

Mineral requirements and maximum tolerable levels in beef rations (NRC Beef 1996). Compiled by Shelby Filley, Oregon State University.

Mineral	Minimum Requirement			Maximum Tolerable Level
	Growing & Finishing Cattle	Gestating Cows	Early Lactation Cows	
Calcium (%)	See notes <sup>c</sup>			
Cobalt (ppm)	0.10	0.10	0.10	10.00
Copper (ppm)	10.00	10.00	10.00	100.00
Iodine (ppm)	0.50	0.50	0.50	50.00
Iron (ppm)	50.00	50.00	50.00	1000.00
Magnesium (%)	0.10	0.12	0.20	0.40
Manganese (ppm)	20.00	40.00	40.00	1000.00
Molybdenum (ppm)	-	-	-	5.00
Nickel (ppm)	-	-	-	50.00
Phosphorus (%)	See notes <sup>c</sup>			
Potassium (%)	0.60	0.60	0.70	3.00
Selenium (ppm)	0.10	0.10	0.10	2.00
Sodium (%)	0.06 - 0.08	0.06 - 0.08	0.1	10.00 <sup>d</sup>
Sulfur (%)	0.15	0.15	0.15	0.40
Zinc (ppm)	30.00	30.00	30.00	500.00

**NOTES:**

<sup>a</sup> nd (not done)

<sup>b</sup> ppm = parts per million (1 ppm = 0.0001%; 1% = 10,000 ppm) and 1 mg/kg = 1 ppm.

<sup>c</sup> Calcium (Ca) and phosphorus (P) requirements vary with age, weight and type of animal and production level (lb/day growth, stage of gestation/lactation,...). Young animals have high requirements because of bone growth. Also high rates of gain or milk production, and pregnancy increase Ca requirements. It is also important to meet the P requirement and then make sure you keep the Ca:P ratio between 1:1 and 7:1. See specific values at <http://extension.oregonstate.edu/catalog/html/em/em8883-e/requirements.pdf> , table 1.1 and 1.2 or find them at <http://www.nap.edu/> , Nutrient Requirement of Beef Cattle, Ch.5.Minerals.

<sup>d</sup> 10% Sodium Chloride (NaCl - salt).