Vitamin/Mineral Problems in Cattle Herds of Montana

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Vitamin/Mineral Deficiencies

- Copper Deficiency (72%)
- Selenium Deficiency (56%)
- Vitamin E Deficiency
- Vitamin A Deficiency
- Rarer
  - Manganese (1%)
  - Zinc (9%)
  - Cobalt (<1%)
Vitamin/Mineral Deficiencies

- 2008 saw half as many deficiency cases as was seen 10 yrs previous with slightly increased numbers of tests
- 2009 the number significantly increased
- 2010 numbers doubled from 2009
- 2011-14 slight increase from 2010
- 2015 – similar to 2011-2014

Vitamin/Mineral Deficiencies

- Why do we see more now than 30 yrs. ago???
  - Fall of 2008 – Cost cutting
  - More common testing
  - Increased production output
  - Altered nature – calving dates
  - Drought effects
Copper Deficiency

- Deficiency in calves can cause
  - Poor Growth Rate
  - Poor Immune Function
    - Susceptible to various causes of diarrhea and pneumonia
- Calves should be born with higher body reserves than an adult
- Cows move copper to fetus during gestation

Copper Deficiency (cont.)

- Deficiency in a calf is caused by maternal deficiency
- Deficiency due to inadequate intake or precipitated by high sulfur, iron, selenium, or molybdenum in the diet
- Feeder and Adult deficiencies associated with repeat breeders, poor conception rates, prolonged calving dates, non-breeders, poor immune function, and poor growth
- Sample of choice for testing is liver
  - Deficient Serum is accurate
  - Adequate serum is questionable
Copper Excess

- Over-Supplementation
- Causes interference with iron, selenium, and zinc
- Can cause mild to severe functional liver changes

Selenium Deficiency

- Deficiency in calves can cause:
  - Poor Growth Rate
  - Weak calves
  - Poor Immune Function
  - White Muscle Disease
  - Sudden Death
Selenium Deficiency (cont.)

- Calves should be born with higher body reserves than an adult.
- Cows move selenium to fetus during gestation.
- Feeder and adult deficiencies associated with repeat breeders, poor conception rates, prolonged calving dates, non-breeders, poor immune function, poor weight gain, and sudden deaths.
- Deficiency due to inadequate intake or precipitated by high sulfur, zinc, or iron.
- Sample of choice is liver, serum, or whole blood:
  - Serum is a good monitor of recent intake.
  - Whole blood is a monitor of long term status.

Chemical Form of Supplements

- [Graph showing the effect of different selenium supplements on serum selenium concentration over time.]
- [Legend showing control, 1 mg Se/kg BW as selenite, 2 mg Se/kg BW as selenite, and 3 mg Se/kg BW as selenite.]
- [Graph showing the effect of different selenium supplements on serum selenium concentration over time.]
- [Legend showing control, 1 mg Se/kg BW as SeMet, 2 mg Se/kg BW as SeMet, and 3 mg Se/kg BW as SeMet.]
Manganese Deficiency

- Manganese necessary for bone and joint development and reproductive functions
- Deficiency associated with cystic ovaries, repeat breeding, and weak calves

Supplement Type can make Differences

![Bar chart showing whole blood manganese concentration over time for different supplement types.](chart.png)
Vitamin E Deficiency

- Deficiency in calved can cause:
  - Poor Growth Rate
  - Weak calves
  - Poor Immune Function
  - White Muscle Disease
  - Sudden Death

Vitamin E Deficiency (cont.)

- Vitamin E is a fat soluble vitamin that requires intake of green vegetation
- Drought conditions result in less accumulation of Vitamin E to sustain the cow through the winter and gestation
- Liver or serum are adequate for testing
Vitamin A Deficiency

- Deficiency in calved can cause:
  - Poor Growth Rate
  - Weak calves
  - Poor Immune Function
  - Poor digestive tract integrity
  - High susceptibility to diarrhea
  - Deaths

Vitamin A Deficiency (cont.)

- Vitamin A is a fat soluble vitamin that requires intake of green vegetation

- Drought conditions result in less accumulation of Vitamin A to sustain the cow through the winter and gestation

- Liver or serum are adequate for testing
Effects on Immunity

- Copper, Selenium, Zinc, Vitamin A and Vitamin E are required for normal immunity

- With deficiencies
  - Direct immune compromise
  - Indirect immune compromise
    - Poor response to vaccinations (cow)
    - Poor colostrum

Copper Cycle of Body Reserves
**Vitamin A and E Cycle of Reserves**

- Vitamin-Mineral supplement intake limited by salt and phosphorous content
- Intake is based on a relative percent of total dietary intake
- As dry matter intake decreases so does supplements
- Lab is already seeing more nitrate cases this year
Timing Supplementation

- Vaccine Timing
  - Not wise to vaccinate when animals are in poor condition for vitamin/mineral balance

- Optimization of Health – Calves, feeders, etc.

- Optimization of Reproductive Efficiency

Herd Testing

- Serum
  - Groups of samples required
  - 5-10 samples per group of similarly treated animals (dependent on group size)
  - Copper – questionable

- Liver
  - Saved samples from “normal animals”
  - Liver Biopsies
Questions