



VITAMINS

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Vitamins



are organic compounds that are needed in very small quantities for the maintenance of vital functions such as growth

health

production.



Clasification of Vitamins



1. Fat soluble vitamins

- A (Retinole)
- D (Colocalciferole)
- E (Tocopherol)
- K (Phillocinone)

2. Water soluble vitamins

- B (Tiamine, B1; Riboflavine, B2; Nicotinamid; Piridoxyne, B6; pantotenic acid; biotine; coline; Cyanocobalamine, B12)
- C (Ascorbic acid)



Fat Soluble Vitamins and Properties



It covers only carbon (C), hydrogen (H) and oxygen (O).

They are found in Provitamin and turn into active vitamins in the animal's body.

It plays a role in regulating the metabolism of building units

They will suck as long as they are fat in the intestine.

They are stored in the body together with the fat

They are released from body with feaces.



Water Soluble Vitamins and Properties



They contain sulfur (S) and cobalt (Co) as well as C, H and O, nitrogen (N).

They have no provitamins.

They act as coenzymes and are effective in energy transfer.

They release from body with urine.



Certain disorders occur when vitamins are used more or less.



If multiple vitamins come into play due to the lack of it, it is called **polyhypovitaminosis**.

If the deficiency progresses enough to lead to death, it is called **avitaminosis**.

When deficiency occurs due to multiple vitamins, it is called **polyavitaminosis**.

When excess amounts of vitamins A and D are taken, there is a toxic indication called **hypervitaminosis**.



Factors Affecting the Stability of Vitamins



- ✓ Moisture
- ✓ Pressure applied during pelletization, Temperature
- ✓ Light
- ✓ Oxidation and reduction
- ✓ Rancidity
- ✓ Trace elements,
- ✓ pH
- ✓ Interactions with other vitamins,
- ✓ Substances and additives used as carriers



Vitamin Antagonists



- ✓ It opens up the molecules of vitamins: TYAMINASE (An antagonistic effect against thiamine occurs in raw fish eaters.)
- ✓ Complexes with vitamins: AVIDIN-BIOTIN (Avidin is a biotin-inactivating metabolite found in raw egg)
- ✓ Relationship between dicumarol and vitamin K
- ✓ By turning of cumarole into dicumarole in the deteriorated sweet clover, the mentioned antivitamin-active compound comes into play. This compound reduces the blood clotting rate by blocking the effect of vitamin K.



Fat Soluble Vitamins

A,D,E,K



Vitamin A



Chemical structure: Retinol

Provitamines: α , β , δ

carotene

the cryptoxanthin

zeaxanthin

90% of the carotenoids in plants are β -carotene



Sources of Vitamin A and Provitamin A



Animal origin: liver, fish oil, egg yolk, milk fat, colostrum, plasenta=so liver of new born

Vegatable origin: green vegetables (meadow, alafalafa..), silage, yellow corn, carrot, pulp



Deficiency of Vitamin A



- ✓ Stopping the growth and development in young animals
- ✓ Night blindness
- ✓ Bone disorders
- ✓ Disorders of testicular and placental epithelium
- ✓ Chick deaths, retarded growth, reduced egg production, reduction of incubation yield
- ✓ Hair and hair loss, reduction of wool efficiency, in chickens, cross beak



Hipervitaminosis of Vitamin A



When too much vitamin A is given more than necessary

Overgrowth in the head bones,

Pain in optic and ear nerves as prevent hearing and vision as

Chronic hypervitaminosis is seen in house cats eating liver for a long time.



Vitamin D



Chemical structure: Ergocalciferol, cholecalciferol

Provitamins: Sterins

in plants;

Ergocalciferol

in animals;

Cholecalciferol

Ergocalciferol and cholecalciferol do not turn into each other



Vitamin D



Vitamin D2 and D3 are absorbed from the small intestines and then comes to the liver via blood.

It converts to 25-hydroxycholecalciferol in the liver.

It is transported to the kidneys from the liver. Here it is converted to **1,25-dihydroxycholecalciferol**.

This compound has the highest biological activity of vitamin D



Vitamin D



The amount of 1,25-dihydrocycalciferol produced in the kidney is controlled by parathormone.

As the amount of Ca decreases in blood, the parathyroid glands secretes more parathormone.

Thus, the kidney produces more 1,25-dihydrocycalciferol and increases the absorption of Ca from the intestines.

1,25-dihydrocycalciferol also raises the absorption of P.



Vitamin D



The absorption of cholecalciferol occurs in the duodenum like other oil soluble compounds.

Cholecalciferol is insoluble in water, soluble in alcohol and other fat solvents.

Peroxidized when stored in the presence of unsaturated fatty acids



Sources of Vitamin D and Provitamin



Animal origin: fish liver, egg yolk, milk, colostrum

Vegetable origin: dried hays, leaves, dry brewer yeast



Deficiency of Vitamin D



The most important indication of vitamin D deficiency is observed in bones. The amount of ash is reduced by 30-50%.

In young animals, a disorder of storage of Ca and P in the bones occurs, which is characterized by rickets. Resulting inadequate calcification bones are weak, curved, easily breakable.

In adult-Osteomalacia



Hipervitaminosis of Vitamin D



In the excess of vitamin D, the level of calcium and phosphorus of blood increases,

Calcium salts accumulate in the organs and arteries.

Ca is thrown from bones, hardening occurs in tissues by accumulation in soft tissues



Vitamin E



Chemical structure: Tocopherol

Provitamins are:

tocopherols (side chains saturated)

tokotrienols (unsaturated side chains)



Vitamin E



Chemical structure: Tocopherol

Provitamins are:

α , β , δ , delta tocopherols (side chains saturated)

100%, 25, 10, 1

α , β , δ , delta tokotrienols (unsaturated side chains)



Functions of Vitamin E



Physiological function:

Antioxidant

Metabolic function:

Biological antioxidant

It prevents the oxidation and degradation of unsaturated fatty acids.

It increases the durability of body and milk fat.

Protect carotene and vitamin A from oxidation.



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Deficiency of Vitamin E



Rats: infertility

Lamb/calf: White muscle disease (muscular dystrophy)

Chicks: Muscular dystrophy

Encephalomalacia

Exudative diathesis



Vitamin K



Chemical structure:

Fillokinon K1

In leaves:

Merakuinon (Furnokinon) K2

in bacteria:

Menadion K3



Function of Vitamin K



Physiological function:

Coagulant factor

Metabolic function:

Coagulation of blood

It provides that the prothrombin is at normal level in blood by stimulating the prothrombin formation in the liver,



Deficiency of Vitamin K



Vitamin K can be synthesized in the digestive system of ruminants and pigs.

In the cattle; sweet clover disease

In chicks, the blood clotting time can be prolonged, resulting in hemorrhages that can be easily injured and result in death.

Intestinal bleeding in newborn animals



Sources of Vitamin K



Animal origin: egg yolk, fish meal

Vegatable origin: Alfalafa meal, cabbage and cauliflower leaves





Water Soluble Vitamins

B,C



Vitamin B1 (Tiamine)



Sources

Wheatgrass and leguminous grain feeds, green leafy plants are rich in vitamins.

Animal products include egg yolk, liver, kidney

In all feeds, especially beer yeast, grain embryos, milling residues



Functions of Vitamin B1



Physiological functions:

Antibacterial vitamin, antinecrotic vitamin

Metabolic functions:

It is responsible for carbohydrate metabolism.

Has a role for conversion of acetyl Co-A of Pyruvic acid by oxidative decarboxylation.

is necessary for Valine synthesis.



Deficiency of Vitamin B1



Loss of appetite, general weakness, weakening in muscles, malfunction of the nervous system.

Nervous symptoms occur within approximately 10 days following loss of appetite and weakness symptoms.

Polyneuritis occurs in poultry

Cardiovascular system disorders can also be seen in some animal species.



Vitamin B2 (Riboflavin)



Physiological functions:

Antidermatitis factor

Metabolic: functions:

It is found in the structure of the flavoproteins

Flavoproteins play a role in carbohydrate, lipid (bdegradation of fatty acids) and amino acid metabolism.

It is a component of H carrier enzymes and plays an important role in respiration.



Sources of Vitamin B2



All vegetable and animal products

Dried yeast, dairy products, meals, green leafy plants are high in content

Cereals and milling byproducts are poor



Deficiency of Vitamin B2



Deficiency can be seen in the poultry because most of the rations are made of grain grains.

The delay of the growth,

Reduction of FCR, egg yield, hatching efficiency,

Increase in embrional deaths on day 11

Dry bark dermatitis in ectodermal tissues, spillage and hardness in hairs



Vitamin B6 (Pyridoxine)



Chemical structure: Pyridoxine, pyridoxal, pyridoxamine

Pyridoxal phosphate (Most active)

Sources:

Grains (corn, wheat)

By products of the milling industry

Soy and peanut seeds, yeast, green plants

Skimmed milk powder, fish meal, blood meal



Vitamin B6



Physiological functions: antidermatitis, antipellegral for rats

Metabolic functions:

→ It plays an important role in protein metabolism as coenzymes of transaminases and decarboxylases.

Transaminases → Endogenous amino acid synthesis

→ Synthesis of tryptophan niacin

→ Cysteine and porphyrin synthesis

→ Keratin metabolism

→ It plays a role absorption of amino acids in the small intestine

→ It plays a role in the conversion of essential fatty acids into lipid metabolism.

→ It is effective in using lipids and carbohydrates as energy source.



Deficiency of Vitamin B6



Because protein and energy metabolism are not affected, the rate of evaluation of feeds decreases, growth slows down.

The synthesis of growth hormones is reduced, sodium metabolism is disturbed.

Dermatitis and hair loss are seen.

Macrocytes - hypochromic anemia occurs in calves and chicks.

In chicks, ataxia and cramps are formed in the muscles due to nervous system disorders.

Eggs and hatching yields fall in chickens.

In rats, bilateral symmetrical dermatitis (rat pellet) occurs in the ear, lips and tail.



Nicotinamid (Niasin, Vitamin B3)



Physiological functions: Antipellagral factor

Metabolic functions: Nicotinamide, which drives the H⁺ transport mechanism in living cells form the active group of dinucleotide (NAD) and NADP coenzymes.

In organism, tryptophan can be synthesized (60 mg tryptophan = 1 mg niacin).

Sources:

Liver, yeast, peanut and sunflower seeds are rich in vitamins.

Even though plenty of vitamins are found in grain grains, it is very difficult to utilize poultry and pigs in this form of vitamins.



Deficiency of Nicotinamid



Niacin inactivity causes a number of disorders in the skin, gastrointestinal tract and feather in different animal species.

Lack of growth in chicks, black tongue-like symptoms in dogs, dermatitis are observed in dogs.

Reduced eggs and incubation yields in chickens are common symptoms that can be seen in the absence of niacin.

In humans, red coloration of the tongue results in the appearance of pellagra, characterized by mouth ulcers, loss of appetite, dermatitis and nausea.



Panthenonic acid



Sources: Liver and egg yolk

Peanuts, peas, yeast, molasses, grains of grain, wheat pod

Physiological function: Antidermatitis factor (for chicks)

→ It is in the structure of the coenzymes, which play a role in the transport of active acid radicals.

Deficiency:

Dermatitis between the fingers in the chicks, swelling in the eyelids and sticking to each other.

Fall in breeding ability in chickens

Decrease in appetite, decrease in utilization rate of feed, delay of growth



Biotin (Vitamin H)



Physiological factor:

Protective factor in egg albumen (Avidin)

Metabolic factor:

It is involved in the structure of enzymes that act as catalysts in intermediate metabolism such as transcarboxylase.

..is necessary for fatty acid synthesis and fat metabolism.

..is necessary for the synthesis of substances related to protein metabolism such as serum albumin, purine, urea.

Sources

It is found in animal and vegetable origin feeds and foods in abundance in free or combined form.



Deficiency of Biotin



Inadequacy is rare because biotin is abundant in all kinds of feed and can be synthesized by microbial pathway.

Perozis, dermatitis, fatty liver and kidney syndrome, delay the growth.



Colin



It is in free form in animal and plant cells or in lecithin form.

Sources

Liver meal, fish meal, egg yolk, soybean, alfalfa species, grains

Physiological functions: Antiperosis factor, Lipotropic factor

It is in the structure of lecithin, the transfer form of neutral lipids.

Avoids accumulation of pathological fat in the liver.

Increase the use of the oil.

There are positive effects on the metabolism of fat and cholesterol.

There are metabolic associations between biotin, methionine, folacin and vitamin B12, which contain labile methylproline, such as choline. But in metabolism these compounds can not take their place.

The cholinergic derivative, acetylcholine, plays an important role in the transport of impulses in nerve cells.



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Deficiency is hardly seen.



Vitamin B12(Cyanocobalamin)



Physiological functions:

Antipernal factor

Metabolic function:

It participates in DNA and RNA synthesis.

Has an effect on labyl methyl groups.

Plays a role in the transfer of methyl malonyl CoA to succinyl CoA in propionic acid metabolism in ruminants.

Vitamin is the prosthetic group of methionine synthetase enzyme related to methionine metabolism.





Sources of Vitamin B12

Vitamin B12 is found only in feedstuffs of animal origin. Fish meal, meat meal, milk powder, etc. contain plenty of vitamins.

Vitamins found in these feeds can be fully evaluated by animals.

It is not found in plant-based foods.

It is synthesized by microorganisms.





Deficiency of Vitamin B12

Young animals are more sensitive than adults. Growth in young people is delayed and mortality rates are high.

Growing slows down in poultry, kidney damage, fall of hatching ability, perozis

Perennial anemia in humans





Vitamin C

Physiological functions: Antiscorbutic acid

Oxidation is the electron acceptor in the fermentation events.

It plays a role in the formation of ligaments that connect the cells in bone and soft tissues.

Hydroxyproline is incorporated into the proline formation

Required for normal calcification

Effective on evaluation of energy

There is a stimulating effect on enzymes

It increases the resistance of the body against infections.

It plays a role in the oxidative degradation of phenylalanine and trozine.





Sources of Vitamin C

Plenty of leafy plants, pepper, cabbage, spinach and citrus fruits

Storage, cooking, drying = reduction of Vitamin C





Deficiency of Vitamin C

Guinea pig, monkey, human x L-glucanolactone oxidase

Vitamin A and E deficiency = Vitamin C deficiency

- ✓ Common bleeds under skin, muscles, internal organs
- ✓ Inflammation and severe bleeding in the teeth
- ✓ Cold and hot weather stresses
- ✓ In chronic infections and metabolic diseases
- ✓ In humans softening, bleeding and ulceration occur in the gums. Especially Scurvy, which causes scorbutus





Vitamin Similar Items

Vitamin B (Bioflavonoids)

Vitamin B-T (Carnitine)

Koenzim Q (Ubiquinon)

Vitamin B17 (Amigdaline, nitrilocides)

Lipoic acid

Vitamin B13 (Ortic acid)

Vitamin B15 (Pangamic Acid)





Carnitine

It can be synthesized from amino acids, lysine and methionine

especially filled in muscles

Carnitine is especially involved in transporting long chain fatty acids into the mitochondria from cytoplasm.





What are the points that are aware of when feeding vitamins?

- 1) In order for the level given for vitamin D to be available the ration must be sufficient for Ca and P.
- 2) The requirement of vitamin E varies depending on the amount and type of lipid, Se level and whether antioxidants are added or not.
- 3) Some of the B group vitamins may reduce the need for others. For example, folic acid and B12 increase the need for colin.





What are the points that are aware of when feeding vitamins?

4) Biotin availability in feeds is often lower than 50%. The biotin coverage of most feeds can also vary greatly from sample to sample. Furthermore, biotin is not resistant to peroxidation conditions. Therefore, rations be extremely careful when adjusting the biotin content.

