A greater amount of the essential amino acid Lysine is needed by the young horse for growth than is available from micro-organisms in its intestinal tract and than is present in feeds. The most, and generally only, limiting amino acid in the growing horse’s diet is Lysine. Grains and grasses are Lysine-poor; the grains we feed to meet the energy needs of growing and working horses are particularly weak in Lysine. Proteins that require Lysine include the collagens and elastins that make up bone matrix, tendons, skin, and articular cartilage. The iron-carrying haemoglobin molecule needs Lysine in its unique structure. Myosin and other muscle proteins contain large amounts of Lysine. Even the keratin protein in hoof and hair requires Lysine. Without enough Lysine, the production of these and other proteins is restricted.

A deficiency in Lysine will ultimately lead to a reduced growth rate and feed deficiency.

**METHYL SULFONYLMETHANE (MSM)**

MSM is a bio-available, organic sulphur which is easily absorbed and usable in the body. Sulphur is needed as a constituent of several amino acids (Methionine, Cystine and Cysteine) and vitamins (Biotin and Thiamine), as well as a number of other body constituents (e.g., coenzyme A, Heparin, Insulin, Glutathione, Lipoic acid, Taurine, and Chondroitin Sulphate [a component of cartilage, bone, tendons, and blood vessels]). The concentration of sulphur-containing amino acids, and therefore sulphur is highest in hoof and hair, which contain the protein keratin, which in turn is 4% sulphur. Any processing of a foodstuff, even the drying of alfalfa, turns is 4% sulphur.

**CALPHORMIN**

Supplementing the mare in foal, mare with foal at foot and young horse’s diet with CALPHORMIN will help achieve optimum skeletal development and conformation.

CALPHORMIN is unique in that it contains a balanced combination of macro-minerals, trace minerals, amino acids along with the added benefit of Sodium Zeolite a bio-available silicon-containing compound.

It is every breeder’s concern whether their new born foal will develop into a top athlete, able to withstand the rigours of competition, given that an immature two-year-old may be expected to gallop at speeds up to 35 miles an hour on legs that are not yet fully developed.

The foundations for a horses future success can be laid down before he is even born. Ensuring the broodmare has the correct balance of macro-minerals, trace minerals, and amino acids to pass on to her new born, CALPHORMIN will give the young horse the best start he can get. Continuing to feed the young, rapidly growing horse CALPHORMIN will optimise his growth and bone development, in a correct and balanced way.

**The MACRO-MINERALS**

While Calcium and Phosphorus are necessary in numerous body functions including as a buffer for energy metabolism, blood coagulation, and temperature regulation, their principal utilisation in the body is in the development of bones and teeth. These minerals comprise 70% of the mineral content of the body, and from 30-50% of the minerals in milk. In addition 99% of the Calcium and in excess of 80% of the Phosphorus in the body are found in bones and teeth. Horses are more likely to suffer from a lack of Calcium and Phosphorus, than from a lack of any other mineral. The NRC has recommended levels for both minerals, but there are further studies that suggest higher levels still (15-20%) may be required for growing horses due to the fact that the amount necessary to maximise bone strength and ash content is different to that required to maximise growth rate. It also appears that the incidence of equine developmental orthopedic disease has been reported to be lower with higher dietary levels of Calcium and Phosphorus.

In the supplementation of these macro-minerals it is vital to ensure that sufficient levels are provided, but also that they are in the correct ratio to each other. If quantities of both Calcium and Phosphorus in the diet are adequate to meet the animals requirements the Ca:P ratio in the diet of the growing horse can vary from 0.6 : 1 to 3 : 1. CALPHORMIN contains the optimum ratio of 2.85 : 1. If there is excess Phosphorus it will bind Calcium, and prevent it’s absorption. This effect becomes detrimental the lower the Calcium content in the diet. Excess dietary Calcium by contrast has little effect on Phosphorus absorption, as in the horse Calcium is absorbed in the small intestine, while the majority of Phosphorus absorption occurs afterwards in the large intestine.

However the matter of primary importance is to ensure that there are sufficient amounts of both minerals in the diet to meet the animals requirements. If the amount of dietary
Calcium and Phosphorus is insufficient to meet the horses requirements, or if the amount of one mineral with respect to the other is outside of these ratios skeletal deformities may occur. The amount of Calcium and Phosphorus being provided in the horse’s daily diet can vary dramatically depending on the content of the feed, the proportion of roughage to concentrates, and indeed the type and quality of roughage provided. CALPHORMIN will ensure adequate and balanced levels of these minerals, thus ensuring optimum conditions for strong, healthy bone growth in the young athletic horse.

- Effects of Calcium & Phosphorus Deficiency

A diet with inadequate quantities of these macro-minerals can lead to bone demineralization. Once mobilised, they are replaced by fibrous connective tissue, which leads to osteodystrophy fibrosa. Fibrous deposition in the bone causes it to enlarge. Although all the skeletal system is affected, the effect is most noticeable in young horses in the growth plates of the legs and cervical vertebrae. Prior to an obvious bone enlargement, other clinical signs such as insidiously shifting of the leg, lameness and generalised bone and joint tenderness may occur. Epiphyses1 may occur in advanced cases in young horses. Fractures of long bones of the legs and compression fractures of the vertebrae may also occur. The daily supplementation of a horses diet with CALPHORMIN will ensure that even horses fed on mostly cereal grains, where the Phosphorus content is greater than the Calcium content by a factor of 3 to 4, will have sufficient levels of bio-available Calcium to re-establish a Ca:P ratio within an acceptable range.

THE TRACE-MINERALS

Copper is involved in bone collagen stabilisation, elastin synthesis and the mobilisation of body iron stores. Impairment of the first two functions may result in developmental orthopedic disease in young horses and in aorta or uterine artery rupture, particularly in aged parturient mares. Deficiencies can occur, especially with the metal minerals. The reason why there may be a Copper deficiency in a horse can either be traced back to the soil that the grass, hay or grain was grown on or some inhibitory substance that stops the uptake of Copper. A number of studies seem to indicate that increasing Copper intake for weanlings from 3 to 12 months of age may decrease the risk and occurrence of developmental orthopedic diseases (DOD). Inadequate Copper intake does not slow the foals growth rate; rapid growth continues but without adequate Copper for normal uptake of Copper. A number of studies seem to indicate that increasing Copper intake for weanlings from 3 to 12 months of age may decrease the risk and occurrence of developmental orthopedic diseases (DOD).

Manganese deficiency results in birth of weak young that may show incoordination or have leg deformities such as enlarged joints, knuckled-over pasterns, twisted forelimbs, and bones that are weak, thickened, well calcified, brittle and shortened, resulting in lameness, stiffness, joint pain, bowed legs, and a reluctance to move. Manganese toxicity does not appear to occur naturally in the horse, even with ingestion of large amounts over a long period of time.

SODIUM ZEOLITE

Sodium Zeolite is a bioavailable Silicon-containing compound. Sodium Zeolite enhances bone calcification, and is present in large quantities in connective tissue. Horses normally consume Silicon in their diet. The mineral is found in grains and soil, but is not in a form horses can readily absorb. CALPHORMIN contains Silicon in the form of Sodium Zeolite. Sodium Zeolite is broken down by stomach acid into monosilicic acid, the absorbable form of Silicon, which is absorbed directly through the stomach wall and the gastro-intestinal tract into the blood stream. Silicon is associated with collagen formation, the fibrous protein matrix which provides support for body structures such as cartilage and bones. Consequently optimum bone health depends upon Silicon as well as Calcium.

- Sodium Zeolite and Joints

Silicon is essential for the formation and maintenance of articular cartilage, as well as ensuring the integrity of joints and ligaments. Nutritional silicon deficiency in animals caused the development of small poorly formed joints and decreased articular cartilage content. To summarise silicon supplementation is essential for maintaining the strength and integrity of virtually every important tissue in the body: bones, joints, skin, capillaries, arteries and even brain tissue. Feeding Sodium Zeolite in the horse’s diet during growth is a safe and effective means of decreasing the risk of exertion-induced bone injury when training, and when racing begins at a very young age.

PROTEIN AND AMINO-ACIDS

The amount of protein needed in the diet depends on: (1) the amount of that diet consumed, (2) the digestibility of the protein in the diet, (3) the individual animal’s need for protein.

Restricting protein intake restricts growth rate in young horses. Weanlings should consume rations containing about 13% protein, yearlings should have 10-11% protein in their total diets, and two year old horses should receive 9-10% protein in their diets (depending on whether they are in training).

Different types of proteins consist of different combinations and numbers of amino acid. Both the amount of protein and its quality, or amino acid content, are important for growth. Amino acids serve as the “building blocks” of proteins. To make proteins for growth, development, and maintenance of tissues, the horse must have an adequate supply and balance of amino acids in the diet. Although there are twenty-two basic amino acids, only eight of them are considered to be essential. By “essential”, we mean that the body cannot make them; they must be supplied in the diet. The body can make the fourteen non-essential amino acids if it has adequate supplies of the essential eight. Therefore, even if one of the essential amino acids is deficient in the diet, the production of new proteins is cut short as well. High quality protein and the full complement of essential amino acids are present in CALPHORMIN.

LYSINE

The protein content of many horse diets is often low in Lysine. The National Research Council classifies Lysine “the first limiting amino acid” in the diet of growing foals. Inadequate protein or Lysine intake results in decreased growth and development of young animals.