Vitamin and Mineral Needs of the Cow Herd

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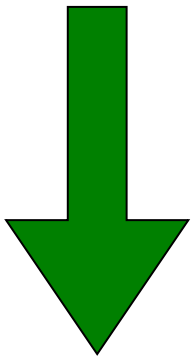
mineral nutrition impacts

- growth
- reproduction
- milk production
- health



PROFITABILITY

Components of a Complete Mineral Supplement

- salt
- macro minerals
- trace minerals (aka micro minerals)
- vitamins A, D, and E

Macro

% of diet

- calcium
- phosphorus
- potassium
- magnesium
- sodium
- sulfur

Trace (micro)

ppm or mg/kg

- copper
- zinc
- manganese
- iodine
- cobalt
- selenium
- iron
- *others*

Common Formulations

- higher-calcium, lower phosphorus
  - 15% Ca, 4% P
  - 16% Ca, 5% P
  - 15% Ca, 7.5% P
- similar Ca & P levels or higher P
  - 14% Ca, 12% P
  - 12% Ca, 9% P
  - 12.5% Ca, 8% P
- winter pasture (moderate to higher Mg)
  - $\geq 5\%$ Mg
  - higher Ca

	Example A	Example B	Example C
Calcium	15	15	16.5
Phosphorus	4	7.5	5
Salt	21	20	16
Magnesium	3	1	5
Potassium	-	1	0.1
Copper	1,200	1,200	2,500
Zinc	4,200	3,600	7,000
Manganese	3,600	3,600	4,000
Selenium	25	27	26
Iodine	100	60	250
Cobalt	150	12	20
Vitamin A	100,000	300,000	200,000
Vitamin D	2,500	30,000	20,000
Vitamin E	100	300	200

Additives

researched

- IGR
- CTC (requires VFD)
- bovatec (not labeled for cows)
- rumensin

- product A
- product A with IGR
- product A with CTC
- product A with IGR and CTC

Additives

not well researched or limited/no benefits

- there is a long list of these
- be cautious of claims
- be aware of selectively reporting research
- many would not justify the added cost

Macro Minerals Considerations

Phosphorus Levels

once nutrient requirements are meet, providing extra P will not improve reproduction

NRC requirements are too high for P

Trace Mineral Considerations

- copper
- zinc
- manganese

- selenium
- iodine
- cobalt

trace mineral supplementation will not overcome inadequate energy and protein intake

energy and protein intake are responsible for the big improvements or changes

trace minerals provide insurance and if deficiencies exist can help with improvements

too much trace mineral can cause

- decreased ADG
- decreased WW
- decreased feed intake
- decreased pregnancy rates
- death

be cautious of using multiple products with added trace minerals

excess free copper, zinc, and probably iodine in rumen can reduce fiber digestibility

	Requirement, mg/kg of DMI	Maximum Tolerable, mg/kg of DMI	Ratio of Maximum Tolerable: Requirement (mg/kg of DMI)
Copper	10	40	4
Zinc	30	500	17
Manganese	40	1000	25
Selenium	0.10	5	50
Iodine	0.50	50	100
Cobalt	0.15	25	167

desirable ratios for Cu – Zn – Mn

- requirement: 10-30-40
- formulate mineral: 1-3-2 or 1-4-2

good targets for copper in most situations

- 1,200 to 1,500 ppm in 4 oz mineral
- many products have way more copper than needed
- higher levels of copper have been reported to:
  - reduce ADG
  - reduce feed intake
  - accumulate to toxic levels and cause death

Iodine

preferred forms

- EDDI (organic form)
- calcium iodate
- good target $\geq$ 100 ppm in 4 oz mineral

don't want

- potassium or sodium iodide they are less stable

foot rot

- no benefit beyond meeting requirement

to much iodine has been reported to reduce weight gain and feed intake

inorganic vs. organic vs. hydroxy

all cattle consume some organic trace minerals from forage and other feedstuffs

research is inconsistent on animal growth, reproduction, and health

organic and hydroxy sources may be safer for vitamins added to mineral supplements

Vitamins

Vitamins

water soluble vitamins

- "B" vitamins
- produced by rumen microbes

fat soluble vitamins

- vitamin A
- vitamin D
- vitamin E
- vitamin K
  - produced by rumen microbes

vitamin A deficiency

- birth of dead or weak calves
- frequent occurrence of retained placentas
- reduced conception
- impaired spermatogenesis

- precursors to vitamin A are found in green growing forages

- drought concerns

Table 1. Daily vitamin A requirement for beef cows and heifers

Cow weight, lb	Dry pregnant cows or heifers, IU	Lactating Cows, IU
1,000	27,200	38,100
1,100	29,920	41,910
1,200	32,640	45,720
1,300	35,360	49,530
1,400	38,080	53,340
1,500	40,800	57,150
1,600	43,520	60,960

Table 2. The effect of vitamin A concentration in the mineral on vitamin A consumption

IU of vitamin A per lb of mineral supplement	Daily intake of mineral supplement, lb	IU of vitamin A consumed per cow each day
100,000	0.25	25,000
150,000	0.25	37,500
200,000	0.25	50,000
300,000	0.25	75,000

Blocks

American Stockman Sulfur Salt Block, 50 lb.

American Stockman Se-90 Trace Mineralized Salt with Selenium Block, 50 lb.

American Stockman Big 6® Trace Mineral Salt Block, 50 lb.

American Stockman Iodized Salt Block, 50 lb.

	Big 6	Se-90	Iodized	Sulfur
Calcium				
Phosphorus				
Salt	96 - 99	95 – 98.5	97 – 99.7	95 - 97
Magnesium				
Potassium				
Sulfur				3
Copper	260 - 380	280 - 420		
Zinc	320	3,500		
Manganese	2,400	1,800		
Selenium		90		
Iodine	70	100	100	
Cobalt	40	60		
Vitamin A				
Vitamin D				
Vitamin E				

American Stockman Sulfur Salt Block, 50 lb.

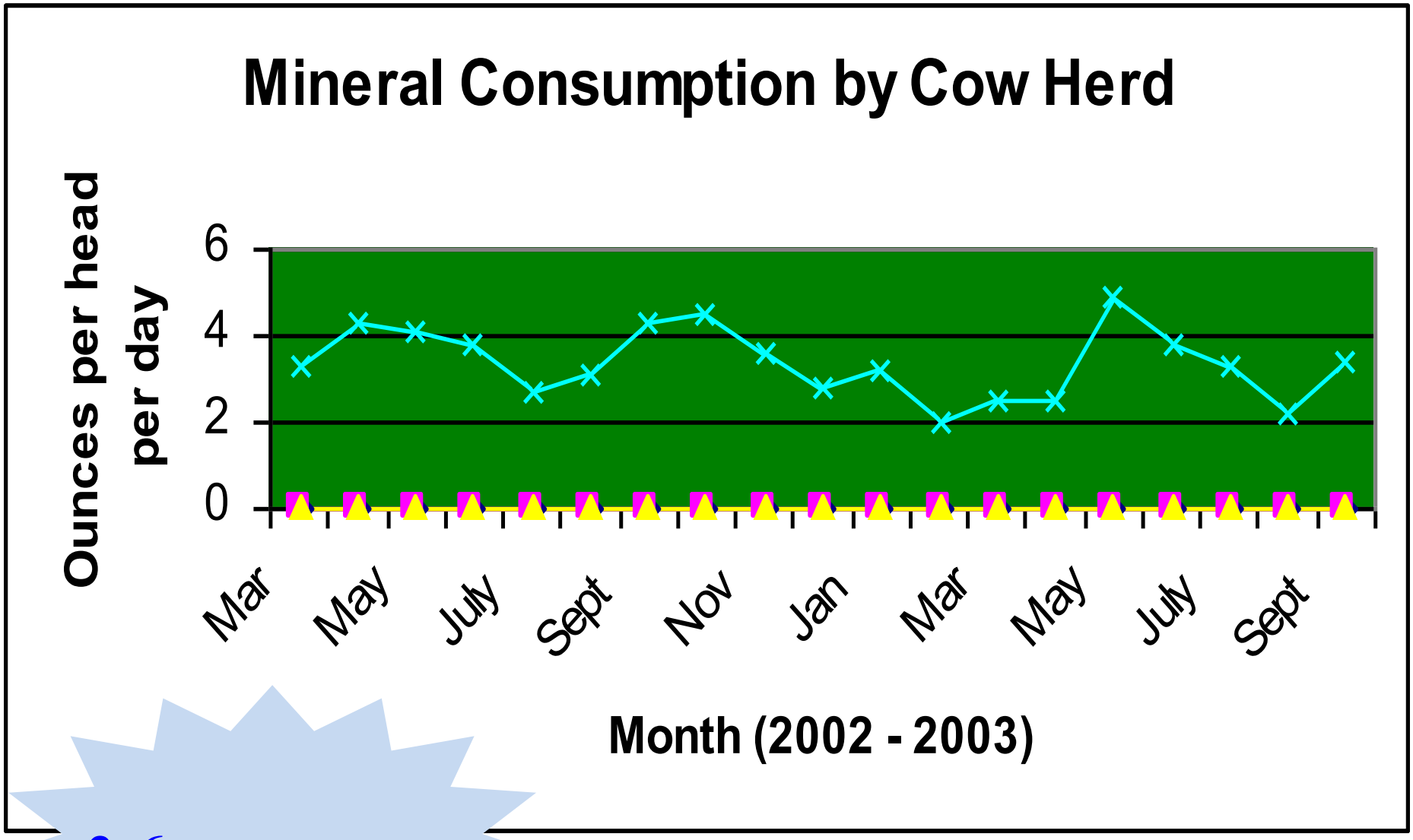
American Stockman Se-90 Trace Mineralized Salt with Selenium Block, 50 lb.

American Stockman Big 6® Trace Mineral Salt Block, 50 lb.

American Stockman Iodized Salt Block, 50 lb.

Mineral Intake

- focus on average consumption over several weeks
- intake varies over time
- lactation may increase intake, 2 to 2.5x



3.6 ounce avg.

(Mason, 2005)

- if intake is to high
  - provide free choice salt
  - check location of mineral feeder
  - reduce amount of mineral fed

- if intake is low
  - determine if cattle are receiving salt from another source
  - check location of mineral feeder

- salt
  - initially encourages intake
  - as salt consumption increases mineral intake is reduce
- phosphorus
  - generally decreases intake
- magnesium
  - generally decreases intake

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