Mineral Nutrition Concepts in Whitetail Deer

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Nutrition - Whitetails

Many whitetail breeders have not had previous ruminant livestock experience.

Maintaining a healthy rumen is the foundation of all wellness in this species.

Metabolism changes occur in whitetails throughout the year.

This can vary 250% during the year for bucks and does.

Mineral nutrition must be adjusted to metabolism and growing conditions.

Optimum mineral nutrition is required for efficiency in body and hair coat, antlers, wellness, immunity, parasite wars and reproduction.

When animals are consuming growing roughage or harvested roughage they will consume trace minerals as needed. Frequently an increase in mineral consumption is evident during these times.

If an animal is salt satisfied through its pelleted or textured diet it will not consume supplemental trace minerals presented to it.

DO NOT BE MISLED by studies performed in non-ruminant species that are extrapolated and used in ruminants.

TOPICS:

- sources of minerals – organic vs inorganic
- absorption of minerals - organic vs inorganic
- Does increased absorption correlate to increased performance? Ex: Se Me Ruminants

Effects and absorption of minerals is governed by type of roughage and carbohydrate constituents in the diet.

Co – the concept of the “sweet spot” Supplementation vs absorption and utilization

Co – (a) deprivation causes massive increases in succinate levels in Rumen (acidosis)

In other words– changes in rumen function as a result of mineral deficiency

(b) decrease in VFAs production (proprionate) is the result. Proprionate – main source of energy. Appetite . Growth.

Evaluate: Feeds / Forages / Soil in pens if growing crops

Who believes “If a little is good, a lot is better”?

MINERAL NUTRITION – weaning issues
– stress resilience

No yellow sulfur salt blocks

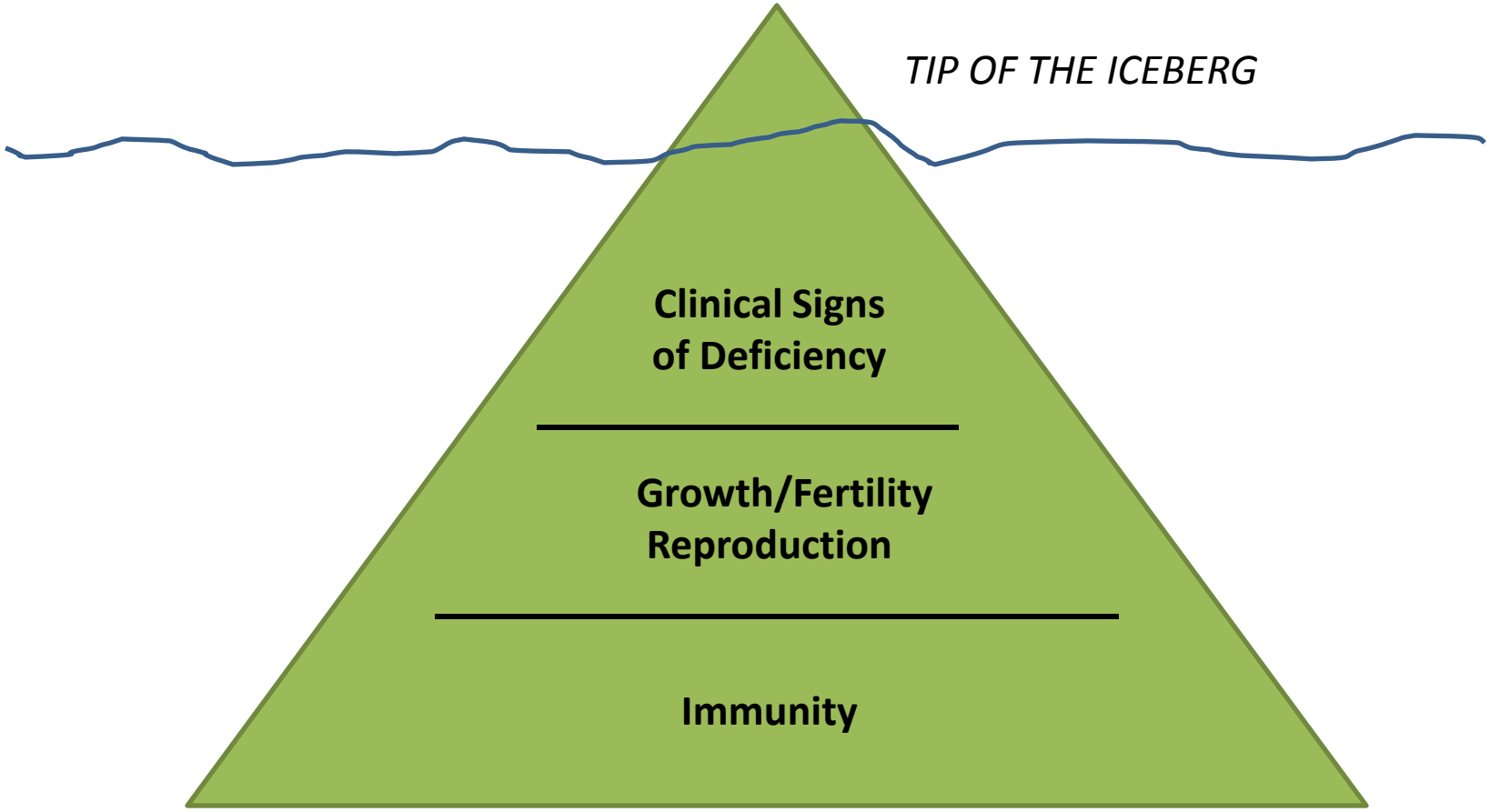
Milk transfer efficiency

Cu –
Se ++

I – variable by season

Colostrum concentrations much higher for most microminerals

Clinical Disease



When you see Clinical Disease:
You already have experienced abnormalities in the "submerged" compartments

SUBCLINICAL DEFICIENCY
⇓⇓ Immunity
⇓⇓ Reproduction Function
⇓⇓ Growth Antler Development
⇑⇑ Higher Cost of Production

CLINICAL DEFICIENCY → **DISEASE**

Metal	Required for	Deficiency	Toxicity
Copper	Enzymes for repro	Immune Suppression	
Cu	Metabolism of Fe	<u>Repro:</u> • Fertility ⬇ • Twins • Implantation • Semen quality • Libido ⬇ • Placenta necrosis	Hemolytic crisis
	Connective tissue maintenance	<u>Newborns</u> • Cold stress • CNS issues • Poor growth rate	
	Hoof tissue maturity	Hoof problems	
	Immunity (copper level into milk are low)	Antler develop ⬇	
	Hair coat/Antler development	Anemia	
	Parasite resistance	Poor growth rate/weight loss	
		Hair coat issues Antler issues	
		Parasite resistance ⬇	

Metal	Required for	Deficiency	Toxicity
Selenium	Antioxidant (w/ Vitamin E)	Immune Suppression	Abortion
Se	Tissue repair	Repro. function ↓	Sperm defects
	Cellular damage and repair	Muscle degeneration (white muscle disease)	Newborn milk
	Immune function w thyroid hormone	Silent Heats	Blind staggers ? (Plants) Lameness, polioencephalomalacia
	Metabolism	Cystic ovaries	Abnormal gait movement
	Reproduction		Respiratory distress
	Circulation		Diarrhea
	Muscle function		Emaciation (wasting)
	Complex w heavy metals to make harmless		Anemia
	Very efficiently transferred into milk!!!		Poor repro. function
	Requirements increase with: High legume diets, high sulfur intake, low vitamin E intake, presence of heavy metals		

Metal	Required for	Deficiency	Toxicity
Zinc	Sexual maturity	Abortion	
Zn	Onset of Estrus	Fetal mummy	
	Skin integrity	Low birth weight	
	Lining of repro tract	Poor sperm quality	
	Repair after fawning	Prolonged labor	
	Implantation of embryos	pica	
	Hoof health w copper		
	Antler development		

I **T3** Determinate of metabolic rate.
Interacts with insulin, GH, corticosterone, and regulatory proteins of exocrine origin

The seasonality of reproduction (ov) is related to seasonal changes in thyroid activity.

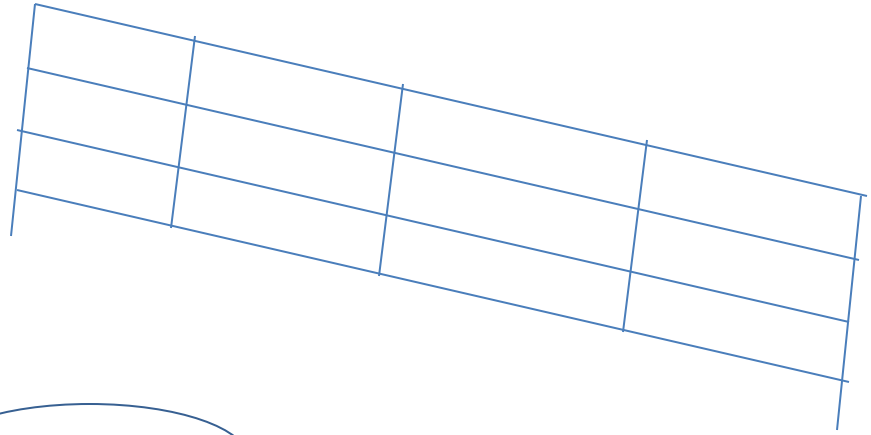
Male cooperation is likely facilitated by a thyroid response to change in day length.

Thyroid dysfunction: ↓ fertility, embryo/fetal development, post natal mortality, growth depressions, skin, low milk yield.

Not predicted by traditional methods T4, T3, T4:T3

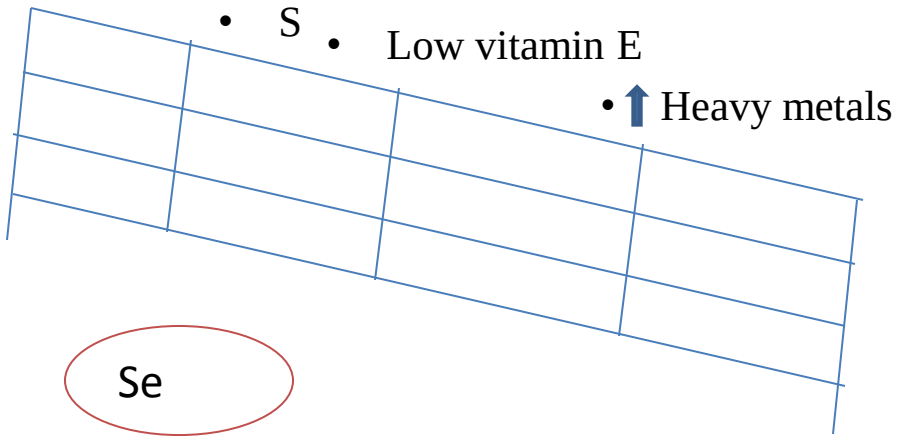
Interaction with **Se** deficiency.

Fe S Mo



Copper

- High legume diets
- S
- Low vitamin E
- ⬆ Heavy metals

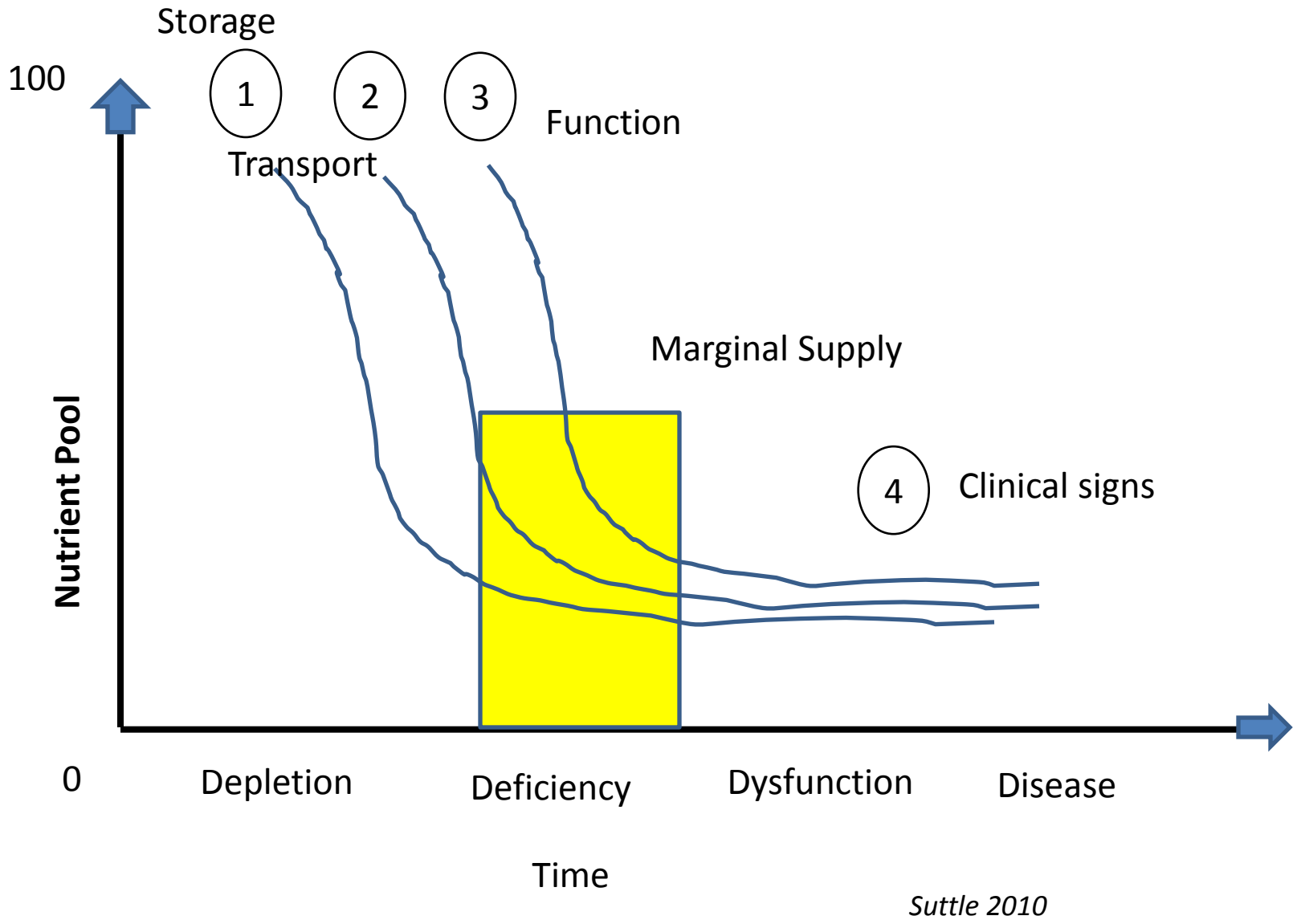


Mineral References

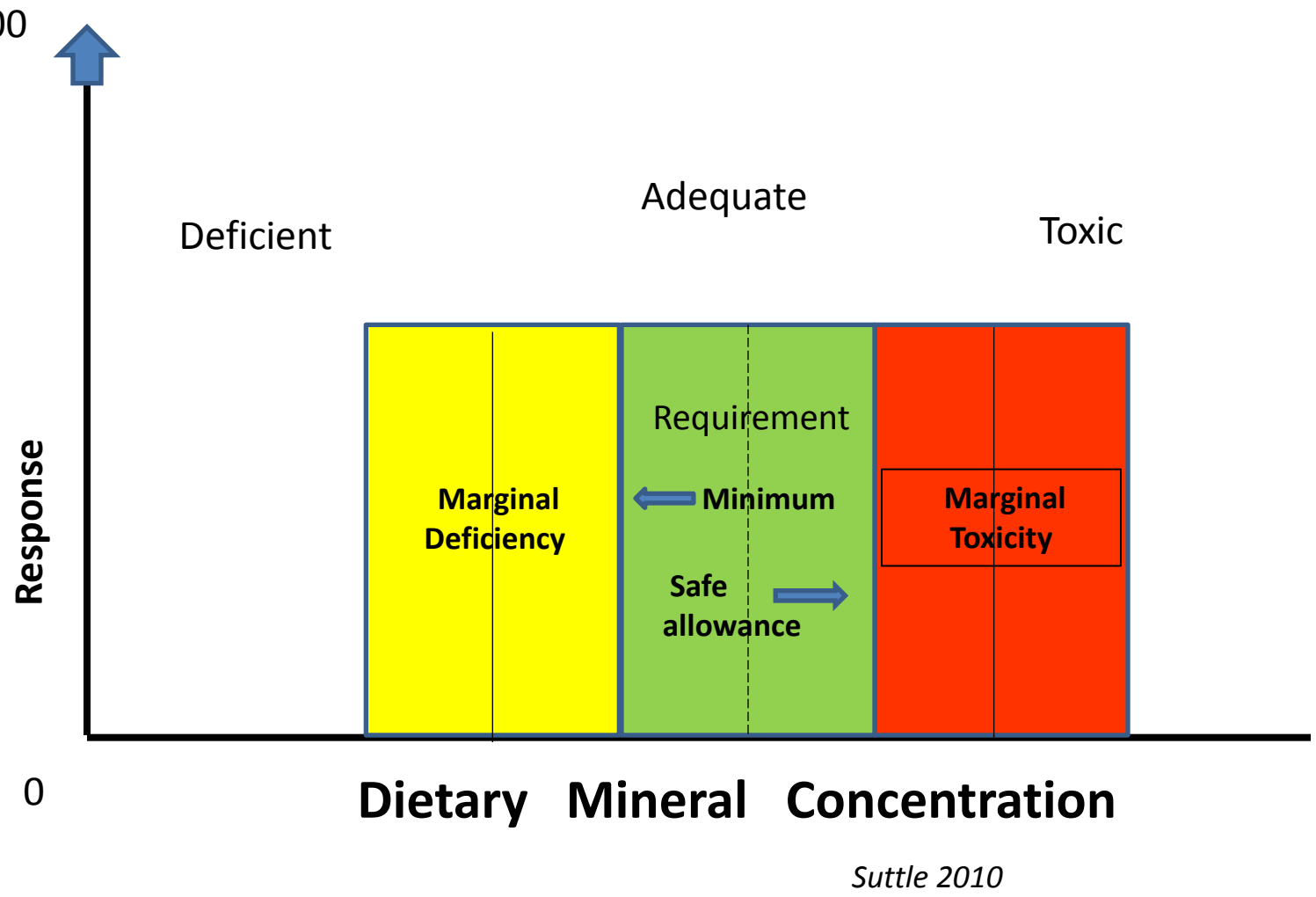
Source: DCPAH/CVM/MSU 2015
Dr. Tom Herdt

	Whitetail Deer	Sheep (all)
	ug/g or ppm	**Dry liver sample weight**
Cobalt	0.39	0.30-0.60
Copper	347	75-300
Fe	733.3	200 - 600
Mn	8.77	6.0 - 12.0
Mo	0.832	1.5 - 3.0
Se	*4.28	1.0 – 2.5
Zn	189.11	60 -- 270

comment


Storage
100
1
2
3
Function
Transport
Marginal Supply
4
Clinical signs
Nutrient Pool
0
Depletion
Deficiency
Dysfunction
Disease
Time

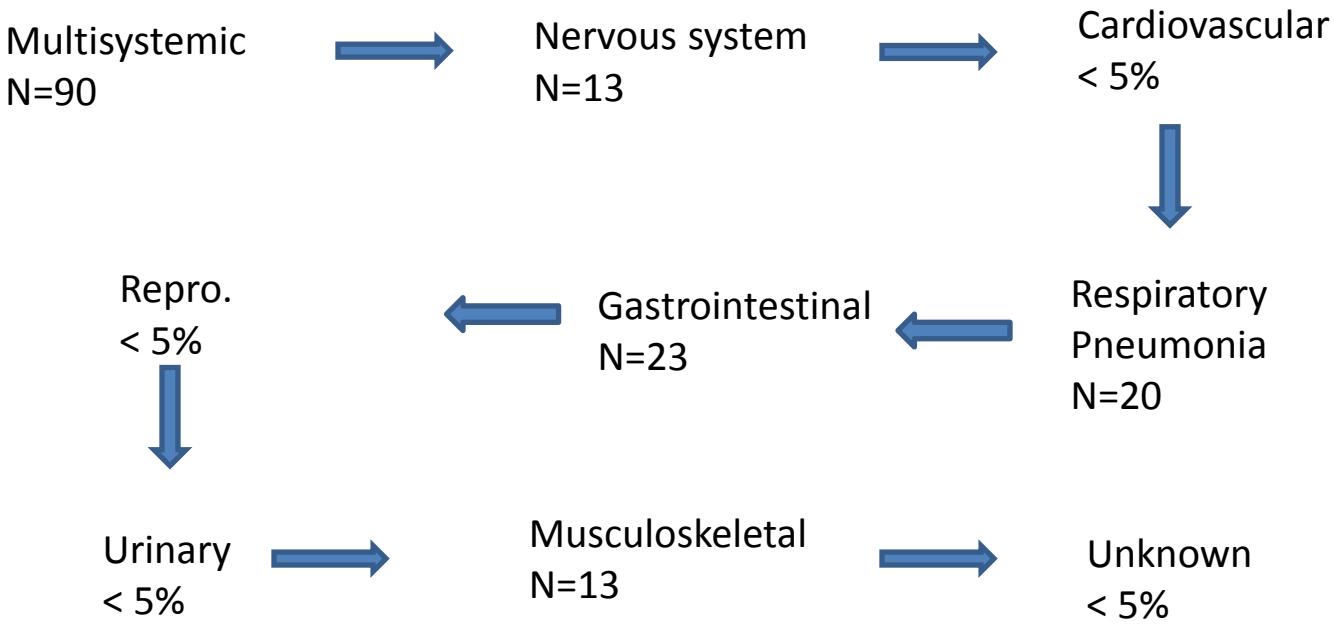
Suttle 2010


100
Deficient
Adequate
Toxic
Response
Marginal Deficiency
Requirement
Minimum
Safe allowance
Marginal Toxicity
0
Dietary Mineral Concentration

Suttle 2010

Causes of Death Cervids (ILL.)
169 captive accessions

Katie Maples, DVM 2014 NADEFA, Birmingham. Al



Multisystemic (90)

(most under 1 year)

- EHD
- Sepsis (50% respiratory, 50% GI)
- Lepto
- Trauma
- Johne's
- Other

GI (23)

- Nutritional
- Infectious
- Parasites

Nervous

- Infection
- Trauma

Respiratory (20)

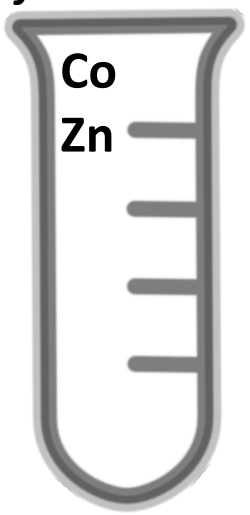
- Pneumonia

Musculoskeletal

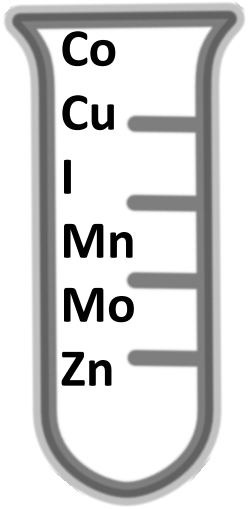
- Fracture
- Trauma
- Infection
- Capture Myopathy (may show up as unknown)

Macro Minerals	Micro Minerals
Na	I
Cl	Fe
Ca	Cu
P	Mo
Mg	Co
K	Mn
S	Zn
	Se
	Fl

Reduced Appetite
feed intake

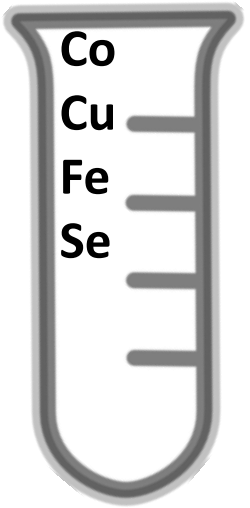


Reduced Growth
Weight Loss

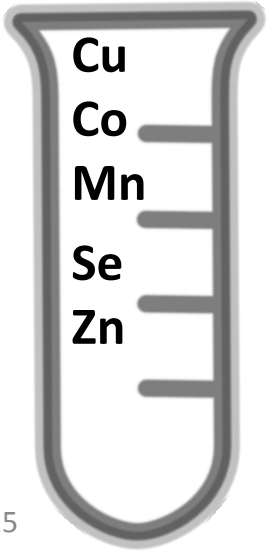


Cu
Se
Zn

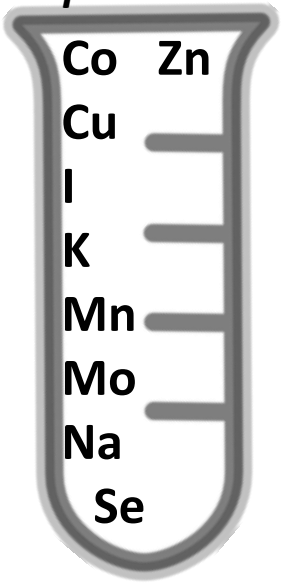
Anemia



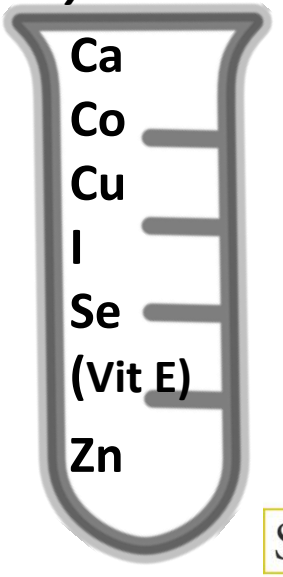
Suppressed
Impaired
Immunity



Reproduction
Impairment

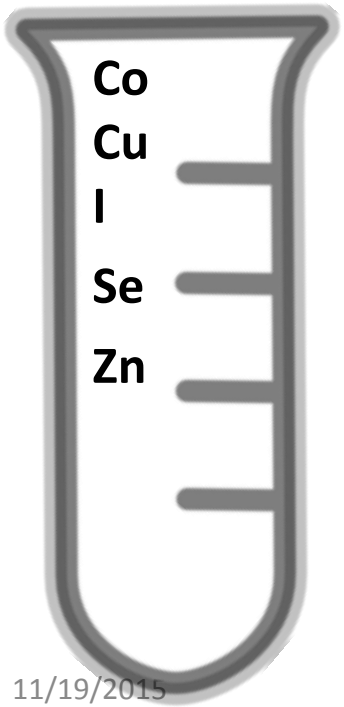


Muscle Function
Body Condition

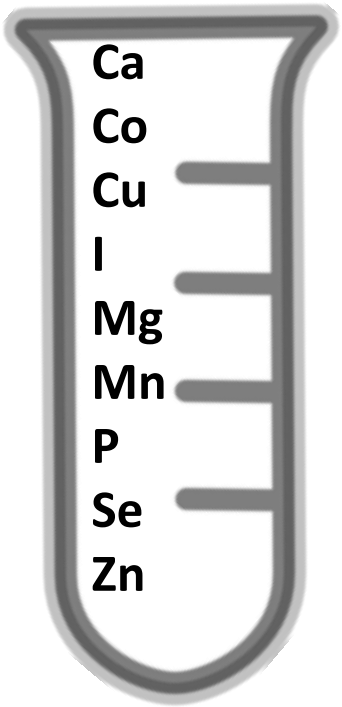


Cu
Se
Zn

Goiter/Growth Rate
Thyroid function/ Inflammation
Heart rate
Body Temperature
Protein Production (inc. calcitonin)



Antlers
Hoof health
Haircoat
Skin



Nerve Function