VET 406: Water Soluble Vitamins

Vitamin	Source	Species	Function	Deficiency
Niacin (B_3)	Good: Meat, Yeast, Leafy Greens Excess tryptophan Poor: Grains (corn and sorghum)	Swine Poultry Dogs	Coenzyme for oxidoreductase reactions Substrate for ADP-ribosyl transferases catalyzing the transfer of ADP-ribose units to proteins Tx of hyperlipidemia	Pellagra (humans) Black tongue (dogs) 4D's Dermatitis Diarrhea Dementia Death Swine: diarrhea, stomatitis, dermatitis, alopecia, degenerative changes in the nervous system Poultry: Enlargement of the hock joint, bowing of the legs, stomatitis, glossitis, dermatitis Dogs: Glossitis, gingivitis, necrosis and ulceration of oral mucosa and GIT
Riboflavin (B_2)	Good: Animal Products, green forages and vegetables Poor: Cereal grains, food products exposed to UV light	Poultry example, but other species are able to be affected	Prosthetic group of flavoproteins and functions in oxidoreduction reactions 1. NADH Dehydrogenases 2. Oxidases 3. Dehydrogenases	Signs primarily involve the eyes, skin or nervous system Photophobia, burning and itching eyes, cataracts and vascularization of the cornea Angular stomatitis, dermatitis, and alopecia

				Neuropathy, degenerating myelin of the sciatic and brachial nerves *Curly toe in birds
Vitamin C	Most species can synthesize vitamin C from glucose Species that lack gluconolactone oxidase require dietary source of vit. C	Required by: Primates Guinea pigs Bats Some birds Some fish	Collagen synthesis -Required for production of hydroxylation of proline and lysine Water soluble antioxidant and regenerates reduced vitamin E Reduces metal ions and enhances Fe absorption Required for formation of epinephrine form tyrosine (hydroxylation reaction)	Scurvy
Thiamin (B_1)	Good: Cereal grains Soybean meal Greens, leafy hay Animal products (egg yolk, liver, kidneys)	Dogs Cats Poultry Sheep Ruminant	Oxidative decarboxylation Transketolase reaction Nerve transmission Reasons for low levels: Damaged by processing	Beriberi *Star gazing Cardiovascular and nervous system disorders Tachycardia (or bradycardia in some species) enlarged heart, edema Ataxia, paralysis, muscle weakness, mental confusion, severe anorexia,

	Poor: oils, fats, refined foods		Destruction of thiamin -Thiaminases in raw fish, bracken fern, horsetail, star thistle, endophyte-infected tall fescue, gut/rumen microbes -Antagonists, polio encephalomalacia in ruminants	opisthotonos, bilateral symmetrical lesions in distinct brain regions
Vitamin B_6			Amino acid metabolism -Transaminases -decarboxylation reactions -side chain cleavage Glycogen metabolism -binds to lysine in glycogen phosphorylase to make the enzyme active	
Pantothenic Acid			Component of CoA required for fatty acid carbohydrate and protein metabolism. Component of acyl carrier protein required for fatty acid synthesis	
Biotin (Vit. H)			Coenzyme for four carboxylase enzymes -pyruvate carboxylase	Sever dermatitis and alopecia

			-Acetyl CoA carboxylase -Propionyl CoA carboxylase -3-methylcrotonyl CoA carboxylase	Cracked hooves, dermal lesions on the bottom of the feet
Folate (folacin)			Methyl-met formation Methylene- DNA synthesis Formimino- Histidine metabolism	Megaloblastic anemia and leukopenia
Vit. B_{12}	Only synthesized by microorganisms Requires cobalt Animal products (meat, milk, eggs, fish) Intrinsic factor is required for absorption in the ileum Stomach, pancreas, and ileum are all required for absorption		Methionine synthetase Methylmalonyl CoA mutase	Methylmalonic aciduria, hyperammonemia Wasting syndrome Megaloblastic anemia (humans) Normocytic, normochromic anemia (some animals) Neutropenia