Mineral Supplements: What do I Need for my Operation?

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Disclaimers

The information given herein is for educational purposes only.

Reference to trade name is made with the understanding that no discrimination is intended and no endorsement is implied by the Texas A&M AgriLife Extension Service.

Only a partial listing of available products and companies is included and no discrimination is intended by the omission of a product.

Listed values do not guarantee current company specifications.

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mineral nutrition impacts

- growth
- reproduction
- milk production
- health

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PROFITABILITY

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Components of a Complete Mineral Supplement

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

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Macro
% of diet
· calcium
· phosphorus
· potassium
· magnesium
· sodium
· sulfur

Trace (micro)
ppm or mg/kg
· copper
· zinc
· manganese
· selenium
· iodine
· cobalt
· iron
· *others*

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Differences Between Companies

- formulation
- mineral source
- reputation
- palatability enhancers
- research programs
- targeted intake
- weatherization

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Targeted Intake

2 or 4 oz.

- most are 4 oz.

target of 4 oz.

- average intake of 3 – 4 oz. would be acceptable

Se level

- 4 oz: commonly 25 - 27 mg

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Common Formulations

- higher-calcium, lower phosphorus
- similar Ca & P levels
- winter pasture (moderate to higher Mg)

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Additive Options

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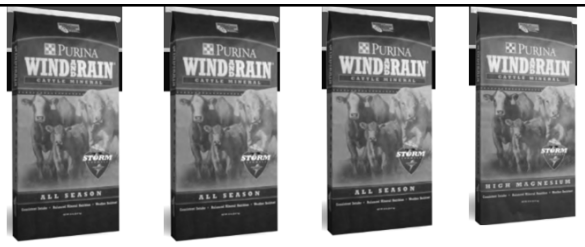

4 basic formulas, common in Texas

- Texas All Season 12 Complete
- Texas All Season 7.5 Complete
- Texas All Season 5 Complete
- Hi-Magnesium Complete

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Additives

researched

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

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- Texas All Season 7.5 Complete
- Texas All Season 7.5 Complete AU5600
- Texas All Season 7.5 Complete ALT
- Texas All Season 7.5 Complete AU5600-ALT

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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

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Macro Minerals: Geographic & Forage System Considerations

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Native Range

dormant forages: most mineral concentrations decrease with time especially P & K

protein and energy supplement can greatly impact the Ca:P ratio of the mineral needed

consider K level in protein and energy supplements

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AMPT
ADVANCED MINERAL PERFORMANCE TECHNOLOGY

AMPT-A 15% Ca, 4% P

AMPT-P 12% Ca, 9% P

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product	intake, lbs	% P	gm P supplied
15:4 mineral (A)	0.25	4	4.5
12:9 mineral (P)	0.25	9	10.2
12:9 mineral (P)	0.125	9	5.1
cottonseed meal	2	1.1	10.0
DDGS	2	0.7	6.4

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Phosphorus Levels

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

work showing improvement was on South Texas ranch before 1950

NRC requirements are too high for P

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Native Range

Calcium content of the soil

- just because the soil is high in Ca or is sitting on a limestone base doesn't mean the plant will take up more Ca
- bermudagrass average Ca: 0.43%
- native forages average Ca: 0.48%

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Coastal Regions

mineral intake can be challenging

- try low salt formulations
  - ADM AMPT-T Low Salt
  - Purina Coastal Cattle Mineral
- molasses based mineral tub
- some work from Florida would suggest that putting the mineral supplement in a cube and feeding 1 time per week would work alright

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Winter Pasture

grass tetany concern for cows

- need consistent intake of Mg
  - 5% or greater Mg level
- salt is important for absorption of Mg
- milk fever and grass tetany may both be involved in some cows
  - want higher Ca, lower P level

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Poultry Litter

- inverted Ca:P ratio in forage
- milk fever and grass tetany concerns
- may need P free mineral

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Trace Mineral Considerations

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- copper
- zinc
- manganese
- selenium
- iodine
- cobalt

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desirable ratios for Cu – Zn – Mn
- requirement: 10-30-40
- formulate mineral: 1-4-2 or 1-3-2

the copper race
- many products have way more copper than needed
- a few are at levels that are concerning
- higher levels of copper have been reported to reduce ADG

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Copper
- female: no effect on reproduction
- male: probably no effect on reproduction

Zinc
- female: very little data in cattle, but important in ovarian remodeling and CL production
- male: impacts testicular growth

Manganese
- female: possible estrous effect
- male: no claims about reproduction

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Selenium

requirement
- about 1.30 mg/d for 1250 lb cow

legal limit
- 3 mg/d
- that is about 2.31 times requirement

toxicity could be a concern if getting added Se from multiple sources

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Iodine

preferred forms
- calcium iodate
- EDDI (organic form)

don't want
- potassium or sodium iodide
- less stable

to much calcium iodate has been reported to reduce weight gain and feed intake

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Cobalt

preferred forms
- calcium iodate

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Sources of Trace Minerals

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inorganic
- ionic bond
- copper sulfate, zinc oxide, sodium selenite, etc.

organic
- covalent bond to carbon-containing ligand
- mineral bonded to: amino acid, protein, or CHO
- zinc methionine, copper amino acid complex, cobalt glucoheptonate, etc.

hydroxy
- covalent bond to a hydroxy (OH) group
- zinc hydroxychloride, basic copper chloride, manganese hydroxychloride

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inorganic vs. organic vs. hydroxy

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

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inorganic vs. organic vs. hydroxy

research is inconsistent on animal growth, reproduction, and health

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

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too much trace mineral can cause
- decreased ADG
- decreased pregnancy rates
- death

be cautious of using multiple feedstuffs or products with added trace minerals

lowering levels of highly bioavailable sources is probably wise in most situations

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Vitamins

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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

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Vitamin A

- vitamin A deficiency
  - birth of dead or weak calves
  - frequent occurrence of retained placentas
  - impaired spermatogenesis
  - reduced conception
- precursors to vitamin A are found in green growing forages
- drought concerns

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Tubs

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- most need separate source of salt
- most have a similar Ca:P ratio
- most have less Ca then loose supplements

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	Mineral-lyx	IGR Max
Calcium	3.5 - 4.5	5 - 6
Phosphorus	4	5
Salt	none	none
Magnesium	3.0	5.0
Potassium	1.7	1.5
Copper	500	1,000
Zinc	1,500	3,000
Manganese	2,000	4,000
Selenium	8.8	13.2
Iodine	25	50
Cobalt	5	10
Vitamin A	100,000	200,000
Vitamin D	10,000	20,000
Vitamin E	100	200

recommended intake
mineral-lyx: 4.8 to 12 oz.
IGR max: 4 oz.

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	AS 4 CP add Zn& Cu	MAG Mineral Tub
Calcium	4.5	5.5
Phosphorus	4	4
Salt	10	0
Magnesium	1	5
Potassium	1	2
Copper	1,250	650
Zinc	3,750	2,375
Manganese	1,250	1,250
Selenium	10	10
Iodine	68	68
Cobalt	30	30

recommended intake
4 to 8 oz.

need to put salt out
with the "MAG" tub

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Blocks

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	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				

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American Stockman Big 6® Trace Mineralized Salt is the most popular in the eastern half of the United States. With the six core micro-minerals required for animal health - zinc, manganese, cobalt, copper, iodine and iron - it's the first choice for weight gain, feeding efficiencies and overall herd performance. For all classes of beef and dairy cattle, pigs and horses.

Ingredients:
Salt, Manganous Oxide, Ferrous Carbonate, Magnesium Oxide, Copper Oxide, Zinc Oxide, Calcium Iodate, Cobalt Carbonate, Red Iron Oxide for Color.

Guaranteed Analysis:
Salt (min.) 96.0%, Salt (max.) 99.0%, Manganese (min.) 2,400 ppm, Iron (min.) 2,400 ppm, Copper (min.) 260 ppm, Copper (max.) 380 ppm, Zinc (min.) 320 ppm, Iodine (min.) 70 ppm, Cobalt (min.) 40 ppm.

Feeding instructions:
Allow livestock free access to this feed salt.

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Ingredients:
Salt, Sulfur, FD&C Yellow #5 Dye for Color.

Guaranteed Analysis:
Salt (min.) 95.0%, Salt (max.) 97.0%, Sulfur (min.) 3.0%.

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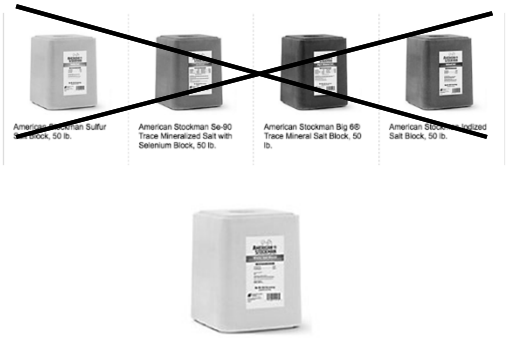

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Mineral Feeders

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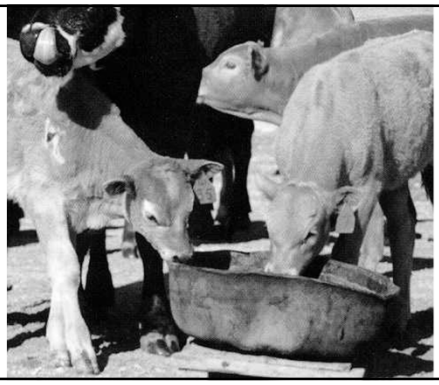

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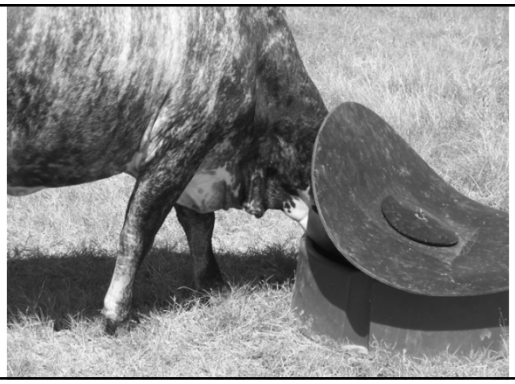

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Mineral Intake

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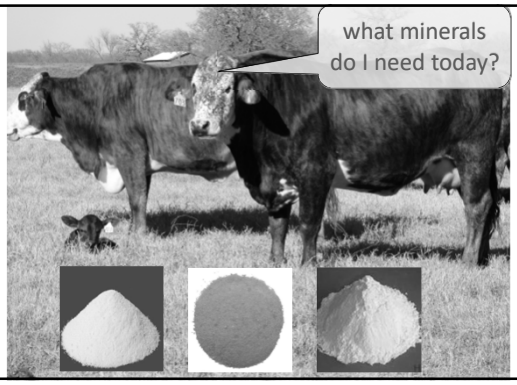

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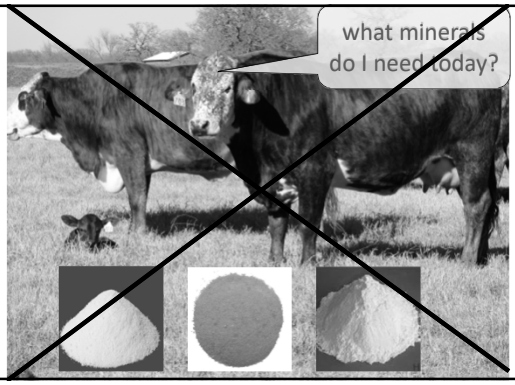

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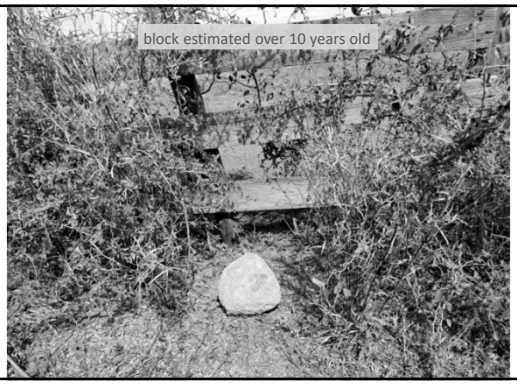

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- 2 or 4 oz. average consumption
- intake varies over time
- lactation may increase intake, 2 to 2.5x

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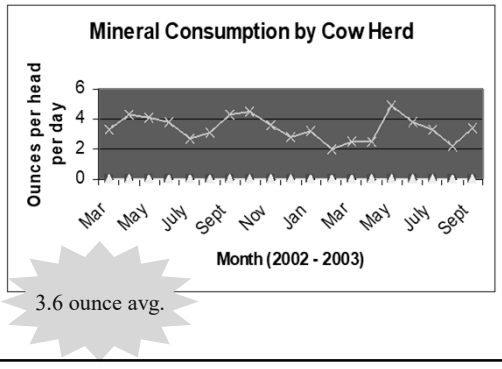

(Mason, 2005)

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- 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

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

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additives that stimulate intake
- molasses, yeast, other flavoring agents
- mineral oil and weatherization products

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Calculating Mineral Intake

- 35 cows
- put 50 lbs of mineral in an empty feeder
- mineral lasts for 6 days
- 50 lbs ÷ 6 days = 8.33 lbs per day for the herd
- 8.33 lbs per day ÷ 35 hd = 0.24 lbs/hd/d
- 16 oz. x 0.24 lbs = 3.8 oz./hd/d

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When and What Do I Feed

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Reputable Company with a Nutritionist on Staff

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Company Nutritionist
vs
Marketing Staff

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Consider Flexibility

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Cow-Calf

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When should I feed a cow-calf mineral?

- year round is best
- last 3, first 3
- provide salt when not feeding a mineral

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introduced pasture and hay

- higher Ca, lower P

Emerald

AS 5 complete
AS 7.5 complete

AMPT-A

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growing native range

- higher Ca, lower P

dormant native range (with protein/energy supplement that has some P)

- higher Ca, lower P
- if possible get protein/energy supplement with added K

Emerald

AS 5 complete
AS 7.5 complete

AMPT-A

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dormant native range (no protein/energy supplement)

- similar Ca & P levels
- make sure intake is adequate

Bronze

AS 12 complete

AMPT-P

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winter pasture

- higher Ca, lower P
- 5% or more Mg, make sure intake is good

Emerald

AS 5 complete
High-mag complete

AMPT-M

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Stocker

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Things That
Don't Make Sense To Me

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- having more P than Ca in the mineral
- not having any Ca in the mineral
- putting sodium bicarbonate in a mineral
- adding sulfur to the mineral

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http://beef.tamu.edu

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For Reference Only

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	Emerald	Bronze	Gold
Calcium	16	12.5	12.5
Phosphorus	5	8	2
Salt	15 - 16	15 - 17	13 - 15
Magnesium	5	3	13
Potassium	0.1	2	0.2
Copper	2,500	2,500	1,500
Zinc	4,500	6,000	4,500
Manganese	4,000	4,000	4,000
Selenium	26	26	26
Iodine	200	200	200
Cobalt	20	20	20
Vitamin A	100,000	100,000	100,000
Vitamin D	-	10,000	-
Vitamin E	100	110	100

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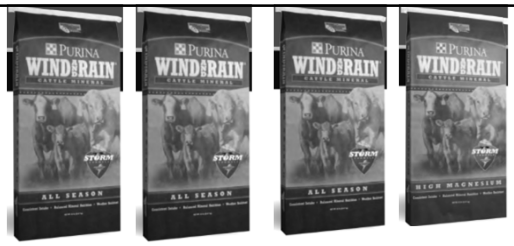

4 basic formulas, common in Texas

- Texas All Season 12 Complete
- Texas All Season 7.5 Complete
- Texas All Season 5 Complete
- Hi-Magnesium Complete

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	Texas All Season 12 Complete	Texas All Season 7.5 Complete	Texas All Season 5 Complete	Hi-Magnesium Complete
Calcium	14	15	12	14
Phosphorus	12	7.5	5	4
Salt	24	20	20	18
Magnesium	1	1	5	10
Potassium	1	1	0.1	0.1
Copper	2500	2500	2500	1200
Zinc	7500	7500	7500	3600
Manganese	4000	4000	4000	3600
Selenium	27	27	27	27
Iodine	60	60	60	60
Cobalt	12	12	12	12
Vitamin A	150,000	150,000	75,000	75,000
Vitamin D	15,000	15,000	7,500	7,500
Vitamin E	150	150	75	75

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	AMPT-A	AMPT-M	AMPT-P	AMPT-T	(Low Salt) AMPT-T
Calcium	15	9	12	12	12
Phosphorus	4	4	9	7	7
Salt	21	20	17	20	4
Magnesium	3	10	2.5	3	3
Potassium	-	-	-	-	-
Copper	1,200	1,200	1,200	1,200	1,200
Zinc	4,200	4,200	4,200	4,200	4,200
Manganese	3,600	3,600	3,600	3,600	3,600
Selenium	25	25	25	25	25
Iodine	100	100	100	100	100
Cobalt	150	150	190	200	200
Vitamin A	100,000	100,000	400,000	250,00	250,00
Vitamin D	2,500	2,500	8,000	5,000	5,000
Vitamin E	100	100	400	250	250

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