



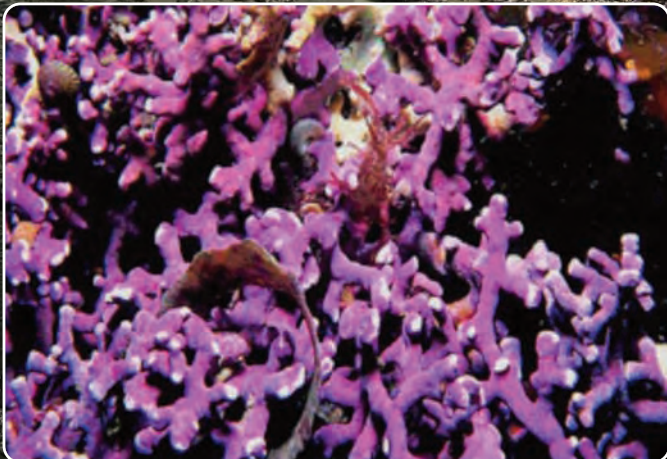
Pure rumen
conditioning
with bio-available
minerals

CelticSea
MINERALS

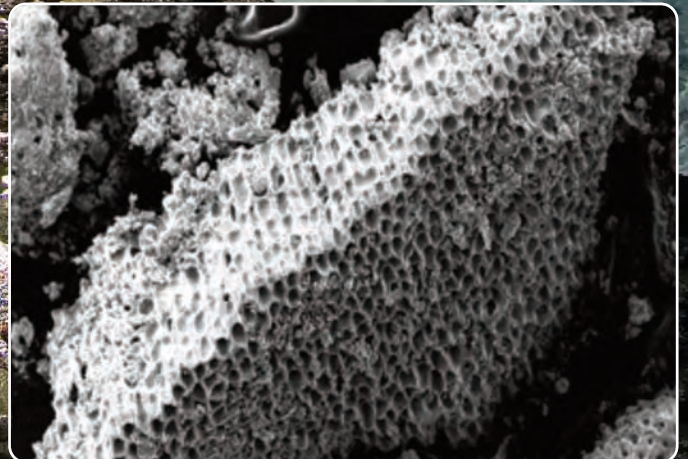




Natural, bio-available minerals from the seabed



Living marine algae



Dead, calcareous marine algae and its honeycombed structure - from which Acid Buf is made



Pure Rumen Conditioning

Acid Buf conditions the rumen and allows it to work more efficiently. Acid Buf is manufactured from calcareous marine algae, which is harvested from clean, unpolluted waters off the coasts of Ireland and Iceland. It is a highly effective rumen buffer and pure source of bio-available minerals deposited within its structure by the sea, especially calcium and magnesium.



Harvesting the calcareous marine algae

Thanks to its unique honeycombed physical structure and large surface area, Acid Buf breaks down slowly in the cow – conditioning the rumen and neutralising significantly more acid, over a longer period, than many conventional buffers. As Acid Buf breaks down it releases highly bio-available calcium and magnesium to the cow.

Acid Buf in the lactating cow

- Better neutralisation of rumen acid
- Slow-release and longer-term rumen buffering
- Excellent source of bio-available minerals
- Improves fibre digestion
- Boosts milk yield and quality
- Reduces methane output and environmental pollution

Acid Buf in the dry cow

- DCAD neutral - allowing inclusion in dry cow diets
- Allows increased concentrate feeding close to calving
- Releases valuable calcium and magnesium to the cow
- Reduces the risk of metabolic disorders
- Conditions the rumen for lactation

Conditioning the Rumen:

Lactation Feeding

Failure to maintain a consistent rumen pH in high yielding dairy cows may result in metabolic disorders and reduced production performance. Increasing energy supply through increased use of concentrates or rapidly fermentable fibre can plunge the rumen into acidosis. Even cows on fresh grass can experience a rumen pH of below 5.5, at which level lactic acid starts to accumulate and volatile fatty acid (VFA) production is compromised.

Rumen pH is governed by:

1. The production of VFAs from the fermentation of carbohydrate in the feed.
2. The loss of VFAs through the rumen wall to deliver energy to the cow
3. The flow of buffers into the rumen through saliva.

The Importance of a Balance of VFAs

The balance of VFA production is crucial to rumen efficiency and optimum milk production. Carbohydrate energy fermented into propionate is more efficient because for every mole of acetate produced one mole of methane is lost to the environment as the cow belches. So not only is acetate production inefficient, it also increases greenhouse gasses.

However, the production of some acetate in the rumen is still important because it essential to the production of milk fat in the mammary gland. If rumen pH can be held above 5.5 and up to 6.0, the production of propionate can be maximised with the optimum amount of acetate still being produced.

(See graph below)

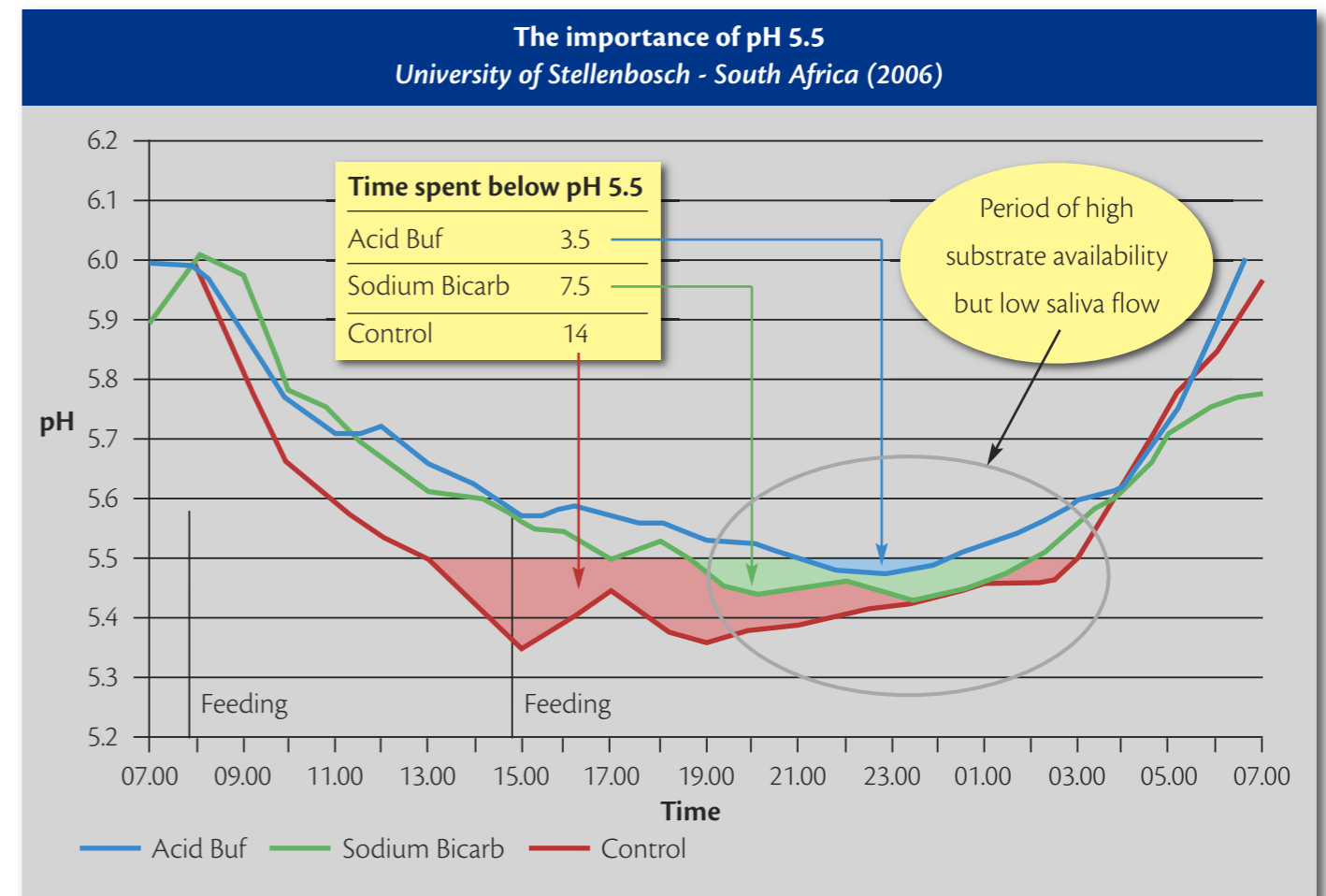
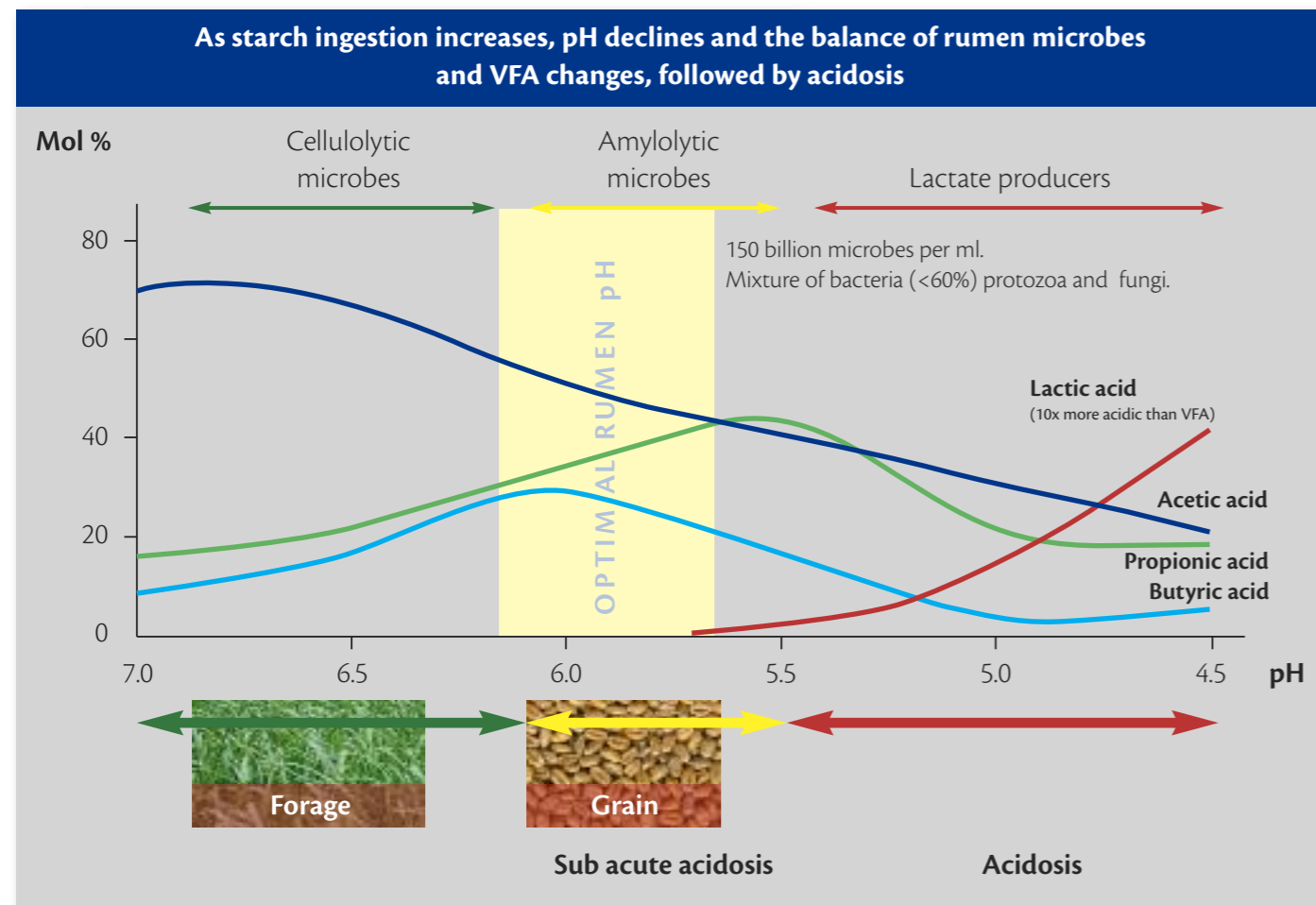
Propionate must pass through the rumen wall as the undissociated acid, which means the rumen becomes more acidic after feeding before the propionate can start to leave. Saliva flow provides around 3kg/day of sodium bicarbonate, a flow that is sustained by eating and chewing the cud. Unfortunately, when the cow is at rest she is at risk of a build up of VFA – particularly if a very soluble buffer like sodium bicarbonate has been used in the diet.

The effect of buffering the rumen with a soluble (sodium bicarbonate 180g/cow/day) and a slow release buffer (Acid Buf 90g/cow/day) were compared against a placebo in a metabolism experiment in which the rumen pH was continuously monitored using an in dwelling electrode. The control diet resulted in rumen pH remaining below 5.5 for 14 hours in the day, compared to 7.5 hours for sodium bicarbonate and 3.5 hours for Acid Buf (see chart below).



Acid Buf in the lactating cow

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Conditioning the Rumen:



Trial Summary

Acid Buf in high concentrate diets for lactating dairy cows: its effect on milk production, milk composition and rumen parameters

Source: University of Stellenbosch, South Africa (2004)

Trial Outline:

Early lactation cows fed a high concentrate TMR (first feeding 0700 hours, second feeding 1500 hours). The TMR, formulated to be potentially acidotic, was used to construct dietary treatments in which Acid Buf was included as a percentage of dietary DM in place of limestone.

Production trial results:

	Control	Acid Buf
Average Daily Milk Yield (kg)	39.00	44.60
4% FCM (kg)	35.00	41.70
Average Milk Fat (%)	3.33	3.58
Average Milk Protein (%)	2.80	2.93
Average Milk Lactose (%)	4.79	4.77
Milk Fat Yield (kg/d)	1.29	1.59
Milk Protein (kg/d)	1.09	1.31

Metabolism trial results:

Continuous monitoring of rumen pH demonstrated the increase in acidity that occurs with feeding. Minimum pH levels were noted after the second feed at about 1500 hours. There was a response to Acid Buf on rumen pH, with an average increase of 0.33 pH units.

Conclusions:

The trial showed that an increase in average rumen pH does not only improve fibre digestibility, but can also impact on milk yield and quality. For normal milk production from a high concentrate TMR, Acid Buf inclusion levels of 0.3% (80g/cow/day) of DM supported maximum milk production.



The full trial report is available as a Celtic Sea Minerals' technical bulletin.

Trial Summary

Buffering the rumen: the importance of pH 5.5

Source: University of Stellenbosch, South Africa (2006)

Trial Outline:

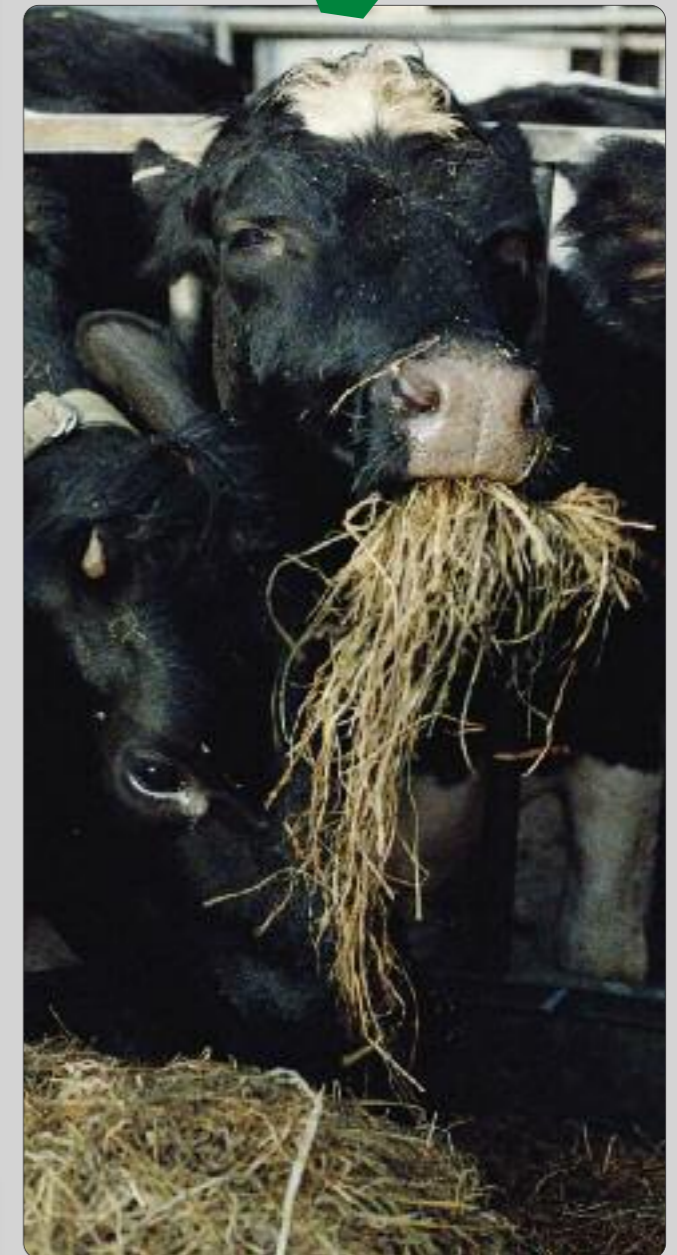
The effects of buffering the rumen with a soluble (sodium bicarbonate 180g/day) and a slow release buffer (Acid Buf 90g/day) were compared against a placebo in a metabolism experiment in which the rumen pH was continuously monitored using an in dwelling electrode. The experiment was a balanced cross-over design in which the cows were fed each treatment for a total of 21 days. Milk yield was also monitored in the final seven day period of measurement.

Results:

Milk yield per cow per day increased by the addition of buffer from 27.6 litres (control) to 29.1 litres (sodium bicarbonate) to 31.8 (Acid Buf). Milk protein and fat percentages were also improved by the inclusion of Acid Buf and sodium bicarbonate over control. Comparison of the rumen pH suggested that the cows were very acidotic when on the control diet, but the addition of buffers provided relief. The control diet resulted in rumen pH remaining below 5.5 for 14 hours in the day, compared with 7.5 hours for the sodium bicarbonate and 3.5 hours for the Acid Buf.

Production trial results:

	Control	Acid Buf	NaHCO ₃
Average Daily Milk Yield (kg)	27.6	31.8	29.1
4% FCM (kg)	26.9	32.8	29.9
Average Milk Fat (%)	3.86	4.21	4.18
Average Milk Protein (%)	3.43	3.47	3.38
Average Milk Lactose (%)	4.57	4.58	4.59
Milk Fat Yield (kg/d)	1.06	1.33	1.22
Milk Protein (kg/d)	0.93	1.09	0.98



Conclusions:

The control diet used in this experiment resulted in acidosis problems in the cows and this was relieved by the addition of rumen buffers. Acid Buf produced a higher rumen pH and greater milk production than did sodium bicarbonate addition although it was included at half the concentration.

The full trial report is available as a Celtic Sea Minerals' technical bulletin.

Conditioning the Rumen:



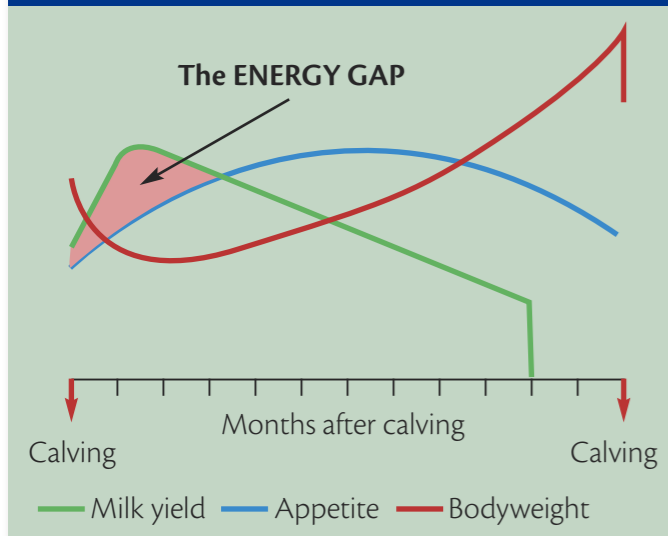
The Importance of the Dry Period

It is now recognised that effective management of the post-calving energy gap starts in the dry period. In the far off dry period, the diet is now based on chopped straw or other low quality forage in order to maintain rumen volume, but minimise energy input.

As calving approaches, better quality forages and concentrates are introduced gradually. This helps condition the rumen to post-calving feed quality. The introduction of the better quality feed may also help increase appetite after calving and help the cow make more use of the feed she does eat.

Minimising the traditional energy gap after calving is the goal of all dairy cow nutritionists. The size of the energy gap determines the cow's ability to sustain milk output after peak yield and her fertility.

Changes in milk yield, bodyweight and appetite of dairy cows throughout the lactation cycle



The ability to increase concentrate intake is limited because feeding high levels could lead to SARA or acidosis, and – significantly – conventional buffers (eg. sodium bicarbonate) cannot be used at this time because they adversely affect DCAD (Dietary Cation, Anion Difference).

DCAD Balance in the Dry Period

DCAD balance is very important in the control of metabolic diseases, particularly hypocalcaemia (milk fever). The relationship between cations (mainly sodium and potassium) and anions (chloride and sulphur) should be zero or marginally in favour of the anions (-ve) in the close up diet. This ensures a mild acidosis in the body, which allows the cow to mobilise calcium from its bones and absorb it effectively from the post calving diet to satisfy the demands of milk production.

With grass silages often high in potassium, the introduction of straw into dry cow diets has helped enormously to reduce cation levels. However, straw-based diets and concentrates are low in calcium, which is not ideal. The low nutritional value of straw also depresses nutrient intake, which clearly does not help address the energy gap challenge post-calving.

The aim is to feed a higher energy diet that maintains a negative DCAD without increasing the risk of acidosis. Unfortunately, including a traditional buffer such as sodium bicarbonate only tips the balance in favour of the cations (+ve).



The Value of Acid Buf in the Dry Cow

The DCAD of Acid Buf is neutral. This means it can be included in close up dry cow diets as a slow-release rumen buffer to help increase concentrate consumption without the associated risk of acidosis. As Acid Buf solubilises, it also releases valuable calcium and magnesium to the cow, helping to reduce the incidence of metabolic disorders and retained placentas without any increase in milk fever (see below).

The mineral content of Acid Buf is a significant contributor to cow nutrition as a consequence of being solubilised during the buffering action within the rumen. The calcium and magnesium released is highly bio-available to the cow.

Mineral release (%) from Acid Buf over time at pH 5.5 - Source: University of Limerick

	0-2 hours	2-4 hours	4-6 hours	6-8 hours
Calcium	56.71	74.57	87.55	100.00
Magnesium	86.17	87.16	95.96	98.66

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Pure Rumen Conditioning

Acid Buf Analysis:

Ash	95%
Moisture	<5%

Calcium	30%
Magnesium	5.5%
Potassium	0.7%

Other minerals (approx):

Phosphorus	500ppm
Boron	10ppm
Iron	800ppm
Cobalt	0.1ppm
Copper	10ppm
Zinc	10ppm
Manganese	50ppm
Molybdenum	0.2ppm
Selenium	1.8ppm
Iodine	30ppm

Heavy metals:

Lead	< 5ppm
Arsenic	< 5ppm
Mercury	< 0.1ppm
Cadmium	< 2ppm
Fluoride	< 500ppm

Bacteriology:

Salmonella	Absent in 25g
<i>E.coli</i>	Absent in 1g
Yeast and moulds	Less than 10/g

Recommendations for Use:

Dairy Cows

(Lactation): 50g-80g/cow/day

Note:

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

Dairy Cows

(Dry cow transition): 40-50g/cow/day

Sheep & Goats

(Feedlots): 0.5% of compound feed





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