



All your Questions... ANSWERED!

Scientific literature does suggest that MSM may have clinical applications for arthritis and other inflammatory disorders such as acute exercise-induced inflammation. Holding a USDA Food and Drug Administration (2007) status of 'Generally Recognized As Safe (GRAS)' in humans, MSM is well-tolerated by most at dosages of up to four grams daily, with few, mild side effects.



wall, passes into the cell and can be found in every structure inside the cell. In specialised structures within the cell it is bio-transformed into the multitude of organo-sulphur molecules required for health. Unused MSM passes out in the urine and manure.

Because MSM has the ability to penetrate membranes and permeate throughout the body, it has broad biological effects. Its full range of actions involve a collection of cell types and is therefore difficult to elucidate. Studies in laboratories and in animals and humans suggest that it somehow operates at the crosstalk of inflammation and oxidative stress. Among its many actions, it regulates the production of pro-inflammatory chemicals that wreak havoc in the body and although it supports the immune system, it prevents its over-activation.

The ability to enter cells and to moderate inflammation are believed to be why it has a therapeutic role in humans and other animals for:

- arthritis and inflammation
- cartilage preservation
- rheumatoid arthritis
- muscle soreness after exercise
- improvement of skin quality and texture

Although MSM has been well-investigated in animal models, human clinical trials and experiments, there is a dearth of scientific literature regarding feed additives and supplements for the horse. Because the majority of research has been conducted in tissue cultures, humans or laboratory animals, knowledge of the effect and bioavailability of MSM in horses is limited. There are however many clinical trials and subjective observations about this seemingly amazing product. Many claims have been made about the benefits of MSM in horses and it's potential:

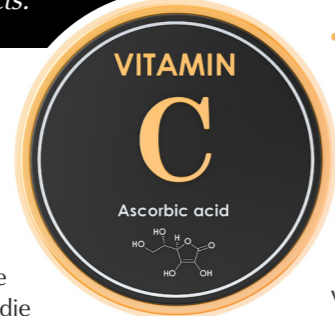
- to modulate allergic reactions – although no benefits were found for head-shaking
- to moderate gastrointestinal tract upsets from diet and oral drugs
- to correct malabsorption of minerals
- for antiparasitic action
- for pain and inflammation relief
- for antimicrobial and antioxidant effects

One study in show-jumping horses found a reduction in oxidative stress when they were fed 4 grams (8mg/kg body weight) daily. The protective effects were greater when MSM was combined with another anti-oxidant, vitamin C, at 2.5 grams (5mg/kg bodyweight) per day.

An anti-inflammatory effect has been demonstrated in horses with hock arthritis – the effective dose was 20 grams/day. Another study on 30 racing Standardbreds found a significant improvement in the ability of equine muscle tissue to rebound from exercise stress. The horses were fed either 10 grams or 20 grams of MSM per day and monitored by thermography (a very sensitive way to identify sites of inflammation), blood tests to measure the leakage of enzymes (AST - aspartate aminotransferase and CK - creatine kinase) from damaged muscle cells, and performance times. All the horses receiving MSM had dramatic improvement - less inflammation and soreness, a reduction in muscle enzyme leakage and improved training times. The changes occurred faster and were more dramatic in the horses on 20 grams per day. Trainers reported that the horses on the higher dose had better hair coats, faster healthy hoof growth, and quicker recoveries after exercise, with no side effects.

Also known as dimethyl sulfone, methyl sulfone, sulfonylbismethan, organic sulfur, or crystalline dimethyl sulfoxide, MSM is a naturally occurring compound. Synthesised in nature by algae, phytoplankton and other marine micro-organisms it is absorbed into soil, used by the bacteria in the soil and taken up by plants. During respiration, the plants excrete MSM into the atmosphere as sulphide and when they die and decompose the sulphur sources are incorporated into soil minerals, which undergo erosion and return to the oceans - thus completing this sulphur cycle. It is found in the diets of all vertebrates and is present in vegetables, fruit, fish, milk and meat – although processing of feedstuffs (including drying of lucerne to make hay) can drive it off. The amounts in fruit, corn, tomatoes, tea, coffee and milk are just a fraction of the amount generally included in supplements. MSM can be produced from DMSO and there are no biochemical differences in its ability to intermediate oxidative stress and inflammation, whether MSM is naturally produced or manufactured.

Over the last 30 years, quite a bit has been discovered about the movement and metabolism of MSM. When taken orally, some binds to receptor sites of the mucous membranes and the rest is absorbed into the blood and travels to every cell in the body. There it crosses the cell



Due to enhanced penetrability properties, MSM is commonly combined with other anti-arthritis agents (including glucosamine, chondroitin sulphate, and boswellic acid). Accounts in humans of MSM in combination with glucosamine, chondroitin sulphate, MSM, guava leaf extract, and vitamin D showed positive results in knee osteoarthritis. And, MSM with arginine l-a-ketoglutarate, hydrolysed Type I collagen, and bromelain improved rotator cuff repair post-surgery. In horses, some studies have failed to show significant improvements. In one such study in geriatric horses, a glucosamine-chondroitin-MSM combination supplement given orally for three months failed to show significant changes in gait characteristics. Its important to remember that although MSM is added to many joint supplements it may not always be added in the same amounts that research has shown to be beneficial. So, to assess your horse's response to MSM, its worth checking the amount in individual products or buy a pure MSM product and add that at varying doses.

Almost 40 years ago MSM was trialled in horses and dogs. Finding his own respiratory allergy (including to horses!) much-improved after feeding himself 1gram twice a day, a respected equine veterinarian began using MSM in his clinical management of horses and dogs. Excited about his response, he provided his arthritic 11-year old Labrador and four of her friends with daily MSM in their diet, and after a month of treatment, their soundness and level of activity reverted to what it had been 4 years previously. Their coats also improved and their toe-nails grew faster, prompting its use in horses with poor-growing, flinty hooves. Another of his patients, a 4-year old gelding with a history of poor racing performance due to chronic muscle soreness, was fed 12-15 grams twice daily. Within a week he worked with enthusiasm and no longer flattened his ears and swished his tail when asked to work. Dr Metcalf also used it in cases of current digestive tract disturbance, epiphysitis, acute laminitis and early navicular disease at 12-14 grams twice daily with the horses improving within 30-90 days. Symptoms returned after 10 days when the MSM was withheld and resolved again once it was reintroduced to the daily diet.

More recent descriptions suggest a role for MSM in promoting stronger, healthier hooves. Hoof quality and growth rate are influenced by dietary deficiencies or excesses of protein, particular minerals, vitamins or amino acids. Variations in the amino acid content of hoof samples (notably methionine and cystine) are related to both diet and management. In a study on the hoof wall strength and composition, two different types of defects were found brittle feet - one responded to biotin and the other to calcium supplementation. Several mineral deficiencies affect the hooves: magnesium deficiency is linked to flat, thin soles and sub-clinically laminitic hooves; calcium deficiency is a contributor to brittle hooves; horses with low intakes of zinc and copper are more likely to develop white line disease; sulphur deficiency is associated with less than optimum methionine intake, and MSM has been suggested to support hooves in wet environments. When methionine intake is low or a horse has poor hoof quality, supplementation of 5000 to 10,000 mg (5 to 10 grams) per day for the average size horse can improve hoof wall integrity. 5 grams = approx. 1 teaspoon.

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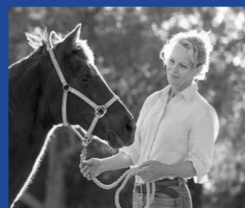
Due to its many actions in the body, MSM needs to be used with care and veterinary advice in certain horses. Any horses with clotting disorders or taking medications to aid in clotting should not receive this supplement without close veterinary supervision. Any horse with hyperglycaemia (elevated blood glucose) should not take MSM. Although there are no studies indicating any toxicity from MSM in a variety of species, if an individual horse is given more than the manufacturers recommended dose, it should be done under veterinary supervision.

The recommended dosage of MSM seems variable according to either the company that packages it or the therapist who prescribes it - anything from 7 grams to 36 grams daily. Some scientists advise that sound eventing and endurance horses should be started on 5 grams twice daily, increasing over 4 weeks to 18 grams twice daily; horses with inflammation and lameness 20grams twice a day. Ponies receive a reduced amount based on bodyweight.

Dietary imbalances, excesses and deficiencies contribute to clinical and health problems in horses. As with all supplements and additives, it's important to ensure the basic diet is balanced and correct for minerals, vitamins and amino acids before exploring the option of supplements. In addition, randomly adding individual vitamin, amino acid and mineral supplements is a hit-and-miss affair and can lead to disproportionate and sometimes toxic levels of intake. Some supplements contain a range of different vitamins and minerals and if multiple supplements are used, overlaps can occur. A diet analysis and a well-formulated

balancer remove the guesswork and risks of trying to balance the diet with individual supplements, ensuring the benefits of supplements such as MSM are not being undermined by other nutrient deficiencies or imbalances.

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Dr Jen Stewart have been an equine veterinarian for more than 40 years and a equine nutritionist for more than 10 years. Jen has been developing premium formulas for studs, trainers & feed companies in Australia & around the world and regularly consults to leading International studs & trainers in various countries.

Jen has spent a fair bit of time researching & being involved in nutritional management of developmental orthopedic diseases, colic, tying-up, laminitis, performance problems, post-surgery & other conditions. And is currently the only practicing equine veterinarian & clinical nutritionst in Australia. Jen's promise is to continue to BRING SCIENCE TO YOUR FEED BIN. For more information visit www.jenquine.com



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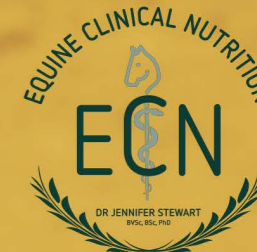
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