

# **Unit C: Meeting Nutritional Needs of Animals**

## **Lesson 4: Meeting Mineral and Vitamin Requirements**

# Terms

- Calcium
- Cobalt
- Copper
- Fat soluble vitamins
- Iodine
- Iron
- Magnesium
- Major minerals
- Manganese
- Phosphorus
- Potassium
- Sodium chloride
- Sulfur
- Trace minerals
- Vitamin A
- Vitamin B
- Vitamin C
- Vitamin D
- Vitamin E
- Vitamin K
- Water soluble vitamins

# What are the mineral requirements for cattle?

- The important minerals in cattle feeding are divided into two groups:
  - ***Major minerals*** include calcium, phosphorus, potassium, sodium chloride, sulfur, and magnesium.

# What are the mineral requirements for cattle?

- **Calcium** is the most abundant mineral in the body. Ninety-nine percent of the total Calcium in the body is found in the skeleton and teeth of animals.
  - Deficiency symptoms include rickets (misshapen bones, lameness) especially in calves and milk fever (hypocalcaemia - low blood calcium level )
  - Sources of Calcium include bonemeal, shell meal, meat meal, fish meal, milk, legumes, pulses, dicalcium-phosphate.
  - Calcium utilization is strongly related with phosphorus (P) and vitamin D.

# What are the mineral requirements for cattle?

- ***Phosphorus*** is used in bone formation and is in close association with calcium and vitamin D. Phosphorus is known to have more functions in the animal body than any other mineral.
  - Deficiency symptoms include rickets; chewing wood, bones, rags, etc; poor fertility; lower milk yield
  - Sources include cereal grains, bonemeal, dicalcium P, milk, and fish meal.

# What are the mineral requirements for cattle?

- **Potassium** is important for osmotic regulation of the body fluids and regulation of the acid-base balance in the rumen.
  - Deficiency is very rare, although excess potassium may interfere with the absorption of Magnesium which leads to hypomagnesia (grass staggers or grass tetany which is the result of low levels of magnesium in the blood).
  - Plants generally have high concentration of potassium.

# What are the mineral requirements for cattle?

- ***Sodium chloride*** is also known as table salt. Sodium chloride functions (with K) in acid-base balance and the osmotic regulation of body fluids. This is extremely important in warm climates because animals are sweating.
  - Deficiency symptoms include general poor performance including poor growth and infertility.
  - The main source of NaCl is through a “lick” or in a special water trough. Most feedstuffs (especially plant-based) have low concentrations of NaCl.

# What are the mineral requirements for cattle?

- ***Sulfur*** is found in body proteins.
  - Deficiency symptoms are caused by a protein deficiency in the ration
  - Sources of sulfur include protein rich sources such as soya cake, cotton seed cake, or sodium sulfate. Extra sulfur needs to be added to diets that have large amounts of NPN (urea).



# What are the mineral requirements for cattle?

- ***Magnesium*** is closely related to Ca and P. The skeleton contains 70% of the body's magnesium.
  - Deficiency is common in milk fed calves between 50-70 days of age. Symptoms include poor bone formation and hypomagnesemia.
  - Sources include wheat bran, legumes, plant protein cakes like cottonseed cakes and soya cakes.

# What are the mineral requirements for cattle?

- **Trace minerals** include iron, copper, cobalt, iodine, and manganese.
  - Ninety percent of the **iron** in the body is combined with proteins.
  - Deficiency symptoms include anemia, especially in young calves which are fed on milk. Adult cattle have less incidence of Fe deficiency because most feedstuffs have substantial amounts.
  - Sources include green leaves, legumes, seed coats and meat, bone and fish meal.

# What are the mineral requirements for cattle?

- ***Copper*** is used in haemoglobin formation and pigmentation.
  - Deficiency symptoms include anemia, dull coat color, infertility, and scouring.
  - Copper is easily found in most feedstuffs. Extra sources of Cu include seeds and seed by-products.

# What are the mineral requirements for cattle?

- ***Cobalt*** is necessary for rumen microorganism function in association with vitamin B<sub>12</sub>.
  - Deficiency symptoms include emaciation, anemia, and pining.
  - Most feedstuffs have normal amounts of Co.

# What are the mineral requirements for cattle?

- ***Iodine*** is important in thyroid gland function.
  - Deficiency symptoms include enlargement of the thyroid gland. This may result in breeding problems and birth of hairless, weak or dead calves.
  - Sources include Brassica family feedstuffs (kale, rape, rape seed, cabbage), soya beans, peas, and ground nuts. Iodized salt can also be used as an iodine supplement.

# What are the mineral requirements for cattle?

- ***Manganese*** is an important enzyme activator.
  - Deficiency usually does not occur because such small amounts are needed.
  - Most feedstuffs contain Mn, especially wheat bran, ricebran, and seeds.

# What are the vitamin requirements for cattle?

- Vitamins are needed in very small amounts, but are still indispensable. They are sorted into two categories:
  - ***Water soluble vitamins*** include vitamin B complex and vitamin C.

# What are the vitamin requirements for cattle?

- ***Vitamin B*** is a group of vitamins that are produced in the rumen.
  - Deficiency is not likely in ruminants, except if the diet is deficient in cobalt.
  - Sources include bran, milk, and brewers grain.



# What are the vitamin requirements for cattle?

- ***Vitamin C*** is synthesized by animals and therefore there is no deficiencies.
  - Rich sources include green leafy vegetables, citrus, and potatoes.

# What are the vitamin requirements for cattle?

- ***Fat soluble vitamins*** include vitamin A, D, E, and K
  - ***Vitamin A*** assists in maintaining healthy skin and eyes.
    - Deficiency symptoms include dry skin, infections of the skin and eyes, diarrhea, and infertility.
    - Rich sources of vitamin A include green feedstuffs.

# What are the vitamin requirements for cattle?

- ***Vitamin D*** assists in depositing Ca and P and is produced by the skin when exposed to sunlight.
  - Deficiencies include rickets (similar to Ca and P) and will not occur in animals that are outdoors.
  - Rich sources of vitamin D includes sun dried feedstuffs such as hay and straw.

# What are the vitamin requirements for cattle?

- ***Vitamin E*** is important in fertility and is related to Selenium and muscle development.
  - Sources include green foods and cereal grains.
- ***Vitamin K*** is important in blood clotting.
  - Deficiencies do not occur frequently.
  - Sources include green fodders but ruminants synthesize vitamin K.

# Review/Summary

1. What are the mineral requirements for cattle?
2. What are the vitamin requirements for cattle?