TECHNICAL REPORT for VETERINARIAN USE ONLY
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RxVitamins for Pets™ Formulator and Clinical Consultant

VBS Amino B+K

FORMULA SUMMARY:

1) Nutritional support for dogs and cats that require additional oral potassium supplementation, either showing clinical or sub-clinical symptoms.

2) Nutritional support for those dogs and cats that have the need for additional and B-Vitamin, water-soluble amino acids.

3) Use as a palatable vehicle to ease the administration of other medications or herbal formulas when they are dissolved in the Amino B + K Liquid.

4) Use on in-appetent or anorexic dogs and cats to improve appetite and to supply essential B-vitamins and amino acids for improved vitality.

INGREDIENT LIST:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount per 2 ml:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium (potassium gluconate)</td>
<td>468 mg</td>
</tr>
<tr>
<td>Proprietary Amino Acid Blend (includes: lysine, methionine, phenylalanine,</td>
<td>6.67 mg</td>
</tr>
<tr>
<td>taurine, threonine, arginine, leucine, isoleucine, valine, glutamine &amp; histidine)</td>
<td></td>
</tr>
<tr>
<td>Pantothenic Acid (calcium pantothenate)</td>
<td>5 mg.</td>
</tr>
<tr>
<td>Niacinamide.</td>
<td>5 mg</td>
</tr>
<tr>
<td>Spirulina</td>
<td>3.34 mg.</td>
</tr>
<tr>
<td>Vitamin B-1 (thiamine HCl)</td>
<td>1 mg.</td>
</tr>
<tr>
<td>Vitamin B-2 (riboflavin 5-phosphate).</td>
<td>1 mg.</td>
</tr>
<tr>
<td>Vitamin B-6 (pyridoxine HCl)</td>
<td>1 mg.</td>
</tr>
<tr>
<td>Vitamin B-12 (cyanocobalamin)</td>
<td>2 mcg</td>
</tr>
<tr>
<td>Elemental Iron</td>
<td>70 mcg.</td>
</tr>
</tbody>
</table>
INGREDIENTS INFORMATION:

A) **Potassium gluconate**

Each ml providing 1mEq/ml or 234mg of K⁺ source of ionic potassium in this formula.

B) **Amino Acids:**

The amino acids provided in this formula are considered to be essential amino acids for cats and dogs, especially taurine in the domestic cat species.

The amino acids are building blocks for protein molecules, which include enzymes, structural proteins, and chemical messengers for intra and inter-cellular communications; amino acids are valuable both for the part they contribute to protein formation in the body. As free-form of individual amino acid compounds, they have been found to serve a wide variety of biochemical functions within the body. The listing below is a summary of some of the more important functions of the amino acids included in this formulation.

This formula provides a variety of important amino acids in small but significant amounts, which can benefit the patient’s free amino acid pool, thus contributing to positive protein metabolism during periods when the immune system, kidneys or liver metabolism may be compromised, or loss of amino acids is increased as in chronic renal failure.

a) **L-glutamine**

Promotes protein anabolism; is a conditional essential amino acid depending on the health status of the animal. Promotes inter-cellular hydration, improves wound healing and tissue repair, benefits hepatocytes, macrophages, T and B lymphocytes, pancreatic exocrine cells, renal tubular cells, fibrocytes, and myocytes, and is a building block for glutathione, the most important antioxidant.

b) **L-arginine**

Improves immune response to bacteria, viruses and neoplastic cells; promotes wound healing and regeneration of the liver; assists in release of growth hormone; valuable for optimal muscle growth and tissue repair.

c) **L-threonine**

Constituent of collagen, elastin and enamel protein; helps to prevent fat build-up in the liver; helps with digestive function; assists metabolism and assimilation.

d) **L-lysine**

Insures adequate absorption of calcium; helps form collagen; aids in the production of antibodies, hormones and enzymes; effective in the treatment of herpesvirus infections by inhibiting viral growth; deficiency may result in tiredness,
inability to concentrate, irritability, bloodshot eyes, retarded growth, hair loss, anaemia and reproductive problems.

e) **L-methionine**
Dietary source of sulphur which contributes to healthy hair, skin and nails; reduces liver fat and protects the kidneys; a natural chelating agent for heavy metals; regulates the formation of ammonia and helps to acidify the urine; promotes hair growth.

f) **L-phenylalanine**
Used by the brain to produce norepinephrine; contributes to awareness and alertness; reduces hunger pains; functions as an antidepressant; helps improve memory. Precursor to endorphin production; has been used concurrently with acupuncture for improved pain management.

g) **L-taurine**
It stabilizes the excitability of neuronal membranes that raise the seizure threshold. Taurine combines with sulphur, which are co-factors involved in the control of many biochemical changes involved with aging; helps in the excretion of free radical species. It is essential for cats in their diet, and conditional for dogs.

h) **L-leucine**
Biochemical components involved in the production of energy and brain function. Branch chain amino acid (BCAA), BCAA’s enhance protein synthesis in liver and muscle cells, help to restore liver function and are the preferred amino acids in cases of hepatic encephalopathy.

i) **L-isoleucine**
Same as for leucine.

j) **L-valine**
Promotes muscle coordination and emotional balance.

k) **L-histidine**
Prevalent in large amount in haemoglobin; used in the treatment of rheumatoid arthritis, allergic diseases, ulcers and anaemia; deficiency can cause hearing difficulties.

C) **B-Vitamins:**
i) **Pantothenic acid (B5)**
   Vitamin B5 is utilized in the manufacture of coenzyme A (CoA) and Acyl-Carrier protein (ACP) of which both are compounds that have essential roles in the utilization of fats and carbohydrates for energy production. Cats and dogs with pantothenic acid deficiency will have fatty livers and demonstrate poor appetites, and weight loss. (Baker, 1986)

ii) **Pyridoxine HCL (B6)**
   The active forms of this vitamin are involved primarily in amino acid metabolism. It is also involved in the utilization of glycogen stores and the metabolism of lipids. Vitamin B6 plays an important role in the multiplication of all cells, with particular benefit to mucous membranes, skin, red blood cells and the immune system. (Hand, 2000)

iii) **Niacinamide (B3)**
   Vitamin B3 is a water-soluble vitamin required by all living cells. Niacin is the common name for both nicotinic acid and niacinamide which is also called nicotinamide. Niacin is a major constituent of the coenzymes NAD (nicotinamide adenine dinucleotide) and NADP (nicotinamide adenine dinucleotide phosphate), which are involved in over 50 different metabolic reactions. Niacin-containing enzymes provide an important function in energy production and release. Niacinamide also possesses antioxidant properties.

iv) **Thiamine HCL (B1)**
   Found in highest concentrations in liver, heart and kidneys. Thiamin is enzymatically involved in the oxidative and non-oxidative decarboxylation of alpha ketoacids, as well as trans-ketolation reactions. A non-enzymatic function is also ascribed to thiamin. Thiamin triphosphate concentrates in neurons and it is believed to affect chloride permeability in these cells. All of the B vitamins, including thiamine are essential for the liver to perform its multitude of metabolic functions. Supplementation with the B-vitamins is recommended in general for small animal patients with hepatobiliary diseases. (Hand, 2000).

v) **Cyanocobalamin (B12)**
   First extracted from liver tissue in 1948, vitamin B12 was found to be the extrinsic factor of food that treats pernicious anaemia. Since then, Vitamin B12 has also been found to be essential for the normal functioning of all cells, but especially those of the gastrointestinal system, bone marrow and nervous tissue. With methionine, folic acid and choline, cobalamin participates in the transfer of methyl-groups during the synthesis of the nucleic acids, purines and pyrimidine intermediate species. (Mahan, 1996).

D) **Spirulina**
A spiral-shaped blue-green algae, spirulina contains over 60 diverse nutrients, such as vitamins, minerals, essential amino acids, chlorophyll, enzymes and antioxidants, including carotenoids and phycocyanin, B vitamins (B1, B2, B12), the omega 6 fatty acid GLA, and iron.

**E) Liver fractions, aqueous**

Excellent source of B-vitamins, minerals (elemental iron), antioxidants such as SOD (superoxide dismutase). Provides exceptional palatability for this formula.

**RECOMMENDED DOSAGE:**

2 ml (2mEq/468mg K+) per 4.5 kg of body weight twice daily

Adjust dosage based upon the degree of potassium depletion as measured by serum potassium determination. It is recommended to provide oral potassium supplementation that targets the median of the range of published normal values for serum potassium.

**Feline normal Potassium range**

3.4 – 5.6mEq/L (mmol/L)

**Canine normal Potassium range**

3.4 – 5.4mEq/L (mmol/L)

*Patients where the serum potassium is low normal or just below normal limits, it is safe to use the low end of the dosage scale (2ml/4.5kg of body weight/day) for extended periods of time.*

When this formula is being used to supplement measurable serum potassium deficits, dosage adjustments need to be applied according to the degree of patient serum potassium depletion. Serial serum potassium determinations must be performed to assess degree of potassium repletion. Dosage adjustments are made accordingly.

Caution should be exercised when using this formula in patients diagnosed with the following conditions where high serum potassium levels may be encountered:

- Acute, anuric or very advanced renal diseases
- Hypo-adrenocorticism
- Acute dehydration
- Obstructive uropathy

**AMINO B+K USAGE:**
1. **HYPOKALEMIA** (potassium depletion) of any origin.

   Difficult to diagnose hypokalemia in subclinical stages. Signs are subtle, not obvious (1% of total body stores of potassium are reflected in serum potassium measurements. The bulk of potassium is found in the intracellular fluid.

   **Weight loss**
   **Anaemia**
   **Poor hair coat**
   **Listlessness**
   **Generalized muscle weakness (hypokalemic polymyopathy)**

2. **CHRONIC RENAL DISEASE**

   Leads to potassium depletion secondary to increased potassium urinary losses in older cats with diminished renal capacity. Potassium depletion is exacerbated by urinary struvite acidifiers. Hypokalemia and mild metabolic acidosis from dietary urinary acidifiers can increase rate of progression of renal disease. Taurine depletion has been found in cats with concurrent potassium depletion and renal disease.

3. **OTHER CHRONIC DISEASES LEADING TO POTASSIUM DEPLETION**

   A 1989 study of 500 hospitalized cats at Colorado State University Veterinary Teaching Hospital found 186 (37%) who were Hypokalemic (Dow, 1989). This same study found associations with hypokalemia and the following diseases ranked in order of frequency of occurrence after chronic renal failure.

   - **Liver disease**
   - **Insulin-dependent diabetes mellitus**
   - **Diuretic usage (except for potassium-sparing diuretics)**
   - **Feline Lower Urinary Tract Disease (FLUTD)**
   - **Cardiac disease**
   - **Systemic infectious diseases**

**AMINO B+K SUPPLEMENTATION IN CONJUNCTION WITH MEDICATIONS:**
1. **Proactive/Preventative Supplementation:**

When patient serum potassium is low normal or below the range of normal values, supplementation with dietary sources of potassium, such as is found in fresh vegetables, fruits (bananas) and nuts (cashews) or by the use of the Amino B +K formula may help to prevent diseases associated with hypokalemia. (Hand, 2000)

2. **Disease Management Supplementation:**

In patients with frank clinical disease and concurrent low normal or below normal serum potassium levels, supplementation with additional dietary sources of potassium, such as this Amino B+K formula is absolutely recommended. (Dow, 1990) (Dow, 1992)

**REFERENCES:**


