

Maximizing Equine Reproductive Performance: The Impact Of Nutrition



By Alex Austin, B.S.

A successful equine reproduction program depends on many factors. Supplying high quality nutrition is one major area where horse owners can provide effective solutions to optimize reproductive performance. The average foaling rate of a hand-bred

mare is only 60%¹. This means there is much work to be done to ensure that a mare becomes pregnant and then carries that pregnancy to term. This article will discuss the important roles that body condition and nutrition play in reproductive performance.

Body Condition

According to USDA Extension sources, the most universal system for assessing body condition; The Henneke Horse Body Condition Scoring System, was developed by researchers at Texas A&M University in the early 1980's². This system is based on a scoring scale of 1 to 9, with 1 being extremely thin and 9 being obese. Body condition refers to the amount of fat on a horse's body. This fat cover can be visibly assessed in specific locations as shown in Figure 1. More information on equine body condition scoring, along with visual descriptions, can be found online at <https://www.extension.iastate.edu/equine/body-condition-score>².

Stallions are recommended to have a BCS (body condition score) of 5 to 6 prior to breeding, with a visual appearance of being moderate to fleshy, depending on the specific horse and the amount of condition lost during the breeding season². While obesity in stallions can affect their libido and lower fertility rates, the demands of the breeding season can change their body condition very rapidly, making the feeding of additional calories, protein, vitamins and minerals necessary to maintain performance.

Mares ideally should have a BCS of 6-7 and be fed to keep this BCS through early gestation to increase their chance of maintaining a successful pregnancy. Mares with a BCS of less than 5 have lower

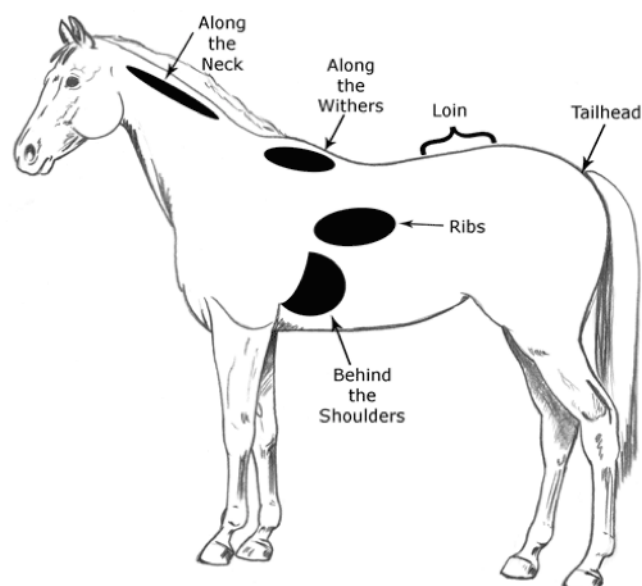
pregnancy rates, increased chances of embryo loss, fewer heat cycles, later heat cycles and poor milk production when the pregnancy is brought to term².

Nutrition

There are many different feeds and supplements to choose from in the equine industry. Finding the appropriate product that delivers the correct number of calories, while providing high quality, bioavailable vitamins and minerals, is key. Many feeds have feeding rates that deliver excessive calories, which are not needed and can even attribute to weight gain issues. Unfortunately, feeding a lesser amount of the feed would not supply adequate values of vitamins and minerals; resulting in nutrient requirements not being met. Typically, a good quality hay paired with a high-quality mineral supplement will fulfill the needs of most horses for calories, protein, minerals and vitamins. The quality of the mineral supplement being used in a horse's diet is especially important. Two critical questions should be asked when choosing a mineral:

1. Does the mineral meet the horse's nutritional requirements?
2. Is the mineral source easily absorbed and utilized?

Figure 1 EQUINE BODY CONDITION SCORING AREAS



Source: USDA Extension, <https://horses.extension.org/body-condition-and-reproductive-performance-of-hoodmares/>

Figure 2 DAILY EQUINE VITAMIN & MINERAL REQUIREMENTS (Based on 1,100 lb. Body Weight)

	Calcium	Phosphorus	Zinc	Selenium	Vitamin A	Vitamin E
Stallion						
Non-Breeding	20 g	14 g	400 mg	1 mg	15,000 IU	500 IU
Breeding	30 g	18 g	400 mg	1 mg	22,500 IU	800 IU
Mare						
Maintenance	20 g	14 g	400 mg	1 mg	15,000 IU	500 IU
Light Work (Breeding)	30 g	18 g	400 mg	1 mg	22,500 IU	800 IU
Gestating (10 months)	36 g	26.3 g	400 mg	1 mg	30,000 IU	800 IU
Early Lactation	59.1 g	38.3 g	500 mg	1.25 mg	30,000 IU	1000 IU

*NRC, Nutrient Requirements of Horses Sixth Revised Edition³

Meeting Requirements

Equine nutritional requirements are broken down into several categories. The first is based on an ideal, adult body weight and then broken down into the type of work the horse does and what stage of life it is in. Broodmares and stallions have an increased nutrient demand placed on them during the breeding season. Mares will experience additional demands during pregnancy and throughout lactation.

Figure 2 shows how some nutrient requirements increase during the periods of breeding, pregnancy and lactation. Nutrient requirements for stallions are broken down into categories for breeding and non-breeding. Although mares do not have categories that specify breeding, it is safe to assume they will have some increased nutritional needs during the breeding season due to elevated activity and stress levels.

Mineral Quality On Paper vs. Mineral Quality In The Body

According to the American Association of Equine Practitioners, "Bioavailability is the amount of a nutrient absorbed from the GI tract in a form the body can use." Which means a supplement or ration may look like it is meeting nutrient requirements on paper, but it may not be bioavailable to the body. Not all mineral forms are created equal. Minerals formulated using sulfates or oxides have

a reduced bioavailability and may even interfere or "tie up" other nutrients in the diet. Chelated trace minerals are typically much greater in bioavailability. Chelation is the chemical process by which a mineral (iron, cobalt, copper, zinc and manganese) is combined with a mixture of amino acids and peptides. Chelation makes the minerals more bioavailable. Studies in the equine industry comparing chelated minerals to sulfates and oxides have shown "a reduction in early embryonic death rate, an increased number of eggs produced per cycle and an improved foaling rate⁴. The entire line of Crystal Creek® livestock minerals are formulated using polysaccharide chelated mineral sources because they are more bioavailable to the animal. Figure 3 (on page 14) uses the micro mineral Zinc to demonstrate the extra steps the body must go through to utilize zinc in a sulfate form versus a readily bioavailable polysaccharide chelated zinc form.

When a mineral is attached to a polysaccharide chelate, it is not only available but also easily absorbed by the body. When it is attached to a sulfate or oxide, the body must take extra steps to make the mineral available and absorbable. When the body breaks the bond between the mineral and a sulfate or oxide, attempting to absorb the mineral, the loose sulfate or oxide then has the potential to tie up other minerals and/or vitamins, thus preventing absorption of those nutrients as well.

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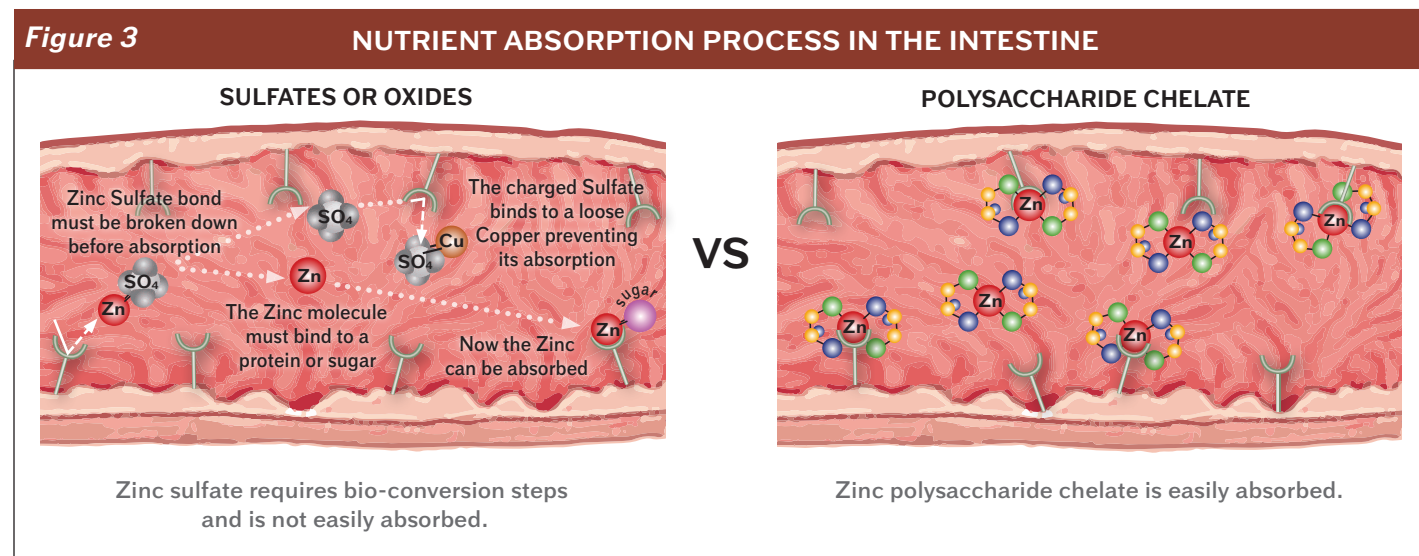


Figure 4 demonstrates the differences in the properties of the Crystal Creek® Crystal Advantage® Equine Pelleted Mineral vs. a competitor's brand of feed. Both products more than meet the minimum nutrient requirements on paper but the amount of nutrients that are available for the animal to use is quite different. It is estimated that sulfate mineral forms are absorbed at approximately 50% and polysaccharide chelates are absorbed at 95%⁵.

Figure 4 ABSORPTION COMPARISON

Brand X Texturized Horse Feed	Crystal Creek® Crystal Advantage® Equine Pelleted Mineral
77 mg/lb. of Copper Sulfate	836 mg/lb. of Copper Polysaccharide Chelate
5 lb. Feeding Rate	7 oz. Feeding Rate
77 mg x 5 lb. = 385 mg on paper	836 mg x (7/16 lb.) = 365.75 mg on paper
Brand X: 385 mg x 50% Absorption = 192.5 mg of Copper Delivered to the Horse	Crystal Advantage®: 365.75 x 95% Absorption = 347.5 mg of Copper Delivered to the Horse

Manufacturer Research

When bioavailability is considered, the amount of mineral absorbed by the horse is over 1.5x more with the Crystal Advantage® Mineral than with the Brand X feed. Another consideration with Brand

X is the high feeding rate required to meet mineral requirements. If fed a quality forage, most horses would not need this high feeding rate and extra calories. Unfortunately, decreasing the amount of Brand X feed being fed will also decrease the amount of minerals and vitamins delivered to the horse.

Taking the time to assess body condition and nutrition options prior to breeding can help ensure a successful pregnancy and increase the chances of producing a healthy foal. Crystal Creek® focuses on providing our producers with high quality, bioavailable nutrition products for their animals. Additional information on evaluating mineral sources and feed tags can be found in the April 2019, Crystal Creek® Newsletter article "Interpreting the Value of a Livestock Mineral," by Dan Leiterman. Contact Crystal Creek® today to learn more about how the Crystal Advantage® line of equine products can enhance your horse's reproduction program.

SOURCES

- 1 Honey, W. G., "Management factors affecting equine fertility," in Morrow, D.A., ed., Current Therapy in Theriogenology (Philadelphia: W. B. Saunders) 737, 1986.
- 2 USDA, Cooperative Extension <https://horses.extension.org/body-condition-and-reproductive-performance-of-broodmares/> and <https://www.extension.iastate.edu/equine/body-condition-score>
- 3 National Research Council, "Nutrient Requirements of Horses, Sixth Revised Edition", 2007.
- 4 Kentucky Equine Research Staff. "Chelated Minerals Enhance Nutrient Bioavailability." Kentucky Equine Research, 21 Nov. 2019, <https://ker.com/equine/chelated-minerals-enhance-nutrient-bioavailability/>
- 5 Manufacturer Research, Crystal Creek®