

MICRONUTRIENTS AND ANIMAL NUTRITION AND THE LINK BETWEEN THE APPLICATION OF MICRONUTRIENTS TO CROPS AND ANIMAL HEALTH

Dr George Fisher
Offerings Director (Cattle)
Kemira GrowHow oyj



SCHEME

- The need for micronutrients (what do they do in animals?)
- Micronutrients of interest
- Importance of micronutrients (case study with cobalt)
- Animal requirements
- The link between application and animal health
- Future work
- Conclusions



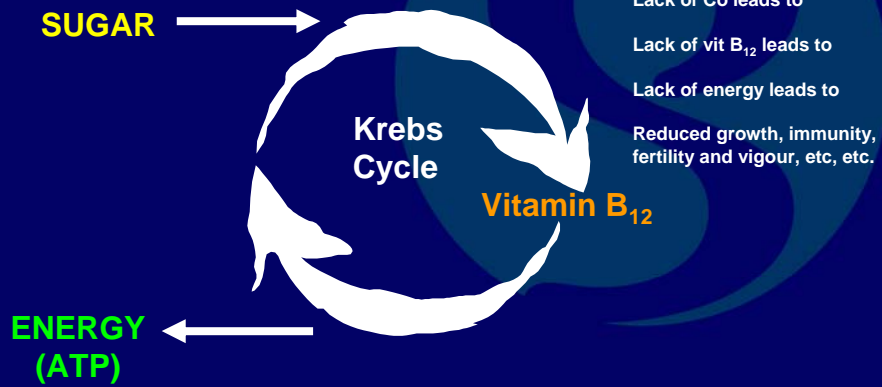
THE NEED – WHAT DO MICRONUTRIENTS DO?

- Enzymes and co-enzymes – **THEY ARE INVOLVED IN EVERYTHING!**
- Metabolic disorders in livestock affecting fertility, growth and welfare
- Deficiency – Clinical and sub-clinical forms
- Toxicity – in certain cases

MICRONUTRIENTS OF INTEREST

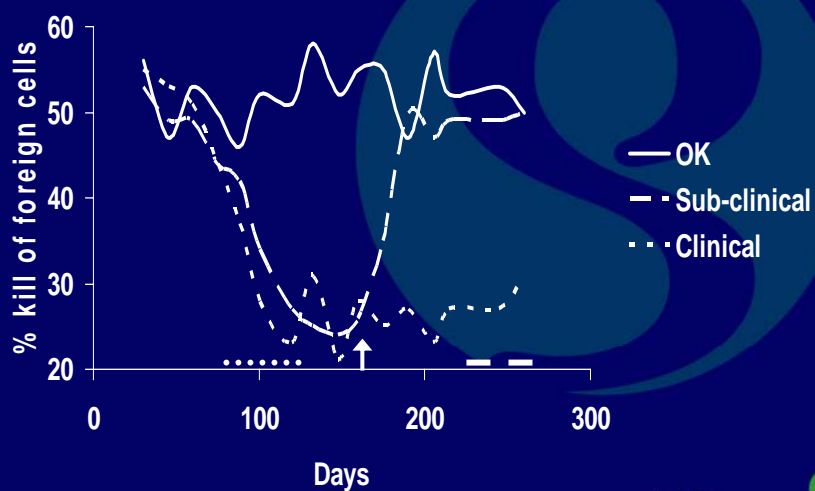
- Copper (Cu)
- Selenium (Se)
- Cobalt (Co)
- Iodine (I)
- Zinc (Zn)
- Manganese (Mn)
- Boron (B)

MICRONUTRIENTS ARE IMPORTANT A CASE STUDY WITH COBALT



KEMIRA
GrowHow
partnership • knowledge • solutions

Cobalt deficiency and immunity to disease



(Fisher and MacPherson, 1988)

KEMIRA
GrowHow
partnership • knowledge • solutions

Cobalt deficiency and lamb vigour

| Time from birth to (average in minutes): | Clinical | Sub- clinical | OK |
|---|----------|------------------|----|
| Standing | 22 | 29 | 15 |
| Finding udder | 41 | 44 | 24 |
| Suckling | 76 | 61 | 31 |

(Fisher and MacPherson, 1988)

Cobalt deficiency and immunity to disease

| Lamb blood immunoglobulins (as % of OK) | Clinical | Sub- clinical | OK |
|---|----------|------------------|-----|
| 2 weeks after lambing | 69 | 61 | 100 |
| 4 weeks after lambing | 62 | 52 | 100 |

(Fisher and MacPherson, 1988)

Cobalt deficiency and lamb survival

| | Clinical | Sub-clinical | OK |
|---------------------------------------|----------|--------------|----|
| % neonatal mortality | 47 | 6 | 5 |
| % treated for ill-health and survived | 5 | 24 | 0 |

(Fisher and MacPherson, 1988)



ANIMAL REQUIREMENTS

e.g. copper:

Cattle

| | |
|-------------|-------------------------------------|
| Maintenance | 0.7 mg Cu per 100 kg live weight |
| Growth | 1.1 mg Cu per 1 kg live weight gain |
| Milk | 0.1 mg Cu per litre |

Sheep

| | |
|-------------|--|
| Maintenance | 0.04 mg Cu per 10 kg live weight |
| Growth | 0.11 mg Cu per 0.1 kg live weight gain |
| Milk | 0.4 mg Cu per litre in early lactation |
| | 0.2 mg Cu per litre in late lactation |



APPLICATION AND ANIMAL RESPONSE

Options for diagnosis:

- Soil
- Herbage
- Animals

Soil and herbage levels of micronutrients are poor indicators of deficiency

Animal tissue (usually blood) provides more accurate diagnosis, but account for the 'liver-effect'

KEMIRA
GrowHow
partnership • knowledge • solutions

DON'T sample happy cows!
(mid lactation, early pregnancy)

DO sample stressed cows!
(last third pregnancy, early lactation)



- Sample 10% of stock
- Get a full metabolic Profile
- Re-sample after treatment

KEMIRA
GrowHow
partnership • knowledge • solutions

DON'T sample suckling young!

DO sample rapidly growing, weaned stock



- Sample 10% of stock
- Get a full metabolic Profile
- Re-sample after treatment

KEMIRA
GrowHow
partnership • knowledge • solutions

OPTIONS FOR SUPPLEMENTATION

Treat the soil

- Fertilisers

Treat the herbage

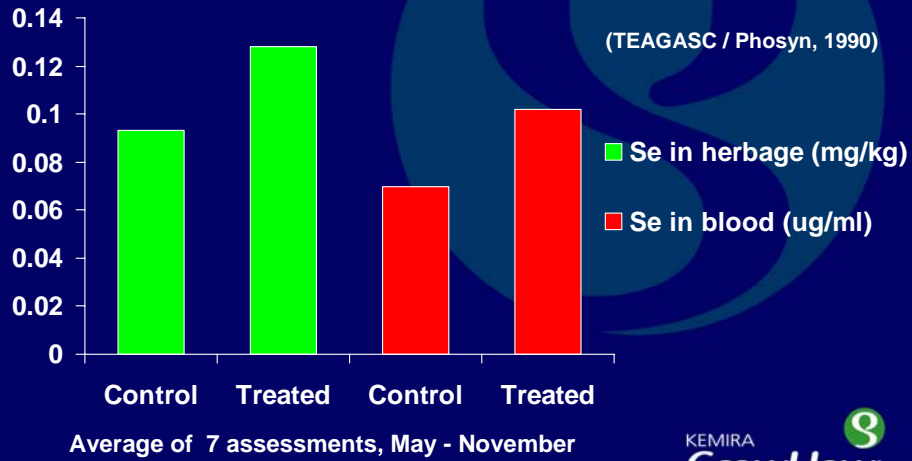
- Sprays

Treat the animal

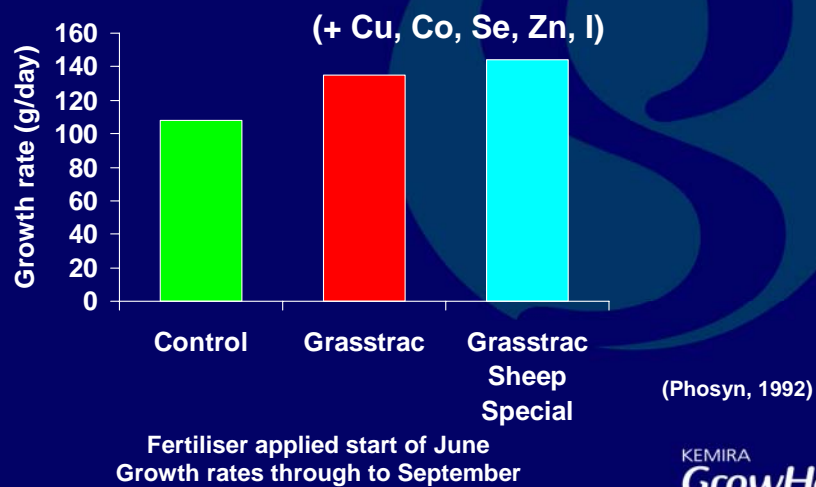
- Metered water
- Feeding blocks and licks
- Feed supplements
- Injecting
- Dosing (with boluses)
- Drenching

KEMIRA
GrowHow
partnership • knowledge • solutions

Example with Se from a fertiliser for dairy cows



Example with mixed nutrients from a fertiliser for lambs



Animal selection



Micronutrient content of different species

| Species | Fe (mg/kg DM) | Cu (mg/kg DM) |
|--------------------------------|------------------|------------------|
| <i>Achillea millefolium</i> | 123 - 284 | 10.5 - 18.4 |
| <i>Daucus carota</i> | 164 - 298 | 7.3 - 17.6 |
| <i>Sanguisorba officinalis</i> | 278 - 356 | 7.6 - 25.0 |

(Lyduch and Trzaskos, 1992)



FURTHER WORK

- Micronutrients in manures
- Concentrations in different forage plant species
- Selection by animals
- Gaps in the knowledge of farmers



CONCLUSIONS

- Micronutrients are important
- Ask the animal
- Treat all deficiencies in a manner that fits the system best
- Benefits in fertility, production, welfare

