# COMPARISON OF THE BIO-AVAILABILITY OF COMBINATION VITAMIN AND MINERAL SUPPLEMENTS

## Background

Vitamins and minerals are required for animal and human health. One of the most critical periods for vitamin and mineral nutrition is from birth to adulthood during the time of rapid growth. A deficiency of vitamins and minerals can lead to a slowing of growth, ill health and ultimately, death.

In this study, two different vitamin and mineral combinations are compared in a rat growth assay. Equal amounts of the two combinations are given to weanling rats depleted of body vitamin and mineral stores. The growth of the rats is used as a measure of the relative availability of the supplements.

## Protocol

Sixteen weanling rats were divided into two groups of equal average weight. The One a Day (USP Isolate) group weighed 47.3 ± 3.8 grams and the FoodMatrix™ group weighed 47.1 ± 4.0 grams. All animals were individually housed. Each group was depleted of body vitamins and mineral stores by feeding diet containing no vitamins and minerals (Bio-Serv, Inc.) for a period of two weeks. Then the rats were repleted by feeding the same diet to which has been added either 10 USP Isolate Vitamin and Mineral tablets/kilogram of diet or 60 grams of FoodMatrix™ and Mineral Mix/kilogram of diet. The two supplements contained equal quantities of vitamins and minerals and the composition is listed below.

## Vitamin And Mineral Composition

| Component | Amount / kg food | Recommended Amount / kg food |
|---|---|---|
| Vitamin A | 50,000 I.U. | 4,000 I.U. |
| Vitamin E | 300 I. U. | 300 I.U. |
| Vitamin C | 600 mg | - - - |
| Folic Acid | 4 mg | 1 mg |
| Thiamine | 15 mg | 4 mg |
| Riboflavin | 17 mg | 3 mg |
| Niacin | 200 mg | 20 mg |
| $B_6$ | 20 mg | 6 mg |
| $B_{12}$ | 60 ug | 50 ug |
| Vitamin D | 4000 I.U. | 1,000 I.U. |
| Panthothenic Acid | 100 mg | 8 mg |
| | | |
| Iron | 180 mg | 35 mg |
| Calcium | 1000 mg | 5000 mg |
| Phosphorus | 1000 mg | 4000 mg |
| Iodine | 1500 mg | 35 ug |
| Magnesium | 1000 mg | 400 mg |
| Copper | 20 mg | 5 mg |
| Zinc | 150 mg | 12 mg |

The recommended amount is taken from the “Nutrient Requirements for Laboratory Animals” published by the National Academy of Sciences in 1978. It is the amount recommended for optimum growth. As can be seen from the list, the diet provides more than the minimum amount of most vitamins and minerals. It, however, does not provide sufficient amounts of calcium and phosphorous. It contains only the recommended amount of Vitamin E.

The two groups of animals were pair-fed to insure that the amount of food eaten by both groups was the same. This means that differences in weight between the two groups was not due to differences in the amounts of food consumed. The animals were weighed weekly during the study.

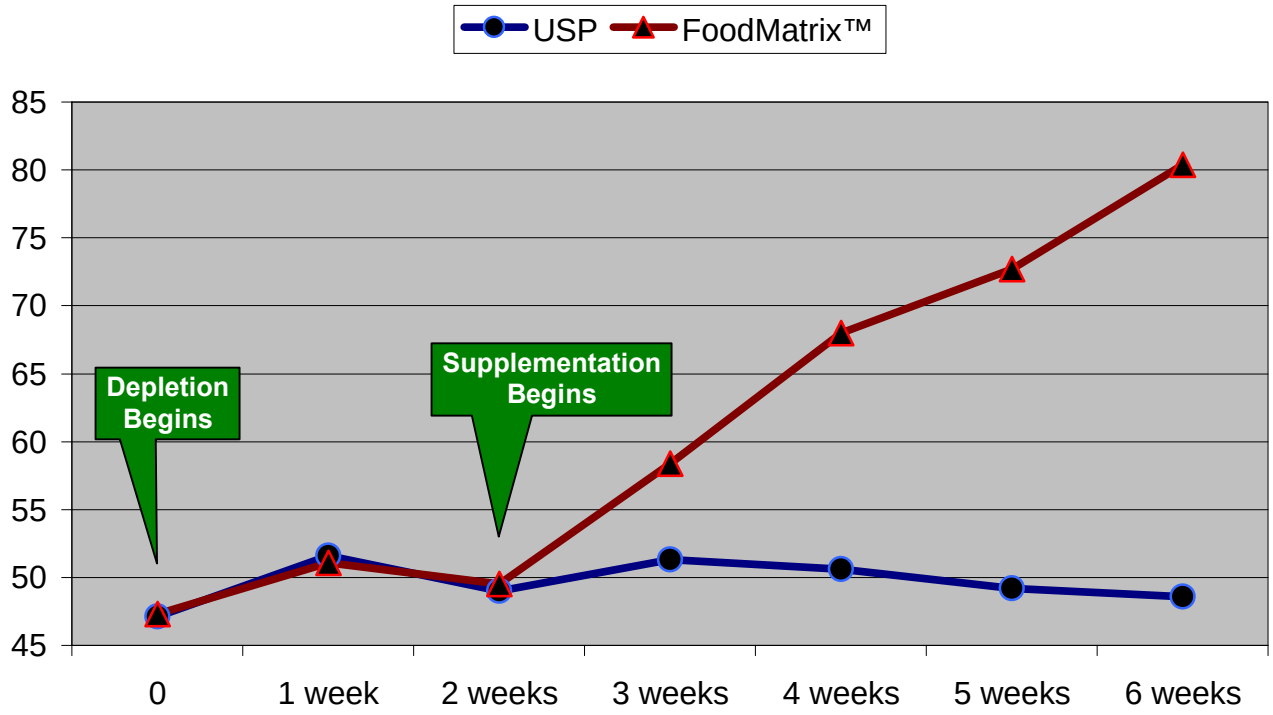
The results of the study are shown below.

**Average Weights**

| Group | 0 | 1 week | 2weeks | 3weeks | 4 weeks | 5 weeks | 6 weeks |
|---|---|---|---|---|---|---|---|
| USP Isolate | 47.1 | 51.6 | 49.0 | 51.3 | 50.6 | 49.2 | 48.6 |
| FoodMatrix™ | 47.3 | 51.1 | 49.5 | 58.4 | 68.0 | 72.7 | 80.4 |

The average weight of the two groups before the study was the same. The first two weeks were the depletion period and in both groups after two weeks there was only a slight weight gain relative to time zero. At the time of two weeks, the two groups were supplemented with equal amounts of vitamin and minerals and the FoodMatrix™ group began to record gains in weight indicative of repletion of body stores of vitamins and minerals. The USP Isolate group continued to maintain a constant weight indicating both stores of vitamins and minerals were not being repleted. At the end of three weeks, one of the USP Isolate group died and a second rat died at the end of four weeks. A plot of the results is shown in the accompanying graph.

**Time of Vitamin and Mineral Supplementation VS Average Weight Gain of Rats.**




Another difference in the two groups was their appearance and general health. The eyes of the USP Isolate group were almost closed by the end of five weeks. Their hair was fine and sparse. One of the USP Isolate animals had scratched one of his eyes out. The USP Isolate group was very sluggish in movements as compared to the FoodMatrix™ group.

These results indicate that the vitamins and minerals in the FoodMatrix™ product are much more available to the growing rat than the vitamins and minerals in the USP Isolate product.

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