marstall®
Premium horse feed

Nutrition for brood mares, part 2 "Vitamins and minerals"

Nutrients in balance

Pregnant and lactating mares have special requirements for minerals and vitamins. Calcium, phosphorus, copper, zinc, selenium and the vitamins A, D and E — the right balance is important, since, in this sensitive phase, an over- or undersupply can have serious effects both on the mare and the (unborn) foal.

Everything the mare takes in naturally also enters the circulatory system of the unborn foal. Since many of the nutrients influence each other, it is not only important to choose the right kind of food, but also to administer the appropriate ration. In this situation, "a lot helps a lot" is not necessarily the name of the game, because an oversupply of certain substances or unfavourable proportions may harm the mare and the foal.

If individual minerals are given in amounts that are either too big or too small, this may also affect the uptake of other minerals. Since the nutrient content of crop products tends to vary greatly, it is advisable to have them analysed on a regular basis. As a general rule, particular attention should be paid to the supply of calcium, phosphorus, copper, zinc and selenium when feeding brood mares!

Overview of minerals

- **Calcium** and **phosphorus**: These two nutrients are almost always mentioned together, because the ratio between them is just as important as their absolute content. The optimal ratio is 2:1. Calcium and phosphorus are essential for a good mineralization of the foal's skeleton, for the energy metabolism and for blood clotting. Caution: In case of an undersupply of calcium, the mare detracts the mineral from its own skeleton to make it available to the foal — at the expense of her own bone stability! Oat and barley, by-products of milling and brewer's yeast are rich in phosphorus. By implication, they often cause a calcium deficiency. On the other hand, grass meal, dried beet pulp mixed with molasses and linseed contain a lot of calcium.

- **Magnesium**: During the lactation period the need for this mineral is significantly increased! Magnesium plays a particularly important role in the nerve and muscle tissue and is also contained in bones and teeth. If grain is fed, a sufficient supply during pregnancy can be assumed. During the lactation period, however, it is possible that an additional amount of magnesium needs to be administered.

- **Sodium** and **chlorine**: These two minerals are important for the regulation of the acid-base and water balance. During lactation, the demand increases significantly.

- **Potassium**: Potassium is indispensable for the osmotic pressure within cells, for the transmission of stimuli in the nervous system, for muscle contraction and for the activity of many enzymes. During pregnancy, the mare's

requirement does not deviate from the normal state, but during peak lactation, it is twice as high.

- **Iron**: Iron is a trace element needed for the production of red blood pigment (haemoglobin) and the muscle protein myoglobin. It is responsible for the oxygen supply and transport. Compared to the maintenance requirement the demand increases by around one third. With normal, balanced rations, a deficiency is very rare.

- **Copper**: Copper is a trace element that is also mainly found in the muscles, but it is also needed in the blood and in nerves and bones for build-up and function. At the end of pregnancy, the foal stores copper it in the liver. After birth, it draws on this supply, since mare's milk is lacking in copper. Although a deficiency is rare, experts recommend to secure a sufficient uptake.

- **Zinc:** It is important to watch the amount of zinc administered, as an oversupply may have a negative effect on the foal. Zinc is needed for the carbohydrate and protein metabolism and it is important for the immune system. Heavily pregnant mares have an increased need for zinc, but with view to the health of the foal the amount administered should only be moderately increased.

- **Manganese**: Manganese is involved in numerous enzymatic processes. Additionally, it is important for ovarian function.

- **Iodine**: Iodine is needed for proper thyroid function. A deficiency — but also a surplus! — may cause miscarriages, disorders of the nervous and the skeletal system or a prolonged gestation period.

- **Selenium**: Especially in roughage, the amount of selenium contained can vary significantly. A deficiency weakens the immune system. An oversupply is almost worse, because it can quickly lead to poisoning!

Table 1:

	LM	Ca	P	Mg	Na	K	Cl	Fe	Cu	Zn	Mn	Se	J
	kg	g						mg					
maintenance	600	19,9	13,7	6,5	3,3	16,8	1,8	485	120	485	485	1,2	1,8
high pregnancy	600	42,5	29,4	7,6	5,0	19,9	2,6	605	120	545	545	1,8	1,8
peak lactation	600	61,9	42,6	9,6	8,3	31,9	7,4	605	120	545	545	1,8	1,8

Example of the daily requirement of minerals in the feed ration of horses with a body weight of 600 kg (modified according to GFE 2014)

Vitamins for fertility and development

Vitamins are needed for health and fertility. Additionally, they regulate growth and development. For brood mares the vitamins A, D and E are particularly important:

- **Vitamin A** or **beta-carotene**: Horses process beta-carotene to vitamin A, which in turn has a positive effect on fertility and the immune system. With regard to vitamin A it is important to adjust the supply: A lack of vitamin A may cause the death of the embryo or at least impair the embryonic development. But an oversupply has a negative effect on the development of the foetus as well! Beta-carotene is for instance contained in algae meal, grass meal, carrots and beetroot. In animal feed the concentration of this vitamin decreases with increasing length of storage. Therefore, a sufficient supply must be taken heed of in the period from the turn of the year until spring.

- **Vitamin D**: Vitamin D regulates the absorption of calcium and phosphorus. A sufficient supply with calcium and phosphorus paired with a lack of vitamin D may impair the development of the skeleton of the foal. Heavily pregnant mares need almost twice the amount of vitamin D compared to maintenance. A vitamin D deficiency is rare, more often there is a surplus — with negative consequences, since a surplus promotes the development of bladder stones. It may also cause a secondary calcium and phosphorus deficiency due to excessive absorption. Vitamin D is taken up through green fodder. In order to convert the vitamin into its active form, the body needs sunlight.

- **Vitamin E**: In conjunction with vitamin A, vitamin E influences ovary function and hormonal balance in general. It also plays in important role for the cellular metabolism in the entire body. Vitamin E is found in grass, clover, alfalfa, grass meal, uncrushed seeds and vegetable oils. The concentration of this vitamin decreases with increasing humidity and length of storage.

Table 2:

	A	D	E	B1	B2
	IU				
maintenance	18000	3600	610	35	25
high pregnancy / lactation	36500	6000	310	35	25

Example of the daily requirement of vitamins in the feed ration of horses with a body weight of 600 kg (modified according to GFE 2014)

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Our recommendation

marstall Zuchtmüsli – for brood mares and stallions!

- For brood mares from the 8th month of pregnancy and stallions
- With optimised levels of essential amio acids
- High levels of ß-carotene and lysine
- Rich in copper to fill the foetal liver depot
- Contains organic selenium, for vital foals and increasing the contents in the mare´s milk