

DOES FEED OR DIET AFFECT BLOOD TEST RESULTS ©
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What are the odds of blood test data being useful for detecting dietary deficiencies? It depends on the nutrient and correct interpretation of the results. Most nutrients have multiple roles in the body and hence any deficiencies will affect the function of a number of systems. In addition, because blood levels of nutrients are kept within a narrow range, blood tests give no indication of whole-body status.

One widespread belief is that anaemia is common in horses. But, although sports-related iron deficiency anemia can develop in human athletes, it has not been reported in horses - parasitism or intestinal ulceration are the most common causes of anaemia and iron deficiency the least common.

PCV or Hct is determined by a number of factors, including: breed, sex (colts run about 2% higher than fillies), temperament (nervous individuals 2 to 3% higher than average), training, disease and diet. A diagnosis of anaemia is made on the basis of the haematology results. A low haemoglobin is usually attributed to iron deficiency, however, the only thing that causes haemoglobin to rise is the correct work program. Nutrients provide the raw materials to make haemoglobin, but insufficient or inappropriate work means no rise in haemoglobin. A strong, hard workout relative to the stage of preparation will destroy up to a gram of haemoglobin/100 ml of blood, so it is especially important to allow sufficient time to rebuild after a fast day. Putting too many fast days close together, can drop the haemoglobin.

Changes in red cell results may be due to blood loss (ulcers, bleeder); Vitamin B6, B12, Folic Acid, copper or niacin deficiencies, or gut upsets causing reduced production or absorption. The aim of training is to stress the system so the bone marrow makes more haemoglobin to meet the workload. Intense work, without adequate nutritional support, can create a situation where the bone marrow production of new red cells cannot keep up due to a too-heavy work program or nutritional factors such as copper, vitamin E and B-vitamin deficiency.

There are complex relationships between nutrients and this affects their impact on blood levels. For example, deficiencies of energy, protein, vitamins A, B1 and K cause several changes in blood test results; neither a calcium deficiency nor a calcium excess affects blood calcium levels, but calcium deficiency increases blood thyroid and blood vitamin D concentrations.

BLOOD CHANGES THAT OCCUR WITH NUTRIENT IMBALANCES		
DEFICIENCY STATES	STATES OF EXCESS	BLOOD TESTS RESULT
Energy, protein, amino acids, vitamin A	Vitamin A	Low albumin
Energy or protein	-	Low protein
Protein	Vitamin K	Low BUN
Energy	-	High bilirubin
Energy	-	High triglycerides
Water	Salt	High sodium
Salt	Vitamin K	Low sodium
Salt	-	High potassium
Potassium	-	Low potassium
-	Vitamin K	Low chloride
-	Vitamin D	High calcium
Phosphorus	Phosphorus, vitamin D	Low phosphorus
Magnesium	-	Low magnesium
Selenium	-	High AST
Zinc	-	Low LDH
Iron, vitamin A	Selenium, vitamin A	Low PCV, Hb & RCC

The body's regulation of blood levels of nutrients may preclude finding simple relationships to nutrient intakes. A dietary deficiency of protein, sodium, potassium, magnesium, phosphorus, copper, manganese selenium, zinc and vitamins A, B1 and E may cause a decrease in their blood concentration. However, imbalances may be present without changes in the blood levels. Also, a dietary imbalance has to be quite prolonged before it is reflected by changes in the blood.

CLINICAL SIGNS CHARACTERISTIC OF NUTRITIONAL IMBALANCES		
CLINICAL SIGNS	DUE TO DEFICIENCY OF:	DUE TO EXCESS OF:
Reduced feed intake	Water, phosphorus, electrolytes, zinc, vitamins A,D and B1	Fluorine, vitamins A & D
Decreased weight or performance	Energy, protein, calcium, phosphorus, electrolytes, selenium, zinc, vitamins A, D, E & B1	Fibre, zinc, vitamins A & D
Poor coat	Protein, iodine, phosphorus, zinc, vitamins A & D	-
Fatigue	Potassium, selenium, vitamin A	Selenium, iodine, vitamin A
Weakness	Magnesium, vitamins B1 & E	Selenium, vitamins A & K
Lameness	Calcium, phosphorus	Sodium, selenium, vitamin A
Stiffness	Selenium, vitamins E & B1	Selenium, fluorine
Hoof problems	Protein	Selenium, fluorine, vitamin D
Diarrhoea	Fibre, selenium	Selenium, excess grain in diet
Constipation	Sodium	Grain, selenium, sodium
Colic	Fibre, magnesium	-
Dehydration	Water, sodium	Grain, sodium, vitamin K
Excess licking	Sodium, potassium, chloride	-
Dirt eating	Sodium, potassium, chloride, phosphorus, protein	-
Excess urine	-	Sodium, vitamins D & K
Blood in urine	-	Vitamin K
Muscle tremors	Magnesium, vitamin B1	-
Convulsions	Vitamin A	Magnesium, vitamin D
Reduced immunity	Selenium, vitamin A	Iron
Anaemia	Vitamin A, amino acid imbalance	Vitamin A, selenium, zinc
Excess tears	Vitamin A	-
Pitted teeth	-	Fluorine

Muscle and liver enzymes also bear complex relationships with the nutrients on which their structure depends. Indirectly, diet affects muscle function and elevated SGOT may occur secondary to imbalances in potassium, magnesium, calcium and B vitamin intake, antioxidant (vitamin E and selenium) deficiency and insufficient high quality protein. The anti-oxidant systems are dependent upon vitamin E, selenium and copper. But although body selenium status is reflected by blood levels, testing for vitamin E levels is costly and blood copper levels give no indication of whole body status, because reserves of copper are held in the liver.

Elevated GGT levels can indicate oxidant damage and insufficient zinc, vitamin E selenium and vitamin C. Falling levels of key antioxidants such as selenium and vitamins E and C is the link between overtraining and depressed immune function – which shows up on a blood test as electrolyte abnormalities, protein and white cell changes.

The best protection against deficiencies is to have the dietary intake calculated, ensure total amounts of individual minerals are brought up to comfortably above minimum requirements and that the ratios of minerals in the diet are correctly balanced.

There is a lot that can be done for horses nutritionally. Evaluation of the diet is the easiest and best way to diagnose and correct many nutrient imbalances, before they impact on performance. Equine veterinarians and nutritionist at Mitavite have taken the guess work out and produced a scientifically balanced race feed in Mitavite XLR8. Total reliance on blood test results can be misleading and subject to errors arising from sampling, transport analysis and interpretation, which is why Mitavite provides specialised feeds with the correct profile and balance of nutrients to meet the demands of intense work and racing. For further information on Mitavite feeds or feeding horses, contact Mitavite 1800 025 487 www.mitavite.com.au Email: ausfeed@ozemail.com.au