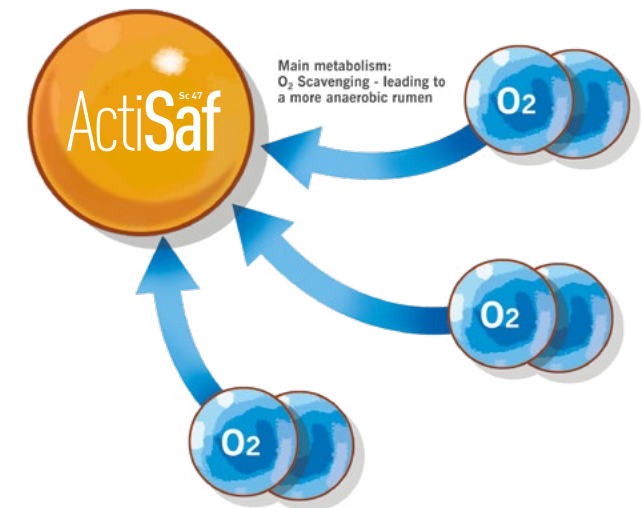


SARA and associated issues...



How does Actisaf work in the rumen?

- The rumen is continually challenged by oxygen. Oxygen, while it is there, is toxic to the bacteria in the rumen
- Actisaf is a live yeast that uses up oxygen, enhancing the rumen environment
 - The removal of O₂ from the rumen results in the growth of fibre-digesting bacteria and lactate-utilising bacteria, increasing feed digestion and stabilising rumen pH, which prevents SARA from developing
 - The removal of O₂ increases the hydrogen concentration in the rumen, which then reacts with lactate to produce propionate, a volatile fatty acid (VFA) that optimises milk yield and lean meat production
 - Actisaf also increases ammonia utilisation by the rumen microbes, which increases microbial protein production
 - Five grams of Actisaf has been proven to have the equivalent buffering effect of 150 grams of sodium bicarbonate, thereby stabilising rumen pH.



Identifying SARA at grass...

- Low butterfats at grass are indicative of sub-acute rumen acidosis. Rule of thumb: if a Holstein has a butterfat percentage of less than 3.6 and a Jersey less than 5.0 it is worth investigating further.

Further indicators of SARA at grass:

- If greater than 10% of the herd have a higher milk protein than milk fat.
- A rapid fall in fat percentage of 0.3%-0.5% occurs in a week.
- A sudden fall in milk protein of greater than 0.3% occurs in a week.
- A fat to protein ratio of less than or equal to 1.1 to 1
- Review average bulk milk samples with caution. Individual milk records can highlight the range of butterfat percentages across the herd.



Individual milk recording can help to identify the range of butterfat levels in the herd

Identifying SARA at grass - what is the cow telling you?



Observe rumen fill 3-4 hours after milking - SARA will reduce the digestive ability of the rumen microbes, reducing feed intakes

Identifying SARA at grass - dung



Normal dung, indicative of normal rumen fermentation pattern



Gas bubbles and loose dung, indicative of excess lactic acid production in the rumen

Identifying SARA at grass - ruminating



Aim for more than 65% of the herd to be ruminating at any one time. A content cow, chewing the cud, is indicative of good rumen health and function



Summary

- SARA is just as likely to occur when grazing high quality grass as when feeding energy-dense winter rations
- If butterfat levels fall, or butterfat falls below protein level then this is a warning sign
- Look out for other warning signs such as loose, bubbly dung and poor rumination
- Actisaf fed in conjunction with grazing swards replicates the effect of including structural fibre in the diet.

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