Introduction

The phospholipid membrane of mammalian spermatozoa has a characteristic fatty acid composition. In most mammals, DHA (docosahexaenoic acid; 22:6) and EPA (eicosapentaenoic acid; 20:5) are major components of the membrane, although this varies by species as well as by individual (3, 4). Recent research suggests that DHA is important to normal spermatozoa function. The deficiency of LC-PUFAs in the spermatozoan plasma membrane, especially DHA, is one of the most consistent fertility defects in men (4).

The sperm lipid profile for boars and stallions are similar (6), and studies have shown that a high-DHA concentrate dietary supplement to DHA (dia-epicosapentaenoic acid; 22:6), an omega-6 fatty acid ratio is associated with greater fertility (9). In boars, high DHA concentrations are associated with poor semen quality, while high DHA concentrations are associated with good semen quality. Moreover, boars fed DHA-enriched diets had elevations with increased sperm concentration and a higher percentage of morphologically normal spermatozoa (10). This relationship may be especially important in stallions. Popular stallions in all breeds are often bred to a large number of mares. But, approximately 30 percent of stallions have semen that has poor quality after cooling and storage at 5°C, or after freezing and thawing. Horses and other animals are unable to synthesize the essential omega-3 LC-PUFAs from saturated or monounsaturated fatty acids; thus, they must be provided in the diet. Unfortunately, most horse feeds are very high in precursors for omega-6 fatty acids while the precursors for omega-3 fatty acids, such as DHA, are low. Plant sources of omega-3 fatty acids, such as flaxseed meal or flaxseed oil, contain only short chain precursors that cannot be converted to DHA in sufficient quantities to meet requirements. Research at Colorado State University has demonstrated that feeding horses a supplement containing DHA resulted in increased plasma levels of DHA, whereas feeding flaxseed meal did not increase plasma levels of DHA (11). Thus, the omega-3 LC-PUFAs, from marine sources, must be provided in the diet to supply DHA for sperm production. Magnus™ provides an unique proprietary blend of LC-PUFAs, in particular the important LC-PUFAs DHA and EPA (eicosapentaenoic acid; 20:5 n-3), plus complimentary antioxidants and vitamins. Magnesium’s source of fatty acids is similar to those often used in human foods and nutrients, and several studies have confirmed the safety of DHA in both humans and other mammals (7). Research suggests that DHA oils do not cause toxicity, even at doses 100 times the daily recommended human intake (2).

References


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Research Evaluating the Impact of Feeding Magnus™ on Stallion Sperm Production and Motility Characteristics

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Harms et al. at the University of Arizona (5,6) reported results similar to Texas A&M after feeding Magnitude™ to stallions for 90 days. Daily sperm output was increased (P < 0.05) by 46 percent in supplemented stallions compared to stallions fed control diets. The percentage of morphologically normal spermatozoa (Fig. 2) was also increased (P < 0.05). These improvements were most dramatic for the stallions with the lowest initial morphology score and lowest progressive motility. Improved progressive motility was observed following 48 hours of cooled storage and cryopreservation (Fig. 3). Sperm plasma membrane DNA concentration was increased (P < 0.05) in supplemented stallions, but remained unchanged in stallions fed the control diet. DNA levels in supplemented and control stallions did not change, thus the DHA/DPA ratio was improved for stallions supplemented with Magnitude™. These researchers also suggested that supplementation of stallions with Magnitude™ could increase daily sperm output and provide particular benefit in stallions with poor quality ejaculates.

Trials conducted during the 2005 breeding season at Colorado State University (12) and the University of Arizona (1) confirm and support the previous research. Stallions were allotted to either control or Magnitude™ supplemented diets. Sperm reserves were obtained by daily semen collection for five days. Then semen was collected daily for one week experimental period. This procedure was conducted both pretrial and at the end of a 90 day feeding period. Standard semen analysis was performed on each ejaculate of fresh, cooled, for 24 and 48 hours, and frozen-thawed semen. The results are presented in Figure 4 for Colorado State University and Figure 5 for University of Arizona as percent change in TPM (total progressively motile sperm per ejaculate) at the end of this experimental period relative to the TPM for each stallion as the beginning of the trial. The TPM was calculated by multiplying the total cells (daily sperm output) in fresh semen, times the percent progressively motile sperm in fresh, cooled, and frozen-thawed semen. Magnitude™ resulted in improved TPM for fresh, 24 and 48 hour cooled, and frozen-thawed semen in both trials. Of particular note was the significant (P < 0.05) increase in TPM in fresh and 24 hour cooled semen at Colorado State University and 48 hour cooled semen at the University of Arizona.