

## The Dietary Cation-Anion Balance (DCAB) system

The DCAB system is probably the most commonly used modern dry cow feeding approach to milk fever prevention.

It involves balancing the minerals naturally present in the feeds to create the most favourable, slightly acidic conditions in the blood that promote calcium mobilisation from the bones.

The approach is geared to offsetting inputs of

positively-charged cationic salts such as potash and sodium which make the blood less acid with acidifying negatively-charged anions like chloride and sulphate.

To do this, forages need to be analysed for their key mineral elements (**Figure 2**).

Armed with this analysis, the Cation-Anion Balance of the basic ration can be established (**Figure 1**).

**Figure 1: Typical Cation-Anion Balance (CAB)**

Cations (+)		Anions (-)	
Sodium	186 mEq/kg	Chloride	320 mEq/kg
Potassium	621 mEq/kg	Sulphur	137 mEq/kg
Calcium	459 mEq/kg	Phosphorus	167 mEq/kg
Magnesium	213 mEq/kg		
<b>Total</b>	<b>1479 mEq/kg</b>	<b>Total</b>	<b>624 mEq/kg</b>
<b>CAB</b>	<b>+559 mEq/kg*</b>		

\* CAB = [Na + K + (0.38 x Ca) + (0.3 x Mg)] - [Cl + (0.6 x S) + (0.5 x P)]

**Figure 2: Typical DCAB forage analysis**

Mineral Elements (DM Basis)		Assay	Very Low	Low	Mean	High	Very High
Chloride	CL %	1.12	0.30	0.75	1.40	2.00	4.00
Phosphorus	P %	0.26	0.10	0.20	0.40	0.50	0.60
Potassium	K %	2.43	0.20	0.49	3.50	4.00	5.00
Magnesium	Mg %	0.26	0.10	0.25	0.50	0.70	0.80
Calcium	Ca %	0.92	0.25	0.35	0.55	0.65	0.75
Sodium	Na %	0.43	0.10	0.15	0.25	0.35	1.00
Sulphur	S %	0.22	0.10	0.20	0.40	0.60	0.80

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In preventing milk fever, the aim should be to reduce the ration CAB around 3 weeks ahead of expected calving to between -150 mEq/kg DM and -200 mEq/kg DM.

This mild acidosis triggers the metabolism of calcium from the bones reserves in an attempt to redress the balance, allowing milk fever to be prevented.

## **Two slightly different approaches can be used to achieve this acidification:**

1. Partial DCAB, involving the careful selection of feeds to minimise potash and sodium intakes and the addition of magnesium chloride crystals.

The correct quantity of magnesium chloride needs to be assessed for each diet to achieve the desired CAB level.

In some situations ammonium chloride may be needed in addition to magnesium chloride.

2. Full DCAB, involving the use of a commercial mineral supplement containing a balance of anionic salts and additional calcium.

This works well under careful management but the high calcium input can make the milk fever situation worse if the supplement is not fed accurately every day – including days when relief staff take over.

To check whether the DCAB approach is achieving the desired effect, urine pH can be measured as an indicator of blood pH.

Strips of pH indicator paper held in the urine stream or touched on the ground where dry cows have just urinated are all that is required.

If the approach is working the pH of the urine which is normally around 8.0 should be below 6.5 and ideally less than 6.0 within 3-4 days of going onto the diet.