



9 basics for successful feeding

1. Good teeth
2. Absence of parasites
3. Good hay or pasture
4. Ample sources of energy
5. Sufficient sources of good protein
6. Clean and free feeding area
7. Salt (preferably iodised, free choice)
8. Good water, free choice
9. Feed by weight, not by sight

Macro Minerals

Calcium [22g]

- Efficient absorption by body
- Essent Phosphorus reduces absorption of C.
- Russian Rites high in Calcium, but make high in Phytate
- Needed for: Bone formation, Muscular contraction, Blood clotting, Normal release of hormones, Activation of enzymes, and Normal heart rhythm.
- Grains have low calcium - Alfalfa hay has high calcium. (1.24%)
- Feed grass hay and grains with Alfalfa to balance Phosphorus.
- Low level can cause "Thumps", hiccups the ailment. Insect calcium solution directly into bloodstream if serious.
- Monoacid Phosphate, (26% phosphorus)
- Skeleton 14 - 17% P

Phosphorus [14g]

- Not as easily absorbed as Calcium.
- Most absorption in hind gut, assisted by bacteria.
- Assist P. uptake with bacteria enhancement i.e. add yeast culture to feed
- Feed probiotics, lactobacillus acidophilus. For debilitated or stressed horses only.
- Deficiency symptoms = swollen knees and fetlocks
- Magnesium carbonate, magnesium oxide
- Chelated or protected
- A horse is 0.05% M - 6% of which in skeleton and teeth
- Most grain and forage contain enough - it is contained in chlorophyll of green plants
- Needed for: Synthesis of proteins, and the digestion of starches
- Activator of over 300 enzyme functions.
- Increase M. intake if going barefoot - strengthens hooves - Keratin growth
- M. absorption deficiency can be caused by too much calcium, phosphorus, excess Vit. D, diuretics, (eg. Lasix), and lack of dietary protein.
- Uptake of M. and calcium regulated by same hormone
- Type II diabetes = insulin resistance
- Blood sugar goes up after eating. Pancreas releases insulin to carry extra sugar to tissues.
- Sugar converted to energy by complex enzyme action. Enzyme actions require M.
- Flow M. pancreas gets frustrated - excess blood sugar is turned into fat
- Fat deposits at crest of neck and base of tail sure sign
- High insulin due to low M. blocks small blood vessels - can lead to laminitis
- M. imbalance easy to cure - supplement M. or cut down on calcium
- Good calcium to M. ratio by a live for 1.5 : 1 to 2 : 1
- Long term effect is mineralisation in arteries and damaged capillaries. Possible laminitis from poor circulation
- Deficiency symptoms = nervousness, muscle tremors, rough lustered coat
- Intolerance to work or exercise, obesity (insulin resistance) - fat deposits at crest of neck and base of tail sure sign
- 0.15% of horse mass - average horse contains 1.5 pounds of S.
- Meat S. contained in hooves and hair which are around 3% S.
- Two amino acids contain sulfur - methionine and cystine
- cystine can be metabolised from methionine which is an essential amino acid
- S. is present in: Biotin, thiamin, insulin, heparin, and chondroitin sulfate.
- Needed for: hoof and hair growth, metabolism of carbohydrates and simple sugar, S. is a regulator of blood viscosity, Low S. = low flow rate (lack of hemoglobin in the blood)
- No known RDA
- A good quality protein source gives approx. 0.15% S, which is enough for most horses
- Elemental S. is not a natural nutrient - do not feed pure sulfur
- Methionine and biotin are usual means of supplementing for foot and hoof problems
- Phases Chloride
- P. and Sodium work together to regulate oil fluid
- Regulation of osmotic pressure and acid base balance in the body
- Plays role in nerve impulse transmission - proper muscle function
- High P. in forage, Low P. in grains
- 25g P. per day for 1100lb maintenance horse
- Horses on hay or pasture need no extra P. - 14lb forage = over 35g P.
- Very sweaty horses may need extra P. if on high grain diet
- P. electrolyte formulas can be added to food as top dressing or to water
- Low level of P., calcium and/or sodium is a cause of Azotemia

Magnesium [8g]

- Deficiency symptoms = weight loss and generally poor appearance, loss of appetite - eventually refusal to eat
- Salt blocks should always be offered free choice - always with abundant water nearby
- Grains and forage are low in sodium and chloride
- Salt blocks can be straight table, iodized salt or mineralized salt
- Sodium and chloride maintain the body's acid base balance and fluid balance
- Sodium and potassium act together - P. stops cells drying out / S. stops cells filling with water
- Horses with salt deficiency will eat slower and drink less water
- Salt deficiency produces rough haircoat and dry skin - licking things with sweat on them sure sign
- 100g of salt gives 40g of sodium = 10% of body wt
- Supplemental forms: C. sulfate, C. polychalcate
- Needed for enzyme systems involved in manufacture and maintenance of connective tissue, maintenance of mitochondria within cell nuclei, synthesis of melanin (pigment)
- Also needed for: bone formation, maintaining elastic strength of blood vessels, manufacture of haemoglobin, healing of wounds
- Especially important for maintaining an efficient immune system
- as an aid in reproduction, and for the synthesis of connective tissues (collagen and elastin)
- 62mg - 115mg per day, horses can tolerate much higher than min requirement
- Grass hays generally have a higher Copper content than alfalfa hays
- Most feeds low in C, therefore supplement recommended - especially with high carbohydrate diet
- Prolonged deficiency may cause Osteochondritis - metabolic bone disease
- A deficiency may result from feeding too much calcium, iron, molybdenum and zinc
- Also caused by low protein levels in the diet
- Deficiency symptoms = enlarged joints and fragile bones, the haircoat turns grey, slowed growth, may become anemic
- Cobalt is involved in synthesis of Vit. B12, which is needed for haemoglobin production
- 0.8 - 1.1mg / day, in forage and grains - 14lb feed usually enough
- Deficiency symptoms = anemia, reduced appetite, slowed rate of growth
- Regulation of thyroid function - preventing goitre. A diet low in iodine causes thyroid gland to swell due to hormone activity
- Thyroid gland regulates metabolic rate - "metabolic metronome"
- thyroxine
- Produces two amino-acid like hormones both contain iodine

Sulfur

- Essential for oxygen transport round body - i.e. most body functions involve iron
- hemoglobin = primary constituent of red blood cells
- 60% of body's 30grams of sulfur is in blood
- myoglobin = haemoglobin-like compound
- loosely holds oxygen in muscles when abundant, releases it when body needs it
- Grains and forages generally contain enough iron for most horses
- May need to supplement for horses under stress, injured with high blood loss, or with heavy parasitic loads also judicious supplement for fast growing horses, late pregnant mares and performance horses
- High levels of cadmium, cobalt, copper, zinc, and manganese prevent iron absorption
- Alfalfa hay is very high in iron

Potassium

- Too much iron can lead to affected metabolism of phosphorus leading to slowed rate of growth accompanied by poorly mineralised bone
- many pathogenic bacteria have high iron requirement - thus, excess iron may make bacterial infection worse
- M. required by enzymes to metabolise chondroitin sulphates in joint cartilage
- M. needed for carbohydrates and fat metabolism, and for normal reproductive functions
- Timothy and orchard grass hay high in M., most other common feeds lacking in M.
- Supplementation should be considered for growing and performance horses
- Vitally important in formation of connective tissues, leads to bone to mares deficient in M. may have cracked legs and deformed joints with severely limited lactation
- Mn and toxic levels not known. Excess could affect absorption and utilisation of other nutrients
- Performance horses deficient in M. exhibit stiff joints and general soreness. They will not want to work
- Zinc methionine is one form of supplemental Z. found in hoof health supplements
- Zinc subphate - most easily absorbed inorganic source for horses
- Z. is found in high levels in the cereals, the prostate gland, the skin, the hair, and the hooves
- Z. is essential for about 340 different enzyme systems
- Some of the many functions include: Growth and maintenance of hoof walls
- skin growth and healing, normal prostate function, phosphorus and protein metabolism
- Adequate amounts of Z. lacking in almost every common grain and forage
- Most feed milks include some form of Z. supplement in their grain rations
- Z. is also available in polysaccharides and amino acid complexes, amino acid chelates, and proteinates
- High levels can be tolerated but will affect utilisation of other nutrients, especially copper
- Foals deficient in Z. will have poor appetites, reduced rate of growth, hair loss, and dry scaly skin
- Selenium is serious business - too much can kill
- S. is very easily absorbed by the horse, (75% efficiency or above)
- Sodium selenite, sodium selenate are usual supplemental forms
- In nature S. forms complexes with the amino acids, cystine, cysteine and methionine
- S. over dose symptoms = (1 f6g for 1100 lb horse) blind staggers (alkali disease) - horse appears colicky with elevated heart rate and irregular breathing. They may appear to be blind. May be seen to press their head against stationary objects and may sweat profusely
- Long term signs of overdose = anemia, lameness and joint stiffness, rough haircoat with loss of hair in mane and tail, malformed hooves with cracks around coronary band
- if symptoms go unchecked for a long time chronic toxic can cause death
- Deficiency symptoms = in foals, white muscle disease. (a form of muscular dystrophy), the foal becomes pale in appearance, if symptoms go unchecked for a long time chronic toxic can cause death
- General weakness and laboured movement, difficulty in nursing and swallowing, irregular and laboured breathing
- Trace minerals are disappearing from the soil due to farming
- Organic forms of copper, cobalt, iodine, iron, manganese and zinc are better absorbed than inorganic form

Minerals

Trace Minerals

Horse Nutrition

Vitamins

Fat soluble (Only in vertebrates)

Vit. A

- Vit. A is a class of at least a dozen compounds - all display the same activity in the body
- Plants do not manufacture Vit. A - only made in the bodies of vertebrates
- Plants do manufacture pigments called carotenoids which are converted to Vit. A in the body
- Most important carotenoid is beta carotene
- Vit. A is important for vision - chel compound of light sensitive pigment in the rod cells of the eye
- Essential for cell differentiation, (so bone cells become bone and liver cells become liver), and assists in the continuing process of bone remodeling in growing horses
- A horse on green pasture will get all the Vit. A it needs
- Fresh green pasture contains 10 - 120 times more Vit. A precursors than dried hay due to action of sunlight and moisture on beta carotene
- Cereal grains, (with the exception of corn), contain almost no beta carotene. Therefore all your horses Vit. A needs come from forage and supplements
- Vit. A stores well in the body, primarily in the liver and beta carotene can be stored in the fat cells where it can be converted to Vit. A when needed
- Therefore a horse kept off pasture and put on dried levels is a long way off from Vit. A deficiency and most feed mills add Vit. A to their grain mixes
- Vit. A overdose symptoms = abnormal thickening of bone and bone fragility, flaky skin, poor muscle tone, rough haircoat and loss of hair, and depression
- foals born to mares fed too high levels of Vit. A through their pregnancy can be severely debilitated. Food for thought!
- Beta carotene is the preferred supplement as it is non-toxic, instead of energy Vit. A
- Better reproductive performance in breeding stock and anti-oxidant activity in performance horses
- Deficiency symptoms = poor growth and depressed appetite, progressive weakness, impaired reproductive function, continuously runny eyes, night blindness, hardness of skin and corners of eyes, respiratory infections, and abscesses of the salivary glands

Vit. D

- Made in plant tissues from compound ergosterol and ultra violet light
- Vit. D2 more prevalent in dried forage than green pasture
- Made under the skin as 7-dehydrocholesterol by sunlight
- Without Vit. D a life threatening mineral imbalance will result
- Vit. D is part of the proteins that bind calcium and magnesium, facilitating their absorption. Also helps to regulate the excretion of phosphates in the urine
- Some plants, such as yamaine (castrum durum), contain a substance that causes hyper absorption of calcium
- Horses eating these plants can show symptoms that show Vit. D toxicity
- Vit. D3 supplementation not necessary if exposed to sunlight, except young growing horses or mares in final trimester of pregnancy
- Over dose symptoms = deposition of calcium in soft tissues primarily in the blood vessels, heart, lungs and kidneys
- Most likely by over feeding supplements containing Vit. D
- Deficiency symptoms = nervousness, dull haircoat, regression and phosphate deficiency, rickets like symptoms, including poor bone density, swollen joints, and a painful gait / laboured gait
- Vit. E is the term used for the substance, tocopherol, which has at least 8 known variants
- Vit. E is easily oxidised, i.e. it reacts readily with charged oxygen-containing compounds produced by anaerobic respiration, thus preventing them from reacting with and destroying lipids and proteins in the cell membranes. (i.e. it is an anti-oxidant that neutralises free radicals)
- Tocopherols work with Vit. E to protect cardiac and skeletal muscle tissues
- Selenium is part of an enzyme that protects the cell interior whilst Vit. E protects the outer portion of the cell
- Some degree of supplementation recommended for most horses
- Hay very low in bioavailable / refined on
- Lactating mares need more to pass on to their foals in their milk
- Young horses need it for normal muscle development
- Performance horses need it to combat muscle degradation by anaerobic respiration
- Recommended for breeding stallions
- Normal reproductive function in pregnant mares
- Deficiency symptoms (most evident in young growing horses) = rapid degeneration of cardiac and skeletal muscles, noticeable symptoms include exaggerated and uncoordinated movement, especially in the hind limbs and a sprawled stance
- Required for normal clotting of the blood
- Usually synthesised by bacteria in the intestine in sufficient quantities for most horses
- Vit. K3 = menadiolone - often found in supplements, especially for breeders
- through the efficacy of these preparations remains to be seen
- Oral menadione relatively non-toxic
- Injunctable menadione given for haemorrhage can cause acute kidney failure and death
- Thiazine enzymes in trackles, horse tail and yellow star thistle - break down vit B1

Water soluble (needed by all animals and available in yeast)

Vit. B 1 (Thiamin)

- The need for thiamin is directly related to the caloric needs of the horse. Supplementation beneficial if on a high carbohydrate diet
- In the body thiamin is converted into thiamin pyrophosphate, a compound required for the metabolism of pyruvic acid (an essential link in the utilisation of carbohydrates and proteins)
- If metabolic thiamin is lacking the horse cannot derive sufficient energy from its diet
- Some thiamin synthesised in the gut but not enough - supplementation recommended
- Deficiency can occur from feeding poor quality hay or mixing barbers, horse tail, or yellow star thistle
- Especially helpful to performance horses
- Thiamin can help restore appetites in horses that have gone off their feed
- Can help alleviate nervousness in horses that are stall-bound on high energy rations
- Many vitamin / mineral supplements contain thiamin
- Safe limit for thiamin is at least 1000 times the minimum requirement - overdose unlikely
- Deficiency symptoms = nervousness, dull haircoat, loss of appetite, weight loss, lack of coordination in the hind quarters, slowed or irregular heartbeat

Vit. B 2 (Riboflavin)

- Present in enzyme systems involved in converting feed into energy - essential to every cell in the body
- Synthesised in large quantities, but not quite enough for daily needs
- Good quality hay should contain enough - supplementation not a concern for most horses
- Supplementation may allow performance horses on a high calorie diet to utilise their feed more efficiently
- No point in feeding large amounts as it is not stored in large quantities in the body and whatever is not used is quickly excreted
- May cause retarded growth, hair loss and dermatitis if deficient in diet. Not proven however

Niacin

- Actually two substances, nicotinic acid and nicotinamide. Both have equal vitamin activity
- The term "niacin" was adopted to avoid confusion with the addictive alcohol, nicotine
- Part of two coenzymes that are critical in the metabolism of carbohydrates, fats, and amino acids
- Some niacin synthesised by microbes in the gut from the amino acid, tryptophan
- Ample amounts can be found in forages, protein sources and cereal grains, although most of the niacin in grains is bound in unusable forms
- Often in large amounts in vitamin supplements for no reason - no record of a niacin deficient horse
- Deficiency symptoms = pellagra in humans, black tongue disease in dogs
- However, supplementing biotin at 10 - 20 mg per day often shows improvement. Symptoms disappear when biotin withdrawn
- These conditions are characterised by loss of appetite, muscular weakness, digestive disorders, dermatitis and anemia
- involved in energy metabolism, (a component of coenzyme A)
- Essential for the synthesis of steroids, including cholesterol, and for the production of adrenal hormones
- Synthesised in the intestine but a dietary source also needed
- Brewers yeast is an excellent source
- No record of deficiency symptoms in the horse
- A component of enzyme systems involved in the metabolism of protein, fats and carbohydrates
- Required for formation of red blood cells

Vit. B6 (Pyridoxine)

- Pyridoxine is the form of Vit. B6 found in plants. Converted in the body into pyridoxal and pyridoxamine
- Synthesised by microflora in the gut
- Found in small quantities in forages, grains and protein sources
- No record of deficiency symptoms in the horse but it is part of the systems that turn feed into energy, the need increases as the work increases. Often added to supplements for performance horses and pregnant mares

Folic Acid

- No established dietary requirement
- Grass is one the richest sources of folic acid
- Needed for formation of red blood cells, synthesis of methionine, and the formation of nucleic acids
- Synthesised by intestinal bacteria as well as ingested
- May be of some benefit to pregnant or lactating mares who always need most of everything
- Folic acid is lost in sweat so supplement for performance horses as they manufacture more blood than other horses
- Deficiency symptoms in the horse not recorded, symptoms for humans are certain forms of birth defects

Choline

- Unlike the other B vitamins, choline has no known catalytic role in the body. (i.e. it is not part of any enzyme or coenzyme)
- Further set apart by the fact that it is synthesised in the liver, not the intestine
- Still vitally important. As a constituent of acetylcholine, it is needed for the transmission of nerve impulses
- Acts in synergy with methionine as a methyl donor, where it has a role in fat metabolism
- A structural component of cell membranes
- Choline chloride added to most supplements
- Abundant in forages and grains - shortfall in metabolic synthesis unlikely
- No record of choline deficient horse

Vit. B 12 (cobalamin)

- Not produced by any plants - synthesised in the horses intestines by microorganisms from cobalt
- Last vitamin to be discovered
- Possibly one of the most potent vitamins - very little needed
- Essential for production of red blood cells
- Almost always included as cyanocobalamin in vitamin supplements formulated for performance horses
- No signs of toxicity at several hundred times minimum amount
- The organ, mainly the liver, can store Vit. B12 indefinitely. Horses deprived of cobalt or depleted of intestinal microflora (from parasites or disease) can rely on stores of Vit. B12 for several months if necessary
- No evidence of dietary need for Vit. B12 beyond what is synthesised in the gut
- Biotin, like several other B vitamins, is an integral part of a number of enzymes
- The organ, mainly the liver, can store Vit. B12 indefinitely. Horses deprived of cobalt or depleted of intestinal microflora (from parasites or disease) can rely on stores of Vit. B12 for several months if necessary
- Subject of much controversy as hoof tonic - the reason for hoof improvement remains elusive
- Horses on a good diet with poor hooves show same biotin levels in the blood as horses on the same diet and good hooves
- High levels of cadmium, cobalt, copper, zinc, and manganese prevent iron absorption
- It is unlikely that weak crumbly hooves are a result of simply biotin deficiency
- It may be that biotin prevents premature decay of the horn cells forming the outer wall of the hoof
- This then may mean the new cells that lay down an environmental more conducive to growth
- This still does not explain the same levels of biotin in horses with good and bad feet
- A horse will not live long without biotin. Most plants contain small amounts though most to bound to proteins that prevent absorption in the gut
- Biotin is, however, synthesised in the gut (as well as others that do not require absorption in the horse has been recorded)
- Horses manufacture ascorbic acid in their livers from glucose - humans do not therefore it is labelled as vit c on human food and ascorbic acid on horse food
- It is a vitamin for primates but a simple metabolic essential for equines
- Most important role is as a co-factor in the synthesis of Collagen - primary constituent of connective tissues, including the skin, tendons, bone and cartilage
- literally holds us and our horses together
- the most prevalent protein in the animal world
- Many supplements contain esterified ascorbic acid (Ester - C) for joint and cartilage health but these are not developments in human medicine and based on rats, which have more highly developed absorption
- If the joint repair supplement you are feeding does contain ascorbic acid it cant hurt
- No dietary requirement for ascorbic acid in the horse as there appears to be no significant dietary path way for its utilisation
- It is very poorly absorbed by horses as it is broken down by gut bacteria before it gets to the bloodstream
- If you give a supplement just for its ascorbic acid content you are probably wasting your money

Carbohydrates (digestible energy)

Carbs are the primary source of energy.

Carbohydrates (digestible energy)

- Energy requirement is called "digestible energy" [DE]
- Amino Acids form proteins in the body - 11 essential must be fed, 20 in total - 14 needed for living horses
- Primary sources - Hay, Pasture
- Alfalfa hay (high as 20% when fresh)
- Orchard Grass
- Timothy Hay
- Most hays have 20% fibre, most insoluble - 10% starch and 10% protein
- Mixed hay best for most horses. From permanent pastures on good upland is best
- Cut from specially seeded pastures containing many mixed grasses and clovers.
- High Moisture Content
- A horse eats 15 to 2% body weight of forage per day
- Feed instead rather than whole oats
- Oats - Amount fed should relate to temperament of the horse and the capabilities of the rider. Oats can have an alarmingly exhilarating effect on some horses!
- Grain - Corn - Low salt and fibre. High starches, fats and sugars. Good heating feed with other grains or cubes for the winter. Very palatable. Can encourage shy feeders to eat.
- Maize

Protein [8% - 15%] (building material)

Energy requirement is called "digestible energy" [DE]

Protein [8% - 15%] (building material)

- Press and beans are very heating. Therefore should be fed in small quantities. Should only be given to horses in hard work or overwintering in severe conditions
- Feed min. 12% protein, raise for increased work
- Feed 40 - 50 grams Protein per 1 Mol of DE
- Variety of sources is best
- Supplement with Lysine (amino acid) if poor sources available
- Deficiency symptoms = dry skin, weak brittle hooves, lustered coat
- Flaxseed Meal - High Omega 3 and 6
- Good for putting a bloom on the haircoat
- Linseed oil - Fed as a jelly, (summer seeds in water overnight), mixed with bran and cereal. Use the water left from making the jelly to brew mash
- Saturated - Good for a horse that needs fattening. Two weeks to notice results. Solid at room temp.
- Unsaturated - Liquid at room temp. Preferred.
- Polyunsaturated - Liquid at room temp. Preferred.
- Trans fats very bad - eg hydrogenated.
- Omega 3 and 6 can be metabolised from omega 3
- Most important fatty acids - Linoleic Acid (Omega 3), Linolenic Acid (Omega 3)
- Deficiency symptoms = dry skin, weak brittle hooves, lustered coat
- 1 Ounce corn oil = 255 calories.
- Very palatable for Horses.
- Feed as 10% of diet increases the mucous to use free fatty acids, instead of glycogen. This is a stamina advantage.
- 2.25% more energy than Glufs or Protein
- Soluble in ether but not water.
- Burned temporarily as used to slower paced activities
- Too much fat blocks protein absorption, feed more protein with fat - min 12%
- Use fats to replace grain for less bulk but same energy, i.e. for endurance riding
- Easily digested but worst eat if too much in diet
- "Crude fat" or "Fiber Extract" = same thing.
- Major deposits of fat are under the skin, around the major organs (liver, heart, and in the abdominal cavity)
- Fat is called dietary stores. This stored as high energy in horses that triglyceride deposits as there are no fat in the adipose (storage) stores
- Too much fat affects heat loss from the body. This can seriously affect the metabolism in general
- Liver glycogen for general body use. Constant release of glucose into the bloodstream
- Muscle glycogen. Supplies glucose and energy for the muscle itself during contraction
- Liver fat glycogen. Triglyceride molecules.
- Glycogen is a Polysaccharide - linked glucose molecules.
- All living things produce energy from the compound ATP
- 12 steps, (first ten same as beer)
- 1 mol glucose breaks down to give: 2 mol lactic acid - causes cramp, 2 ATP products 4 ATP
- 1) Anaerobic - Fast but not very efficient. 1 mol glucose produces 36 mol ATP. Requires oxygen. Tires quickly. Slow and very efficient.
- 2) Aerobic - Requires oxygen. Tires quickly. Slow and very efficient.
- Glucose, Protein and fat used as fuel.
- ATP = H2O - enzyme -> ADP (adenosine di-phosphate) + P + energy
- Digestible Energy [DE] = energy in food minus energy left in dung
- Average daily requirement = 18000 calories (enough to fill 55 gallons of oil)
- Low energy may result in refusal to work
- Mares come into heat late if not enough energy, i.e. feed more hay and grain
- About 75% fat is stored
- All net muscle energy is derived from free fatty acids. As work increases muscle energy is derived more from fatty acids in a fit horse. As it gets fatter it uses less glucose to produce the same energy. Increased enzymes break down more fatty acids in a fit horse. Excess blood sugar is then turned into fat. Hence the need to change the diet as the fitness level of the horse changes.

Fat (Triglyceride molecules)

Energy

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Exotic Nutrients

Dimethyl Sulfoxide (Methylsulfonylmethane, MSM)

- Manufactured from DMSO (dimethyl sulfoxide), a byproduct of paper manufacture.
- Treat DMSO with hydrogen peroxide and you get MSM compound and water
- MSM is a methyl donor which means it gives a part in fat and energy metabolism.
- Excellent source of metabolic sulfur - worth feeding for this alone
- It is abundant in fresh green forages and mares milk. Also in coffee, tea, and beer.
- MSM has been used to help or cure epiphysitis, navicular disease, arthritis, laminitis, and dry brittle hooves
- pulmonary haemorrhage (bleeders syndrome), dull haircoat, and dry brittle hooves
- DMG has been called vit. B15, tetraemic acid, an additive and a drug
- It is a natural compound found in feeds and animal tissue
- DMG assists the process of aerobic respiration. It aids in the transport of oxygen across the cell to the mitochondria where energy reactions take place.
- By making oxygen more available for aerobic respiration it delays the build up of lactic acid in the muscles
- It is also a factor in breaking down the lactic acid in the muscles and blood - it reduces recovery times
- C. S. not a natural part of the equine diet. Occurring in some plants, they are bound to other compounds that inhibit digestion
- They are synthesised in the connective tissue by specialised cells called chondrocytes
- Dietary C. S. supplements are made from bovine cartilage, shark cartilage, and green lipped mussels
- These appear to be no vegetable based formulations available
- Connective tissue is comprised of three substances: water, collagen (proteins that are the basic building blocks of connective tissues) and the proteoglycans, which are long chains of glycosaminoglycans (GAGs) in a protein matrix
- Very large molecule - most likely that C. S. are completely broken down and re-assembled by the body
- 40% absorption but still fed to the body (re combination of constituent compounds within the joint)
- Among the GAGs, the most widely distributed in the body are chondroitin sulphates
- Precursor to chondroitin sulphates
- Smaller molecule than C.S., therefore can pass through digestive system more easily
- Probably most important building block of the glycosaminoglycans (GAGs)
- Found in abundance in synovial fluid in the joints, in chondroitin sulphates and is necessary for the production of collagen
- It is needed for manufacture of nearly every compound involved in joint growth and repair
- Chondrocytes (cells that make cartilage and chondroitin sulphates) determine how much cartilage they can make by how much glucosamine is available
- If choosing from the many supplements those that contain glucosamine hydrochloride (purer and more stable) are better than those made with glucosamine sulfate.
- Supplemental glucosamine may be mixed with zinc, manganese, ascorbic acid, of methionine, and bromelain
- All are factors in the joint repair process. You may be feeding them in other supplements already
- B. is a class of naturally occurring proteolytic enzymes extracted from pineapple stems
- Easily digested with no known side effects
- B. known to reduce pain and inflammation due to acute trauma (such as the pounding on a horses joints during competition)
- B. also known to reduce pre- and post-operative pain and inflammation
- Open in significant quantities more than 6 grains a day / 5 days before competition
- B. could be expected to reduce the severity of joint damage and increase the speed at which the joint recovers
- Check ingredients list on joint supplements. Is bromelain there? Why is it there? Is there more than 5g per day?
- These exotic nutrients are all either produced in the horses tissues or are in natural feedstuffs
- Chromium
- Silicon
- Fluorine
- Nickel
- Etc etc for several thousand chemicals and compounds
- Check at least every 6 - 12 months - preferably every two months
- Impaction colic can be due to worm teeth
- Slabbing and quidding are a sure sign of poor teeth
- No nerves in the horse tooth the humans, raising doesn't hurt, (but)
- Molars get sharpened by chewing (can take as little as six weeks)
- If jaws are over or under shot (parrot or pike mouthed) it is very difficult to bite off grass stems. Food can get ground up by molars.
- Make sure fibres are short if feeding roughage to horses with worn teeth. Possible impaction colic risk.
- Small Stomach - 2 to 3 gallons. Designed for small amounts of grass from grazing.
- Control Parasites - worm regularly. Change wormer seasonally - ask local vet
- 8 - 9 % digestion takes place in the stomach
- Duke of digestion takes place in the Small and Large Intestines
- Horses are hind gut fermenters
- Insoluble nutrients are broken down by enzymes produced by bacteria in large intestine (hind gut)
- Soluble nutrients are broken down by enzymes in small intestine
- Impaction materials cause colic can be seen in gut for YEARS! eg plastic, string etc
- Best pulp is an excellent substitute for all or part roughage needs in older horses. Soak thoroughly before feeding. (24hrs if in cold water)
- Dry hays re-hydrates in the gut = possible colic. Too much dry feed can kill
- Digestive upsets, some of which are fatal, are relatively common in the horse.
- Small amounts of food continually, 3/4 full always Golden Rule = Feed little and often
- Micro Flora and Micro Fauna in the gut need feeding constantly
- Grains are a small part of natural diet in the wild - wild horses eat mostly grass and some leaves
- Grains are only available at one time of year in the wild - a special treat even!
- Round the clock access to roughage is better than grain supplements
- Feed little of all dietary ingredients at each feed for balanced gut organisms
- Large intestine turns 180°
- A horse cannot produce saliva unless it is chewing. Sponging the mouth between every stages is advantageous
- Grind - very small horses can be given great when sponging the inside. But a double handful of commercial is a bucket and pour on boiling water. Stir well and feed when cool. It should be thin enough to drink easily.
- If a horse does ever regurgitate his food it is very ill indeed.

Teeth and Gut

Dental Health

Gut Health