

Mineral and Vitamin Supplementation For Neonatal Beef Calves and their Dams

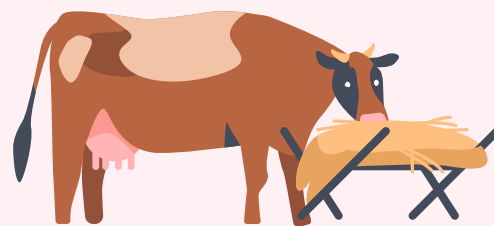
A Guide for Beef Cattle Producers

Trace minerals and vitamins play crucial roles in the health and productivity of beef cattle. Although grazing may provide many of these nutrients, deficiencies in essential nutrients are common due to the types of plants available, soils low in minerals, climate factors, and maturity stage of forage.

Rumen microbes provide cattle with many water-soluble vitamins, but fat-soluble vitamins, such as A, E, and K, must be taken up through food sources. Delivery of trace minerals and vitamins through injectables or feed supplements can have beneficial effects on cows and their calves.

The concept of fetal programming suggests that the dam's nutrition is one component that affects the developing fetus' future productivity in life, such as carcass traits or reproductive performance of heifers.

Supplementation for Dams



Background

- Many micronutrients pass the placenta to reach the developing fetus and are essential for proper bone and muscle development, among other functions.
- Trace minerals reach higher levels in the fetus than in the dam if requirements aren't met (i.e., the needs of the fetus take priority over the needs of the dam).
- When a fetus is submitted to the diagnostic lab, trace element levels in the fetal liver may be higher than in the dam and should be interpreted with caution.

- Pasture examination and drinking water evaluation are good starts to a trace mineral program assessment.
- [Extension advisors](#) can help with pasture sampling and interpretation of results.
- Your veterinarian can also help you with testing cattle for mineral status through a blood test or a liver biopsy.

Mineral Forms

The decision on which type of mineral product to use may depend on many factors, such as the pasture conditions or stage of the production cycle. For example, organic supplementation could be offered in late pregnancy through the breeding season.

Inorganic Minerals	Organic or Chelated Forms
<ul style="list-style-type: none">• Examples: Oxides, carbonates, chlorides, and sulfates.• Prone to form complexes with other minerals in the rumen.<ul style="list-style-type: none">◦ These complexes reduce the rate at which they can be absorbed in the digestive tract.	<ul style="list-style-type: none">• Examples: Amino acid complexed minerals and methionine hydroxyl analog chelated minerals• Thought to be absorbed at higher rates than inorganic forms.• Have shown superior results in some research trials, e.g., earlier puberty in heifers born to dams that were supplemented with chelated minerals.• The cost is higher than for inorganic forms.

Additional Information

- There are selenium and copper boluses available that slowly releases minerals in the reticulo-rumen and provide supplementation from several months to a year.
- Injectable products, such as Multimin®, can be a component of a supplementation program; but usually cannot replace oral supplementation because they do not provide enough trace elements for an extended period.

Supplementation for Calves



Calves born to well-supplemented dams are ahead of the curve, as the placenta provides efficient supplementation as vitamins and minerals cross the placenta. Calves will continue to receive these micronutrients through the milk and their own feeding.

Selenium

- In regions with severe selenium deficiency, supplementation of the calf through injectable selenium products, such as Bo-Se® or Multimin®, may be beneficial. Both products require a prescription from your veterinarian.
- The [US Geological Survey](#) provides a map that details the levels of soil selenium by county. This resource can help determine the level of supplementation that may be necessary in your area.
- To avoid human exposure to high levels of selenium in meat products, the FDA has set legal limits for selenium supplementation.
 - **Free Choice Mixtures:** 120 ppm (parts per million)
 - **Maximum Daily Intake:** 3 mg per head per day.
- High levels of selenium exposure in cattle can lead to toxicity. Clinical Signs include:
 - Lameness
 - Deformed hooves
 - Loss of tail hair
- As a rule, to avoid over supplementation and risks of toxicity, **DO NOT** give two forms of selenium supplementation simultaneously.
 - For example, **DO NOT** give a bolus on top of a free choice mineral that also supplies sufficient selenium.



Vitamin A

- Vitamin A is made from precursors in green forage and stored in the liver.
 - During drought conditions, vitamin A storage in the liver is likely depleted after 3–4 months.
- Vitamin A deficiency can lead to:
 - Blindness in calves
 - Poor fertility in cows.
- Vitamin A is poorly supplied to the fetus through the placenta; therefore calves are dependent on colostrum intake for their initial vitamin A needs. Aborted fetuses or stillborn calves will have low liver Vitamin A, which may not reflect the herd status.
- Due to manufacturing shortages, many mineral mixes do not supply enough vitamin A to meet the minimum requirements for calves.
 - Vitamins in mineral mixes will degrade over time and with inappropriate storage.



Vitamin D

- Vitamin D is produced in the skin when the animal is exposed to sunlight. Unless cattle are kept indoors, vitamin D deficiency should not be a problem.
- There are injectable products that supply vitamins A, D, and E that might be helpful for fall-born calves.



Vitamin E

- Requirements for vitamin E and selenium are co-dependent (i.e., if one of them is low, higher levels of the other can compensate).
- Drought conditions may result in forages and colostrum that are low in vitamin E. Calves born during droughts may require higher selenium supplementation than when green feed is abundant.

- White muscle disease is a condition that is caused by a deficiency in vitamin E and/or selenium.
 - It is characterized by a stiff gate, trembling, increased breathing effort, or sudden death in calves.

Vitamin K

- Vitamin K is produced by the microbes in the rumen, which is usually sufficient to meet the needs of cattle.

Additional Vitamin Information

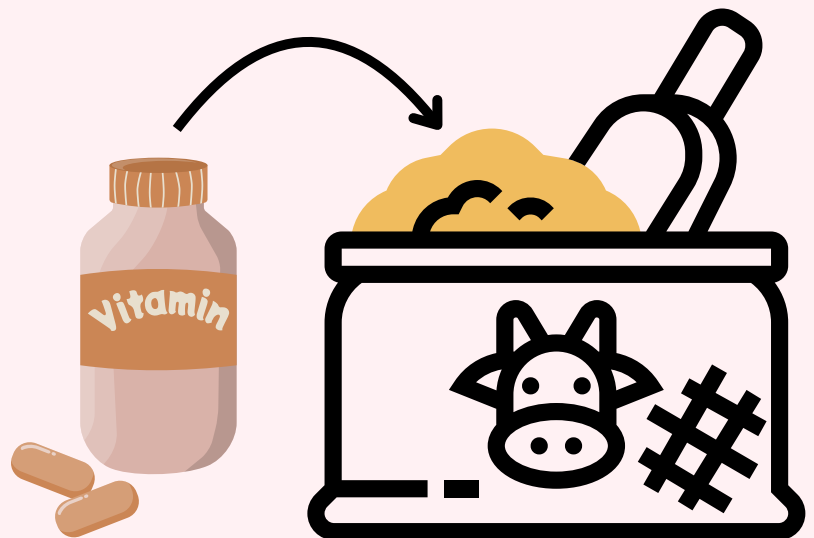
- Anecdotally, there is a higher risk of a vaccine reaction called anaphylaxis when vaccines for gram negative bacteria (*Moraxella*, *Pasteurella*, *Salmonella*, *Mannheimia*, *Histophilus*, *E. coli*) are given at the same time as a Vitamin A, D, & E injection.



Therefore, it is not recommended to do many vaccinations at the same time as vitamin A, D, & E injections.

Take Home

- Work with your veterinarian to assess if vitamin and/or mineral supplementation is necessary based on your herd demographics, grazing location, and other feed sources.



Additional Resources

Videos

- **Mineral Health and Supplementation:**
 - <https://tinyurl.com/BeefCattleMineralHealth>
- **How to give a bolus to cattle:**
 - <https://tinyurl.com/HowToBolusforCattle>



Papers:

- **Mineral status of California beef cattle:**
 - <https://tinyurl.com/CABeefCattleMineralStatus>
- **Efficacy of selenium supplementation methods in California yearling beef cattle and resulting effect on weight gain:**
 - <https://tinyurl.com/SeleniumSupplementationMethods>
- **Monensin and mineral supplementation economically increase yearling cattle weight gain on California annual rangeland:**
 - <https://tinyurl.com/MonensSupplementation>



Product:

- **CA Cattlemen Association Selenium Boluses and Bolus Gun:**
 - <https://tinyurl.com/CCABolus>



Other:

- **US Geological Survey map on the levels of soil selenium by county:**
 - <https://tinyurl.com/USGeoSurveyMap>
- **DairyOne: Options for Forage Sampling:**
 - <https://tinyurl.com/DairyOneForageSampling>
- **CAHFS Laboratory Testing:**
 - <https://tinyurl.com/CAHFSLabTesting>



CDFA Antimicrobial Use and Stewardship | www.cdfa.ca.gov/ahfss/aus

UC Agriculture and Natural Resources | <https://ucanr.edu/site/newborn-beef-calf-health>

This document was made in collaboration with the following organizations:

