

Reducing the Risk of Hip and Elbow Dysplasia in Large Breed Dogs

By Sy Guth

The human mind is like a parachute. It only works when it is open.

This appeared on all the main doors into the Levi Strauss buildings in San Francisco one week back in 1987 as one of their inspirational statements. I've always been fond of the statement, because it reminds us to open our thoughts to new theories and ideas. It doesn't mean we have to accept these theories or ideas, but rather, we should give consideration to them and then determine what part, if any, should be retained. Critical analysis does not seem to be taught much in the schools these days. I had some rather avant-garde secondary teachers to thank for providing the lessons in this type of critical thinking. It was post-McCarthy era in California and we were taught to question everything and take nothing at face value.

In 2003, I started a quest to find out why a lovely Golden Retriever puppy scored 2:3 on his elbows when he had been bred from 0:0 parents. This seemed a clear case that heredity was not to blame, although that was the vet's explanation. The x-rays showed hairline fractures.

Most breeders, having received the 2:3 elbow score and total 23 hip score, probably would have just written the puppy off and gone on. Most vets would have told the owner of the puppy that it was heredity and the parents, who had hips scores of 23 and 7, should not have been mated. In 2001, I retired from the corporate world and started my life long passion of dog breeding. It was greatly upsetting to me to have to re-home all three of the puppies I had kept from the long awaited 2002 litter. I had run two girls on and when it came time to choose to home one of them, I sent the pick bitch overseas to owners who thought they wanted to breed and show her -- but never did. The other pick bitch was not suited to a kennel with numerous dogs and as such got re-homed where she was the only dog. This second girl was scored and had total 8 hips and 0:0 elbows. The overseas girl was not scored. But it was my lovely boy that broke my heart and started the quest to discover what was involved in the breeding and rearing of puppies to prevent dysplasia in elbows and reduce the risk of dysplasia in the hips.

I listened to a discussion on hip dysplasia on a video, *Fields of Gold*, by Dr Malcolm Willis, UK veterinarian, who has studied hip dysplasia for decades and took in what he said about reducing protein in puppy diets. I wrote to Dr Robert Wyburn in Australia, who sent a paper back to me on the subject. I queried a dog nutritionist in Canada, Michelle Seaborn, Silmaril Kennels, Canada. Michelle, and husband Rick Stopps (paediatrician) breed Golden Retrievers and have used a protein step-down diet for a couple of decades that has resulted in lowering their hip dysplasia scores on their dogs. I read and read and read on the subject.

From this and other research, I concluded that I wanted to try a protein step-down diet on my puppies and I began in 2003. I understood what Dr Wyburn had to say about the critical growth periods being from 5 to 7 months -- the period when the fastest growth spurts occur. I understood from Michelle Seaborn that reducing the protein content of the puppy diet to 20% or under would slow these growth spurts down and allow the 3 joints in the elbow to grow together better and she recommended starting the step-down at 16 weeks of age. I soon realised that based on the foods I was using for the puppy diet, I need to start the protein step-down at 14 weeks of age. In 2006, I started researching Vitamin C and three articles made a great deal of sense to me. These three articles were written by Dr Wendell Belfield, US veterinarian, Sylvia Hammarstrom, breeder of Champion large breed dogs, and Ron Kennedy, MD, a human doctor

in Santa Rosa, California. In 2006, I understood from an article, *Early Spay-Neuter Considerations for the Canine Athlete One Veterinarian's Opinion* by Chris Zink DVM, PhD, DACVP, why the growth rates of the bones matter. Dr Zink has written on how bones grow at different times and how unbalancing the skeletal frame of a dog puts pressure on one area or another and can cause those hairline bone fractures that I saw in x-rays of my boy from the 2002 litter. His growth spurts were so obvious that I would look at him and comment to him, "Oh you grew your back legs today!" Dr Zink also brought to light that early spay / neuter under a year of age prevents the growth plates in the rear quarters from closing down properly and causes the rear legs to keep growing longer than they should. This also leads to increased risk of hip dysplasia. Now I only need to look at a photo of one of my puppies bred prior to 2007 and know that it was neutered under a year old. When I ask the owners, they always verify that the dog was neutered around 6 to 8 months of age. The dog has long rear legs and lacks the beautiful turn of stifle that my lines normally produce.

Hip dysplasia is a complex issue and has many facets. I get the feeling that because it is complex that most veterinarians find it easier and less time consuming to just tell people that the problem is hereditary. I have set out to prove that environmental factors such as nutrition, exercise, and early spay / neutering all have an affect on hip and elbow dysplasia. That is not to say that I don't think the problem is hereditary. I do, but for different reasons than most veterinarians. I now believe that it is the heredity of genes responsible for the dog's ability to naturally produce its own Vitamin C that may be at the crux of the problem. I believe that in many large breed dogs these genes have mutated or do not function as well as they have prior to the 1950s. My "study" is a minuscule one, but has returned some very positive results in both the area of hips and elbows. In the area of elbows, the reduced protein levels to 18% - 20% from 12 weeks to 9 months has resulted in all puppies, from 8 litters, kept on my diet and x-rayed having scored 0:0 on elbows. This excludes one case where the owner of a puppy related that her puppy was hit in her front-end by a car. Since this puppy's hips were 2:3, it seems obvious that the 1:3 elbows are the result of the car accident.

The hip scoring has taken longer to discover the key factor to improving better formed hip joints and lower dysplasia affects. However, early indications are that the key lies in adding a minimum of 460 mg units daily of GNLD molecularly natural Vitamin C. I breed Golden Retrievers and this seems to be the minimum daily amount my lines need. I must add here, that when I mentioned this theory at first to some, I got the standard "brush-off" comment that dog's manufacture their own Vitamin C so it was a silly idea. Pretty much the same reaction Dr Belfield got when he published his papers back in the 1980s and 1990s.

A note on Vitamin C: the reason Vitamin C (ascorbic acid) is necessary is because the body synthesises the Vitamin C and turns it into collagen. Collagen is needed for the health of ligaments and tissues that hold the bones together. Vitamin C contributes to the healthy growth of cells, teeth, and bones. There are different types of Vitamin C. Pretty much all of what is sold through health food stores and grocery stores is a synthetic Vitamin C. GNLD Vitamin C, which is what I have used in my testing, is made from fruits and is molecularly natural Vitamin C. It includes more than just ascorbic acid or Vitamin C. It includes the elements found in the peel, seeds,

etc. I don't know what the results would be with synthetic Vitamin C such as Ester-C (not C ester, which is different still) because I have not tested these forms of Vitamin C. I've only tested the GNLD molecularly natural Vitamin C because some of my research stated that one needed "natural" Vitamin C to manufacture collagen. I also have read reports that state there is no difference between synthetic Vitamin C and natural forms of Vitamin C, but the report did not clarify in what regard -- in the synthesis of collagen or in treating the common cold? There is a wide gap here that needs further study. Although the GNLD Vitamin C is a great deal more expensive than synthetic Vitamin C, I prefer to use it to avoid a build up of toxins in my dogs and because it contains those extra essentials that make the ascorbic acid work as it should in the body.

PENN HIP SCORING AT 16 WEEKS OF AGE

There are seven puppies in all in my small study. Three females from two September 2007 litters were hip scored at 16 weeks using the Penn Hip scoring method and one male that I bought from another breeder was Penn Hip scored at 8 months of age. One of the three females scored at 50% median and I have calculated that she should have scored a 14 on traditional radiographic hip scoring schemes. The other two were 20% higher than median and calculated that they should have scored 16 to 18 using the traditional method. The Penn Hip scheme claims to be 75% accurate at 16 weeks for the life of the dog. Had I not done the PENN HIP scoring at 16 weeks of age, I would not have known the dramatic affects that the GNLD Vitamin C had on these puppies.

The girl that should have scored approximately 14, scored a 1:2=3 at age 1 year -- an 11 point improvement. One of the girls that should have scored 16 to 18, scored 4:1=5 at age 1 year -- an 11 to 13 point improvement. The only difference from the previous litters was in the feeding of the pregnant bitch and the weaning of the puppies in

regards to Vitamin C and keeping some of the puppies in the study group on the GNLD Vitamin C to a year old. During pregnancy, the bitches were periodically given GNLD Threshold Vitamin C, a 6 hour slow release formula plus a chewable GNLD Neo-C Vitamin C. They were also fed on half dog biscuits and half meat, fish and vegetables. The first puppies were weaned on GNLD powdered Vitamin C from 3 weeks of age and then 1 GNLD chewable Neo-C Vitamin C tablet daily. When the results came back from the Penn Hip exams at 5 months of age, I increased the GNLD Neo-C Vitamin C to 2 tablets a day (460 mg) and continued this until the girls were old enough to have their hips/ elbows officially scored. I now give the GNLD powder (supplying 500 mg) for the first 3 months and then feed 2 GNLD Neo-C tablets supplying 460 mg to a year old.

It would have been ideal to have done both Penn Hip scoring and traditional scoring on all the puppies in the two litters at both 16 weeks and at 1 year of age. However, that requires funding that I have not been able to secure thus far.

The results below are from 7 puppies. The #1 and #2 puppies were from litters born to dams who were litter sisters and the litters were born 10 days apart. The parents from litter #1 had hip scores of 3:3 and 12:6. The parents from litter #2 had hip scores of 0:0 and 3:3. All parents had 0:0 elbows. The non-Lorgair puppy's parents had hip scores of 2:5 and 4:8 / elbows scores of 0:0 and 0:1.

LORGAIR PUPPY PROTEIN STEP-DOWN DIET (LPPSDD)

I acknowledged that raw meat diets such as the BARF diet are known to reduce hip dysplasia. However, my experience with puppy owners has also taught me that if the diet is not easy to source and prepare, puppy owners will not use it. Preparing the BARF Puppy Diet requires study and understanding the diet; sourcing the raw food to be used free from disease; and preparing and packaging the food for freezing

ID	Score at 1 year of age	Diet / Exercise Note: Hip / elbow scores at 1 year are using traditional radiographic method and scored by Dr Robert Wyburn, Australia.
JZ-1	Hips 1:2 = 3 Elbows: 0:0	Lorgair Puppy Protein Step-Down Diet (LPPSDD) – no meaty bones. Vitamin C dosages – 500 mg powder from 3 weeks to 12 weeks; 230 mg Neo-C from 12 weeks to 5 months; 460 mg Neo-C from 5 months to x-rays at 1 year. Free running 30 to 60 minutes daily from 6 months of age. Penn Hip at 16 weeks. 50 percentile (average for all Golden Retrievers scored by Penn Hip and assumed by the author to be total 14 using traditional radiographic x-ray scoring.)
IY-1	Hips 10:6=16 Elbows: 0:0	LPPSDD, + meaty bones + some fresh mince. Vitamin C dosages – 500 mg powder from 3 weeks to 12 weeks; 230 mg Neo-C from 12 weeks to 5 months; 460 mg Neo-C from 5 months to 7 months; REDUCED to 230 mg from 7 mos to x-rays at 1 year old. Free running daily from 6 months of age. Penn Hip at 16 weeks. 30 percentile (worse than average and assumed by the author to be total 18 using traditional radiographic x-ray scoring).
JY-2	Hips 4:1 = 5 Elbows: 0:0	LPPSDD, + meaty bones. Vitamin C dosages – 500 mg powder from 3 weeks to 12 weeks; 230 mg Neo-C from 12 weeks to 5 months; 460 mg Neo-C from 5 months to x-rays at 1 year. Free running 30 to 60 minutes daily from 6 months of age. Penn Hip at 16 weeks. 30 percentile (worse than average and assumed by the author to be total 16 to 18 using traditional radiographic x-ray scoring.)
HO-2	Hips 4:4 = 8 Elbows: 0:0	LPPSDD, + meaty bones. Vitamin C dosages – 500 mg powder from 3 weeks to 12 weeks; 460 mg Neo-C from 12 weeks to 6 months. No additional Vitamin C after 6 months old. Daily walks.
KE-2	Hips 1:1 = 2 Elbows 0:0	Home-kill raw meat and bones with a small amount of home-cooked. Vitamin C dosages – 500 mg powder from 3 weeks to 8 weeks. No additional supplements after 8 weeks old. Unlimited free running and swimming on farm.
AN-2	Hips 5:5 =10 Elbows 0:0	BARF Puppy Diet (raw meats / fruits / vegetables) to 7 months old and then Canidae Life Stages to a year old. Vitamin C dosages – 500 mg powder from 3 weeks to 8 weeks. No additional Vitamin C after 8 weeks old. Dr Kruger High Performance supplement and meaty bones throughout. Free running on Lifestyle block.
SR-3 Non Lorgair Puppy	Hips 5:7 = 12 Elbows: 0:0	LPPSDD from 8 weeks to 1 year, but did not start reduced protein until 14 weeks of age. Vitamin C dosages –230 mg Neo-C from 8 weeks to 9 months; 460 mg Neo-C from 9 months to x-rays at 1 year. Was not weaned on supplements. Free running exercise between 30 to 60 minutes daily. Penn Hip at 8 months scored 60 percentile (better than average and assumed by the author to be total 12 using traditional radiographic x-ray scoring.)

and re-serving. Dr Billinghamurst recommends adding probiotics and Vitamin C among other vitamins to the BARF diet. In today's busy world, most puppy owners work and have a family and just preparing the family dinner is time consuming enough for them. They want and need something easy to prepare for the puppy in their lives.

To that end, the puppy diet I use and recommend is all commercially available and does not require much time for puppy owners to source and prepare.

I believe the development of healthy puppies starts at least three months before mating and continues through pregnancy; lactating; and weaning of the puppies and finally their puppy diet to a year old. However, the ground work for skeletal formation starts in the womb.

In my study, the pregnant bitch was fed on: Nutrience Junior Large Breed (the same type of food you would feed growing puppies); Butch Black Label dog roll; raw mince; cooked poultry; cooked fish; cheese; home-made yoghurt; goat's milk; Complian; GNLD Threshold Vitamin C; and Dr Kruger Puppy and Pregnancy formula.

24 hours after the puppies have been whelped; the bitch is switched back to the Dr Kruger Joint and Muscle formula. There are anti-inflammatory herbs in the product that should not be fed from start of heat through the whelping stage. However, 24 hours after whelping, those herbs are wanted for their inflammation reduction attributes. The formula also cleans the stomach wall of bad bacteria and adds probiotics to enable better nutritional absorption and increased milk production for the puppies. It also stimulates the dam's appetite, keeping her eating. The dam is still fed on the Nutrience Junior Large Breed formula along with Butch Black Label dog roll and fresh mince, cooked chicken, fish, and home-made yoghurt.

At three weeks of age, the puppies begin to be weaned off the dam. This process needs to be gradual, the same as it is with human babies -- only the timeframe is much faster. I start off with goat's milk, then add Farex 4+ to this after a few days and then add in ground Milk Oaties and start to taper off on the Farex. This first process takes about a week. During this first week I start to introduce the GNLD powdered Vitamin C along with the Dr Kruger Puppy formula. Assuming a litter of 10 puppies, I only add a 1/2 teaspoon to 2 cups of goat's milk the first couple of days and then build it up very slowly. At three weeks of age, the puppies should start to make some of their own natural Vitamin C.

The next stage is adding in moistened, ground Nutrience Junior Large Breed Puppy to the goat's milk and Milk Oaties. Increase the Nutrience whilst decreasing the Milk Oaties. This process takes another week. During this week the puppies are on about 1/2 teaspoon each daily of GNLD powdered Vitamin C and Dr Kruger Puppy formula.

From the beginning of week 5 to when the puppies go to their new homes, they are fed on moistened Nutrience Junior Large Breed Puppy with Butch Black Label dog roll and / or fresh raw mince and each puppy is getting 1 teaspoon a day of both the GNLD powdered Vitamin C and Dr Kruger Puppy formula. From 7 weeks the puppies are reared on the Nutrience Junior, Butch Black label, 1 teaspoon of Dr Kruger Puppy formula and either 1 teaspoon of GNLD powdered Vitamin C or 2 GNLD chewable Neo-C Vitamin C tablets until they are 12 weeks old.

At 12 weeks old, the puppies are put on the reduced protein diet. Two basic changes occur from the previous step -- the dry food is changed to 1/3 Nutrience Junior Large Breed Puppy (24% protein) and 2/3 Nutrience Senior (18% protein) to reduce the percentage of protein in the daily meal. Secondly, the puppies are switched from Dr Kruger Puppy formula to the Joint & Muscle formula. The puppies are still getting 460 mg of natural Vitamin C daily. The puppies stay on this diet until they are 9 months old.

At 9 months of age, the puppies are put back on the same diet they were on from 7 weeks to 12 weeks. They stay on this until they are

18 months old and then put on their adult diet, which in my case is Canidae + Butch + Dr Kruger Joint and Muscle + 1 GNLD chewable Vitamin C.

It is important to note that any diet change takes two weeks to take affect. So starting the puppy protein step-down diet at 12 weeks means it will be effective from 14 weeks. Likewise, when bringing the puppy off the step-down -- it will be effective from 9 1/2 months. According to a bone specialist, the canine's bones are fully formed at 10 months of age. I'm sure this probably varies slightly from dog to dog and should be used as a guideline.

DRY DOG FOODS

Not all 24% protein dry dog food mixed with 18% protein dry dog food will give the same results. In 2003, when I first started the step-down diet with puppies, I used Canidae Life Stages (24%) with Canidae Platinum (18%). When started at 16 weeks of age, the puppies started their growth spurts and then stopped. I then moved the step-down back to 14 weeks of age and it proved to be in time to avoid the growth spurts altogether. In late 2005, Canidae Platinum no longer became available in New Zealand and I was forced to find another combination that fit my criteria for dry dog foods. I liked the Canidae both because the dogs were calmer on that formula and because the meat used is human-grade.

In short, my criteria for the dry dog foods I use and recommend are: no by-products; no BHA, BHT, or "e"; no wheat or gluten; the first ingredient on the label must be meat or poultry; and preferably there needs to be both a 24% protein and 18% protein dry formulas in the line. I actually scrutinize the ingredients label much closer than this, but this is the basic guideline.

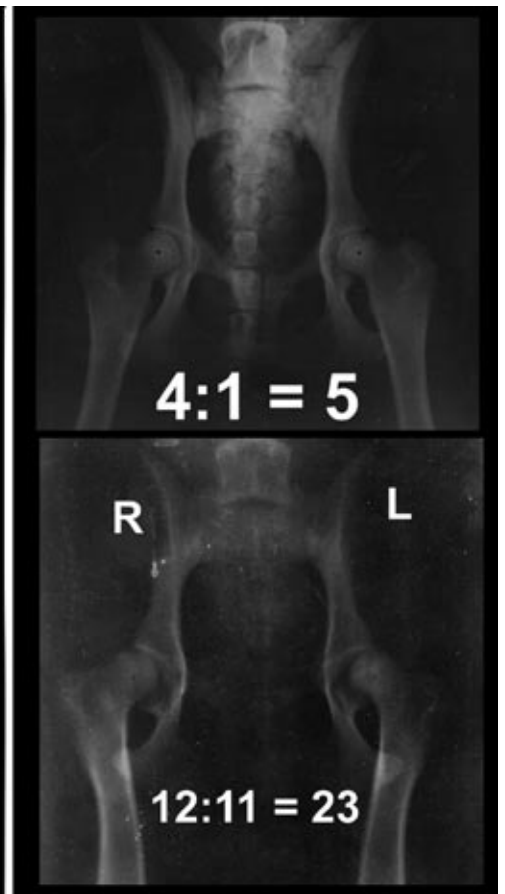
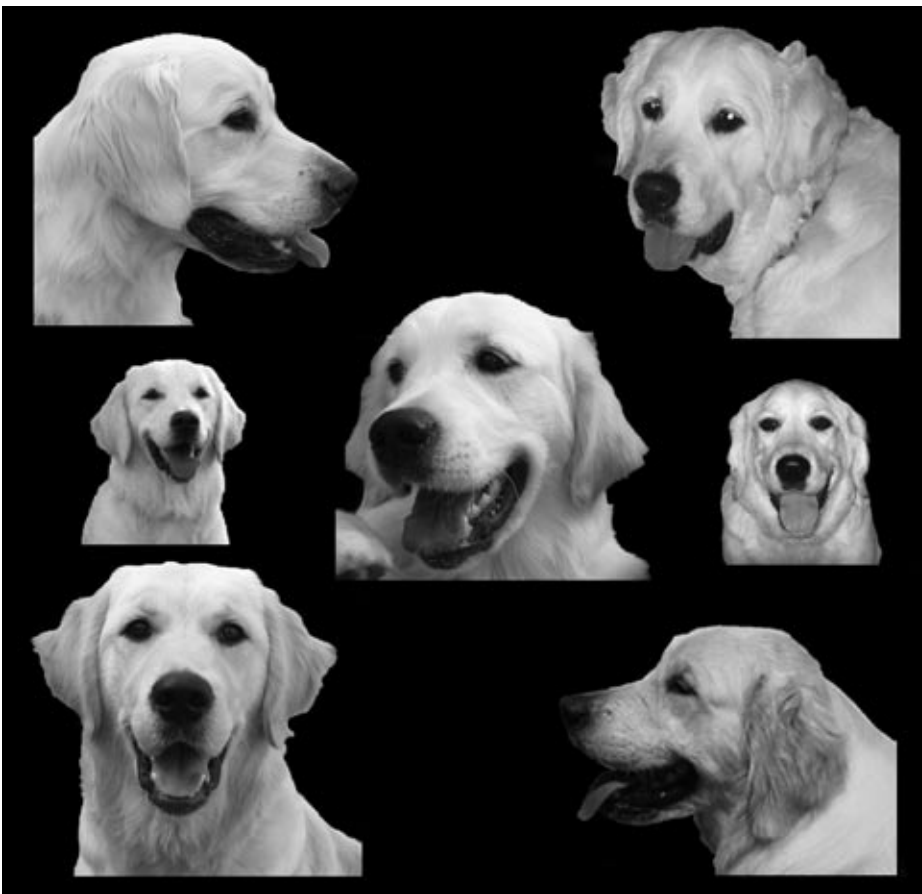
The replacement dry dog food I came up with was Nutrience - Junior Large Breed and Senior formulas. Nutrience Senior formula is nearly the same ingredients as the Junior, but with lowered protein levels which is ideal for the puppy step-down diet.

Not having kept any puppies from a late 2005 and early 2006 litters, I did not realise that the Nutrience was causing growing spurts earlier than the Canidae until I used it on a puppy I bought in July 2007. This puppy gained 3.5 kg between weeks 12 and 13 and incurred growing spurts that were then difficult to bring back under control. With two September 2007 litters I moved the start time of the step-down diet back to 12 weeks of age and experienced no growth spurts. So, the brand of dog food fed to the puppies will make a difference on how much condition and how soon the growth spurts will start.

THEORY

My theory on the Vitamin C is that dog's are either not manufacturing enough Vitamin C or have not inherited the genes needed to synthesis enough Vitamin C for healthy bones and connective tissues. Before the introduction of the commercial dry dog foods in the 1950s, the dog's intake included more Vitamin C from the raw food / home-cooked diets. Humans have changed the way dogs are fed in the last 60 years. Vitamin C / ascorbic acid degenerates rapidly in the presence of heat! Using high temperatures to cook or dehydrate meat and vegetables reduces the effectiveness of vitamins and minerals available to us. The typical analysis of Vitamin C in dog biscuits is listed around 50 mg. It took 460 mg from 5 months to 1 year to affect change in my puppies. So my theory is that, humans have reduced the intake of Vitamin C available to our dogs and that, in part, has resulted in an increase in dysplasia. It's worth remembering that hip dysplasia was unknown before the invention of commercial dry dog foods came on the market in the 1950s.

As, Dr Ron Kennedy, M.D, states in his paper, *Vitamin C and Vascular Disease*, Vitamin C reduces heart attacks in humans. His paper is based on the research done by Dr Linus Pauling, MD and Dr Matthias Rath, MD. He states that animals in the wild do not get heart attacks because they can manufacture their own Vitamin C. Well, guess what? More and more dogs are now dying from heart attacks.



Again this leads one to think that they are not manufacturing enough Vitamin C. He also states that the only way that animals would stop making their own Vitamin C is if they were confined and fed a human type diet. You see, humans used to make their own Vitamin C, but one of the genes needed to produce the Vitamin C mutated and we lost the ability. It just could be that the heredity factor in hip dysplasia is actually that some dogs inherit good genes for producing Vitamin C and some have received a modified one that doesn't produce as much Vitamin C as the original gene or genes did.

After coming to this conclusion, I re-read Sylvia Hammarstrom's article, *Vitamin C and Hip Dysplasia*, and noted "Dogs manufacture some Vitamin C themselves, but obviously some do not manufacture enough. Like Dr. Earl D.V.M., I strongly believe that a HIGH REQUIREMENT for Vitamin C may be inherited, rather than the disorder itself. This should come as no surprise, as dogs are not allowed to breed by natural selection, but rather at the whim of the breeder."

As I stated at the beginning, it is early days for my own study and results. However, the results I've seen in my minuscule study are enough to convince me to continue with the trial and see what results I get over a 5 year period. If they are as successful as the results in elbow scores in the past 5 years, than I will conclude that the molecularly natural Vitamin C is the answer to the missing link in reducing hip dysplasia. It will also mean that those before me that have been advocates of natural Vitamin C have been right all along. What I find puzzling, is why vets find this so hard to accept. It's sad, because some beautiful dogs that would have produced lovely puppies have not been bred because someone thought that some hereditary gene formed bone defects in the dog. And to think, that maybe all one had to do was feed additional natural Vitamin C to the next generation of puppies to correct the deficiency and have bones form correctly is a sad commentary on our lack of research and testing in this area.

CONCLUSION

- The deciding key in the formation of the hip bones to attain the best hip joints possible in my study was the addition of the GNLD molecularly natural Vitamin C. The amount needed will depend on the size and breed of dog and its particular ability

to manufacture its own Vitamin C naturally. For the Golden Retriever puppies in my small 2007 study it was a minimum of 460 mg daily to a year old.* The puppies were weaned on GNLD Vitamin C from 3 weeks of age. However, in the beginning from 3 weeks they were gradually given the powder supplement starting with 1/2 teaspoon for 5 puppies in 1 cup of goat's milk until they were up to 1 teaspoon each (500 mg) daily at 5 weeks.

- Based on the Penn Hip results of JY-2 that was targeted for 16 to 18 on the traditional scheme and then scored a 5 at a year old -- her litter sister, AN-2 who was raised on the BARF Puppy Diet to 7 months of age and then Canidae dry dog food, might have scored higher than her 5:5=10 without the raw diet start.
- This study does convince me that because the bones do not fully form until at least 10 months of age, that the whole period up to a year old is important. Between months 5 and 7 the puppies do the majority of their growing upward, but those bones are forming during the whole of the first year. Increasing the amount of Vitamin C after 9 months of age will not reverse what has gone before. The addition of Vitamin C needs to start with feeding the pregnant dam and carry through with the puppy to at least a year old and preferably, 18 months of age.
- Slowing the growth of the puppy down by reducing the protein level between 12 weeks and 9 months is great for the elbows and because it causes the dogs to grow in proportion and it reduces the risk of hip dysplasia from uneven weight distribution during the growth spurt periods.
- The fact that the BARF fed puppy did not continue on the BARF raw diet to a year old due to her owner's time constraints supports my convictions that the best intentioned puppy owners find it hard in these times to stick to a raw diet. Finding a solution to the hip dysplasia issues using a commercially available diet is worthy of the quest. 🐾

* Joanne Carson, Ph.D. in her article, *Supplements For Home Cooked Diet*, gives the following guidelines for dosages of Vitamin C for dogs: Small dogs: 500 mg; Medium to large dogs: 1,000 mg to 1,500 mg; Giant dogs: 2,000 mg.