VITAMIN A

EAR - Lowered resistance to infections.

EYE - Xerophthalmia; night blindness; faulty vision; conjunctivitis.

NOSE & THROAT - Infections of mucous membranes.

TONGUE - Inflammations; glossitis.

TEETH & GUMS - Aids in utilization of calcium; defective dentin; inflammation of gums.

BLOOD VESSELS - By lowering of blood serum esterase, may affect fat metabolism. (see also Iron)

NERVES - Degeneration of nervous system characterized by lack of co-ordination of legs and impairment of vision.

HEART - Edema; lowered resistance to infections.

HOOFS - Cracks, furrows, and abnormal growth.

LUNGS- Lowered resistance to infections; haemorrhagic conditions.

LIVER - Diseased conditions of organ may reduce capacity for storing vitamin A, and conversion of carotene and other pigment precursors in vitamin A.

GASTRO-INTESTINAL SYSTEM - Disturbances in system may result in poor absorption of carotene and other pigment precursors of vitamin A, resulting in deficiency of this vitamin; poor gastric digestion.

KIDNEYS - Nephritis; calculi; predisposes to secondary infections.

COLON - Predisposition to oitis.

URINARY BLADDER - Cystitis; calculi.

SEXUAL ORGANS: Male - Deficiency of long standing may result in sterility; testicular degeneration, particularly when associated with deficiency of Vitamin E.

SEXUAL ORGANS: Female - Sterility; weak or stillborn offspring; faulty lactation.

MUSCLE - Lack of muscular co-ordination.

SKIN & COAT - Predisposes to dermatitis of various types; roughened coat.

BONES & JOINTS - Affects utilization of calcium, thereby affecting structure and formation of bones and joints; joint involvement with lameness and rarifying lesions in joint cartilages.

VITAMIN B1

TONGUE - Glossitis; atrophy, edema.

NERVES - Various disturbances associated with nervous system; nervousness; irritability; neuritis.

BLOOD VESSELS - Capillary weakness; anemia.

HEART - Decreased B content of heart muscle, normally high in the horse; myocardial infections; hypertrophy.

GASTRO-INTESTINAL SYSTEM - Poor appetite; anorexia; gastric disturbances; faulty carbohydrate metabolism; nervous dyspepsia; inanition.

COLON - Stasis; faulty absorption.

SEXUAL ORGANS: Female - Termination of oestrus cycle; disturbances in endocrine secretions; faulty ovulation.

URINARY BLADDER - Incontinence due to nervous irritability.

MUSCLE - Muscular atrophy; degeneration and wasting of muscular fibre; vitamin not stored in muscle tissue, except cardiac muscle, to any appreciable extent.

SKIN & COAT - Dry, scaly skin.

BONES & JOINTS - Bone marrow degeneration.

VITAMIN B2

EYE - Keratitis, corneal ulcer; cataracts.

TONGUE - Ulcerations; oedema.

NERVES - Nervous tissue involvement.

TEETH & GUMS - Inflammation of gums.

BLOOD VESSELS - Secondary anaemia.

GASTRO-INTESTINAL SYSTEM - Faulty carbohydrate metabolism.

COLON - Colitis; degenerative changes.

SKIN & COAT - Certain types of dermatitis and skin lesions.

VITAMIN D3

NERVES - Nervous irritability.

TEETH & GUMS - Defective calcification; decay and dental caries. (see also Calcium & Phosphorus)

BLOOD VESSELS - Deficiency of calcium and phosphorus in blood.

SEXUAL ORGANS: Female - Affects reproduction and viability of offspring.

MUSCLE - Rickets, resulting in poor muscle co-ordination.

BONES & JOINTS - Poor absorption of calcium and phosphorus resulting in low content of theses mineral elements in the bones; poor dentition; rickets; osteomalacia and osteoporosis; faulty bone structure. (see also Calcium & Phosphorus)

VITAMIN B6

NERVES - Loss of nerve and muscular co-ordination.

GASTRO-INTESTINAL SYSTEM - Faulty metabolism.

MUSCLE - Loss of muscular control.

SKIN & COAT - Skin lesions; roughened coat.

NICOTINIC ACID

Nicotinic Acid & Other B Complex Factors

TONGUE - Pellagra-like syndrome.

BLOOD VESSELS - Anemia.

GASTRO-INTESTINAL SYSTEM - Anorexia; digestive disturbances; poor assimilation.

SKIN & COAT - Skin lesions; loss of hair.

VITAMIN E

NERVES - Lack of nerve and muscular co-ordination.

SEXUAL ORGANS: Male - Sterility, responding poorly to treatment; sterility associated with vitamin A responds more readily to vitamins A and E treatment; gonadal atrophy resulting in impotence.

SEXUAL ORGANS: Female - Sterility, miscarriages; resorption of embryo; sexual frigidity.

CALCIUM

Bone-Building Element

Essential for building of normal bones and teeth.

Also of importance in heart, nerve and muscle functions.

Essential element in blood.

Utilized by the body in enzyme activation.

Essential for lactation and reproduction.

Ratio of calcium to phosphorus intake of extreme importance; imbalance, particularly high phosphorus to calcium may result in osteodystrophia fibrosa.

Satisfactory ratio of Ca-P equals 1.0-0.8.

PHOSPHORUS

Bone-Building Element

Essential for building of sound bones and teeth.

Also essential to metabolism of carbohydrates and fats and enzyme activation.

Important in enzyme activity of vitamins B1 and B2.

In form of its salts, acts as a buffer in blood and muscle tissue.

Phosphorus may be deficient in the roughage feed in certain regions.

SODIUM AND POTASSIUM

Cell and Body Fluid Regulating Elements

Regulate osmotic pressure in cellular tissue of body fluids.

Aid in regulation of buffer action of blood and ion balance.

Potassium aids in regulating muscle function.

Sodium protects body against excessive dehydration

Deficiency of potassium not usually common in herbivorous animals who, however, require additional salt (sodium chloride) in their diets.

IRON

Blood-Building Element

Essential in formation of haemoglobin, in oxygen transfer, and in cell respiration.

Aids in blood cell development and prevention of nutritional anaemia.

COPPER

Bio-Catalytic Element

Necessary together with iron in formation of haemoglobin, acting only as "Biological Catalyst".

Aids in tissue respiration and prevention of certain types of nutritional anaemia.

MAGNESIUM

Muscle and Bone Building Element

Essential for normal growth of animals.

Essential for nerve and muscle activity, and bone structure.

Acts as a coenzyme in phosphorus metabolism.

MANGANESE

Essential Trace Element

Essential for normal growth and the proper functioning of lactation and reproduction.

COBALT

Essential Trace Element

Deficiency may result in loss of red blood cells and in emaciation and general rundown condition.

ZINC

Essential Trace Element

Aids in promotion of normal growth and tissue respiration.

Interrelated with insulin and vitamin B1 deficiencies in certain animal species.

May play role in development of normal coat of hair.

IODINE

Essential Trace Element

Essential in the growth and functions of the thyroid gland and formation of thyroxine.

Important in regulation of basal metabolism.

For prevention of goiter.