

## Adding supplements for optimum health

# Cellular Nutrition - Orthomolecular Medicine

By Sy Guth

### Preventing diseases

Most people would agree that preventing a disease from occurring is better than trying to treat a disease after it occurs. There are some basics in dog nutrition that may be of interest to those who believe in preventative health for their dogs.

The main focus of this article is to show the importance of vitamins and minerals in the dog's diet. It will touch on some areas that seem to be problem areas for dogs these days – allergies and skin problems; autoimmune deficiency; reproduction system; and cancer and tumours. We will look at these areas in view of which vitamins, minerals, and trace elements may have an effect in preventing these issues. We will also look at how supplements act as team members. Because of the large scope of the subject, this article is only meant to be an introduction to the subject and inspiration for those who are interested in this area of canine nutrition to carry on learning through their own research and study.

This article does not address treatment of these issues. For those who are interested in using supplements to treat these conditions and others, I would refer you to the book reference at the end of the article - Dr Belfield and Stone - *How To Have A Healthier Dog, The Benefits of Vitamins and Minerals for Your Dog's Life Cycles*, Dr Belfield cured hundreds of cases of diseases using supplements, sometimes alone, sometimes in conjunction with conventional veterinarian medicines and many of his clinical notes are in the book. Any treatment of disease should be used under the supervision of veterinarian care.

Dr Belfield's years of experience recommending supplements to his clients were summarised by him as "stronger immune systems, increased interferon, better quality collagen. More effective detoxification of cancer-causing chemicals. More tumor protection for your animals. These are the results of a solid vitamin and mineral maintenance programme."

### Early pioneers of orthomolecular medicine

The earliest pioneer in this field has to be Dr Fredrick Klenner, a doctor on the east coast of the USA who practiced medicine between 1940s and 1970s. In the late 40s when the polio virus was running wild in the USA, Klenner cured 60 out of 60 cases of polio using high doses of intravenous ascorbic acid (vitamin C). He presented his clinical notes at a conference of doctors during this time. His speech was totally ignored – not one word or even the acknowledgment of his presence at the conference was noted by any other doctor at the time. Dr Belfield, in his book provides his thoughts on why he thinks Dr Klenner's research and clinical notes have been ignored -- "Over the years a scattering of doctors have used Klenner's big doses (intravenous vitamin C) with success, but the medical profession as a body has not followed his promising example. The reasons are rooted in the drug, surgery, and crisis orientation of modern medicine and a parallel disregard for nutritional and preventive medicine."

Adelle Davis -- world renown nutritionist, studied at Purdue University, UC Berkeley, Columbia University, and UC at LA and held a Master of Science degree in biochemistry from the University of Southern California Medical School. Throughout her working career, she worked with physicians and hospitals as a consulting nutritionist. After planning individual diets for more than 20,000 people suffering from almost every known disease, she gave up consulting work to devote her time to her family, writing, and lecturing. She wrote four best-selling books on nutrition during the 1950s to 1970s.

Adelle Davis, along with several other nutritionists and biochemists of her time, including Dr Linus Pauling, were making important discoveries in the field of what Dr Pauling termed -- orthomolecular medicine. Dr Wendell Belfield, noting what was being done in the human arena to cure all types of diseases using orthomolecular

medicine, became an early veterinarian to use this science. He defines *orthomolecular medicine* as "right molecules in the right amounts". The idea is to provide optimal amounts of substances that are normally present in the body to achieve optimal health conditions or to treat disease. Vitamins and minerals are such substances. Drugs, obviously, are not. They are not found in the body.

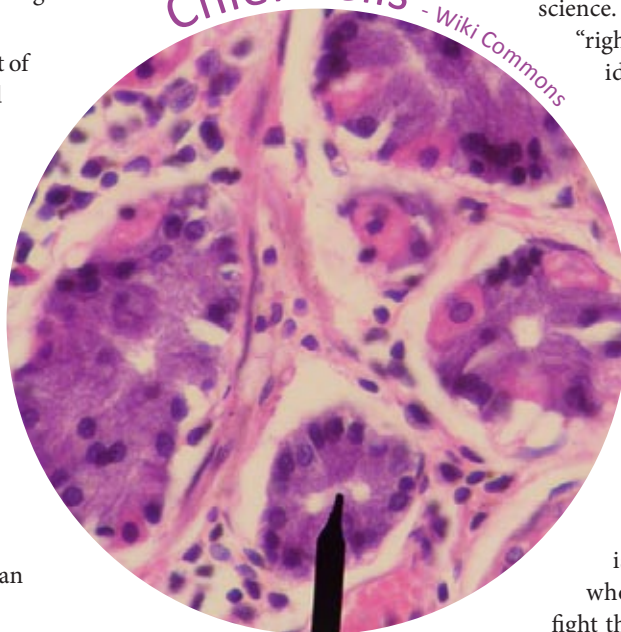
"Orthomolecular medicine provides these natural substances in the form of vitamin and mineral supplementation. The whole body is treated -- and benefits -- in this way. All systems are strengthened, revitalized. An optimal level of health is achieved. If disease is present, the whole body is bolstered and fortified to fight the disorder and get on with the process of healing."

A company formed in the 1950s was the Neo-Life company, suppliers of natural processed supplements for humans. After a merger some years ago, they became known as GNLD and continue to process supplements without using chemicals -- only using all natural ingredients. Their Scientific Advisory Board is composed of leading worldwide scientists and nutritionists. Their focus is looking at nutrition from a cellular level as a way of providing humans with optimum health benefits. Recognising that vitamins and minerals are team players, they formulated their supplements to work within the body as they would from eating the natural foods themselves.

Back on the veterinarian front, in Washington State, the late Dr Charles Kruger, in looking for a way to prevent a disease he named, Toxic Gut Syndrome, that was killing German Shepherd show dogs back in the 1980s, along with a team of scientists and vets developed a supplement, known today as Dr Kruger Supplements, to proactively prevent this killer bacteria from claiming the lives of German Shepherds. What he discovered was that it not only stopped the death of German Shepherds, but had very positive effects on many ailments that dogs were suffering from when brought into his vet clinic.

These were the early pioneers in orthomolecular medicine -- a

Chief Cells - Wiki Commons



science that aims to attain optimum health in both humans and animals to prevent disease from occurring.

### Use of supplements for pets

Not infrequently I hear dog owners cautioned against adding supplements to their dog's food. Normally this is in the context of a warning not to disturb the balance of the "complete dog foods". For the most part, commercial dog foods contain enough nutrients to keep a dog alive and maintain their condition. This is different from maintaining a dog in optimum health.

I can see a danger in pet owners adding an imbalance of supplements if they do not understand the biological effects of what they are doing. For example one pet owner talking to another – the first has read one of the many books on dog nutrition and taken on board to add kelp to the dog's diet. The book gave the safe amount to be added as per body weight. But in the casual conversation that pursues afterward, the first dog owner merely states that adding kelp to her dog's food was beneficial. The second dog owner, not realising that an over dose of kelp can have negative effects, thinks that if some is good, more must be better. This is the danger in supplementing using individual vitamin, mineral and trace elements without understanding their effects and proper dosage.

Throughout Dr Belfield's book he advises to use a good, well balanced, dog supplement that contains all the vitamins, minerals, and trace elements intended for the canine species. This, along with a good diet, is used to bring the dog into optimum health. He also recommends additional vitamin C and vitamin E as supplements used as preventatives for many issues dogs face and he always gives the dosage by weight of the dog.

So of importance, is to understand what the safe dosage of supplements is and how to administer them according to body weight. The easy solution to filling the gaps in dog nutrition is to administer a good over-all supplement designed for canines and follow the manufacturer's directions. That should prevent off-balancing the nutrition of the dog and shore-up any short-coming in the diet and bring the dog into optimum health.

### Team Players

Without going into technical biological levels, it is, however, important to understand that vitamins, minerals, and trace elements are team players. Think of them as the rugby team – they depend on each other to deliver the scoring points.

Some of the main teams include:

- Vitamin B1 (Thiamine) – teams with B3 (Niacin, Niacinamide), B5 (Pantothenic Acid), B6 (Pyridoxine), B9 (Folic Acid)
- Vitamin B6 (Pyridoxine) – teams with B2, B9, B12 (Cobalamin), and Magnesium
- Vitamin B9 (Folic Acid) -- teams with B2 (Riboflavin), B6, B12 and vitamin C (Ascorbic Acid)
- Vitamin B12 (Cobalamin) found in liver – teams with vitamin B6, B9

- Calcium (1.2 - 1.4 parts) & Phosphorus (1 part) requires vitamin D to synthesis properly in the dog's body. And it is important not to over supplement Calcium or it can lead to kidney or bladder stones. It is also important to keep the ratio of Calcium to Phosphorus correct in the diet – especially large breed dogs prone to dysplasia.
- Cobalt – teams with B12
- Copper - teams with Iron
- Inositol – teams with Choline and vitamins A, B1, and vitamin E
- Iron - teams with Copper, B12, and protein
- Magnesium – teams with B6
- Methionine (produces two other sulphur-containing amino acids, Cysteine and Taurine) – teams with B6, B9, B12. Important not to overdose on this one.
- PABA (para-aminobenzoic acid) is an intermediate in the bacterial synthesis of folate.
- Selenium – teams with vitamin E

- Sodium (normally salt-sodium) – teams with Chlorine
- Sulphur – teams with Methionine & Cysteine and is found in every cell of the body.
- Threonine creates Glycine and Serine.

### Healthy eating equates to healthy living



### Immune System

Autoimmune deficiency is a lack of nutrients that contribute to a healthy immune system. A healthy immune system is the gate-keeper to preventing diseases from taking hold. A less than optimal immune system lets the gate down for all kinds of enemies to march in and start their take-over of the body's system.

The important team players needed in the dog's diet for a healthy immune system include: Vitamins A, B2, B5, B6, B9, B12, C, E, Lysine, PABA, Selenium, and Threonine.

Foods rich in some of these vitamins, minerals, and trace elements are: beef liver, eggs, meat, fish, poultry, brewer's yeast, wheat germ, beef brain, raw chicken fat, dried seaweed, beef kidneys, cooked potatoes (do not feed potatoes raw). Each food does not contain ALL the supplements needed, but rather, these foods are rich in some of the nutrients mentioned above.

### Reproduction System

In order to reproduce off-spring, the dam and sire need to BOTH have a healthy reproduction system. Nutrition should be an on-going event in the dog's life, but it is especially important to optimise the dog's health starting three months prior to mating and continuing with the dam throughout pregnancy and the lactation period.

The important team players needed for a healthy reproduction system and delivery of healthy puppies include: Vitamins B3, B5, B6, Biotin (sometimes referred to as vitamin H), vitamin C, vitamin E, Calcium, Lysine, Manganese, PABA, and Zinc.

Foods rich in some of these vitamins, minerals, and trace elements are: Brewer's Yeast, Wheat Germ, Dried whole milk, ground Linseed, Rice Flour, and Kelp. Each food does not contain ALL the supplements

needed, but rather, these foods are rich in some of the nutrients mentioned above.

## Thyroid

The health of the thyroid also needs to be considered along with the reproduction system because the thyroid plays an important role in the control and administration of hormones. This is particularly important in the female where the luteinizing hormone needs to be released in the proper manner for ovulation to occur and once ovulation occurs, the progesterone hormone needs to rise which happens in sync with the ripening of the eggs to allow acceptance of the sperm. If the thyroid is in the low part of the normal range or even below the normal range, chances of successful reproduction will be diminished accordingly.

The important nutrients for a healthy thyroid include: Vitamin E, Biotin, and Iodine.

Adelle Davis had this to say on vitamin E and thyroid: "The thyroid glands of animals deficient in this vitamin become a mass of scars incapable of producing thyroxin or absorbing iodine; their eyes become as prominent as do those of persons with exophthalmic goiter. When 500 units of vitamin E were given daily to 70 adults with abnormal thyroid function, the uptake of iodine doubled and protein-bound iodine in the blood increased; underactive glands markedly improved; and the cases of over-active thyroid became normal. Nodules on the thyroid glands also often disappear after vitamin E is taken."

"This vitamin is essential to glandular function. If adequately supplied, the pituitary, or master gland, contains 200 times more vitamin E than any other part of the body. A vitamin-E deficiency decreases the production of all pituitary hormones; of STH, the pituitary growth hormone; of ACTH, essential to stimulate the adrenals; and the hormones which stimulate the thyroid and sex glands. As soon as vitamin E is given, hormone production rapidly increases."<sup>4</sup>

Interestingly, myself and two other breeders have witnessed an increase in thyroid levels in four bitches when fed 1 cup minimum daily of either Orijen 6-Fish formula or Canidae Salmon grain-free formula over a three-month period. Two bitches rose 8 points in their T4 levels and one rose 5 points. A bitch in Italy rose from 1.2 mcg/dl to 1.7 mcg/dl in a 2 month period on the Orijen 6-Fish formula. The two bitches who both rose 8 points, failed to get in pup prior to the change in diet and when their thyroid T4 readings were at the low end or below the normal thyroid range. After the change to the grain-free fish formula diet and resulting rise in thyroid, both bitches were successfully mated and produced large litters. My feeling is that fish is known to be rich in vitamin E and the amounts of fish in both these products is very high. Although the vitamin E analysis on the packages are not different from other formulas, the vitamin E in the fish must be digesting differently biologically in the body from other non-fish formulas. Also the iodine is slightly higher in the fish formulas. When I reduced my girl, who had increased 8 points, from 1 cup daily to 1 cup every other day, she fell 3 points on her T4 results and did not have a normal season. Feeding the fish formula appears to require a minimum level to achieve the rise in the T4 to a healthy thyroid level in order to produce normal seasons and hormone activity. It would be worth-while for one of the universities to undertake a study in this area.

## Skin and protection from allergies

Skin is the largest cell mass in the body. It also reflects the health of the inner body. When the skin and coat are healthy, the body is normally healthy. Conversely, allergies many times lead to skin and coat problems and as such these two go hand in hand.

The important team players needed for healthy skin include: Vitamins A, B2, B3, Biotin, vitamin E, Copper, Inositol, Methionine, Sodium, and Zinc.

Foods rich in some of these vitamins, minerals, and trace elements are: whole eggs, liver, fish oil, whole milk, carrots, brewer's yeast, parsley, marmite, meat, beef brains, raw chicken fat, dried spirulina seaweed, ground flaxseed, wheat germ, pork, yogurt, chicken heart, salt. Each food does not contain ALL the supplements needed, but rather, these foods are rich in some of the nutrients mentioned above.

Allergies is a subject that one can write an entire book about and many times the origin of what is causing the allergy is not known and after many tests, the answer is still evasive. On this subject I will quote from Dr Belfield on the biological aspect of this problem.

"Authorities on allergies tell us that a healthy individual or animal can be exposed to pollens and molds and environmental chemicals without seeming to suffer. The body's manner of adaptation is complex and incompletely understood. In a body that has an inherited tendency toward allergy or has been insufficiently nourished, however, the stress of an every-present allergen in the environment will cause a breakdown sooner or later at the biochemical level. Problems can then crop up anywhere in or on the body. The allergens cause cellular destruction and when cells die they give off a toxin called histamine. You know the term antihistamine.

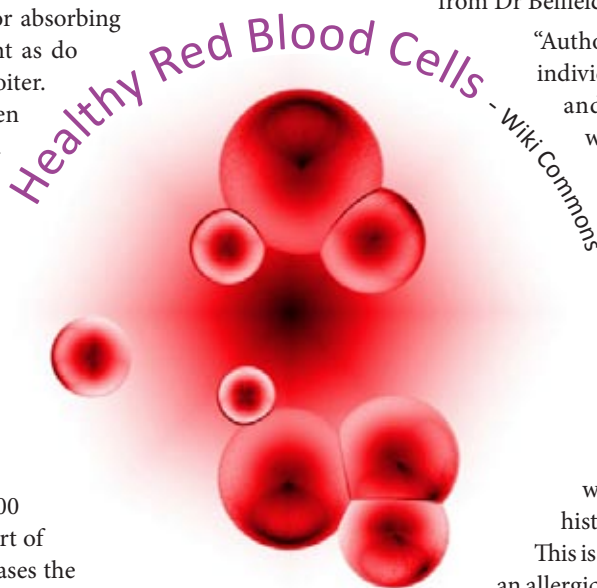
This is a medication taken to counter the effects of an allergic reaction. The histamines are cast into the bloodstream where they circulate and perform all kinds of biochemical mischief. Often they find their way to the skin and as a result the dog will begin scratching or will develop hives, rashes, or swelling. This initial problem can then be complicated by continual rubbing, licking, chewing, and scratching. The skin is damaged and infection can take hold."

"What vitamins and minerals can do for all this potential trouble is to strengthen the body's resistance to allergens. Both vitamin C and pantothenic acid (B5), for instance, are essential in the production of the adrenal hormone, cortisone. This substance is secreted into the bloodstream and acts as an anti-inflammatory and antihistamine agent."

"Ascorbic acid is the natural antihistamine, produced in the liver and used by mammals for millions of years. The liver is supposed to increase ascorbic acid production when the animal is under stress, but this response is sluggish in most canines and felines under physiologic stress. Perhaps once, when the dog was on its own and eating *au naturel*, vitamin C production was more efficient. Domestication, the cooked diet, and the proliferation of chemicals have possibly impaired the canine's natural vitamin C-producing ability. By supplementing, we are fortifying this disability."

The important team players needed to protect against allergies include: vitamin B5 (pantothenic acid), vitamin C, and Methionine

Foods rich in Methionine are: eggs, fish, garlic, meat, and yogurt. Pantothenic acid is destroyed in most prepared foods, as is vitamin C, and therefore these are best given as supplements.



## Pigment

A main contributor to healthy pigment is Copper. And as a team player, Copper needs to team with Iron.

Foods rich in Copper include: beef liver; raw goose liver; dried spirulina seaweed; cooked potatoes; and ground flaxseed.

## Toxins, Cancers, and Tumours

Given the many different types of cancer and tumours, this is a shallow overview of the subject. "Leading scientists have repeatedly found nutritional deficiencies present in cancer patients. Drs. Ewan Cameron and Linus Pauling, who have conducted an intense nutritional investigation of cancer, believe that vitamins hold special promise in enhancing resistance and retarding malignancies, 'with ascorbic acid probably possessing the greatest promise of all', I feel if an animal is on a good vitamin and mineral program he is going to have a strong immune system that can neutralize the viruses, chemicals, pollutants, additives, and abnormal cell growth that are involved in the disease process. I believe an optimally healthy animal at the cellular level is a lesser risk for cancer." (Belfield) <sup>1</sup>

Researchers determined that vitamin A helps prevent cancer by "protecting the vital nucleic acid inside the cells, by influencing normal cellular proliferation and keeping mucous membranes healthy."

The immune system was discussed earlier. The other aspect of this area is ridding the body of toxins. The important team players that act as antioxidants and help rid the body of toxins include: Vitamins B1, B2, B6, and Choline, vitamins C and E, Selenium, and Zinc.

Adelle Davis wrote: "If the vitamin-E intake is generous, the liver can often detoxify such harmful substances as food preservatives, bleaches added to flour, residues from pesticides, nitrites and nitrates from chemical fertilizers, industrial poisons such as carbon tetrachloride, and a wide variety of toxic drugs. Any of these substances can cause liver damage unless vitamin E is adequate. Such liver damage, however, has been found to occur in two-thirds of hospital patients who are also severely deficient in vitamin E." <sup>4</sup>

Two foods rich in vitamins and minerals are Brewer's Yeast and liver. A good comprehensive vitamin and mineral supplement will cover the bases as a pro-active method to ward off many of the cancer causing agents in the environment. Vitamin C needs to be supplemented separately because of the amounts needed.

## Spinal Myelopathy

By 1981, Dr Belfield had been presented with 30 cases of this disease and cured 25 of them. He writes on this subject "I feel spinal degeneration comes about through deterioration of collagen in the spinal tissues. Remember that a dog's ability to make ascorbic acid diminishes with age and the vitamin is needed both for the production and maintenance of good quality collagen."

"By treating an animal with vitamin C, we are improving the collagen and rebuilding the degenerated ligaments and tissue of the spine. Sometimes I will have people bring in animals that have been

paralyzed and down for six months. If the deterioration goes beyond a certain point I can't really offer much hope. If an animal goes down, I like to see it as early as possible. In these cases the deterioration is still minimal and treatment can usually bring the dog back on its feet in a short period of time."

Speaking of a specific case he writes "For three days I administered the routine of vitamin C intravenously twice daily. When the (owners) returned, the dog was eating better and appeared more stable in the hind quarters. I then prescribed oral vitamin C along with multiple vitamins and minerals."

"... People bring in an ailing dog, but after it improves on a therapy program the owners will often neglect the vitamins. Invariably, the dog will revert to its weakened state and I'll see it in the office again with the same symptoms. I keep telling my clients that prevention is a lifetime discipline. It will save them veterinary bills and time and wear and tear on their animals. Some have to learn this lesson the hard way."

Dr Belfield's recommendations for preventative health in older dogs is to maintain the multivitamin and mineral supplement level he outlines in his book plus vitamins C and E in the doses he recommends.

## Iditarod dogs in style

Photo by Frank Kovalchek, Anchorage Alaska - Wiki Commons



## Supplement Dosages

Many people are taken-in by the AAFCO label on dog food packaging. However, by the AAFCO's own definition of its purpose, it was set up to set standards for ingredient terminology for dog food companies across the United States of America and provides some agreed upon minimum standards for nutrition. This does not equate to, or should it be taken, to mean that these minimum nutritional standards are sufficient to keep dogs in optimal health. The standards also do not differentiate between size or

breed of dog. A "one-size-fits-all" lacks scientific basis at best and in worst-cases leaves a good many dogs at a healthy disadvantage. Supplements need to be administered by the dog's weight and activity level. Not all dog's needs are equal.

For example, the AAFCO also lists a few maximum recommendations for supplements including Vitamin A which is set at 250,000 IU/kg. This level of Vitamin A is extremely high and runs the risk of causing birth defects in puppies of pregnant dogs as well as toxicity in all dogs. Belfield's notes on vitamin A, a fat soluble nutrient which is stored in the liver (unlike water soluble vitamins C and B which are released in the urine daily and need to be replenished daily) states on vitamin A dosages "It was only when researchers reached levels of over 100,000 IUs per kilogram of body weight that they began to run into toxicity problems. These are exceptionally high doses and it is unlikely an animal will ever be exposed to them."<sup>8</sup> The other maximum doses are equally absurdly high. In my opinion, it is dangerous to publish such high doses of supplements because it gives people the idea that they can give the supplement up to that amount.

A review published in the *Journal of the Science of Food and Agriculture*, 2008, entitled *Effects of Extrusion Processing on*

*Nutrients in Dry Pet Food* explains the extrusion method (used by most pet food companies) in detail and explains that the purpose for this process method used in making dog food is to ensure that every part of the dog food mixture is exposed to high heat for the purpose of killing all microorganisms. The review further details the degradation effect this process has on certain vitamin, mineral and trace elements under high heat processing. Dog food companies that put “live microorganisms” on their label normally process at lower heat levels. However, water soluble vitamins still have a risk of degradation even at the lower processing temperatures

After treating hundreds of dogs in his practice for several decades using orthomolecular science, Dr Wendell Belfield

published, what he found in his practice, to be the ideal nutritional guidelines for dogs to achieve optimal health based on their size / weight. Activity level still needs to be taken into account by the dog owner. In general terms for publication, he classified the recommended amounts of nutrients into four weight categories for dogs. Additional classification was made for puppies, pregnant dogs, and older dogs. The charts provided in this article are from Belfield and Zucker’s book “*How to Have a Healthier Dog, The Benefits of Vitamins and Minerals for Your Dog’s Life Cycles*”. More detailed information is provided on each supplement in the book. Fig 1

As stated earlier, it is best to find a comprehensive multi-vitamin supplement for dogs that includes vitamins, minerals and trace elements and feed according to the manufacturer’s recommendations. Vitamins C and E should be supplemented separately. This will ensure you fill the gaps in any missing nutrients in your dog’s diet and go a long way to achieving optimum health.

### Summary

I started supplementing my dog’s diet very accidentally back in 2004. Another breeder and I were discussing a particular brand of dog food and noting that one of the formulas in the brand always produced good pigmentation in our dogs. The other breeder guessed that it might be glucosamine that was responsible. I trolled through the internet and happened on the Dr Kruger supplement that included glucosamine. I wanted to see if it would help a dog with a pink nose. Well, it certainly was not the ingredient that produced good pigment and the supplement did nothing for the pink nose. But it did turn a lethargic 7-year-old Golden Retriever back into the equivalent of a 1-year-old in a matter of two weeks. It also brightened his eyes and put a beautiful sheen in his coat and stopped the hot spots. That was 7 years ago and all my dogs have had a daily dose of supplements ever since and the result has been healthy, active dogs. That 7-year-old boy turned 14-years-old the end of October and he is still enjoying life and keeping two Golden Retriever youngsters in line.

My experience has been that daily supplementation is a needed gap-filler for dog nutrition, no matter what the diet – raw or commercial. It helps to keep the dogs in optimum health and wards off disease. ■

### References:

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<b>HOW TO HAVE A HEALTHIER DOG</b>				
<i>The Benefits of Vitamins and Minerals for Your Dog’s Life Cycles</i>				
By Wendell O. Belfield, D.V.M and Martin Zucker				
Dr Belfield’s “idea of safe, effective, and manageable daily vitamin and mineral dosages. These levels have successfully prevented or minimized disease in many hundreds of dogs, from the noblest of blue bloods to the shaggiest of mongrels.”				
“Dosages of vitamin C are given according to the activity of the dog. An active or working dog receives the higher dose.” Commercial multivitamins/mineral products for dogs should come close to the doses recommended below. Individual nutrients may vary from product to product, but do not let this confuse you. Vitamins C & E are given in addition to the multivitamin product.				
Weight is as an adult	Small Weight up to 9kg as adults	Medium Weight from 9kg to 23 kg	Large Weight from 23 kg to 45 kg	Giant Weight from over 45 kg
<b>PREWEANED PUPPIES</b>				
Vitamin C (in paediatric drops figured in mg according to the size of the animal and age) Small breeds – 1–5 days – 20 mg / 5-10 days – 35 mg / to weaning 65 mg Medium breeds – 1–5 days – 35 mg / 5-10 days – 65 mg / to weaning 100 mg Large, Giant Breeds – 1–5 days – 65 mg / 5-10 days – 100 mg / to weaning 135 mg				
<b>PUPPIES – FIRST SIX MONTHS</b>				
Multi-Vitamin Give by weight at stage of growth				
Vitamin C	250 mg	500 mg	500 mg to 1000 mg	750 mg to 2000 mg
<b>PUPPIES – SIX MONTHS TO 1 YEAR, GRADUALLY INCREASING TO ADULT</b>				
Multi-Vitamin As per actual weight				
Vitamin C	250 mg to 500 mg	500 mg to 1500 mg	1000 mg to 3000 mg	2000 mg to 6000 mg
Vitamin E	100 IU	200 IU	200 IU	400 IU
<b>ADULT DOGS</b>				
Vitamin C	500 to 1500 mg	1500 to 3000 mg	3000 mg to 6000 mg	6000 mg to 7500 mg
Vitamin A	1500 IU	3000 IU	5000 IU	7500 IU
B1 (Thiamine)	0.5 mg	1 mg	2 mg	4 mg
B2 (Riboflavin)	0.5 mg	1 mg	2 mg	4 mg
B3 (Niacin)	15 mg	30 mg	50 mg	75 mg
B5 (Pantothenic Acid)	3 mg	6 mg	10 mg	15 mg
B6 (Pyridoxine)	0.75 mg	1.5 mg	3 mg	5 mg
B9 (Folic Acid)	33 mcg	66 mcg	112 mcg	170 mcg
B12 (Cobalamin)	6 mcg	15 mcg	30 mcg	45 mcg
Biotin (aka Vit H)	12 mcg	24 mcg	42 mcg	60 mcg
Vitamin D	100 IU	200 IU	400 IU	400 IU
Vitamin E	100 IU	200 IU	200 IU	400 IU
Calcium *	15 mg	30 mg	50 mg	75 mg
Phosphorus *	11.5 mg	23 mg	40 mg	57 mg
Iron	9 mg	18 mg	30 mg	40 mg
Sodium	175 mg	350 mg	500 mg	1000 mg
Potassium	50 mg	100 mg	150 mg	200 mg
Manganese	0.75 mg	1.5 mg	2.6 mg	3.75 mg
Zinc	10 mg	10 mg	30 mg	30 mg
Magnesium	10 mg	20 mg	50 mg	75 mg
Copper	1 mg	2 mg	3.5 mg	5 mg
Iodine	0.2 mg	0.4 mg	0.7 mg	1 mg
Selenium	12 mcg	25 mcg	50 mcg	50 mcg
<b>AGED DOGS (More active can stay on Adult doses)</b>				
Multi Vitamin same as adult				
Vitamin C	250 mg to 750 mg	750 mg to 1500 mg	1500 mg to 3000 mg	3000 mg to 4000 mg
Vitamin E	200 IU	400 IU	400 IU	800 IU
<b>PREGNANT AND LACTATING DOGS</b>				
Multi Vitamin same as adult				
Vitamin C	1500 mg	3000 mg	6000 mg	7500 mg
Vitamin E	100 IU	200 IU	400 IU	600 IU
Note: Calcium / Phosphorus correct ratio is Calcium 1.2 – 1.4 to Phosphorus 1.0				
Note: Refer to the book for detailed sections and more information on each vitamin and mineral <a href="http://www.belfield.com">http://www.belfield.com</a>				