

Brief review:

Vitamins for horses – when is supplementation required?

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A summary of “Vitamins for Horses” by L.D. Lewis, Equine Clinical Nutrition^[1]

Vitamins: Definition, Imbalances and Horse Health

Vitamins are organic compounds required in very small amounts to promote and regulate body functions. They may be classified as either fat soluble (including Vitamins A, D, E and K) or water soluble (B group vitamins and vitamin C). The horse is able to produce some of the vitamins in the body (all except Vitamins A and E) and under normal feeding situations, vitamin deficiencies or excesses sufficient to cause clinical apparent detrimental effects in the horse are unlikely. However in situations where pasture quality/availability is limited or when the horse is engaged in hard, physical activity, normal diets may not contain a sufficient amount of vitamins for maximum beneficial health effects. For example, Vitamin E supplementation increases tissue levels and appears to increase resistance to infectious disease and decrease exertion reduced muscle damage. The effects of vitamin deficiencies and excesses are shown in Table 1.

Table 1. Vitamin imbalances and effects on horse health [1]

Vitamin imbalance	Effect
A deficiency	↓ Feed intake & growth, anaemia, poor hair, ↑ respiratory disease & diarrhoea, ↓ conception, weakness, ↑ tearing, night blind, ↑ skin and cornea keratin, convulsions
A excess	↓ Feed intake & growth, poor hair & alopecia (hair loss), anaemia, depression, weak, ataxia, hyperostosis (excessive bone growth), ↑ blood clot time
D deficiency	↓ Feed intake, growth and bone ash. Enlarged metaphysis, emaciation & recumbency
D excess	↓ Performance, feed intake & growth, or loss, stiff, ↑ resting heart rate, polyuria (excess urination), recumbency, seizures
E deficiency	Progressive emaciation & no anorexia, painful subcutaneous swelling, rough haircoat, ventral subcutaneous oedema, yellow gritty fat, “wobblers”, stiff gait
K deficiency	Haemorrhage & if sufficient blood loss, its effects
K excess (K ₃)	Renal failure, depression, colic, painful urination, hematuria (blood in urine)
Vitamin B1 deficiency	↓ Growth, grain anorexia, ataxia, muscle tremors, stiff, cold extremities, generalised congestion & haemorrhage, & pulmonary oedema

Vitamin Supplementation

The majority of commercial grain mixes for the horse contain vitamins at a level high enough to meet optimal levels of vitamin intake for a horse in moderate work. However there are some situations where vitamin supplementation may be beneficial. These include:

1. In horses receiving or having received prolonged antimicrobial drug therapy orally;
2. When feeding a high grain/low forage diet (e.g. racing rations);
3. When feeding poor quality hay or hay stored for more than one season;
4. When the horse is under stress, such as frequent travelling or showing/racing;
5. If the horse is typically nervous/hyperactive;
6. Horses in training or undergoing frequent/prolonged physical activity;
7. Horses not eating well for any reason (e.g. illness following surgery, strange surroundings);
8. Anaemic horses.

Vitamin Stability

Vitamin activity is decreased by external factors which include:

- ⇒ sunlight
- ⇒ feed processing (see below)
- ⇒ heat
- ⇒ exposure to air
- ⇒ internal factors that occur in vitamin supplements (e.g. incompatibility of vitamins/minerals in supplements)

Table 2 outlines the decrease in vitamin levels following feed processing.

Table 2. Vitamin stability during feed pelleting and extrusion [1, 2]

Vitamins	% Vitamin Retention During	
	Pelleting ^a	Extrusion ^a
A	85-95	75-93
D ₃	80-95	60-95
E (acetate)	95-99	94-98
E (alcohol)	30-75	10-65
K ₃	55-80	25-70
B ₁₂ & Choline	95-99	93-98
Other B vitamins	80-95	70-95
C	40-75	20-65

^a At 60 to 105°C for pelleting and at 110 to 175°C for extrusion for 0.5 to 3 mins. Retention is highest the lower the temperature and conditioning time.

In situations where vitamin intake is questionable, a balanced supplement providing additional quantities of all vitamins, without excessive amounts of any specific vitamin is recommended.

Buyer beware

Many of the vitamins when added to a feed that is not for immediate consumption must be protected to maintain their activity and efficacy. Some commercial vitamin suppliers will accomplish this by coating vitamins with things like gelatin, wax, or sugar or alternatively they will place short expiry dates on products. Many vitamins in an unprotected form are incompatible with other vitamins and minerals. Vitamin B₁ for example is incompatible with B₂, both are incompatible with B₁₂ in the presence of light, and most vitamins are prone to oxidative destruction by iron, copper, sulfates, sulfides, phosphates and carbonates [2]. It is particularly difficult to prevent these destructive interactions in *liquid vitamin preparations* such as “body builders or tonics”. Seeking evidence on the biological activity of the vitamins in these types of products from the manufacturers is advised, if the information is not available I would question their effectiveness.

References:

1. Lewis, L.D., *Equine Clinical Nutrition: Feeding and Care*. Ed: Williams & Wilkins, US., 1995.
2. Coelho, M.B., *Vitamin Stability*. Feed Management, 1991. **42**: p. 24-35.