THE USE OF NATURALLY CHELATED TRACE MINERALS AS AN AID TO IMPROVE AND PREVENT LAMINITIS AND FOUNDER, AND AS A SUPPLEMENT.

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Contents:

1) Title:

THE USE OF NATURALLY CHELATED TRACE MINERALS AS AN AID TO IMPROVE AND PREVENT LAMINITIS AND FOUNDER, AND AS A SUPLEMENT.

2) Objectives:

To develop a qualitative technique that could be used safely and inexpensively, as an aid in the prevention and treatment of laminitis.

3) Materials:

3.a- The type of mineral to be used for this trial is a naturally chelated form of montmorillonite, with a natural formula (Fig. #1) composed of 76 oligoelements, diluted gases and heavy metals.

FIGURE # 1

ALUMINUM	Al	9.3%	HYDROGEN	H	.05	RUTHENIUM	Ru	7.8
ANTIMONY	Sb	10.5	INDIUM	In	.38	SAMARIUM	Sa	3.5
ARSENIC	As	.2	IODINE	I	7	SCANDIUM	Sc	3.7
BARIUM	Ba	22.5	IRIDIUM	Ir	.51	SELENIUM	Se	4.1
BERYLLIUM	Be	.10	IRON	Fe	1.6%	SILICON	Si	25%
BISMUTH	Bi	14.3	LANTHANUM	La	18	SILVER	Ag	.3
BORON	Bo	7	LEAD	Pb	15	SODIUM	Na	1.2
BROMIDE	Br	5.2	LITHIUM	Li	1.44	STRONTIUM	St	240
CADMIUM	Cd	1.12	LUTETIUM	Lu	.45	SULFUR	S	1.6%
CALCIUM	Ca	.23%	MAGNESIUM	Mg	.83%	TANTALUM	Ta	.50
CARBON	C	.19	MANGANESE	Mn	150	TELLURIUM	Te	.1
CERIUM	Ce	40	MERCURY	Hg	.166	TERBIUM	Tb	.62
CESIUM	Cs	183	MOLYBDENUM	Mo	61	THALLIUM	Tl	10.0
CHLORIDE	Cl	250	NEODYMIUM	Ne	20	THORIUM	Th	>100
CHROMIUM	Cr	70	NICKEL	Ni	60	THULIUM	Tm	.25
COBALT	Co	4.8	NIOBIUM	Nb	2.89	TIN	Sn	.44
COPPER	Cu	2.2	NITROGEN	N	.03	TITANIUM	Ti	.23%
DYSPROSIUM	Dy	4.0	OXYGEN	O	.2	TUNGSTEN	W	8.1
ERBIUM	Er	2.0	PALLADIUM	Pa	.74	URANIUM	U	> 100
EUROPIUM	Eu	.49	PHOSPHATE	P	320	VANADIUM	V	8
FLUORIDE	Fl	3.85	PLATINUM	Pt	.08	YTTERBIUM	Yb	1.4
GALLIUM	Ga	25	POTASSIUM	K	4.8%	YTTRIUM	Y	1.2
GERMANIUM	Ge	25	PRASEODYMIUM	Pr	2.0	ZINC	Zn	20
GOLD	Au	.68	RHENIUM	Rh	1.0	ZIRCONIUM	Zr	10
HAFNIUM	Hf	2	RHODIUM	Ro	.44			
HOLMIUM	Ho	1.1	RUBIDIUM	Rb	36.5			

The silica composition averages 25%, which is one of the reasons why an abundant growth of dermal and connective tissues is expected. This chelated montmorillonite compound is also considered as a humic compound, but it originates from an ancient ocean seabed rock.

Because of the nature of soil on which the test will be conducted, the expectation is that the trace mineral availability in the forage and grain will be very low. The area in question, as in most other cases where horses are kept and bred in that country, is eroded and washed of the kind of minerals needed to provide an appropriate enzymatic pool formation. With this consideration in mind, the decision was made towards the use of a particular kind of supplement that would make available these important elements to the diet. This needed to be done without generating toxicity and providing a readily absorbable source of trace minerals, which would be easily carried through the walls of the last portion of the small intestines.

3.b- The quality of the food should be good to average and the protein content should average 10%. Only for foals the protein content could rise above 12%. In cases of acute laminitis the protein levels should be observed and reduced to 10% if it was higher.

3.c- The water used will be treated and filtered to almost human specifications.

3.d- Follow-up x-rays every 3 months or as needed. The machine to be used is a new portable unit, with a maximum 100 kV of intensity and a maximum of 35 milliamperes in wavelength, with gradual clock settings.

4) Method:

The Qualitative Method of analysis was chosen to test the use of this particular kind of material, since the quantities of absorbed, secreted and excreted elements would not be easily measured by the available technology in the area. A very low amount of traceable elements should be normally found in horses with a normal urinary function, after they have gone through the process of intestinal absorption. Furthermore, the availability of these in saliva, mucus, feces and sweat would be very difficult to measure. Most of the mineral ingested will combine with different molecules in the body, to intervene actively in the enzymatic cellular processes, leaving very small amounts of excretable substances.

Considering the eventual lack of these elements, the absorption of this compound would be observed externally in the overall condition of the supplemented population. The expected changes will include the visible change of coat, the increased growth of hoof tissue and the reduction of the toxicity level of different toxins inherent to the feed manufacturing.

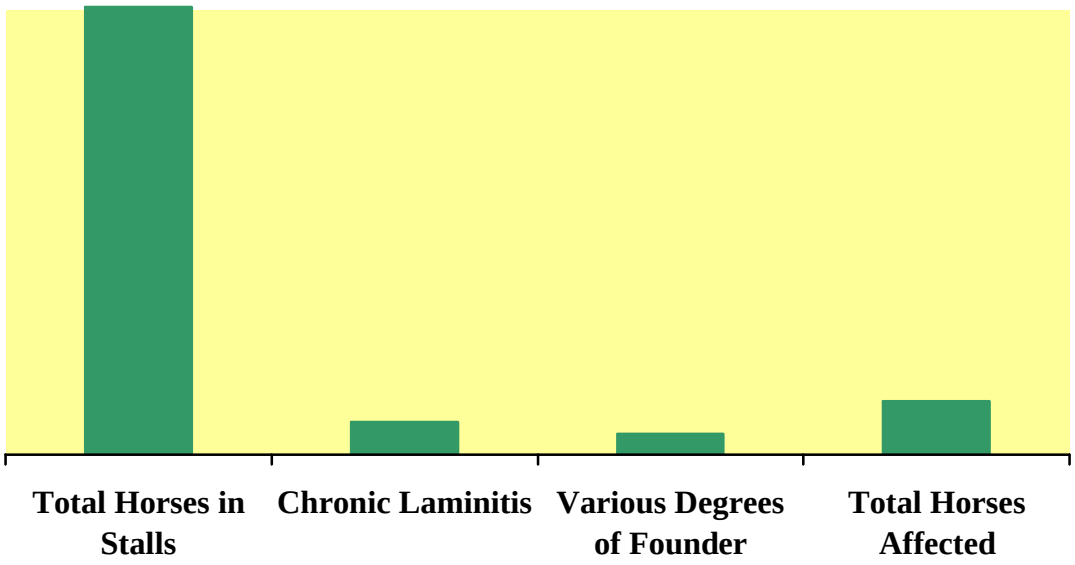
5) Location:

City: Cali.
Country: Colombia.
Average Annual Temperature: 20 degrees Centigrade
Elevation: 1,000 meters over sea level.
Climate Type: Tropical.

6) Population:

A total of 550 of the Paso Fino variety of horses are involved in this test. The average weight of the adult horses is 350 kg. A total of 150 of them are stalled. Eighteen of these (18) are laminitic or foundered. **(Chart # 1)**

Chart #1
Population with Founder or Chronic Laminitis compared to total



6.a - The stallion population is fairly high since most horses are not gelded until adults, or not gelded at all. Within these, most of them are in riding condition. Even those that are not housed in stalls are ridden occasionally. From a population of 281 males, 56 are 4 years old or older. Ten of them are considered foundation sires and the rest are riding prospects. The rest are 3 years old and under, with different levels of ground or saddle training. Within a population of 150 stalled horses, 72 are males.

6.b - The mare population is slightly lower. Most of them are in riding condition, although the older ones are not used for that purpose. From a

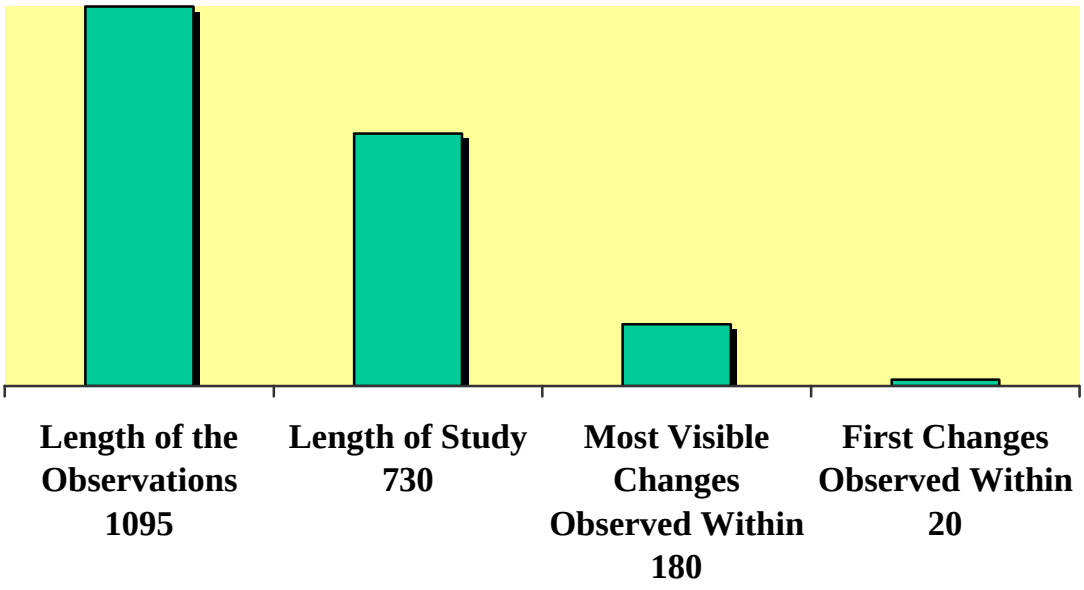
population of 269 females, 53 are 4 years old and older. From these, 35 are considered foundation mares. The rest of them are 3 years old and under,

with different levels of ground and saddle training. Within a population of 150 stalled horses, 78 are females.

7) Length of study and dates:

The proposed length of this study is 24 months. Another 12 months will be used for further observations, to confirm findings or to analyze regressions**. (Chart # 2)**

Chart #2
Time Variables in Days.



The dates chosen for the test are as follows: from May 23rd of 1994 to May 23rd 1996. Another 12 month will be used for follow-up observations.

The population of stalled horses will be analyzed every 30 days, coinciding with the shoeing schedule. The laminitic and foundered horses will be trimmed or shod every 3 weeks, or as needed. The rest of the adult to 3 years old population will be trimmed every 6 to 8 weeks. The remaining 2 years old and under population will be trimmed every 90 days, since they are loose in different pastures and they almost self-trim.

8) Dosage:

Several ways of supplementing for this trial are proposed.

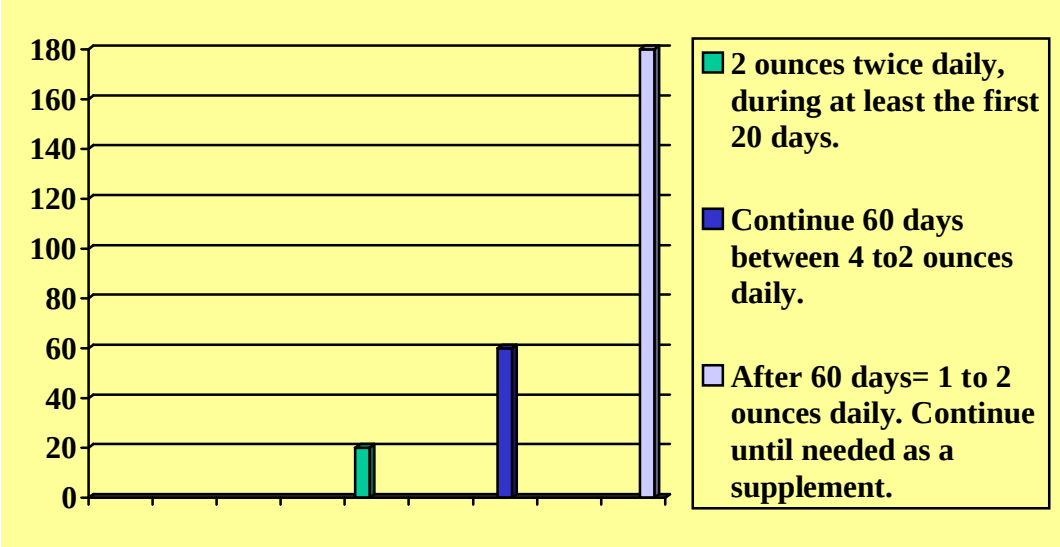
8.a- The first is an amount of 2 ounces of trace minerals, twice daily, mixed with the food / per horse. This dose is intended for animals in a stage of founder, chronic or acute laminitis.

8.b- The second is an amount of one ounce, once daily mixed with the food / per horse. This dose is intended for horses that have gone through the first stage of treatment and are stabilized, or for supplementing for a suspected lack of nutrients, or with the intention to absorb possible toxins in the diet.

8.c- The third is mixing the mineral compound with the grain, at a ratio of 3% of the total mix. This dose would be similar to the administered in point 8.b. After mixing, the total average amount of grain administered to the horses should be less than 1,000 grams per meal; or a total of 30 grams average of minerals, prepared for one meal. A second meal would be given, without the minerals in it. The grain preparation would be complemented with the forage.

8.d- The fourth is free choice. In previous tests, this method has been used to pre-qualify the proposed treatment. The results gave a previous idea of what to look for on a directed test situation. The amounts consumed per individual are impossible to appreciate. Therefore a correlation between dose and effect is not achieved. See **(Chart #3)**

Chart #3
Dosage



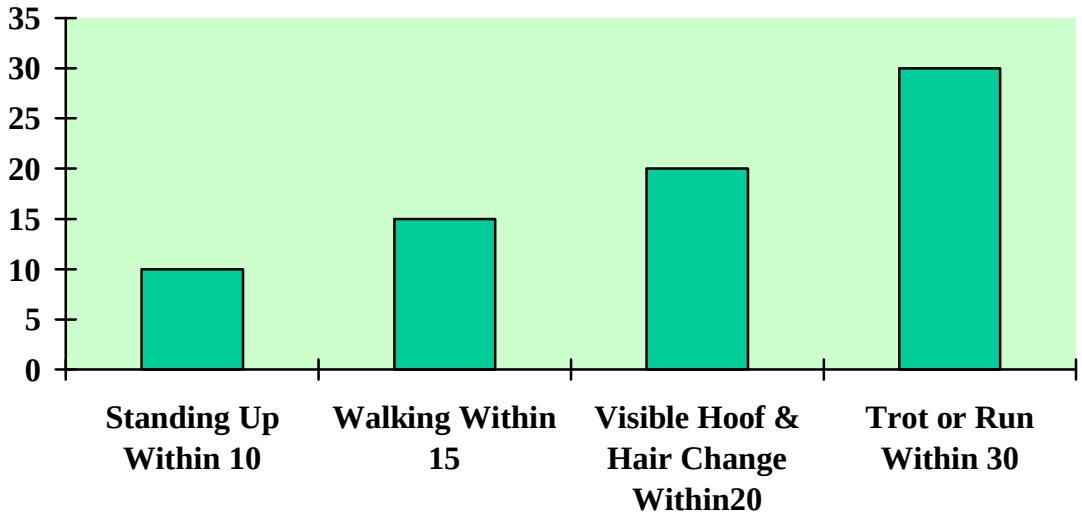
9) Observations:

After the onset of the treatment, the visible signs and changes can be divided in many categories:

9.a- Changes observed within an approximate time frame.

9.aa- Between day 1st to day 10th of the treatment. **(Chart # 4)**

Chart #4
Visible Changes in Days



During the first few days after the supplement is started, no visible change is observed. A gradual reduction of the arterial digital pulse is observed, although it is not uncommon to have some residual abnormal digital pulse even after sixty days of onset. However, horses in lateral decubitus began to stand up after the 5thday. Of the 3 horses in that condition, one stood up at day 6th. The other two stood up between days 10 and 11. The digital pulse was abnormal and the caudal artery pressure ranged still above 140 mm/mercury. They could not walk almost at all. But they were standing. The horses that were not in the previous condition began to walk a few steps within this first ten days. Two horses did not walk at all.

9.ab- Between day 11th to day 20th.

Of the 18 laminitic and foundered horses of this trial, two remained without walking during this period. The condition and posture changed dramatically, allowing weight bearing on the front limbs on the other sixteen horses. The hair has started to shed in all of them.

9.ac- Between day 21st to day 30th.

Most of the horses are walking normally. Some are trotting and some are running in sprints, showing lameness after the exercise. But the overall condition is good. The two horses that were not recovering in the previous

period are beginning to show some signs of relief. Still lame but walking short steps.

The hair has mostly fallen in all of them and has been replaced by a new, short and shiny type. The hydration level of the skin looks normal. The hoof growth has increased noticeably, to the point of generating a wide environmental line in every one of them. In some cases the measurement of this growth reached ¼ inch. Comparing with other horses in the study, the ones that suffered laminitis or founder were the ones to grow the slowest of the whole group.

9.ad- After day 31st.

Every lame horse is ranging between acceptable to normal, except the two cases that are still showing lameness, but are still walking. It is curious to reflect on the fact that they are brother and sister, from the same sire.

The arterial caudal pressure has dropped to normal ranges, although some horses with normal pressure values are still limping occasionally. These are 5 horses of the laminitic group.

There is a noticeable weight gain. The general aspect of the horses is very good. Even in the case of the two that are still lame.

The hoof growth has continued to occur. There is a large amount of corneal material produced at the sole region. The environmental line has advanced an average of 5/8 of an inch, in some cases, up to almost 7/8 of an inch. The new growth seems to be elastic, hard, but not scaly, when compared with the results obtained with biotin and methionine.

9.b- Changes observed consistently or randomly, several months after the onset of the treatment.

After 60 days of treatment there is an overall improvement. Except for those two horses that were still lame at the previous stage, the rest are walking normally, running, but still not ridden. The sound horses began some riding exercises after the 90th day, but the results of this show that 7 horses returned with various degrees of lameness, that disappeared after the exercise was stopped. These went to a breeding status only. The other group with 9 horses was ridden successfully, although only 4 of them returned to the show ring.

The quality of the hoof growth was maintained throughout the trials. In some cases measurements of up to 1 and 1¼ inch of growth within a six weeks period were observed. However, this was not the norm. The condition of the horses was very good and so were the hydration levels. As the trial approached the 6th month, some changes appeared with regards to the amount of the overall intake. The horses started to leave food in their feeders, coinciding with an apparent reduction in the amount of feces. Portions of the

forage administered on drought conditions, with lignified mature taluses were digested to the point of reducing considerably the expected volume of excrements.

Within the next six months, it became apparent that the horses had dropped their overall intake approximately by 20%. This occurred approximately within one year of the onset of the treatment, with visible changes after the first six months. The general condition and weight was maintained at the same level that it had when the intake was 20 % higher.
The stress condition of the herd was good, in spite of the proximity of the stallions to the mares.

The 35 mares that composed the Embryo Transfer Program seemed to be cycling regularly, even at the times of the year when it would be expected to have asynchronisms.

9.c- Regressions after the supplement was suspended within a short period of treatment.

Several horses that were supplemented with the mineral but did not participate in the trial had a visible improvement while receiving consistently the recommended dose. When the owners considered that the horse was out of danger, the supplement was suspended. In a matter of 48 to 72 hours, the symptoms would recur. When this happened, the horse in question would be re-treated with its last known dose, which would return the signs to where they were before stopping the treatment, in a matter of days.

9.d- Correlation with other pathologies.

9.da. Although the results did not appear to overly change the condition of the foals, when the 2 years old and older group started to be ridden, less x-ray damage was observed at the tarsal joints when they reached the 3 years of age. This is critical within this particular breed that requires early bending exercises and collection for the early competitions.

9.db. Other changes that were not expected appeared when a routine X-ray run of the laminitic horses was performed. The appearance of the previously depleted Coffin bone seemed to present more radio- opacity in several of them. This finding could have been altered due to electrical changes at the time, but the Min- X-Ray device used was new and the x-ray parameters were from a patron chart used from the beginning of the trial.

9.dc. The decrease in findings concerning exosthosis and bucked-shins was also observed. Although no specific study was conducted to that effect, the incidence of periostitis observed declined.

9.de. The improvement of the digestive processes was noticeable. Within the region where this trial was conducted, there are several toxins that affect the preparation of the grain feed.

One of them is the aflatoxin from funguses of the genus Aspergillum, which has a tolerance of 20 parts per billion (ppb) when the grain is analyzed to manufacture horse-feed. Toxic levels are considered when the count rises above the level of 20 ppb on grain that is analyzed even before it is cut, to give the purchasing company an idea of whether they should be bought and cut, or not. Some of the most reputable feed companies, such as Purina, offered advice through their Technical Support Veterinarians; who acknowledged to us that in those tropical regions, the quantities of aflatoxins found in the fields before cutting averaged above the 40 ppb. Furthermore, that in some instances they were forced to cut for grain, with chemical analysis of aflatoxins of over 60 ppb, since nothing less could be found. Considering that the laminitic condition is thought to have an endotoxic origin as one of its causes, there seems to be a correlation between the administration of these minerals, and the reduced appearance of laminitis and founder after the treatment was commenced. No new cases of founder with associated rotation of the Coffin bone were observed. Two cases of laminitis associated with severe colic were observed, post-surgery. No rotation of the Coffin bone occurred.

Other toxins found in slightly fermented feed are the nitrates and nitrites. These cause the production of skin rushes and hives. After a few days, the appearance of pustules is noticed.

It coincides also with the presence of green taluses in the food that were treated with fertilizers, of the kind of the urea, for speeding up the growth process. If the green undeveloped taluses are used, the intoxication occurs. When mature taluses are used, the problem seems to disappear. Due to drought conditions, the use of green, fertilized, undeveloped taluses was common.

Before the trial began, this condition was frequent. After the first six months, these cases became very unusual.

10) Conclusions:

Apparently, the added presence in the diet of a factor with absorbing and enzymatic capabilities did show some visible results.

10.a- The laminitic condition was visibly reduced. Although there was not a cure for the symptoms, a visible improvement occurred.

10.b- The laminitic condition seems to have been prevented, since no new cases appeared, with the exemption of 2 surgical cases of colic, with post-surgical laminar compromise. These did not rotate the Coffin bone. No new cases of presumably food-derived intoxication with laminar compromise occur.

10.c- The presence of these minerals seems to have reduced the intake of grain of the herd, an average of 20%. This was confirmed by subtracting the amounts of feed bought every month and comparing with previous months. Also by weighing the leftover grain from the feeders.

10.d- The growth of the hoof material was increased noticeably in speed and in condition. Some areas where the average laminitic horse lacks growth, such as the sole region, were benefited by the supplement. An average of 30 days between shoeing showed very good growth ratios. Approximately 1 centimeter could be taken in depth, at the sole area that adjoins the Coffin bone.

10.e- The general condition of the horses was improved. The hair changed in a matter of 20 days, replaced by a new, shorter and stronger type. The coat looks shiny and the condition of weight is preserved, even when high quality foods are not available.

10.f- The mares improved and sustained their biological cycles, even through periods of time when they would otherwise be asynchronic.

10.g- The stress level was under control over the period of time that the test took place.

10.h- Some evidence was found that supports the theory that the trace mineral formula promotes and replenishes bone density.

10.i- Fewer damages to some critical joints and the periosteal areas were observed, specifically in metacarpal bones.

10.j- A correlation between the absence of endotoxic signs and the administration of these minerals was observed, in spite of confirmed high levels of aflatoxins in the diet.

11) Discussion:

At the end of the test, some conclusions were inevitable:

1) The fact that this mineral formula stimulates the growth of the hoof material increasing its speed and condition;

2) The fact that the laminitis condition improves drastically after a few days of administering the formula;

3) The fact that during the period no new cases of rotation of the Coffin bone appeared and the distinct possibility that these minerals prevent to some degree the intoxication with aflatoxins present in the grain.

These findings, although based on qualitative direct observations, re-affirmed the validity of the original postulates.

Some important data concerning the elimination levels of these minerals was not achieved, leaving room for speculation as to what the action, pathways and via of absorption and elimination and its quantities might be. Nevertheless, the qualitative character of the study makes us conclude that there is a definite effect of these naturally chelated trace minerals over specific areas of the horse's body.

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