ADVISORY COMMITTEE ON ANIMAL FEEDINGSTUFFS

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Presentation on Copper Supplements In Feed For Cattle

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COPPER SUPPLEMENTATION

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Copper

- Copper is an essential trace element
- Many forages in Britain are low in copper so the risk of copper deficiency on unsupplemented diets is relatively high
- Copper deficiency (hypocupraemia and hypocuprosis) is diagnosed relatively commonly by VLA in beef suckler cattle (546 since 2005)
- Cf. Dairy cattle (0)

Copper deficiency disease

- Hypocupraemia
  - Low blood copper but no clinical signs
- Hypocuprosis
  - Infertility
  - Coat colour alterations
  - Skeletal abnormalities in calves

Why supplement copper?

- To prevent copper deficiency disease
  - When the copper content of the diet does not meet production requirements
  - In the presence of copper antagonists such as molybdenum, iron and sulphur

Dairy nutrition

- In general relatively advanced. Nutrition needs to cover maintenance and production (milk and pregnancy)
  - Forages
  - Concentrates
  - straights
  - Minerals
  - TMR
- The modern dairy cow will virtually never receive insufficient copper in a ration

Infertility in dairy cattle in the UK

- Multifactorial
  - Poor oestrus detection
  - Technical eg incorrect time of service
  - Inadequate nutrition eg energy deficit
  - Infectious disease
  - Infections
  - Genetic selection
  - Molybdenumosis

Copper requirement and allowance

- Allowance in diet is always more than the copper requirement
- Provide sufficient copper to fully meet the
  - requirement for maintenance
  - requirement for production
    1. copper requirement for milk production relatively low compared with maintenance
    2. growing foetus
- In addition, an amount to overcome the effect of copper antagonists
- a small additional amount to provide a safety margin

Possible causes of copper poisoning

- Excessive supplementation
  - Intended
  - Incidentally related to production
- Increased bioavailability and absorption of copper
  - Physical and chemical form of copper
  - Antagonists e.g soil ingestion
  - Genetics
- Decreased copper excretion
  - Pathology
  - Genetics
- Increased susceptibility to poisoning by copper
  - Concurrent oxidative stress
  - Concurrent liver disease
  - Genetics

Evidence of excessive supplementation

- Clinical disease: copper toxicity
- Subclinical disease:
  - Raised liver enzymes but this is non specific
- Analytical:
  - Excessive copper content of compounded feeding stuffs
  - Total daily exposure: multiple supplementation
    1. Levels in excess of those permitted without prescription even in absence of known antagonists problem (refer to appendix 2)

VLA survey 1999-2003; results of forage and TMR analysis

Evidence of molybdenumosis?

- No evidence of a severe copper antagonist problem on most of the farms
- Only 2 of 10 forages analysed investigated contained "high" concentrations of Mo
- No forages contained high concentrations of S

The presentation of many dietary analytical results is misleading, possibly promoting over interpretation of deficiencies

Good supplementation practice

- Confirm the need for supplementation
  - *What should the criteria for intervention be?*
- Supplement only to the level required
  - *Are some supplements superior or safer?*
- Consider all sources
- Follow the requirements for a prescription when supplementing above Feed Regulations limits
- Monitor efficacy and safety of supplementation
  - *Possibly not as simple as it sounds*

Problems encountered following good practice

- Inadequate tests used to diagnose copper deficiency and molybdenumosis
- Failure to monitor liver copper
- Failure to eliminate other causes of infertility
- Failure to use control groups
- Failure to investigate mineral status (Cu, Mo, S, Fe, Zn)

Conclusions

- Implement "Good Practice" to avoid over supplementation
- Design a practical scheme for implementing and monitoring good practice in animal feeding
- **Code of Practice**
  - **Can we agree core procedures to follow?**
  - **Do we need further advice as to how responsible supplementation could be done?**