acidbuf®

PURE RUMEN CONDITIONING

Efficient rumen conditioning for optimum productivity

CelticSea MINERALS

Acid Buf - efficient rumen conditioning for optimum productivity

The feeding of high concentrate diets to maximise productivity from dairy cows can lead to problems with increasing acid concentrations in the rumen. When pH drops below 5.5 for extended periods, the rumen is experiencing sub-acute acidosis which will impact on the flow of nutrients into the cow and can lead to reduced productivity.

Acid Buf, from Celtic Sea Minerals, is manufactured from calcareous marine algae, which is harvested from unpolluted waters off the coasts of Ireland and Iceland. It is a highly effective rumen conditioner and a source of naturally produced bio-available minerals, especially calcium and magnesium which are absorbed from sea water and deposited in its skeletal structure.

Celtic Sea Minerals harvest the remains of this skeletal structure which has a high surface area due to its honeycombed structure. This provides Acid Buf with unique characteristics by reacting in the rumen to correct high acidity and conditioning the rumen environment and maintaining an optimum pH for a sustained period. Including Acid Buf in the diet of lactating cows increases milk yield and milk solids, maintains body condition and improves feed efficiency.

Acid Buf improves rumen efficiency

- Increased productivity per kg of DM
- Greater milk yield
- Better milk solids
- Positive energy balance
- Maintains body condition

Trial Summary

An evaluation of the impact of a conditioner and buffer with different DCAD values on production and metabolic parameters in the dairy cow in early lactation.

Source: University of Georgia, USA (2011); Drs. Bernard & West.

Trial Outline:

Three treatments were given to 12 cows per treatment at 14 - 84 days post-calving. The cows (which had a body condition score of 3 at the start of the trial) were fed once per day using Callan gates to measure feed intake.

The cows were milked three times per day. Body condition was measured at the start and end of the trial period. Diets were formulated to contain 17% protein and to provide 1.68 mj/kg DMI of ME based on corn silage, Alfalfa hay, ryegrass baleage, wet brewers grains, corn, citrus pulp and soy products.

A positive control (200g/day sodium bicarbonate) was compared against a negative control (no additives) and an Acid Buf diet (90g/day). Salt was used to maintain **0.35% sodium** in the negative control and Acid Buf diets, DCAD of +200meq/kg in the negative control and Acid Buf diets, and 300 meq/kg in the positive control diet.

Trial Results:

The inclusion of Acid Buf resulted in a 2kg/day increase in Fat Corrected Milk (FCM) compared to the positive control, and 4kg/day more FCM than the negative control. Positive control cows ate 1kg more DM than the other two groups, indicating that the conversion of feed to FCM was better for the cows on the Acid Buf diet.

In addition, the cows on the positive control diet lost body condition during the progress of the trial, whereas the cows on the negative control and the Acid Buf diets saw an improvement in body condition score (BCS). There was no evidence of any impact of dietry DCAD values on the performance achieved.

Trial production results

Item	Negative control	Positive control	Acid Buf
Efficiency	1.94	1.94	2.11
FCM (3.5%)	44.41	46.54	48.71
DMI, kg/d	22.9	24	23
Fat %	3.55	3.56	3.85
Protein %	2.68	2.58	2.57
Lactose %	4.66	4.66	4.68
BCS Change	0.07	-0.01	0.05

The full trial report is available as a CSM bulletin and as a poster in ASDA 2012 abstracts.

How does Acid Buf condition the rumen for optimum productivity?

Trials & research have shown that Acid Buf optimises rumen efficiency by:

1. **Prevents sub-acute ruminal acidosis (SARA)**
2. **Maintains optimum rumen pH**
3. **Optimises total volatile fatty acid yield**
4. **Reduces methane losses**
5. **Provides bio-available Ca & Mg**
6. **Creates dietary space**

1. Preventing Sub-Acute Ruminal Acidosis (SARA):

Studies carried out by the University of Stellenbosch in South Africa have shown that SARA and acidosis problems in cows are relieved by the addition of a rumen conditioner (Acid Buf) and a buffer (sodium bicarbonate). Acid Buf produced a higher rumen pH and greater milk production than sodium bicarbonate, despite being added at half the concentration.

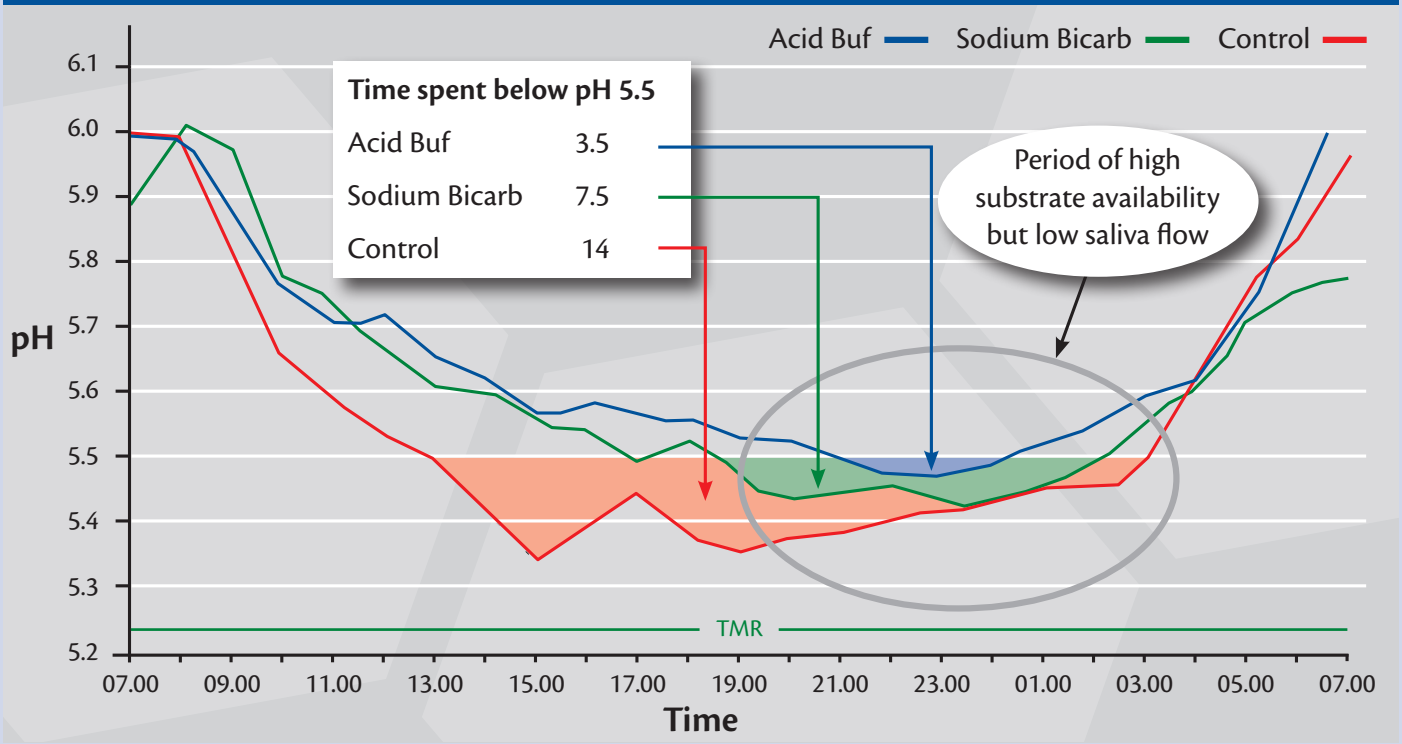
The effect of conditioning the rumen with Acid Buf (90g/cow/day) was compared with a buffering agent – sodium bicarbonate (180g/cow/day) and a control (see graph below).

Production trial results:

	Control	NaHCO3	Acid Buf
Efficiency	1.16	1.23	1.42
4% FCM (kg)	26.9	29.9	32.8
DMI (kg/day)	23.3	24.2	23.1
Average Milk Fat (%)	3.86	4.18	4.21
Average Milk Protein (%)	3.43	3.38	3.47

The graph clearly demonstrates that the Acid Buf treatment minimised the amount of time the pH spent below 5.5, resulting in a much more efficient rumen and greater milk production.

The importance of pH 5.5
University of Stellenbosch - South Africa (2006)

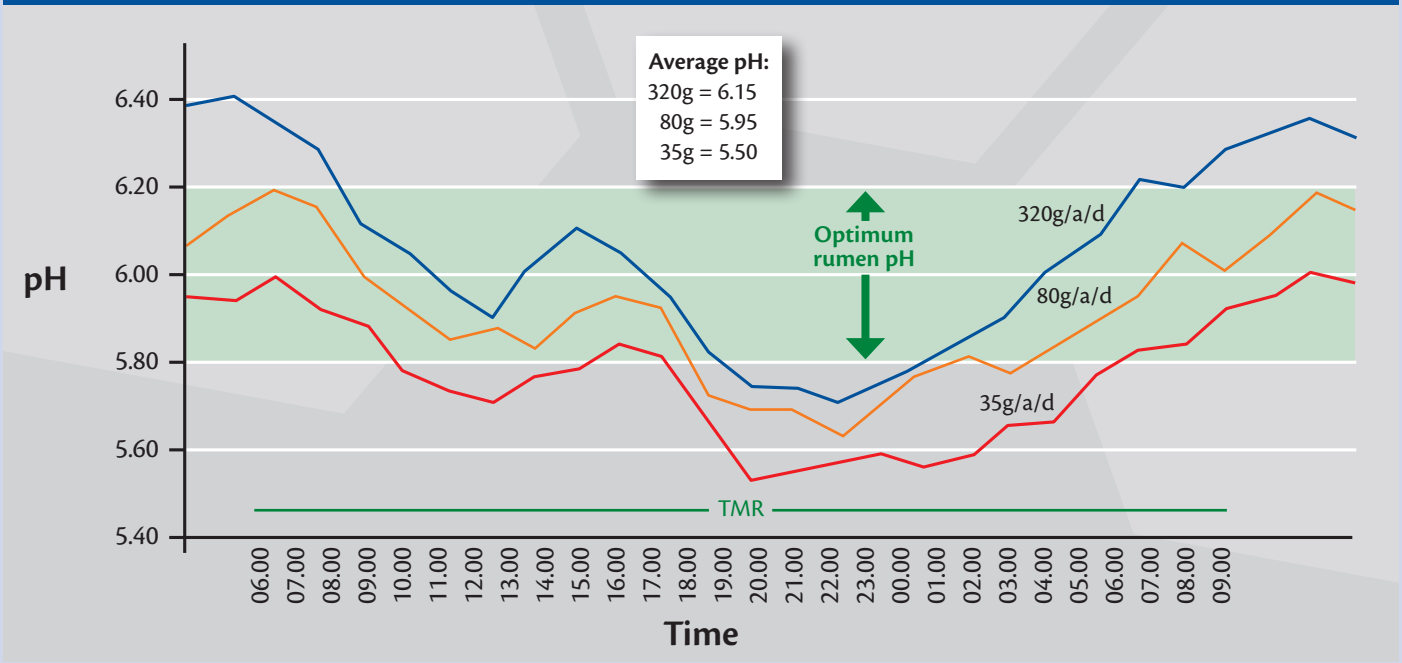


2. Maintaining an optimum rumen pH:

The metabolism trial at the University of Stellenbosch was carried out using continuous monitoring of rumen pH and periodic sampling for volatile fatty acids (VFA) and nitrogen parameters in dairy cows receiving a high concentrate based diet.

Three separate diets were fed individually to ruminally cannulated lactating Holstein cows, with each cow receiving each diet for a period of 22 days prior to a data collection period of eight days. Rumen pH was measured every 10 minutes for four days using a portable data logging system and in-dwelling electrodes.

The effect of Acid Buf on rumen pH
University of Stellenbosch - South Africa (2004)



The trial demonstrated that acidity increase occurs with feeding. Minimum pH levels were noted after the second feed at about 19:00 hours. There was a response to Acid Buf on rumen pH with an average increase of 0.33 pH units.

The experiment showed that the dietary inclusion of Acid Buf increases rumen pH. This not only improves fibre digestibility, but can also impact on milk yield and quality. For normal milk production from a high concentrate TMR ration, Acid Buf inclusion levels of 0.3% of DM (80g/cow/day) supported maximum milk production.

3. Optimising total volatile fatty acid (VFA) yield:

The balance of VFA production is crucial to rumen efficiency and optimum milk production.

The production of propionate needs to be maximised with an optimum amount of acetate still being produced.

Effect of Acid Buf on volatile fatty acid production
University of Stellenbosch - South Africa (2004)

Acid Buf (g/cow/day)	**Acetate: Propionate Ratio**	**Total VFA** (m.moles/litre)
35g	2.5 : 1	80-85
80g	2.5 : 1	120
320g	3.3 : 1	100 and falling

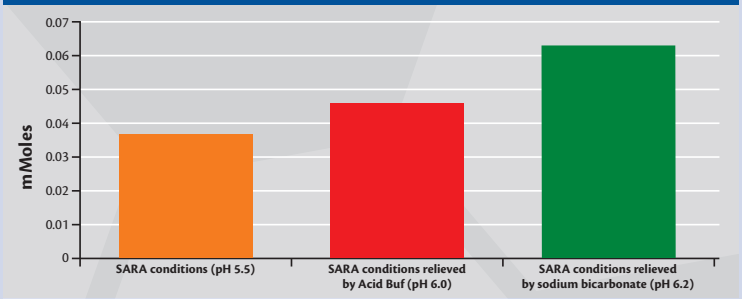
The study carried out at the University of Stellenbosch demonstrated the dose response of dairy cows to increasing levels of Acid Buf inclusion by using 24 hour pH monitoring and repeated rumen sampling for VFA concentrations.

Feeding Acid Buf at 80g/cow/day maintains the VFA ratio while increasing VFA production leading to optimum rumen efficiency and milk production.

4. Reducing methane production:

The addition of soluble buffers to control rumen pH can result in extended periods of high pH (greater than 6.2) in the rumen of cows that are genetically resistant to SARA, or if diets are of a low fermentability. This encourages methanogens and the production of acetate rather than propionate, both of which increase methane production and cause valuable dietary carbon to be lost to the atmosphere. Conditioning the rumen with Acid Buf will prevent SARA by stabilising rumen pH, enabling maximum VFA production and feed conversion efficiency while minimising methane production.

Methane production (ml) per mMole of SCFA at 12 hrs
Alimetrics Ltd - Finland (2011)



5. Providing bio-available calcium and magnesium:

Certain minerals are utilised by bacteria within the rumen, and others (e.g. magnesium) are absorbed directly through the rumen wall. It is therefore essential that these minerals are in a soluble form at rumen pH.

Different sources of trace elements vary tremendously in their ability to deliver soluble minerals to ruminants. The calcium and magnesium in Acid Buf are totally bio-available and can be readily absorbed through the rumen wall or utilised by bacteria to improve rumen efficiency.

Calcium release
Celtic Sea Minerals - UK (2011)

	0-2 hrs	2-4 hrs	4-6 hrs	6-8 hrs
Acid Buf	56.71%	74.57%	87.55%	100%
CaCO3 Agri Grade	3.45%	10.89%	11.69%	12.17%
Cal-Mag	5.60%	9.40%	11.80%	13.60%

Magnesium release
Celtic Sea Minerals - UK (2011)

	0-2 hrs	2-4 hrs	4-6 hrs	6-8 hrs
Acid Buf	86.17%	87.61%	95.96%	98.66%
MgO	1.37%	3.19%	4.81%	6.35%
Cal-Mag	2.40%	3.60%	4.70%	6.00%

6. Creating dietary space:

It has long been recognised that conditioning the rumen with Acid Buf creates space in the formulation compared to buffering the diet by adding sodium bicarbonate. This is not only because the amount of Acid Buf required is much less than the level of sodium bicarbonate needed, but because the Acid Buf replaces an equal weight of limestone in the premix so that the space taken up by the bicarbonate is saved.

The magnesium contribution from Acid Buf also enables the amount of Cal Mag usually added to the diet to be at least halved. It is important to monitor the sodium concentration of any diet to ensure this does not affect the overall balance of nutrient intake.

The use of Acid Buf adds an extra cost to the TMR diet, but the benefits of saving space in the rumen can either be used to create a cheaper diet or to improve the overall balance of nutrients or nutrient density. The rations below illustrate that the inclusion of Acid Buf can save up to 11kg per tonne of feed.

Example of a Typical TMR Diet
Formulated for a 40 - 50 litre dairy cow

	TMR + Sodium Bicarbonate	TMR + Acid Buf
Ingredient	**Mix (kg)**	**Mix (kg)**
Corn (dry ground)	297.00	288.00
Soya oilcake meal 47%	160.00	150.00
Alfalfa hay 16%	100.00	130.00
Corn silage (dry)	400.00	400.00
Acid Buf		5.00
Sodium bicarbonate	10.00	
Magnesium oxide	2.00	1.00
Monocalcium phosphate	7.00	7.00
Salt	3.00	3.00
Suplhur	1.00	1.00
Urea	10.00	10.00
Limestone	10.00	5.00
Total mix (kg)	1,000.00	1,000.00
Space saved:		
Sodium bicarbonate		-5.00
Magnesium oxide		-1.00
Limestone		-5.00
Total space saving		11.00 kg

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Recommendations for use:

Dairy cows (Lactation)
50-100g/cow/day

Note:

1. Diet acidity should be taken into consideration when determining rate of inclusion. The more acidic the diet, the higher the rate of inclusion.
2. In the event of the diet acidity not being apparent, include at 80g/cow/day and reduce to level of acidosis control.
3. During periods of high summer temperatures (heat stress) increase inclusion rates by 20%.

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