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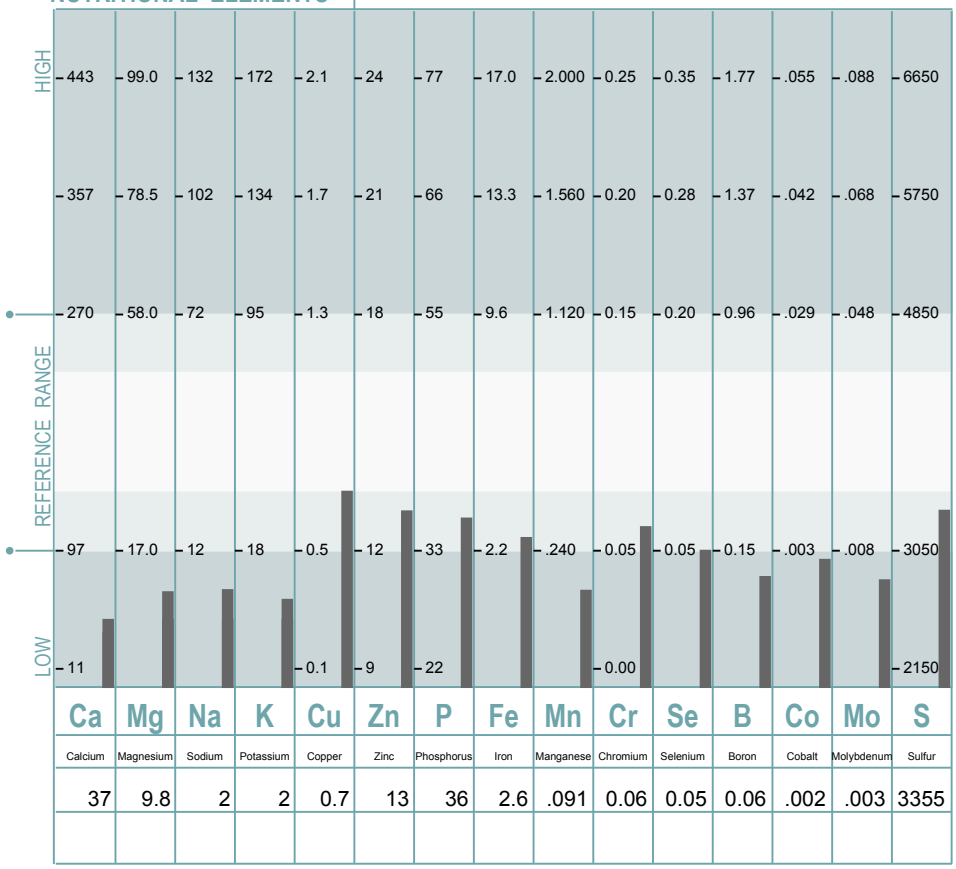
| | |
|---|---|
| LABORATORY NO.: | 999999 |
| PROFILE NO.: | 16 |

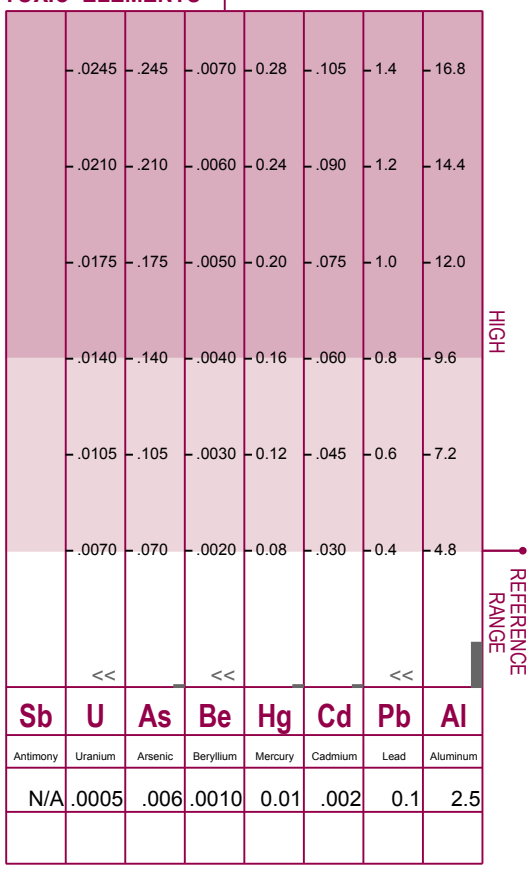
| | | | |
|---|---|---|---|
| EQUINE JERRY | AGE: 11 | SEX: GELD | |
| REQUESTED BY: XXXXXXXXXXXX | ACCOUNT NO.: 2216 | DATE: 15/01/2018 | |

## NUTRITIONAL ELEMENTS



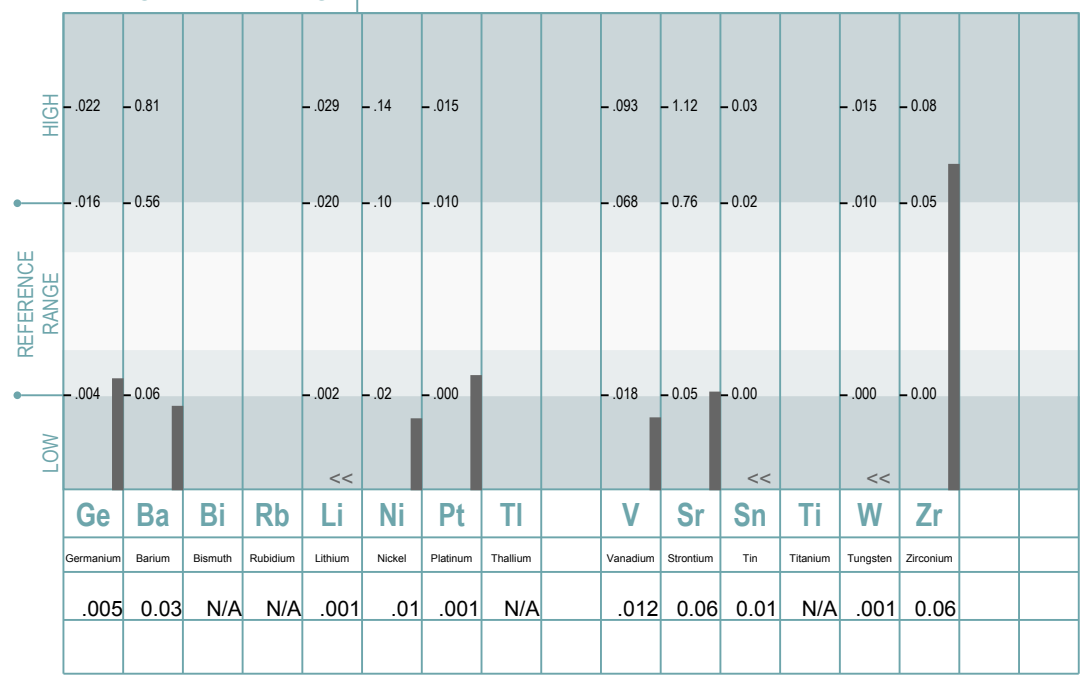

| Ca | Mg | Na | K | Cu | Zn | P | Fe | Mn | Cr | Se | B | Co | Mo | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calcium | Magnesium | Sodium | Potassium | Copper | Zinc | Phosphorus | Iron | Manganese | Chromium | Selenium | Boron | Cobalt | Molybdenum | Sulfur |
| 443 | 99.0 | 132 | 172 | 2.1 | 24 | 77 | 17.0 | 2.000 | 0.25 | 0.35 | 1.77 | .055 | .088 | 6650 |
| 357 | 78.5 | 102 | 134 | 1.7 | 21 | 66 | 13.3 | 1.560 | 0.20 | 0.28 | 1.37 | .042 | .068 | 5750 |
| 270 | 58.0 | 72 | 95 | 1.3 | 18 | 55 | 9.6 | 1.120 | 0.15 | 0.20 | 0.96 | .029 | .048 | 4850 |
| 97 | 17.0 | 12 | 18 | 0.5 | 12 | 33 | 2.2 | .240 | 0.05 | 0.05 | 0.15 | .003 | .008 | 3050 |
| 11 | | | | 0.1 | 9 | 22 | | | 0.00 | | | | | 2150 |
| 37 | 9.8 | 2 | 2 | 0.7 | 13 | 36 | 2.6 | .091 | 0.06 | 0.05 | 0.06 | .002 | .003 | 3355 |

## TOXIC ELEMENTS




| Sb | U | As | Be | Hg | Cd | Pb | Al |
|---|---|---|---|---|---|---|---|
| Antimony | Uranium | Arsenic | Beryllium | Mercury | Cadmium | Lead | Aluminum |
| .0245 | .245 | .0070 | 0.28 | .105 | 1.4 | 16.8 |
| .0210 | .210 | .0060 | 0.24 | .090 | 1.2 | 14.4 |
| .0175 | .175 | .0050 | 0.20 | .075 | 1.0 | 12.0 |
| .0140 | .140 | .0040 | 0.16 | .060 | 0.8 | 9.6 |
| .0105 | .105 | .0030 | 0.12 | .045 | 0.6 | 7.2 |
| .0070 | .070 | .0020 | 0.08 | .030 | 0.4 | 4.8 |
| << | | << | | | << | |
| N/A | .0005 | .006 | .0010 | 0.01 | .002 | 0.1 | 2.5 |

## ADDITIONAL ELEMENTS




| Ge | Ba | Bi | Rb | Li | Ni | Pt | Tl | | V | Sr | Sn | Ti | W | Zr | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Germanium | Barium | Bismuth | Rubidium | Lithium | Nickel | Platinum | Thallium | | Vanadium | Strontium | Tin | Titanium | Tungsten | Zirconium | | |
| .022 | 0.81 | | | .029 | .14 | .015 | | | .093 | 1.12 | 0.03 | | .015 | 0.08 | | |
| .016 | 0.56 | | | .020 | .10 | .010 | | | .068 | 0.76 | 0.02 | | .010 | 0.05 | | |
| .004 | 0.06 | | | .002 | .02 | .000 | | | .018 | 0.05 | 0.00 | | .000 | 0.00 | | |
| | | | | << | | | | | | | << | | << | | | |
| .005 | 0.03 | N/A | N/A | .001 | .01 | .001 | N/A | | .012 | 0.06 | 0.01 | N/A | .001 | 0.06 | | |

"<<": Below Calibration Limit; Value Given Is Calibration Limit

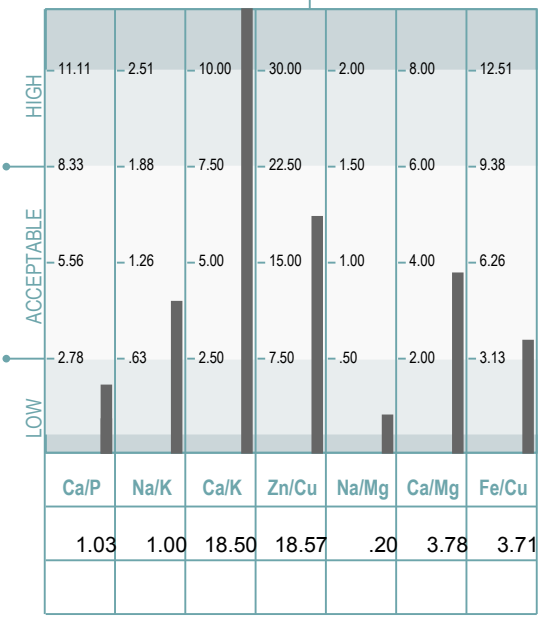
"QNS": Sample Size Was Inadequate For Analysis.

"N/A": Currently Not Available

Laboratory Analysis Provided by Trace Elements, Inc. an H. H. S. Licensed Clinical Laboratory. No. 45 D0481787

15/01/2018
CURRENT TEST RESULTS

## SIGNIFICANT RATIOS




| Ca/P | Na/K | Ca/K | Zn/Cu | Na/Mg | Ca/Mg | Fe/Cu |
|---|---|---|---|---|---|---|
| 1.03 | 1.00 | 18.50 | 18.57 | .20 | 3.78 | 3.71 |

## TOXIC RATIOS


| Ca/Pb | Fe/Pb | Fe/Hg | Se/Hg | Zn/Cd | Zn/Hg | S/Hg | S/Cd | S/Pb |
|---|---|---|---|---|---|---|---|---|
| 370.0 | 26.0 | 260.0 | 5.0 | 6500.0 | 1300.0 | 335500 | 1677500 | 33550 |

## ADDITIONAL RATIOS

| RATIO | CALCULATED VALUE | | OPTIMUM |
|---|---|---|---|
| | Current | Previous | |
| Ca/Sr | 616.67 | | N/A |
| Cr/V | 5.00 | | N/A |
| Cu/Mo | 233.33 | | N/A |
| Fe/Co | 1300.00 | | N/A |
| K/Co | 1000.00 | | N/A |
| K/Li | 2000.00 | | N/A |
| Mg/B | 163.33 | | N/A |
| S/Cu | 4792.86 | | N/A |
| Se/Tl | 100.00 | | N/A |
| Se/Sn | 5.00 | | N/A |
| Zn/Sn | 1300.00 | | N/A |

### LEVELS

All mineral levels are reported in milligrams percent (milligrams per one-hundred grams of hair). One milligram percent (mg%) is equal to ten parts per million (ppm).

### NUTRIENT MINERALS

Extensively studied, the nutrient minerals have been well defined and are considered essential for many biological functions. They play key roles in such metabolic processes as muscular activity, endocrine function, reproduction, skeletal integrity and overall development.

### TOXIC MINERALS

The toxic minerals or "heavy metals" are well-known for their interference upon normal biochemical function. They are commonly found in the environment and therefore are present to some degree, in all biological systems. However, these metals clearly pose a concern for toxicity when accumulation occurs to excess.

### ADDITIONAL MINERALS

These minerals are considered as possibly essential. Additional studies are being conducted to better define their requirements and amounts needed.

### RATIOS

A calculated comparison of two minerals to each other is called a ratio. To calculate a ratio value, the first mineral level is divided by the second mineral level.
EXAMPLE: A sodium (Na) test level of 24 mg% divided by a potassium (K) level of 10 mg% equals a Na/K ratio of 2.4 to 1.

### SIGNIFICANT RATIOS

If the synergistic relationship (or ratio) between certain minerals is disturbed, studies show that normal biological functions and metabolic activity can be adversely affected. Even at extremely low concentrations, the synergistic and/or antagonistic relationships between minerals still exist, which can indirectly affect metabolism.

### TOXIC RATIOS

It is important to note that animals with elevated toxic levels may not always exhibit clinical symptoms associated with those particular toxic minerals. However, research has shown that toxic minerals can also produce an antagonistic effect on various essential minerals eventually leading to disturbances in their metabolic utilization.

### ADDITIONAL RATIOS

These ratios are being reported solely for the purpose of gathering research data. This information will then be used to assist in evaluating their impact upon health.

### REFERENCE RANGES

Generally, reference ranges should be considered as guidelines for comparison with the reported test values. These reference ranges have been statistically established from studying a population of "healthy" animals.
Important Note: The reference ranges should not be considered as absolute limits for determining deficiency, toxicity or acceptance.

NAME: JERRY,

## I N T R O D U C T I O N

Hair is formed from a cluster of matrix cells that make up the follicle. During the growth phase of the hair, metabolic activity is greatly increased, exposing the hair to the internal metabolic environment; extracellular fluids, circulating blood and lymph. As the hair reaches the surface, its outer layers harden, locking in the metabolic products accumulated during this period of hair formation, providing a permanent record of metabolic activity. (TRACE SUBSTANCES IN ENVIRONMENTAL HEALTH VIII. Edited by D. Hemphill. Proceedings of the University of Missouri, June 1974)

Determining the levels of the elements in the hair is a highly sophisticated analytical technique: when performed to exacting standards and interpreted correctly, it may be used as a screening aid for mineral deficiencies, excesses, and/or biochemical imbalances. Tissue mineral analysis (TMA) provides the veterinarian and trainer with a sensitive indicator of the long term effects of diet, stress, and toxic metal exposure.

Most deficiencies in animals are brought about by altered relationships of minerals within the body. It has become evident that either the retention or loss of minerals by the animal is equally important as the nutrients consumed from the feed itself. Both appearance and performance can be greatly influenced by adequate tissue levels of essential nutrients due to their effect upon cellular function. Minerals are necessary for several important functions in the growing and mature horse, such as, formation of structural components, enzymatic co-factors, and energy transfer. They are also used in the production of hormones, vitamins and amino acids.

Tissue mineral testing can aid in measuring mineral retention; it may also help to determine which supplements and feeds are required and more importantly, what is not required in order to avoid nutritionally-induced deficiencies or imbalances.

THE TEST RESULTS AND THE REPORT THAT FOLLOWS ARE NOT INTENDED TO BE AND SHOULD NOT BE CONSTRUED AS DIAGNOSTIC IN NATURE, BUT ARE RESEARCH TOOLS FOR THE DEVELOPMENT OF NUTRITIONAL INFORMATION IN ANIMALS. THE INFORMATION GIVEN BELOW IS ONLY INTENDED TO COMPLEMENT CLINICAL OBSERVATIONS AND THUS FACILITATE TREATMENT TO RESTORE OR TO MAINTAIN GOOD APPEARANCE AND HEALTH. THIS ANALYSIS IS NOT INTENDED TO REPLACE VETERINARIAN COUNSEL.

## METABOLIC TYPE

Neuro-endocrine activity affects mineral absorption, retention, and excretion; therefore, tissue mineral patterns reveal certain biochemical characteristics, which are termed metabolic types.

### FAST METABOLISM

This horse is regarded as having an increased metabolic rate based upon the current mineral patterns as determined in the hair. Increased sympathetic neurological activity, however, does not necessarily translate into high or optimum performance unless there is a synchronization of the endocrine glands. (See Endocrine and Performance Index's)

### CHARACTERISTICS OF FAST METABOLIC TYPES

Generally speaking, a horse with a fast metabolic rate is high spirited and suited to athletic performance. However, if the metabolic rate is too excessive, the energy may be rapidly dissipated due to a nervous or high-strung nature. An excessive loss of energy can in turn result in energy swings and therefore poor long-term energy production and performance.

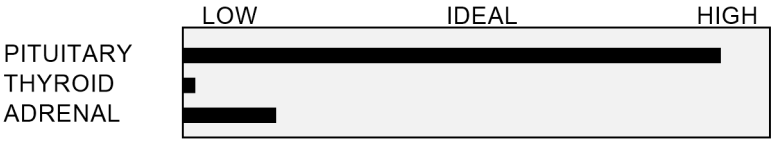
## ENDOCRINE AND PERFORMANCE INDEXES

** ENDOCRINE INDEX **

The endocrine index is a graphic presentation of the pituitary-adrenal-thyroid relationship, or axis (P.A.T.). These endocrine glands influence energy production on a cellular level and ultimately the performance of the horse. Ideally, there should be a balance within the P.A.T. They need not be at the ideal range as this range is used only as a reference point. However, they should be balanced above, below or at the "ideal" point. A major deviation between the P.A.T. axis can adversely affect the health of the horse. In the performance horse, a major deviation will particularly affect speed and/or stamina.

NOTE:

A "balanced" P.A.T. would appear on the following index with all three bar graphs extending the same length to the right. Ideally, all three would extend to the mid-way point, but as mentioned previously, a balance anywhere within the box is acceptable.



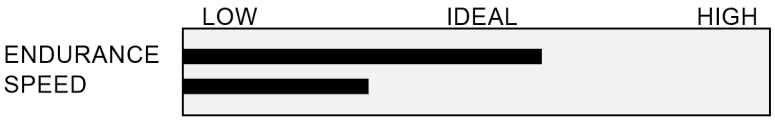

HYPOTHYROID ACTIVITY AND LOW ENERGY PRODUCTION

The thyroid gland influences energy production on a cellular level, resulting in sustained energy release. The current TMA pattern of the horse is indicative of low thyroid activity, which may adversely effect performance over long distances or for long duration.

ADRENAL GLANDS EVALUATION

The adrenal glands produce a number of vital hormones responsible for quick energy production. An insufficiency of adrenal hormone production may result in slow starts for a performance horse and lethargy and fatigue in a non-performance horse.

** PERFORMANCE INDEX **
The following performance index (P.I.) graphically displays the relationship of the energy producing glands on speed and endurance.




PERFORMANCE EVALUATION

The performance index reveals the domination of the thyroid gland over the adrenal gland. This is indicative of the tendency toward good endurance over long distances.

## NUTRITIONAL MINERALS

LOW TISSUE CALCIUM LEVEL

The tissue calcium level is markedly depressed. The following factors may contribute to calcium deficiency:

- Low Calcium Intake
- Toxic Metal Accumulation
- High Sodium Intake
- High Potassium Intake
- Increased Sympathetic Neuro-Endocrine Activity
- Vitamin D Deficiency
- Excessive Vitamin A
- High Phosphorus Intake

CALCIUM TO PHOSPHORUS (Ca/P) RATIO

Both calcium and phosphorus along with other minerals combine to form the major constituents of bone salts necessary for the maintenance of the skeleton and teeth. A prolonged reduction in calcium retention relative to phosphorus (see low Ca/P ratio) can eventually lead to the skeletal depletion of mineral salts, resulting in weakness of the legs, increased susceptibility to fractures, weakening of the tooth enamel, and enlargement of the facial bones.

FACTORS CONTRIBUTING TO A LOW CALCIUM-TO-PHOSPHORUS (Ca/P) RATIO

Several factors should be evaluated that can contribute to excessive phosphorus retention relative to calcium. The most obvious are feeds high in phosphorus and low in calcium. These include:

| | |
|---|---|
| Wheat Bran | Cottonseed Meal |
| Sunflower Meal | Wheat Middlings |
| Linseed | Torula Yeast |
| Soybean Meal | Corn (Yellow) |
| Safflower Meal | Feather Meal |
| Peanut Meal | Rice Bran |
| Barley | Oats |
| Brewers Yeast | Milo |
| Brewers Grains | |

If significantly high in the diet, the above feed source should be temporarily reduced. Meanwhile, high calcium to low phosphorus feed and/or extra calcium supplementation should be added at this time.

THE FOLLOWING FEEDS MAY BE INCREASED AT THIS TIME

The following list of feeds have a high percentage of calcium relative to phosphorus and which may be increased until the tissue calcium-to-phosphorus ratio has been improved.

| FEED | Ca:P RATIO |
|---|---|
| Limestone | 1000:1 |
| Oystershell | 500:1 |
| Citrus Pulp | 15:1 |
| Cane (dried) | 9:1 |
| Birdsfoot Hay (sun cured) | 8:1 |
| Beet Pulp | 8:1 |
| Clover, Crimson (sun cured) | 7:1 |
| Alfalfa Meal | 6:1 |
| Red Clover | 6:1 |
| Red Clover Hay (sun cured) | 6:1 |
| Straw, Barley | 5:1 |
| Clover, Alsike (sun cured) | 5:1 |
| Clover, Ladino Hay (sun cured) | 5:1 |
| Lespedeaz Hay (sun cured) | 5:1 |
| Sugarcane Molasses | 4:1 |
| Soybean Hay (sun cured) | 4:1 |
| Corn Cobs (ground) | 3:1 |

Note:
The mineral content of feeds will vary depending upon different soil conditions. Therefore, this list should only be used as a reference guide.

PICA AND CALCIUM/PHOSPHORUS IMBALANCE

A disturbance in the calcium-to-phosphorus ratio can lead to cribbing and pica, i.e., chewing of bones, wood, etc., which is reduced when the calcium-to-phosphorus ratio improves.

METABOLIC FACTORS THAT CAN CONTRIBUTE TO LOW CALCIUM RETENTION

The following metabolic factors that may be evaluated can contribute to decreased calcium retention:

| | |
|---|---|
| Stress (Increased Workload) | Parathyroid Disturbance |
| Vitamin D Deficiency | Excessive Thyroid Activity |
| Excessive Adrenal Activity | Excessive Vitamin A |
| Toxic Metal Accumulation | Poor Absorption |
| Anti-inflammatory Steroids | |

LOW TISSUE CALCIUM AND MAGNESIUM

Magnesium levels will usually fluctuate in sync with calcium. A deficiency of both calcium and magnesium is indicative of an increased metabolic rate via an increase in sympathetic neuro-endocrine activity. Most competitive horses will have reduced levels of the sedative minerals, calcium and magnesium. However, a significant reduction due to a lack of intake and\or increased excretion can contribute to excessive nervousness or a high-strung nature leading to counterproductive performance.

PROTEIN AND SODIUM DEFICIENCY

Sodium deficiency is known to reduce the utilization of protein and will adversely affect energy efficiency. Low sodium is associated with fatigue, rough coat, emaciation, decreased growth rate, poor milk production, and cribbing.

LOW TISSUE SODIUM RELATIVE TO MAGNESIUM (Na/Mg)

Magnesium has a sedative or suppressing effect upon the central nervous system (CNS), especially when sodium levels are low. High magnesium levels relative to sodium (see low Na/Mg ratio) can result in decreased performance, fatigue, and lethargy.

MANGANESE (Mn)

Manganese is required for carbohydrate and lipid (fat) metabolism as well as skeletal development, formation, and reproduction. Little is known of the effects of manganese deficiency in the horse. Studies have shown that in other species, tissue levels are affected by intake. Therefore, a low tissue manganese may indicate that adequate manganese in the ration should be maintained.

COBALT (Co)

The cobalt level is below the established reference range for this essential trace element. Cobalt is an integral part of Vitamin B12 and it activates a number of enzymes within the body. Reduced levels can occur due to decreased dietary intake, poor absorption, infections, some medications, and parasites. Increased bacterial colonization of the small intestine tends to inhibit cobalt absorption. Cobalt absorption can also be diminished by high iron intake. A deficiency of cobalt may be responsible for the symptoms of pernicious anemia and a slow rate of growth.

MOLYBDENUM (Mo)

The molybdenum level is below the established reference range for this element. Although this mineral is known to activate some enzymes and is involved in purine metabolism and iron utilization through the enzyme, xanthine oxidase, very little is known about molybdenum deficiency. However, deficiency is known to increase the incidence of dental caries. It should be noted that dietary requirements for molybdenum have not yet been established in horses.

VANADIUM (V)

Vanadium is an essential element in lower life forms and recent research suggests it may be essential in humans as well. Vanadium is widely available in the food supply, where refining and processing appears to further increase its content. The vanadium level is below the established reference range for this element. However, deficiency signs and conditions have not yet been documented in the equine. Therefore, at this time, clinical significance cannot be placed on a low vanadium level.

NOTE:
The first step in reducing toxic metal accumulation is to isolate and remove the source. Environmental assessment of chemicals presently being used and testing of the feeds and water supply are suggested.

## CONCLUSION

This report provides a unique insight into the horse's nutritional biochemistry. The recommendations contained within are specifically designed according to individual metabolic type and current mineral status. Additional recommendations may be

based upon other supporting clinical data as determined by the attending veterinarian or trainer.

OBJECTIVE OF THE PROGRAM

The purpose of this program is to re-establish a normal balance of body chemistry through individually designed diet and supplement suggestions, enhancing the horse's ability to utilize the nutrients efficiently and resulting in improved energy production and health.

WHAT TO EXPECT DURING THE PROGRAM

The mobilization and elimination of toxic metals may cause temporary discomfort. This can be expected until removal of the excess metal is complete. Temporary modification of the program can aid in reducing the discomfort associated with the mobilization of the metals.

15/01/2018

Name: JERRY,

| RECOMMENDATION | AM | NOON | PM |
|---|---|---|---|
| SYM-PACK | 5 | 0 | 0 |
| CALCIUM PLUS | 5 | 0 | 5 |
| COPPER PLUS | 3 | 0 | 3 |
| VITAMIN E PLUS | 5 | 0 | 4 |
| | 0 | 0 | 0 |

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THESE RECOMMENDATIONS MAY NOT INCLUDE MINERALS WHICH APPEAR BELOW THE IDEAL OR IN TURN MAY RECOMMEND MINERALS WHICH APPEAR ABOVE THE IDEAL ON THE TMA GRAPH. THIS IS NOT AN OVERSIGHT. SPECIFIC MINERALS WILL INTERACT WITH OTHER MINERALS TO RAISE OR LOWER TISSUE MINERAL LEVELS, AND THIS PROGRAM IS DESIGNED TO BALANCE THE HORSE'S MINERAL LEVELS THROUGH THESE INTERACTIONS.

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THESE RECOMMENDATIONS SHOULD NOT BE TAKEN OVER A PROLONGED PERIOD OF TIME WITHOUT OBTAINING A RE-EVALUATION. THIS IS NECESSARY IN ORDER TO MONITOR PROGRESS AND MAKE THE NECESSARY CHANGES IN THE RECOMMENDATIONS AS REQUIRED.

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