



HEAT STRESS FOCUS ON MINERAL SUPPLEMENTATION

Heat stress management is a key issue in dairy production. During heat stress it is necessary to provide adequate supplementation with mineral macro-elements such as potassium (K), sodium (Na) and magnesium (Mg). It is also essential to protect the rumen environment by reducing pH fluctuations.

SUPPORTING DAIRY COWS IN SUMMER

HEAT STRESS FACTORS

- > Temperature above 21°C
- > Humidity higher than 60%

CONSEQUENCES

- > Decreased intake
- > Increased K and Na losses
- > Lower buffering capacity of saliva
- > Decrease of ruminal pH
- > Decrease of milk production and fat content

MINERAL SOLUTION

- > Balanced K/Mg intake
- > Adapted buffer solution

Heat stress: risk factors

Dairy cows are sensitive to high temperatures, especially when relative humidity is also high. Heat stress is evaluated with the Temperature Humidity Index (THI). This index takes into account the temperature but also the level of relative humidity in the air, which accentuates the effect of heat. According to the THI, heat stress appears as soon as the temperature exceeds 21°C or with a relative humidity of more than 60%.



SuperCow®

The adaptation of mineral supplementation aims to:

COMPENSATING FOR THE LOSS OF ELECTROLYTES (K, Na) THROUGH PERSPIRATION

Under normal conditions (15°C), 25% of the body heat naturally produced by cows is dissipated by lung evaporation (breathing) and perspiration. However, under heat stress conditions, this value increases up to 75%, resulting in higher excretion of sodium and especially potassium.

MAINTAIN A STABLE RUMINAL PH

Cows increase their respiratory rate in hot weather, resulting in a decrease of blood CO₂ concentration, which is necessary for bicarbonate production. This induces the loss of natural buffering capacity of the saliva. At the same time, an increase of concentrates in the diet is recommended, in order to compensate for the lower feed intake by increasing the energy density. This will also increase the risk of Sub Acute Rumen Acidosis.

REBALANCING THE K/MG INTAKE

Magnesium absorption begins to decrease once the total amount of K exceeds 1% of the DMI (dry matter intake). Therefore, it is important to adapt the amount of Mg in the diet during periods of heat stress, keeping in mind the following ratio: at least 4g of Mg for every additional 10g of K^[1].

Table 1: Metabolism and needs during heat stress period

Temperature Humidity Index (THI)	72	75	78
Respiration rate	75	80	85
DMI decrease (%)	0	-5%	-10%
DMI (kg/day)	24.1	22.9	21.7
K requirement (% DM)	1%	1.15%	1.30%
Na requirement (% DM)	0.18%	0.23%	0.28%
Mg requirement (% DM)*	0.25%	0.31%	0.37%

* magnesium content adapted in order to compensate for the absorption decrease linked to K supplementation

GUIDELINES TO ADAPT MINERAL SUPPLEMENTATION DURING HEAT STRESS PERIOD



1 Have key information available and ready to use

Table 1. Macro mineral recommendations (Na, K, Mg) during heat stress period*

Temperature Humidity Index (THI)	72	75	78	Farm diet
DMI (kg/day)	24.1	22.9	21.7	
K requirement (% DM)	1%	1.15%	1.30%	
Na requirement (% DM)	0.18%	0.23%	0.28%	
Mg requirement (% DM)**	0.25%	0.31%	0.37%	

* Adapted from Robinson P.H., 1998. Feeding Strategies for Heat Stressed Dairy Cows During Hot Dry Weather; University of California

**magnesium content adapted in order to compensate for the decreased absorption linked to K supplementation

Table 2. Buffers in the diet

Buffer composition	Dosage in diet g/cow/day

2 Adapt pHix-up dosage in order to maintain a stable pH at the right value

Table 3: Buffers in the diet and their neutralising capacity (NC)

Buffer	Dosage in diet g/cow/day	Neutralising capacity (meq/g)	Ratio vs pHix-up
Sodium bicarbonate		12	3.25 : 1
Acid Buf		20	1.9 : 1
pHix-up*		39	1

*125g/cow/day is the maximum dosage

If another buffer is used in the diet, calculate the buffer neutralising capacity (NC) that will be replaced by pHix-up and then divide it by pHix-up NC.

If diet includes already pHix-up, it is possible to increase dosage by 5 to 10g/cow/day in order to support the rumen environment during heat stress.

Example: Sodium bicarbonate at 250g/cow/day (Neutralising capacity = $250 \times 12 = 3000$ meq)

Solution: Replacement with 85g/cow/day of pHix-up (Neutralising capacity = $85 \times 39 = 3315$ meq)

pHix-up at 85g/cow/day has a higher neutralising capacity than 250g/cow/day of sodium bicarbonate

3 Potassium and magnesium supplementation

3.1 Adapt potassium intake

Example: 85g/cow/day of potassium carbonate (49% K) brings 41g of K

3.2 Check magnesium intake

(i) When 10g of K are added, add 4g of Mg

(ii) Maximum Mg content at 0.6% DM in the total diet

Example: pHix-up (48.5% Mg) at 85g/cow/day covers Mg requirement: it brings 41g of Mg

(i) Check Mg supplementation according to K content

(ii) Check total Mg content in the total diet

4 Add sodium intake

Example: 45g/cow/day of sodium chloride (39% Na) brings 17g of Na

5 Solutions proposed during heat stress period

Table 4: Solution with sodium bicarbonate during heat stress period

Heat stress supplementation	Dosage in diet
NaHCO ₃ (g/cow/day)	250g
K ₂ CO ₃ (g/cow/day)	85g
MgO (g/cow/day)	40g

Table 5: Solution with pHix-up during heat stress period

Heat stress supplementation	Dosage in diet
pHix-up (g/cow/day)	85g
K ₂ CO ₃ (g/cow/day)	85g
NaCl (g/cow/day)	45g

With pHix-up, the mineral intake during heat stress is reduced by 40% (215g vs 375g) and the cost per cow per day is reduced by 2 to 3 cents.

Available in the UK from:

BDC agri, Unit 11, West Mersea Business Centre, Rushmere Close,
West Mersea, Essex CO5 8QQ

Contact Greg Dunn 01206 381521 or 07801 308054

www.BDC-agri.com greg@blackdiamondcommodities.com





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action on rumen pH

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& yield



3x HIGHER
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Bicarbonate

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Proven
EFFICIENCY
J. Dairy Sci. 101:1-12



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Powerful, fast & sustainable action on rumen pH,
naturally supporting performance in ruminants.

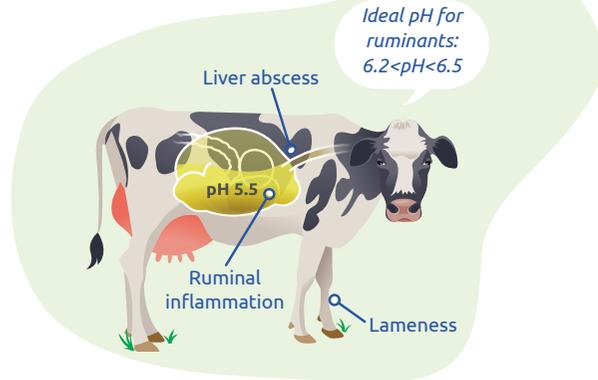


INNOVATION

BDC agri

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Acidosis is a fermentation disorder in the rumen characterized by a **decrease in ruminal pH for several hours a day.**



RUMEN ACIDITY CAN CAUSE:

- A reduction in digestive efficiency**
- A reduction in milk production**
- A reduction in fat content**
- An increase in production costs**
- Opens the door to other diseases...**

Disturbance of rumen balance is a constant threat, especially for animals with high production potential. To **maintain the performance of ruminants**, it is important to ensure the proper **balance of the rumen**, which can be disturbed during certain periods of the year like heat stress, early grazing, change of silo etc.

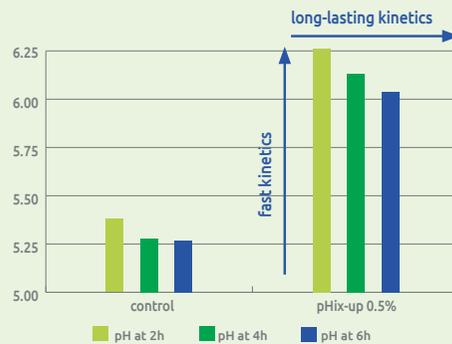


The **specific kinetics** of pHix-up® (Fast and long-lasting) allow to maintain an **optimal rumen pH** between two meals but also over the whole lactation, contributing to a better rumen functioning in the **long term.**

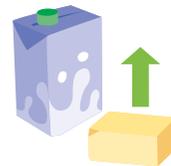
pHix-up®

ensures an effective rumen balance

Effect on rumen pH during fermentation in rumen fluid (in vitro test from pH 5.5)



- > Improvement of milk production
- > Better stabilization of rumen pH
- > Improving rumen micro-flora



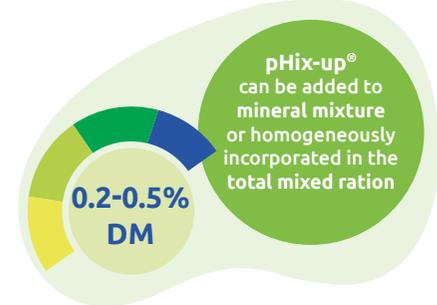
96% effect persistency after 6 hours



+1.35 kg/cow/day ECM compared to the initial buffer solution

pHix-up®

Powerful, fast and sustainable action on rumen pH, naturally supporting performance in ruminants.



Made up of a quality blend of MgO, selected for their complementary kinetics on the rumen pH, **pHix-up®** is an innovative product combining a **fast and long-lasting** product to neutralize excess acid in the rumen.

PHIX-UP® VALIDATED UNDER FIELD CONDITIONS

	before	pHix-up®
Milk production (kg/cow/day)	31.57	+ 1.32*
ECM: Energy Corrected Milk (kg/cow/day)	33.57	+ 1.35*
Total fat content (g/cow/day)	1250	+ 50*
Total protein content (g/cow/day)	1030	+ 30**

* P value < 0,001 ** p value < 0,01

pHix-up® positive effect on rumen pH has been confirmed by a meta-analysis, including 10 000 lactating cows worldwide (30 to 4700 animals per farm).

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SuperCow®