

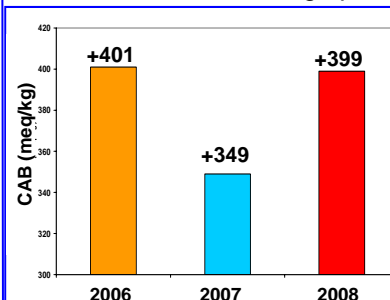
The Mineral Specialists

EARLY SEASON MINERAL PROFILE - GRASS SILAGE 2008

- **POTASSIUM CONTINUES TO INCREASE.**
- **CAB REMAINS HIGH**
- **PHOSPHORUS STATUS IS IMPROVED**
- **LESS SOIL CONTAMINATION MEANS LOWER IRON**
- **MOLYBDENUM HIGHEST FOR 3 YEARS**
- **AVAILABLE COPPER STATUS SLIPS**

CATION-ANION BALANCE (CAB) REMAINS HIGH

- After a dip in 2007, CAB has returned to 2006 levels at +399 meq/kg DM.
- Increase in Potassium is largely responsible.
- High positive CAB will increase alkalinity in the cow to the detriment of calcium absorption from gut and resorption from bone.
- Reducing Calcium supply will inevitably increase the risk of Hypocalcaemia (Milk Fever) at calving, particularly for older cows and those with a high potential for milk production.



- Milk Fever is the ultimate expression of Hypocalcaemia, but sub-clinical symptoms of calcium deficiency include retained cleansings, poor milk initiation, metritis, depressed dry matter intakes and ketosis.

ACTION POINTS

- Attention to limiting K levels in grasses has already been highlighted.
- Analyse forages for electrolyte minerals (K^+ , Na^+ , Cl^- , S^{2-}) and calculate CAB values.
- Adjust forage ratios in pre-calving diets to ensure DCAB and Potassium levels are less than +150meq/kg and 1.3% respectively.
- Target Magnesium intake at 50g/cow/day (min)
- Use anionic salts (Magnesium Chloride, Magnesium Sulphate and Ammonium Chloride) to reduce DCAB if altering forage ratios fails to do so.
- Boost Calcium supply at calving with CALCIJET P+, a liquid supplement containing Albion chelated Calcium and Magnesium, together with Phosphorus salts, and based on Propylene Glycol.

PHOSPHORUS STATUS IS IMPROVED

- Mineral mean values for Calcium, Magnesium and Sulphur have remained largely unchanged since 2007.
- Phosphorus has reported an 8% increase from 0.26 to 0.28%.
- This average increase, while welcome, will hide a wide range of forage Phosphorus values.
- P increase is equivalent to 1-2g/cow/day, which dependent on forage mix should enable a similar reduction in P mineral supplement values.

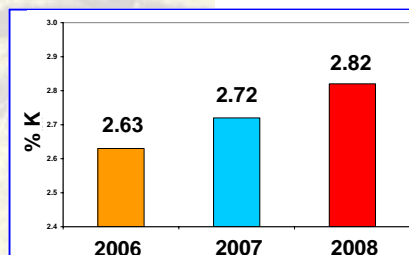
ACTION POINTS

- With the extortionate cost of P, analyse forages to make certain dietary targets (0.36-0.38%) are being met.
- Improve soil fertility and mineral balance which will improve release of P from the generally abundant reserves in British Island soils.

Mean mineral data from new crop grass silage samples analysed during June—July 2008 has shown marked changes to that reported for 2006 and 2007. Every season has its challenges, particularly with regard to weather patterns, and this year is no different. Grass growth took a long time to get going due mainly to the coldest April since 2001, when average temperatures were 2-3°C below the long term mean. This was followed by an explosion in grass growth during May, which turned out to be the warmest since 1914, with fairly average levels of rainfall. June then reverted to the expected pattern for both temperature and rainfall. Undoubtedly this erratic weather pattern resulted in a rapid uptake of mineral nutrients in the weeks just prior to grass cutting, which may well have had an impact on the overall mineral balance reported here.

POTASSIUM CONTINUES TO INCREASE

- Potassium trends are upwards.
- Potassium increased by 5% over 2007, from 2.72 to 2.82%.
- Although Potash fertiliser sales are down, increased targeting of slurry at silage ground is largely responsible.
- As Potassium uptake by grasses tends to follow Nitrogen, the undoubted rapid rise of N during May would have had an impact on K.



- With cow requirement for K between 1.0-1.4% DM, excess intake from silage will have the following consequences.....

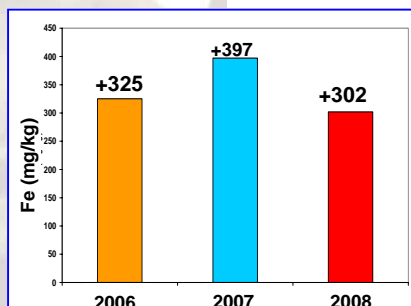
- ▶ Increases DCAB = calving problems
- ▶ Raises alkalinity in cow = reduced performance
- ▶ Depressed Magnesium absorption = staggers

ACTION POINTS

- To limit grass K levels, ensure:
 - ▶ Soil K levels are monitored.
 - ▶ Slurry targeted at low index soils.
 - ▶ Apply salt to pasture in Spring, as Sodium will depress Potassium uptake.

LESS SOIL CONTAMINATION MEANS LOWER IRON

- After the very high level of 2007 (397mg/kg) Iron has fallen significantly by 24% to 302 mg/kg.
- Soil contamination indicated by Titanium and Aluminium are also much lower by 12 and 61% respectively.
- Reason is much improved weather conditions at grass cutting day this year, compared with last year's wet Spring.
- Mean 2008 value (302mg/kg) is well below the long term average of 359mg/kg.
- Reduced Iron mean less competitive pressure on absorption of trace elements in general and Copper in particular.
- Oxidative Stress in cows resulting from high Iron silages will be reduced.
- HOWEVER—compared to cow's requirement, Iron level is still x2-3 higher and has the potential to cause Copper deficiency and reduced immunity.

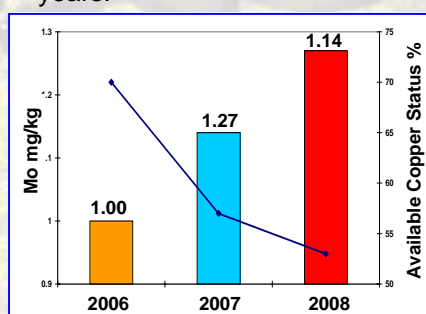


ACTION POINTS

- Continue to persuade farmers to take action to minimise soil contamination at grass harvest.
- Check forage Iron levels and use data to estimate total dietary levels.
- Provide a balanced mineral supplement containing Albion MAAC chelates of Copper, Manganese and Zinc, which are both well protected from Iron competitive pressures and absorbed at different gut sites.

MOLYBDENUM HIGHEST FOR 3 YEARS

- With the exception of Iron and Molybdenum, trace element levels have remained generally unchanged from previous years.



- Over the past 3 years Molybdenum has increased by 27%, with an 11% increase since 2007.
- Over the same period the Available Copper Status has declined by a similar factor (24%) from 70% in

2006 to 53% in 2008.

- Historically, Molybdenum levels have fluctuated year on year dependent on weather conditions in May.

- 2008 would not be expected to be a high risk Mo year, which is associated with a wet, cold Spring, although some carry over from April may be a factor.
- If the rising Mo trend continues, it may relate more to a deteriorating soil fertility, which will need to be reversed if forage production becomes more dependant on the efficient use of soil fertiliser reserves and slurry.

ACTION POINTS

- Analyse forages for mineral status.
- Use the T&J Mineral Check service to produce a customised mineral supplement designed to balance dairy diets.
- To reduce Molybdenum absorption and its consequent adverse effects of fertility use rumen soluble Copper sources (Sulphate and Acetate) to optimise rumen precipitation. Ensure sufficient Sulphur (0.20-0.23% DM) is present in the diet to aid this process
- Copper supplementation should be supported by **COPPER MAAC** at 20-25% of total supplementation to provide a rumen protected, bioavailable and well utilised source for Copper dependent processes essential for cow health, fertility and production.

SUMMARY

- Main trends in 2008 Grass Silage are:
 - ▶ Potassium continues to increase.
 - ▶ CAB remains high.
 - ▶ Phosphorus slightly up.
 - ▶ Soil Contamination and Iron reduced.
 - ▶ Molybdenum follows upwards trend.
 - ▶ Available Copper falls.
- Translated into Risk Factors for mineral related disorders in the forthcoming season:
 - ▶ Risk of **CALCIUM DEFICIENCY** resulting in calving problems— **INCREASED**.
 - ▶ Risk of **COPPER DEFICIENCY** affecting fertility — **INCREASED**.
 - ▶ Risk of **OXIDATIVE STRESS** resulting from high Iron — **REDUCED**.
- To ensure cow health, fertility and production is protected from these potential problems use:
 - ▶ T&J Forage Mineral Analysis Service
 - ▶ T&J Mineral Check
 - ▶ Albion MAAC minerals

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FORAGE MINERAL REPORT

SAMPLE TYPE	Grass Silage	FARMER	UK Average-168 sampl
SAMPLE REF	2008	FIELD ID	June - July 08
DISTRIBUTOR	Thomson & Joseph Ltd.	POSTCODE	
DISTRIBUTOR'S REF		DATE	24 July 2008

MINERAL ELEMENT (DM BASIS)		ASSAY	VERY LOW	LOW	MEAN	HIGH	VERY HIGH
Calcium	Ca %	0.59	0.30	0.50	0.60	0.70	0.90
Phosphorus	P %	0.28	0.20	0.30	0.35	0.40	0.55
Magnesium	Mg %	0.17	0.10	0.15	0.20	0.25	0.40
Potassium	K %	2.85	0.50	1.00	2.00	3.00	5.00
Sodium	Na %	0.22	0.10	0.20	0.25	0.30	0.40
Chloride	Cl %	1.11	0.30	0.60	1.00	1.40	2.00
Cation-Anion Balance CAB	meq/kg	399	50	100	200	300	500
Iron	Fe mg/kg	302	50	100	150	200	350
Aluminium	Al mg/kg	138	25	50	100	150	300
Manganese	Mn mg/kg	112	50	75	100	125	200
Zinc	Zn mg/kg	30.3	25	40	60	80	130
Cobalt	Co mg/kg	0.12	0.10	0.20	0.25	0.30	0.40
Iodine	I mg/kg	1.13	0.25	0.50	1.00	1.50	2.00
Selenium	Se mg/kg	0.10	0.05	0.10	0.15	0.20	0.25
Copper	Cu mg/kg	6.9	5	8	10	12	15
Molybdenum	Mo mg/kg	1.27	0.10	0.35	0.80	1.25	2.00
Sulphur	S %	0.18	0.10	0.15	0.20	0.25	0.40
Available Copper	%	53	40	80	100	120	160
Soil Contamination Index							

Forage Year		2006	2007	2008	% Difference 2008 v 2007
No. of Samples		228	208	168	
Calcium	%	0.54	0.58	0.59	---
Phosphorus	%	0.27	0.26	0.28	+8
Magnesium	%	0.16	0.18	0.17	---
Potassium	%	2.63	2.72	2.85	+5
Sodium	%	0.23	0.28	0.22	-21
Chloride	%	0.94	1.24	1.11	-10
Sulphur	%	0.17	0.19	0.18	---
CAB meq/kg		+401	+349	+399	+14
Iron	mg/kg	325	397	302	-24
Aluminium	mg/kg	194	355	138	-61
Manganese	mg/kg	115	109	112	---
Copper	mg/kg	7.6	7.2	6.9	---
Zinc	mg/kg	28.5	30.7	30.3	---
Cobalt	mg/kg	0.17	0.15	0.12	---
Molybdenum	mg/kg	1.00	1.14	1.27	+11
Iodine	mg/kg	0.71	0.27	1.13	
Selenium	mg/kg	0.05	0.08	0.10	---
Available Copper Status %		70	57	53	-7
Soil Contamination—Titanium mg/kg		11.8	13.0	11.5	-12

Data covers the period 1st June to 31st July in each year.

Results are expressed pm a Dry Matter Basis.

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