

Breeder's Tips

**for managing the health, happiness, and
beauty of your Labrador Retriever**



by Debby Kay

AKC Breeder of Merit

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Other books by Debby Kay:

- *Sweet Snoopers™: How Medical Alert Service Dogs Help People* (coloring book)
- *Super Sniffer Handbook: A Guide to Scent Training for Medical Alert Dogs*
- *Super Sniffer Drill Book: A Workbook for Training Detector Dogs*
- *The Labrador Breeders Handbook*
- *The Collected Writings of Debby Kay: Reflections on Labrador Retrievers, Breeding and Training*

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About Debby Kay

Debby Kay, IACP CDT, has been a pioneer in scent detection work for more than 40 years. She worked with the first search and rescue groups where the idea of using dogs to detect cadavers underwater and the training protocols were introduced. She has worked with many scientists to develop dogs to assist in locating biological specimens in the field for research projects; she trained the first toxic waste detection dog and the first proof-of-concept accelerant detection dog.

She has taught detector dog handler teams and instructors from all over the world, including developing the explosive detection program for the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). Debby teaches Super Sniffer™ workshops for amateur dog owners and professional trainers alike.

In competition, Debby's dogs from her Chilbrook bloodlines established in 1969 have earned hundreds of titles and awards, including all-breed Best in Show, Best in Specialty Show, and Highest Scoring Dog in Trial in obedience. Her breeding stock is highly sought after by service dog schools. She is an internationally recognized author and lecturer, an all-breed conformation judge and has also judged in China.

Debby is a founding officer of the Labrador Retriever Club of the Potomac, and member of the Labrador Retriever Club, Inc. She is a professional member of the Dog Writers Association of America and the International Association of Canine Professionals. Debby lives with her husband, Sam Cochran, on their farm in Harpers Ferry, West Virginia.



Public domain photo of common Tennessee striped skunk

In my mind, the only thing worse than a smelly dog is a buck goat in rut. Both are strong odors that are offensive to my human nose and while I respect my critters' need for these odors as part of their culture, I will have no smelly dogs in my house!

Over the years I have devised and collected several different ways to deal with common odor problems associated with dogs. I hope you find some of these helpful and will share with me any others you have found successful.

Skunked!

Skunks are one of my favorite wild critters around our farm until, in self-defense, they spray an inquisitive Labrador. For those who might not know, skunks have a scent sac at the base of their tails that holds an oily substance they spray when they are scared for their life. They will dip their tail in the sac and spray

the oil in the direction of the predator or threat. This oil is very difficult to get out of the coat of a dog.

However, I found in *Chemical and Engineering News* (October 18, 1993, page 90) the perfect recipe for dealing with this oily, smelly mess that uses peroxide. The peroxide oxidizes the odorant, converting it to something that can react with the weak base NaHCO₃. As a result, it forms a water-soluble substance that is more easily removed with a good doggy shampoo follow-up and thorough rinsing.

Skunk Deodorizing Pet Peroxide Recipe

1 quart of 3% hydrogen peroxide
¼ cup of baking soda (NaHCO₃)
1 teaspoon of liquid detergent

Follow bath with a tap-water rinse.



Continued from page 3

Fish “Perfume”

If you have ever taken your dogs to the beach or by a fishing pier, they will be the first ones to find all the dead fish and fish parts. I know mine have rolled and spread the “perfume” around quite a bit before I can get to them to stop it. Well, they are Labs after all, and fish are part of their heritage—but yuck, what a horrible odor! Again, the culprit seems to be in the oils, which are hard to neutralize. Of course, the wet dog smell doesn’t help either.



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I have tried lemon juice, home remedies, herbal rinses, and good ol’ baking soda to get fishy odors out of dog fur, but nothing seems to be satisfactory.
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I have tried lemon juice, home remedies, herbal rinses, and good ol’ baking soda to get fishy odors out of dog fur, but nothing seems to be satisfactory. Baking soda is a good, natural way of removing fish odors from the surface of anything other than your dog’s coat. To treat things other than dog’s coat that have a fishy smell, wash the odor-offensive area with clean water. Then sprinkle baking soda over the area. Then rub the baking soda into the wet area. Let it dry. Then brush or vacuum the area to remove the dried materials.

That still leaves a smelly dog. In my quest to be safe, natural, and environmentally friendly, I just could not

find any combination of herbs to help in this situation. However, I did find a safe, environmentally friendly product that does seem to work well on several doggy odor problems. It is called Nature’s Secret Weapon™. The company lists in their literature that the “secret” behind the product’s success lies within a two-stage odor destroying technology.

Two-Stage Odor Neutralizer

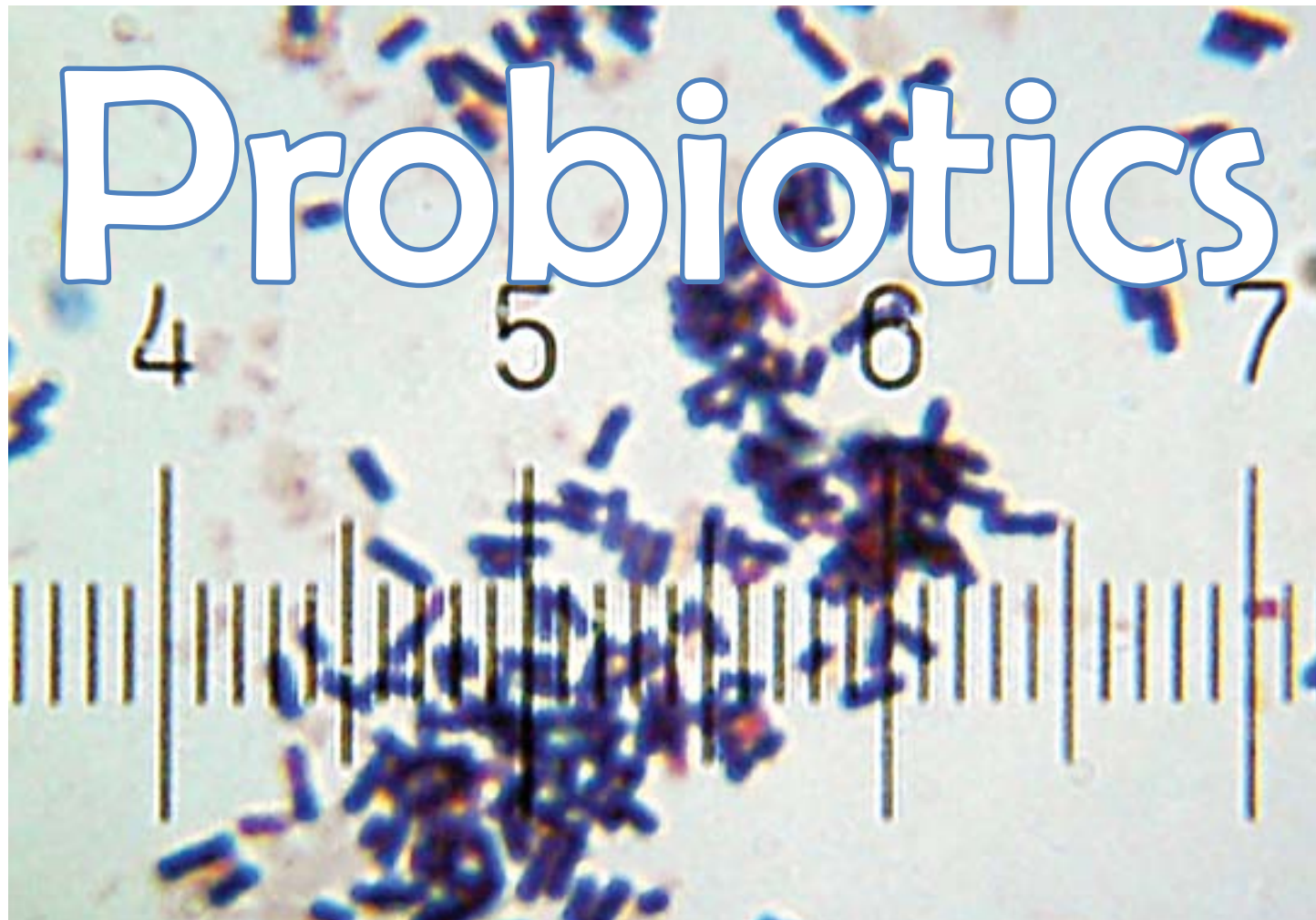
The first stage instantly microencapsulates odor molecules from any biological source including dogs, cats, skunks, garbage, kitchens, bathrooms, and mildewed basements so you can’t smell them. You may have to clean up the source of the odor, but you won’t have to put up with the stink while doing it.

In the second stage, the odor (an organic carbon source) is converted into harmless carbon dioxide through an organic process called organic bioremediation. This is a process created by nature and perfected by years of microbiological research. The second stage permanently eliminates odors.

Nature’s Secret Weapon™ is **certified natural, 100% biodegradable**, and meets **green** certification by independent certification agencies. Their products are shipped from their factory in **PetSafe™ biodegradable foam, safe for children, pets, and our environment**. I don’t usually endorse specific products, but for those hard-to-deal-with smelly dog problems, this is one you might want to check out. They have a toll-free number — (800) 930-7949 — and a number to call to talk to an odor expert, (517) 579-9557.



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Probiotics can greatly enhance your dog's diet and improve their overall condition. After a course of antibiotics, vets will often recommend adding probiotics in the diet to help rebalance the flora in the intestinal tract that were affected by the antibiotics. Technically, they are defined as "live microorganisms which when administered in adequate amounts confer a health benefit on the host."¹

¹ FAO/WHO (2001) Health and Nutritional Properties of Probiotics in Food including Powder Milk with Live Lactic Acid Bacteria. Report of a Joint FAO/WHO Expert Consultation on Evaluation of Health and Nutritional Properties of Probiotics in Food Including Powder Milk with Live Lactic Acid Bacteria.

Lactic acid bacteria (also known as LAB—no pun intended here) are the type of microbes most of us are probably familiar with. You will usually see these listed on yogurt packages as Lactobacillus and Bifidobacterium. The research and material on this topic is extensive and with little effort many types can be identified. I have successfully used probiotics to treat candidiasis, balance the system's pH, and strengthen the immune system overall. Perhaps one of the most striking examples of this last claim is dogs that did not get sick from exposure to salmonella. With the Labradors' known tendency to pick up garbage, dead fish, or anything else disgusting on the ground, this is a nice thing to know.

LAB-rich foods have also been known to reduce inflammation of the bowels and help with the digestion

Lactobacillus by Bob Blaylock (https://commons.wikimedia.org/wiki/Lactobacillus#/media/File:20101212_205549_LactobacillusAcidophilus.jpg)

of certain types of grains. This might explain why dogs on a dry food diet seem to benefit from the addition of LAB to their diets. A meta-analysis suggested probiotics may reduce antibiotic-associated diarrhea.

Probiotics are also helpful in fighting ulcers, something that is not too common in Labradors; however, I have had two older dogs with leaky gut syndrome and the probiotics were useful to restoring health once we got the gut healed.

I am fortunate enough to have my own dairy goats and an ample supply of fresh raw milk. I make my own fermented milk product called "kefir," which has many more varieties of probiotic bacteria in it than yogurt. Kefir can be purchased at any good organic food market or, if you are lucky enough to obtain your own fresh milk, kefir cultures can be purchased from most cheese-making supply companies. There is no great talent needed to make kefir, you simply add culture to milk. I have been using the same culture for over 4 years now with no change in the quality of the kefir. With Labradors, you do not need much kefir to receive the benefits—1 tablespoon for a dog up to 60 pounds and 2 for any dog over that weight in their morning meal. I will usually do this for 3 or 4 weeks

after a course of antibiotics, illness, or with bitches nursing a litter. If you soak your food in hot water, add it after the water has cooled off. With puppies, I use one tablespoon per puppy up to about 4 months.

If your dog will be out in the field where the water

Probiotics are also helpful in fighting ulcers ...

and grounds are questionable, anytime there is a stress in the dog's life, or when there are signs the pH is out of balance, a course of probiotics is in order. If you purchase dry capsules, there are several precautions you should be aware of. First, you should get the highest concentration of bacteria you can. You will pay more, but it is worth it. Try to buy multiple types of LABs in one capsule, it is well worth the extra pennies spent. Freshness cannot be stressed enough; order direct from the manufacturer if you can, or from a reputable dealer that keeps them refrigerated. Otherwise you lose the benefit of the probiotic if it is exposed to high temperatures.



Upside-down smiling Lab

Raw Bones

“Give a dog a bone” has been chanted for so long it’s hard to imagine there can be anything wrong with the idea. However, there are several considerations about feeding raw bones to dogs that you should review before you give one to your dog.

Many people think that there is some nutritional value to feeding raw bones. That could not be further from the truth. In *Orthopaedics: Principles and Applications*, by Samuel L. Turek MD,¹ there is an excellent discussion of the composition of bones. We are talking about just the bone here, no meat on it at all, and his figures are based on a dry weight (no water) of one pound of bones. The largest component of the bone is composed of 65% to 70% inorganic substances; the largest amount of these is the compound called hydroxyapatite, a crystalline mineral. The chemical components of hydroxyapatite are calcium, phosphorus, oxygen, and hydrogen, usually written as $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$. There are no vitamins, fatty acids, enzymes, proteins, or carbohydrates. But the raw bone is a good source of calcium and phosphorus—that is, if it is ground up finely.

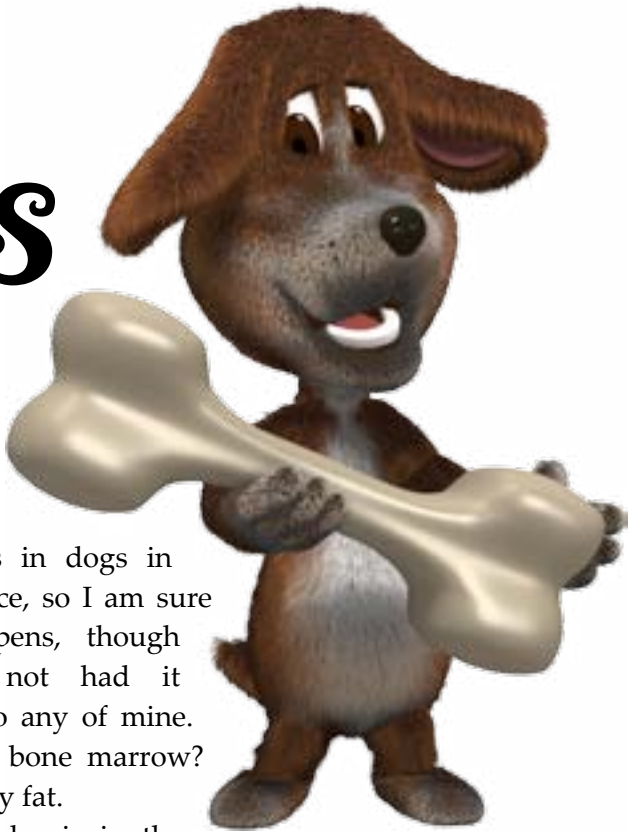
But we usually give our dogs whole raw bones. So how good is that? Well they can’t get much calcium from the bone unless they break it down by cracking it, giving the acids in their stomachs a chance to dissolve it. But the danger of a broken tooth in doing that—or worse still, a lodged bone fragment in the stomach, throat, or intestines—hardly makes it worth it. My vet has seen

¹ Published by J. B. Lippincott, 1985, 2nd Edition. pages 113 and 136.

several cases of bone fragments in dogs in his practice, so I am sure this happens, though I have not had it happen to any of mine. And that bone marrow? It is mostly fat.

What else is in the raw bone that might make it worthwhile to feed? Bones also have organic matter, at about 30% to 35%. Almost all of this organic matter is a substance called collagen. Collagen is a fibrous protein. It is poorly digested by dogs. There is also a tiny bit of chondroitin sulfate, keratin sulfate, and phospholipids. The following observation is from *Canine and Feline Nutrition* by Case, Carey, and Hirakawa, 1995, page 175: “The matrix of bone is composed of the protein collagen. Collagen is very poorly digested by dogs and cats, yet will be analyzed as protein in the pet food.” So what things are left in the raw bone are things that dogs can’t digest either. It seems to me there are not too many reasons to feed a raw bone after all, especially if you have tried to give every dog in your collection of dogs a bone. Even the nicest of dogs can get very possessive over a prize like a fresh raw bone. Dog fights are almost a certainty when bones are involved.

If you are thinking of a good source of calcium for your dog’s diet, you might want to consider eggs instead. An organic, true free-range egg, hard boiled for 5 minutes, crushed shell and all, then given in your dog’s food every other day will provide better usable nutrients to your dog than raw bones.



Helpful Canine Breeding Chart

Did you ever wonder what all that “carrier” and “clear” verbiage you hear breeders talk about really means?

Take a look at this chart to help you sort it out. Remember, the best breeding would be between “clear to clear” parents. Sometimes breeders will do a breeding with a carrier of the targeted disease gene just to help keep the gene pool large and viable. This chart will help you understand the outcome.

Ideal Breeding Pair is clear to clear. Puppies will not have the disease gene (neither as a carrier nor as an affected dog).

Breeding Is Safe with a carrier to a clear. No affected puppies will be produced. However, some or all puppies will be carriers. Accordingly, it is recommended that

carrier dogs that are desirable for breeding be bred with clear dogs in the future, which will produce 50% carrier and 50% clear animals, to further reduce the disease gene frequency. These offspring should be tested by VetGen for this defective gene, and if possible, only the clear animals in this generation should be used.

High-Risk Breeding is carrier to carrier. Some puppies are likely to be carriers and some puppies are likely to be affected. Even though it is possible that there will be some clear puppies when breeding carrier to carrier, in general, neither this type of breeding pair nor carrier to affected” are recommended for breeding.

Breeding not Recommended of affected to affected. All puppies will be genetically and medically affected.

	Clear Male	Carrier Male	Affected Male
Clear Female	100% Clear	50/50 Carrier/Clear	100% Carrier
Carrier Female	50/50 Carrier/Clear	25/50/25 Clear./Carrier/Affected.	50/50 Carrier/Affected
Affected Female	100% Carrier	50/50 Carrier/Affected	100% Affected

There's Something Fishy Here!

The history of the Labrador is inextricably intertwined with fish. There is no getting away from their ethnic background and I thought it would be beneficial to discuss briefly the value of fish oil in the Labrador's diet.

Fish oil is from the tissues of oily fish but is actually not made by the fish. The fish accumulate omega-3 fatty acids from either consuming microalgae that produce these fatty acids, or by eating prey fish that have accumulated omega-3 fatty acids from microalgae. Fish oil should be part of your dog's healthy diet because it contains these omega-3 fatty acids, eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), precursors to something known as eicosanoids. These are the elements in fish oil that reduce inflammation throughout the body.

I have found that the preferred source of omega-3 should be from the fish's body, not the liver. Many years ago I fed cod liver oil to the dogs and found that there can be problems with vitamin A overdosing if you do this. This is not always the case, but worth avoiding. There are many different ways fish oils are purified and the process used can determine the quality of the fish oil you get. You can interpret this as equaling to a higher cost, however you are getting what you pay for.

I am careful to give high-quality omega-3 supplements to my pregnant girls because it has been suggested in studies that these kinds of fatty acids are responsible for the neuronal growth of the frontal cortex of the brain which, a key player in behavior.

In researching more on omega-3s, I read that recent studies have suggested that fish oil use in humans may affect depression, and importantly, suicide risk. One such study took blood samples of 100 suicide-attempt patients and compared the blood samples to those of controls

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and found that levels of eicosapentaenoic acid were significantly lower in the washed red blood cells of the suicide-attempt patients. I have found that older dogs in particular do appear happier after getting extra omega-3 supplements in the diet. Whether is it altering their mood directly or indirectly by helping inflammation of old joints, I can't say. But others have reported that feeding the fish oil with another anti-inflammatory like glucosamine has a very good synergistic effect.

And while on the topic of old dogs, many people have commented about my 15- to 18-year-old dogs having such a clear state of mind. I attribute a lot of this to exercise and diet, but I think a key component of the diet is the omega-3 fatty acids. Having that extra omega-3 fatty acid keeps the mind sharp in old age too. Several studies are emerging to show that there is a link between omega-3 fatty acids and cognitive problems.

One last benefit of the omega-3 fatty acids is on the heart. Last year we rescued a Lab with severe heartworm infestation, among other things, and one of the strategies to help him recover was to feed high quality fish oil. His recovery was remarkable and one would hardly know today looking at him that he had heartworms and was previously in such a debilitated condition.

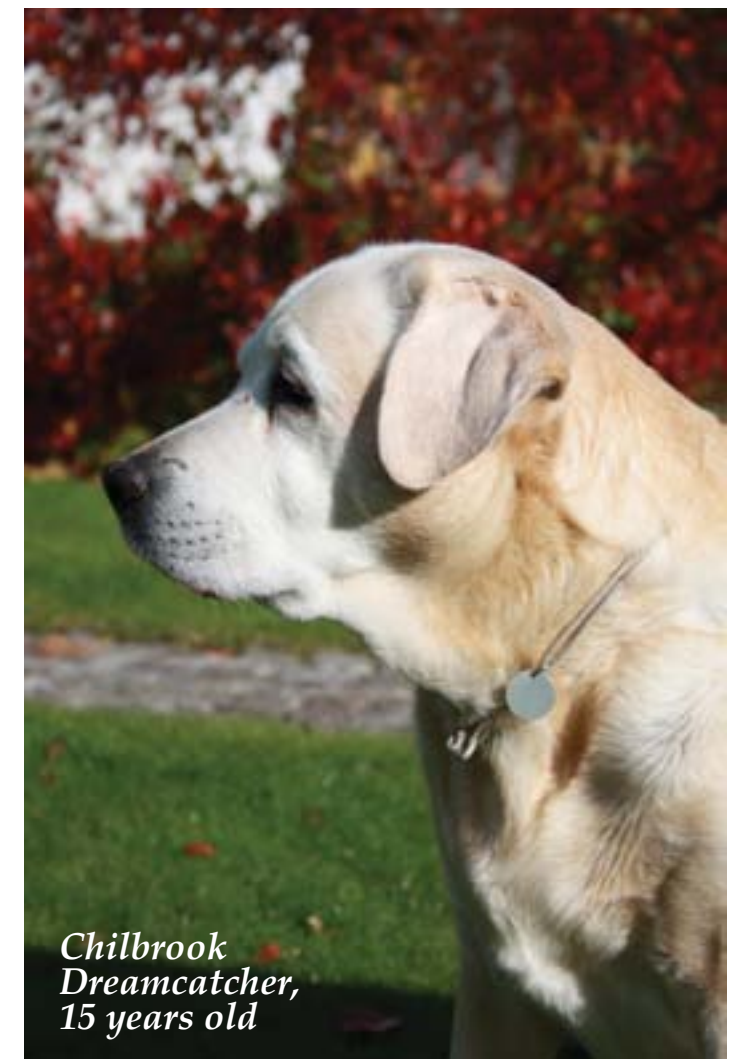
Omega-3 fatty acids such as those found in fish oil supplements can help with cognitive function, heart health, and inflammation of joints. High quality and purity are key to receiving the full benefit of these fatty acids along with a balanced diet and structured exercise for your dog.

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*Chilbrook
Dreamcatcher,
15 years old*

PET INSURANCE

This tip is on a slightly different subject: pet insurance. It doesn't take long for the bill to get over a thousand dollars or more at the vet's office these days for seemingly small emergencies or even routine visits. Have you noticed? And how many breeders have been told stories of their sold pups either not receiving medical treatment they need or being put down because the owners could not afford the surgery or treatment?

The high cost of keeping dogs these days sometimes forces even families with the best intentions to make some tough decisions. Do we take a loan for the \$3000-plus hip or knee surgery the dog needs? Or do we get the new car to commute to work? Do we spend hundreds a month on special meds and follow-up treatments for Fido then not buy the groceries we need? It might seem I am exaggerating here, but I have heard these types of discussions—and in almost every case the dog loses. These dogs either do not get the treatment they need, are given up to Lab Rescue, or simply put down.

To ensure that you or your sold puppies are not placed in this situation, you should consider getting pet insurance. Most reputable breeders will offer some type of health guarantee and some states even require a minimum guarantee often referred to as the "puppy lemon law." The AKC has made it even easier

for breeders to go one step beyond this basic buyer protection plan with a free 60-day accident and illness coverage for each registered puppy in your litter. To ensure buyers enroll, a breeder can preregister the pups and enroll them before transferring to the new owners. If anything happens to that pup in those first two months, they are covered. It encourages the new owners to continue the policy, which is very affordable when you show people some of your vet bills for simple things.

One of my girls found dead fish parts left by some fisherman at the river and ate some before I could stop her. Twenty-four hours later she was one sick dog and spent three days at the vet's for treatment. The bill was over \$1600. Fortunately, her insurance covered the entire bill. Accidents and incidents like this happen with our active Labs and many times there is no way to prevent these things. Tendon cuts or pad cuts on glass or obstacles while doing field work, joint injuries while doing agility, a stray dog attack, or worse still, cancer. It is comforting to me, with insurance coverage on all my dogs, to know I do not have to take a loan out, run up a credit card bill, or try to cut corners on treatments to save money. They get quality care for their entire life at a fraction of the cost of a yearly exam with bloodwork and vaccines.

If you haven't considered pet insurance before, I urge you to look into it. There are many plans and options available now to offer peace of mind that your dogs will always get the quality of care and treatment they deserve.



People are thinking seriously these days about how to do things in a more environmentally friendly way, that is, going green. I, for one, am just thrilled. I have been practicing organic gardening, herbal medicine, and natural living for over 40 years and can attest that in applying these "green" practices to my dog breeding, the long-term effects are well worth the effort. So I thought I would highlight in this column a few tips for going green with your dogs.

Lighting in the Kennel

Most people don't realize scientific tests prove that common cool-white fluorescents affect emotional, physical, and mental well-being. Most office and institutional buildings use the outdated cool-white fluorescent bulbs. The narrow-light spectrum

(unnatural light) and the flicker these older bulbs and ballasts produce, along with the flickering light computer screens generate, play havoc on eyes and produce negative physiological effects. Studies with humans have shown people tire more easily, experience difficulty concentrating, make more mistakes, and become more irritable. I feel that in many instances, this is also true with our dogs kept in kennels. I have changed over to full-spectrum lighting, which I feel is the best for animals. One effect of the lighting change is a peaceful kennel.

Rechargeable Plus Solar Panels

Keeping the small crate fans going at a hot summer show or trial can be challenging when you are relying on batteries, not to mention the cost of those batteries. I am always looking for ways to reduce my carbon footprint and save money too—to which end I found a folding solar panel set that will not only recharge those batteries from sunlight with a special battery recharging unit, but will run a larger 12-volt fan that keeps the air circulating in my van. It was around a

\$100 investment but now I can be assured my fans won't stop working on those hot days and I can feel good about helping the environment too.

Cleaners

We use way too many chemicals to clean our houses and it really isn't necessary. An old-fashioned yet highly effective disinfectant for cleaning floors is made in a bucket by mixing ½ cup of white vinegar with 1 gallon of hot water. This is safe for hardwood, linoleum, tile, and any washable surface. If you have carpets, there are three choices: salt, baking soda, or cornstarch. It is really that simple. Just as salt helps to restore the color of dark colored laundry, it also helps to bring out the color in carpeting, while at the same time removing dirt. Sprinkle ¼ to ½ cup of salt (depending on the size of your rug or carpet), let it sit for 15 to 30 minutes, and then vacuum. You can also alternate between salt and cornstarch. The instructions are the same. To remove odors from carpets, add ¼ cup of baking soda to the salt (or cornstarch) and make a powder with the mixture, sprinkle on the carpet and let it sit for at least 30 minutes, and then vacuum. If you want to add a fresh scent to your carpet, you can sprinkle cinnamon, or all spice on the carpet, let it sit for 15 minutes and then vacuum.

To further ensure that you are helping the environment to remain toxin-free, here are a few more simple things that you can do:

1. Use cloth rags: Never use paper towels or the new "disposable wipes." Such products are bleached, and are therefore contain toxins. Recycle old clothing, sheets, and towels into rags. Wash once a week and you'll never have to waste money on paper products again.
2. Recycle paper and plastic bags: Never buy plastic garbage bags. Use the bags that you get from the grocery store to dispose of cat litter and household garbage or reuse your dog or cat food bags for this. Invest in cloth bags to use for groceries, and take only one or two plastic or paper bags from the grocery store to use as trash bags. Paper bags are the most environmentally friendly option; however, most cities have ordinances against using paper bags for weekly trash pick-ups. Minimize your use of plastic.

Composting Waste Materials

If you have more than two large dogs, the fecal waste material will accumulate rather fast in your kennel. In researching for this article I came across an interesting study done in Alaska where the density of the dog population in some areas can reach very high proportions. The Fairbanks Soil and Water Conservation District requested 319 funds from the Environmental Protection Agency for a study on the best way to handle dog waste. This study focused just on dogs and the results were very positive. Here is what they did to compost the dog waste:

1. Prepare a sunny, well-drained site near the dog area for a compost bin. Add sawdust¹ to the dog waste, mixing thoroughly after each addition. Gradually add small amounts of water until the compost mixture is as moist as a wrung out sponge (50% to 60% water).
2. Continue adding ingredients until the compost is 2 to 3 feet deep. Place the cover over the compost mixture and let the temperature rise.
3. Once a bin is full, do not continue adding fresh materials.
4. Insert the compost thermometer daily and record an average internal temperature. When it starts to decline, in about two weeks, it is time to turn the compost.
5. Turn the whole compost pile, turning the outside to the inside in order to provide more complete composting. Repeat the turning process regularly until it is a crumbly, black, dirt-like mixture. Cooking time varies, usually from 4 to 8 weeks. If desired, the compost can be cured prior to land application.

This really works out nicely to produce organic matter to add back around flower beds and landscaping.

With just a little planning you can help our planet and our homes exist as toxic free as possible. This is not only good for the dogs but will save you money and you can feel good about doing your part to **go green**.

¹ What I found works just as well is using the straw bedding from the dog houses. The dogs break this down rather quickly and it is perfect for mixing into the fecal matter.

Foreleg Problems

There are several abnormalities of the dog's forelimb that breeders should be aware of so early treatment can be obtained.

Most common are problems that cause bones not to grow correctly and usually involve the growth plates in the forearm bone known as the ulna. These problems will occur in young dogs still growing. There are some types of genetic origin in Labradors, although the most common cause is injury.

There are two main bones in the forelimb of a dog, the ulna and the radius. Forelimb deformity begins when the ulna's growth is disrupted because of some problem at the growth plate. What happens next is the radius bone in the foreleg begins to bow outward in what has been termed a "bowstring." The bowing can also cause the wrist bones of the dog to extend outward giving them a "fiddle front" look. This term has been used to describe the exaggerated curves of the bones as one bone grows and the other is not able to keep up. One often sees this condition on very short legged breeds of dogs like Basset hounds; however it is not limited to that breed by any stretch. Another potential problem with the damaged growth plates and this extreme bowing is instability of the elbow.

Dogs with these growth disturbances usually can walk on the affected limb and may not exhibit pain or lameness in mild cases. Most dogs however will begin to limp and favor the leg as they grow. There are three main causes of the growth plate disturbance associated with the deformity: (1) ligament injury or osteoarthritis of the carpus bones in the wrist; (2) elbow subluxation and associated osteoarthritis; when there is extreme subluxation on the top end of the ulna, the whole leg will appear very limp from the lack of stability at the elbow; (3) external rotation, will force the dog to walk on a part of his foot other than the pad.

The proper care and management of these plate injuries is difficult and all options should be discussed with a specialist/surgeon after a comprehensive diagnosis has been made. The 10-week-old pup with

growth plate abnormalities must often be treated differently than the 5-month-old or 8-month-old pup. Treatment depends upon the period of growth remaining. Expensive surgery is often necessary several times during the growth stages to enable the pup to grow the normal leg bones as possible.

Breeders need to be on the lookout for any change in growth with puppies they are running on past the normal 7 or 8 week time a litter is kept. Active pups like Labradors are prime candidates for injury to the forearm growth plates. When a genetic origin is determined for the problem it is best to avoid the bloodline with the problem. Care should be taken, however, to be absolutely positive the cause is genetic and not injury before dropping a line that might otherwise be valuable in a breeding program.



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By Debby Kay

Some Congenital & Heritable Disorders

After one looks over this imposing list of “problems,” you may begin to wonder how in the world can we ever produce a so-called “clean” dog? In the previous articles I discussed some of the issues of the breed and how breeders can control traits in a bloodline. In this article I offer a listing of other things that can cause a dog and a breeder misery if they are present in a line. My intention here is to provide a convenient listing of disorders recorded in our breed that I’ve turned up through an exhaustive literature search and personal notes from interviews with many Labrador breeders.

Most of these disorders, thankfully, are rare. I have discovered that some lines will still produce problems such as dwarfism. The puppies that are affected are put down at birth but their littermates that are not affected are bred from. True dwarfism is rare, as we have DNA tests for this today. What is showing up in today’s puppies is something that affects their front legs in a similar way and is often diagnosed as canine hypertrophic osteodystrophy. There is no DNA test that can help prevent this.

My hope is that by providing what is known so far about these disorders we can perhaps spare some lives and pain in the future. I strongly suggest that anyone wishing further information contact The Association of Veterinarians for Animal Rights, P.O. Box 2008, Davis, CA 95617-0208. They publish a very complete work on congenital and heritable disorders with very clear explanations. Their web address is www.avar.org. I also want to suggest that any serious student of

breeding should read Malcolm Willis’ book *Genetics of the Dog*. He has many Labrador-specific examples of hereditary problems and methods of dealing with them. The book is much more technical than I have attempted with this material, but well worth reading and studying.

A very important merger occurred that has significant impact to serious breeders. The Orthopedic Foundation for Animals (OFA) has combined its resources with the Institute for Genetic Disease Control (GDC). They maintain some of the most comprehensive databases and it is from these data sets researchers can learn things about problems affecting our breed. In 2002, it was planned that a Canine Health Information Center (CHIC) database would be established that breeders could access information for information needed to make wise breeding choices. The database includes information from many sources, making it very useful. Labradors are one of the enrolled breeds. The parent club for the Labrador Retriever has determined at a minimum every breeding dog should have CERF eye clearances, hip and elbow clearances, and an EIC clearance before a CHIC number will be issued for that animal. If you are looking to buy a puppy, the breeder’s stock should meet this criteria at a minimum. The web site for the database is www.caninehealthinfo.org.



Traits

Allergies: Inhaled allergic responses to things like dust, feathers, molds, and pollens appear to be on the rise in the Labrador. Several vets I spoke with said they see a large number of Lab clients with allergies and it mainly shows as itchiness. I wondered, when I was reading the literature, whether a lot of problems are not from management of the diet and the dog’s environment more so than a genetic predisposition for this. I can’t remember now how many phone calls I have received where potential puppy buyers would say something like, “Oh, I don’t want a chocolate they always have allergy problems.” I don’t have any first-hand knowledge of that statement being true and could not find anything other than unfounded hearsay from other breeders or veterinarians to back up that statement. I have had thousands of Labradors in my care over my career and cannot say I have seen allergies more in one color than the other. What I am seeing and hearing more of, though, is food allergies in our breed. Is any of this inherited? The best I could find is there is a tendency for it to run in families.

Carpal Subluxation: A malformation of the lower leg bones (“wrist”). These are usually seen as out of alignment.

Cataracts: Not too big a problem in the breed, though still present and must be watched for. Autosomal dominate in the breed.

Cleft Palate: This is an autosomal recessive in the Labrador and fortunately rather rare.

Coloboma: Abnormal development of the eye which can lead to blindness. The mode of inheritance is unknown in the Labrador.

Corneal Dystrophy: This affects one or rarely both eyes. I could not find any breeders with any first-hand knowledge to share. The literature shows nothing as to how this might be inherited in Labradors.

Craniomandibular Osteopathy: Abnormal development of the bones of the faces. I was appalled when I first saw photos of Labs affected with this abnormality, but it has been reported in the breed. None of the literature I scanned suggested that the mode of inheritance is known for the Labrador but obviously you will want to avoid any lines that produce it.



Cryptorchidism: This is when one or both of the testicles do not descend into the scrotum. It appears to be recessive in the Labrador.

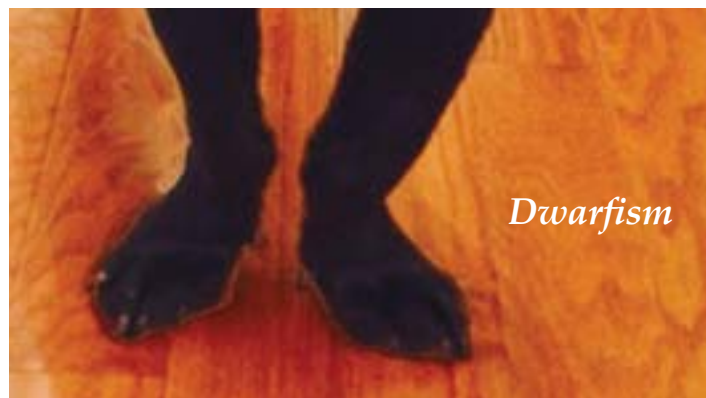
Chronic Hepatitis: The inheritance is unknown in the Labrador.

Dacrocystitis: Inflammation of the tear sac. I could not find much information about this problem but it has been reported in some literature to be a common problem in the breed. The inheritance is unknown in the Labrador.

Deafness: I have been told but could not verify this has been found in Labradors. Mode of inheritance is unknown.

Dermatitis (hot spots): Several of the vets that I asked about this problem could not agree whether or not it is a heritable or congenital problem in the breed. I think part of the issue is with the definition of dermatitis, as some want to include conditions that others leave out. I am often asked if chocolate Labradors are more prone to skin problems than the other colors. My surveys indicate that most vets see and treat a larger percentage of chocolate Labs than other colored Labs for skin problems but overall in my own program I can’t say my chocolates have had any skin problems. I could not find any substantive results that concluded how or if this is a heritable trait but I included it here since the possibility exists.

Degenerative Myelopathy: This is a condition where the hindquarters gradually lose coordination and grow increasingly weaker. My own experience with this is very limited and was mostly with my working German Shepherds; however, the literature reports the condition in the Labrador but does not at this time have the required evidence of association



between the genetic mutation and the actual spinal cord evaluation to make the current tests valid for the breed. The research is being conducted at the University of Missouri and I am sure the list for approved breeds will be updated as their research continues. There are some testing laboratories that offer a test for this at this time but I was unable to find validation from research about these tests.

Diabetes Mellitus: A disorder of the body's ability to produce insulin. It is believed to be recessive but I could not find much in the literature specifically to Labradors.

Distichiasis: Abnormal growing eyelashes. I wonder sometimes where these Labs in these vet journals come from but this is another one of those hopefully rare abnormalities in the breed. No mode of inheritance was suggested.

Dwarfism: This disorder has a fancy name of osteochondrodysplasia, but whatever you call it, it is a sad state to see a dog in. It is inherited as an autosomal recessive and appears most frequently in the field trial lines. There is a DNA test now available for this particular form of bone deformity. There are other deformities that appear to be similar such as Canine Hypertrophic Osteodystrophy but this has not been well researched and the mode of inheritance is not reported.

Ectropion: This is where the eyelid rolls out, something very common on Bloodhounds but not desirable in Labradors. I have seen the trait strongly embedded in certain lines of Labs but it still appears to be an autosomal recessive trait. (See also *Entropion*.)

Elbow Dysplasia: For many years and even to some extent today, Lab breeders will put off any lameness in puppies as growing pains and will not bother to x-ray the elbows when taking the dog for a hip certification.

Unfortunately, some of those so-called growing pains were most likely a form of elbow dysplasia. As a result, we now have quite a serious problem in the breed. I have some good breeding information on this condition and have spent many an hour agonizing over the interpretation of the data. It appears from the examination of the breeding records of one dog that it is a dominant trait with a fairly high degree of penetrance and yet when I look at another set of breeding information I would have to say it is polygenetic like hip dysplasia. One thing I can say from my own experiences with relative certainty, however, is that lines with poor front movement are much more likely to develop some type of elbow dysplasia.

Entropion: This is where the eyelid rolls inward. The trait has been in the breed for a long time and is still fairly common. If you find a line producing it, I would definitely avoid it. This is a recessive trait in the breed. (See also *Ectropion*.)

Epilepsy: As this book goes to print there is no conclusive research showing the mode of inheritance. There are also several factors that can cause epileptiform-type seizures. There are strong family links in the breed and there is much research now in progress on Labradors. Perhaps in the near future we will learn more about its mode of inheritance.

Folliculitis: This is an infection of the hair follicles. The trait that seems to be attributed to the chocolate color. It does occur in other colored Labs, not just chocolates, but there were no studies to show just how many of each color is affected. It is a serious problem, but the mode of inheritance is unknown in the Labrador.

Hereditary myopathy: This disease affects the muscles through a rare deficiency of type II muscle fibers. The literature shows the condition as autosomal recessive in the Labrador.

Hemophilia A and Hemophilia B: Both are blood clotting disorders. I used to think it was rare, but apparently it is on the rise in the breed. The mode of inheritance is unknown in the Labrador.

Hip Dysplasia: An abnormal formation of the hip socket that, in its more severe form, can eventually cause crippling lameness and painful arthritis of the joints. There are many excellent works dealing specifically with this topic. The condition is inherited as polygenetic. My own experiences in consulting with

working dog breeding programs and with my own program is that you can nearly eliminate the condition through careful selection of the breeding stock. But success is only achieved with a high criteria for overall soundness coupled with radiographic evidence of excellent structure.

Hydrocephalus: This is commonly called water on the brain. I have experienced it more with my Chihuahuas; however, I have whelped one Labrador puppy with the condition. I have not found anything that suggests it is inherited in the Labrador or that there is any predisposition for it. It is always fatal.

Hyperadrenocorticism: This is a disorder that puts an excess of cortisol in the system and is also known as Cushing's syndrome in humans. There have been reported cases in the Labrador; the mode of inheritance is unknown.

Hypoadrenocorticism: In humans, this is also known as Addison's disease. This is a rare disease and the Labrador is listed as a breed with an increased risk. No mode of inheritance has been determined.

Hypertrophic Osteodystrophy: Also referred to as HOD, this is an abnormal growth and inflammation in the bones attributed to rapid growth. It appears to be rather common and is often misdiagnosed as Panosteitis.

Hypoglycemia: Low blood glucose. There have been reported cases in the Labrador; the mode of inheritance is unknown. It does seem to run in certain families.

Hypothyroidism: Decreased thyroid gland production. I read varying reports on the incidence in the Labrador and nothing on the mode of inheritance. There is a registry now for this with the OFA. Perhaps with more information we will learn more about this disorder.

Idiopathic Epilepsy: Epilepsy of an unknown origin. Holistic vets seem to be paying more attention to the fact that allergies may be more common in causing this type of seizure than other causes such as accidents, nerve damage, or chemical reactions. Seizures do appear to be fairly common in Labradors. One encouraging bit of news, however, is that researchers are paying more attention to this disorder. There is research going on at VetGen and The Institute for Genetic Disease Control in Animals maintains an open research database. There are many very good

web sites on epilepsy in dogs with up-to-date status on the ongoing research in this area.

Leukodystrophy: This rare condition affects the nervous system, resulting in loss of balance and weakness. It is believed to be autosomal recessive in the Labrador.

Missing Teeth: If you want to stir a hornet's nest at a specialty, raise the issue of missing teeth. Some breeders today never look at missing teeth and others are fanatical about a dog having full dentition. No matter what side of the fence you take on the issue, it is an inherited trait. If you show in AKC shows, you may lose out to dog with full dentition if yours has missing teeth. The missing teeth are usually premolars and the mode of inheritance appears to be recessive in the Labrador.

Panosteitis: Sometimes called "Pano" by breeders, it is spontaneously occurring lameness. In my experience, supported by research, the lameness tends to occur without any history of trauma and usually in the front leg first. The lameness then moves around like it is migrating from leg to leg. There might be a period where it appears the dog is improving but then the condition will worsen again, with a cycle continuing sometimes for months. Diagnosing this condition can be very confusing when you add in the issue of all the elbow problems with the Labrador. While Pano usually goes away when the dog matures completely and there is little after-effect seen, you should not put off any persistent lameness in your dog as "just a case of Pano." An experienced veterinarian will usually be able to tell the difference from a thorough examination of your dog. X-rays will reveal a difference in bone density than is normally found. The mode of inheritance is unknown.



tance is unknown but it does appear to widespread in the breed.

Pannus: Chronic superficial keratitis affects the cornea in the eye causing vision problems. I was able to verify one case of this reported in a Labrador Retriever and this I believe is the first. This is another one of those disorders that relates to some type of malfunctioning of the immune system. It is not known how the condition is inherited.

Persistent pupillary membranes: My first experience with this was at an eye clinic where the vet doing the examination said to me that I best do a follow up in a few months with this puppy that residual membranes from before birth were still showing in the eye! I had never heard of this before yet it seems from the literature that it can potentially be an inherited condition or at least a predisposition for it in pups. I have never seen it since in any of my pups but it bears watching.

Progressive Retinal Atrophy (PRA): Volumes have been written on this subject, which has caused many heartaches for Labrador breeders over the years. There are two main types for the breeders to be concerned with—Generalized and Central. Both are inherited disorders in the Labrador and are recessive. Affected dogs should not be bred from, known carriers should not be bred from, and when possible, always confirm the condition with an electroretinogram (ERG).

Retinal Dysplasia: This disorder is definitely inherited in the Labrador and as far as I can determine from pedigree notes and literature searches, it is an autosomal recessive in our breed. There is a DNA test for this in Labradors.

Skeletal Dysplasia: This is a genetic disease in Labrador Retrievers that causes an early halt in growth of long bones. In contrast to other forms of dwarfism (pituitary dwarfism), the result is “disproportioned” dogs with shortened front limbs and raising dorsal line. Torso length and depth is not altered. Based on the latest knowledge, affected dogs do not exhibit further symptoms like malformed genitals or neuronal diseases as in pituitary dwarfism. The only known testing facility at this time is in England at www.Laboklin.co.uk

Tricuspid Valve Dysplasia: This malformation of the heart valve is a nasty trait to have in a line. It is more common in Rottweilers, as I learned from discussions with cardiologists, which I thought interesting

since some breeders have accused the Rotties of being crossed with the Labs and introducing the Black and Tan color as well as this gene to the Labrador gene pool. In any case, all breeding stock should be tested, as this appears to be an autosomal recessive in Labradors.

Wobblers syndrome: I found this in the literature but did not ever find a breeder who had actual experience with it, so my guess is that it is not very widespread in the Labrador. The disorder affects the spinal column and results in a wobbling gait. The mode of inheritance for the Labrador is unknown.

Other Useful Things

I am sure this list will be outdated by the time the book goes out as there seems to be a flood of new and better tests available to the breeders today. I have tried to get the most current addresses, phone numbers, and contact information available. Many of these groups have web sites that are kept current so once again your best bet is to look on the Internet for any changes. I have focused only on tests available in the United States.

Eyes

DNA testing for hereditary PRA. The OptiGen® prcd test is a DNA-based test that provides, for the first time, a method to eliminate Progressive Retinal Atrophy, or PRA, from the Labrador Retriever gene pool. The OptiGen® prcd test can be done reliably at any age. The test result will never change with age, and



will be the same whenever it is repeated. The prcd-PRA Test is done on a small sample of blood obtained by your veterinarian. This allows the lowest risk of contamination of the sample and added assurance of a match of the sample with the identified dog. You can find out more about this test by visiting their web site at www.optigen.com/

Electroretinography. This is not a particularly painful test and is recommended as positive verification if PRA has been diagnosed by a regular ophthalmoscope examination. Your ophthalmologist can provide more information on where this test can be performed in your area.

Yearly eye examination by a board certified ophthalmologist. These are no doubt important for Lab breeders considering the eye problems that plague the breed and should continue to be done on a regular basis throughout the dog's life. The results of the examination should be registered with the Canine Eye Registry Foundation (CERF), which maintains a very good database and conducts excellent research into eye problems afflicting dogs. The databases are being managed by the OFA; more information can be found at www.offa.org/eyes.html

Joints

Orthopedic Foundation for Animals: The OFA was originally created to assist breeders in addressing hip dysplasia however, in recent years they have added databases to assist breeders in assessing elbow deformities, craniomandibular osteopathy, thyroid, congenital heart disease, eye health, and DNA results. These are searchable databases, and printable electronic quarterly reports for our breed are also available. Both are useful tools for breeders. My only caution to breeders using this data is to be aware that it is not mandatory to submit x-rays to OFA. What this means is that if a dog's x-rays shows signs of dysplasia when the vet/breeder owner look at the x-rays in the office they are often not sent in to OFA. This will obviously skew the statistics for the percentage afflicted in any of these reports. Web: www.offa.org

PennHIP: “PennHIP” stands for the University of Pennsylvania Hip Improvement Program. PennHIP is a multifaceted radiographic technology (x-ray) for hip evaluation. Currently, the PennHIP Program is wholly owned by Antech Diagnostics, Inc.

The technique assesses the quality of the canine hip and quantitatively measures canine hip joint

laxity. The radiographs are made by certified PennHIP members worldwide and are sent to the PennHIP analysis center for evaluation. The resulting data is stored in a database, which is continually monitored as it expands. For more information, visit their web site at: <http://info.antechimagingsservices.com/pennhip/>

Wind-Morgan: This very excellent program was at the University of California, Davis, under the auspices of the *Genetic Disease Control* program, and was specifically an orthopedic evaluation and registry only for Labrador Retrievers. It not only looked at hips or elbows but also looked at all four hocks in the structure. Many breeders did include Wind-Morgan evaluations on their breeding stock while the program was active. Dogs were certified after one year old. The registry was an OPEN registry, which means you were able to ask about any dog and look at any progeny in the database as well. There are few open registries so this was a nice asset while it was available. I mention it here more for historical reference, as there are still a fair number of dogs in the breeding pool with this certification. For basic information, see this web page: www.angelfire.com/bc2/labradors/windmorg.html

Heart

Echocardiogram: This is one of two common tests that vets will use in determining the normalcy of your dog's heart. Check with your local cardiologist as to the availability in your area.



Color Doppler: Of the tests available, many breeders and vets feel this test is the best one for clearing a dog of tricuspid valve dysplasia. It is expensive but worth it if there is any doubt about your dog's status. Check with your local cardiologist as to the availability in your area.

OFA Cardiac registry: The applications for registering your dog after an examination by a cardiologist are available on line at: www.offa.org and their mailing address is:

Orthopedic Foundation for Animals
2300 E. Nifong Blvd.
Columbia, MO 65201-3856

DNA

VetGen™ (www.vetgen.com) offers DNA analysis, storage, and related services. This is useful if there is some question as to the parentage of a litter/puppy and is now required by the AKC for frequently used sires. I think any breeder offering a dog at public stud should have their dog DNA tested and registered for their own and the dog's protection.

DCC (www.vetdnacenter.com) DDC Veterinary 1-800-625-0874. They offer several quality canine DNA tests for use by breeders, veterinarians, and registries worldwide. All canine samples can be obtained easily using buccal (cheek) swabs included with your DNA sample collection kit. Their menu of DNA testing

for dogs include: Dog DNA Breed Test, Parentage Testing, Inherited Traits Testing, Inherited Disease Testing, and DNA Profiling.

Also available are color gene tests, which take all the guesswork out of which puppy in the litter carries what colors when it is not straightforward. I have to laugh every time I think about the test because it reminds about the lady who called and wanted to know what chance her dog had of carrying chocolate. I asked her a few questions including the color of the sire and dam. The sire was chocolate so I explained her dog definitely has to carry the chocolate gene. She still had the test done thinking the outcome could possibly be something else and of course it confirmed her dog carried chocolate. If you have a litter from 2 blacks that carry other colors, however, you will find the test especially helpful if you are trying not to keep a black dominant puppy.

Sonograms: I sure wish we had this aid 34 years ago when I got started breeding, it is certainly one of the best devices and tests for pregnant dogs. You not only get a pretty accurate head count of how many puppies are present, but you have a heads up if there are any problems since a reading of the heartbeats can be done. Some of the vets are using these instruments for other types of non-invasive diagnostics and as the science evolves I am sure our dogs will continue to greatly benefit.



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Labrador Retriever Whelping Table

Gestation is approximately 63 days

Bred Jan.	1	2	3	4	5	6	7	8	9	10
Due March	5	6	7	8	9	10	11	12	13	14
Bred Feb.	1	2	3	4	5	6	7	8	9	10
Due April	5	6	7	8	9	10	11	12	13	14
Bred March	1	2	3	4	5	6	7	8	9	10
Due May	3	4	5	6	7	8	9	10	11	12
Bred April	1	2	3	4	5	6	7	8	9	10
Due June	3	4	5	6	7	8	9	10	11	12
Bred May	1	2	3	4	5	6	7	8	9	10
Due July	3	4	5	6	7	8	9	10	11	12
Bred June	1	2	3	4	5	6	7	8	9	10
Due Aug.	3	4	5	6	7	8	9	10	11	12
Bred July	1	2	3	4	5	6	7	8	9	10
Due Sept.	3	4	5	6	7	8	9	10	11	12
Bred Aug.	1	2	3	4	5	6	7	8	9	10
Due Oct.	3	4	5	6	7	8	9	10	11	12
Bred Sept.	1	2	3	4	5	6	7	8	9	10
Due Nov.	3	4	5	6	7	8	9	10	11	12
Bred Oct.	1	2	3	4	5	6	7	8	9	10
Due Dec.	3	4	5	6	7	8	9	10	11	12
Bred Nov.	1	2	3	4	5	6	7	8	9	10
Due Jan.	3	4	5	6	7	8	9	10	11	12
Bred Dec.	1	2	3	4	5	6	7	8	9	10
Due Feb.	2	3	4	5	6	7	8	9	10	11
Bred Jan.	11	12	13	14	15	16	17	18	19	20
Due March	15	16	17	18	19	20	21	22	23	24
Bred Feb.	11	12	13	14	15	16	17	18	19	20
Due April	15	16	17	18	19	20	21	22	23	24
Bred March	11	12	13	14	15	16	17	18	19	20
Due May	13	14	15	16	17	18	19	20	21	22
Bred April	11	12	13	14	15	16	17	18	19	20
Due June	13	14	15	16	17	18	19	20	21	22
Bred May	11	12	13	14	15	16	17	18	19	20
Due July	13	14	15	16	17	18	19	20	21	22
Bred June	11	12	13	14	15	16	17	18	19	20
Due Aug.	13	14	15	16	17	18	19	20	21	22

Bred July	11	12	13	14	15	16	17	18	19	20
Due Sept.	13	14	15	16	17	18	19	20	21	22
Bred Aug.	11	12	13	14	15	16	17	18	19	20
Due Oct.	13	14	15	16	17	18	19	20	21	22
Bred Sept.	11	12	13	14	15	16	17	18	19	20
Due Nov.	13	14	15	16	17	18	19	20	21	22
Bred Oct.	11	12	13	14	15	16	17	18	19	20
Due Dec.	13	14	15	16	17	18	19	20	21	22
Bred Nov.	11	12	13	14	15	16	17	18	19	20
Due Jan.	13	14	15	16	17	18	19	20	21	22
Bred Dec.	11	12	13	14	15	16	17	18	19	20
Due Feb.	12	13	14	15	16	17	18	19	20	21
Bred Jan.	21	22	23	24	25	26	27	28	29	
Due March	25	26	27	28	29	30	31	4/1	4/2	
Bred Feb.	21	22	23	24	25	26	27	28	29	
Due April	25	26	27	28	29	30	31	5/1	5/2	
Bred March	21	22	23	24	25	26	27	28	29	
Due May	23	24	25	26	27	28	29	30	31	
Bred April	21	22	23	24	25	26	27	28	29	
Due June	23	24	25	26	27	28	29	30	31	
Bred May	21	22	23	24	25	26	27	28	29	
Due July	23	24	25	26	27	28	29	30	31	
Bred June	21	22	23	24	25	26	27	28	29	
Due Aug.	23	24	25	26	27	28	29	30	31	
Bred July	21	22	23	24	25	26	27	28	29	
Due Sept.	23	24	25	26	27	28	29	30	31	
Bred Aug.	21	22	23	24	25	26	27	28	29	
Due Oct.	23	24	25	26	27	28	29	30	31	
Bred Sept.	21	22	23	24	25	26	27	28	29	
Due Nov.	23	24	25	26	27	28	29	30	31	
Bred Oct.	21	22	23	24	25	26	27	28	29	
Due Dec.	23	24	25	26	27	28	29	30	31	
Bred Nov.	21	22	23	24	25	26	27	28	29	
Due Jan.	23	24	25	26	27	28	29	30	31	
Bred Dec.	21	22	23	24	25	26	27	28	29	
Due Feb.	22	23	24	25	26	27	28	3/1	3/2	

Labrador Coat Color Prediction — Table I

	Blk (BB)	Blk (By)	Blk (Bc)	Blk (Byc)	Ylw	Ylw (Ybc)	Ylw (Yc)	Chc pure	Chc(Cy)
BB	All Blk	All Blk	All Blk	All Blk	All Blk	All Blk	All Blk	All Blk	All Blk
By	All Blk	75% Blk 25% Ylw	All Blk	75% Blk 25% Ylw	75% Blk 25% Ylw	75% Blk 25% Ylw	50% Blk 50% Ylw	All Blk	75% Blk 25% Ylw
Bc	All Blk	All Blk	75% Blk 25% Chc	75% Blk 25% Chc	All Blk	75% Blk 25% Chc	50% Blk 50% Chc	50% Blk 50% Chc	50% Blk 50% Chc
Byc	All Blk	75% Blk 25% Ylw	75% Blk 25% Chc	63% Blk 25% Ylw 37% Chc	50% Blk 50% Ylw	38% Blk 50% Ylw 12% Chc	25% Blk 50% Ylw 25% Chc	50% Blk 50% Chc	38% Blk 25% Ylw 37% Chc
Ylw	All Blk	50% Blk 50% Ylw	All Blk	50% Blk 50% Ylw	All Ylw	All Ylw	All Ylw	All Blk	50% Blk 50% Ylw
Ylw (Ybc)	All Blk	50% Blk 50% Ylw	75% Blk 25% Chc	38% Blk 50% Ylw 12% Chc	All Ylw	All Ylw	All Ylw	50% Blk 50% Chc	25% Blk 50% Ylw 25% Chc
Ylw (Yc)	All Blk	50% Blk 50% Ylw	50% Blk 50% Chc	25% Blk 50% Ylw 25% Chc	All Ylw	All Ylw	All Ylw	All Chc	50% Chc 50% Ylw
Chc	All Blk	All Blk	50% Blk 50% Chc	50% Blk 50% Chc	All Blk	50% Blk 50% Chc	All Chc	All Chc	All Chc
Chc (Cy)	All Blk	75% Blk 25% Ylw	50% Blk 50% Chc	38% Blk 25% Ylw 37% Chc	50% Blk 50% Ylw	25% Blk 50% Ylw 25% Chc	50% Ylw 50% Chc	All Chc	75% Chc 25% Ylw

Key:
Blk = Black
Chc = Chocolate
Ylw = Yellow

Labrador Coat Color Prediction — Table II

	Blk (BB)	Blk (By)	Blk (Bc)	Blk (Byc)	Ylw	Ylw (Ybc)	Ylw (Yc)	Chc pure	Chc (Cy)
BB	All Blk (All will be BB)	All Blk 50% BB 50% By	All Blk	All Blk	All Blk 50% BB 50% By	All Blk	All Blk	All Blk	All Blk
By	All Blk 50% BB 50% By	75% Blk 25% Ylw	All Blk	75% Blk 25% Ylw	75% Blk 25% Ylw	75% Blk 25% Ylw	50% Blk 50% Ylw	All Blk 50% Bc 50% Byc	75% Blk 25% Ylw
Bc	All Blk 50% BB 50% Bc	All Blk BB, By, Bc, Byc	75% Blk 25% Chc	75% Blk 25% Chc	All Blk	75% Blk 25% Chc	50% Blk 50% Chc	50% Blk 50% Chc	50% Blk 50% Chc
Byc	All Blk	75% Blk 25% Ylw	75% Blk 25% Chc	63% Blk 25% Ylw 37% Chc	50% Blk 50% Ylw	38% Blk 50% Ylw 12% Chc	25% Blk 50% Ylw 25% Chc	50% Blk 50% Chc	38% Blk 25% Ylw 37% Chc
Ylw	All Blk All By	50% Blk 50% Ylw	All Blk 50% By 50% Byc	50% Blk 50% Ylw	All Ylw	All Ylw	All Ylw	All Blk	50% Blk 50% Ylw
Ylw (Ybc)	All Blk 50% By 50% Byc	50% Blk 50% Ylw	75% Blk 25% Chc	38% Blk 50% Ylw 12% Chc	All Ylw	All Ylw	All Ylw	50% Blk 50% Chc	25% Blk 50% Ylw 25% Chc
Ylw (Yc)	All Blk 50% By 50% Byc	50% Blk 50% Ylw	50% Blk 50% Chc	25% Blk 50% Ylw 25% Chc	All Ylw	All Ylw	All Ylw	All Chc	50% Chc 50% Ylw
Chc	All Blk 100% Bc	All Blk	50% Blk 50% Chc	50% Blk 50% Chc	All Blk	50% Blk 50% Chc	All Chc	All Chc	All Chc
Chc (Cy)	All Blk 50% Byc 50% Bc	75% Blk 25% Ylw	50% Blk 50% Chc	38% Blk 25% Ylw 37% Chc	50% Blk 50% Ylw	25% Blk 50% Ylw 25% Chc	50% Ylw 50% Chc	All Chc	75% Chc 25% Ylw

