The Myth of Hybrid Vigor in Dogs (and a simple genetics example)

by Karen Peak

In the late 1990's the late geneticist Dr. George Padgett found more hereditary diseases in cross bred dogs than is found in the Cocker Spaniel. His findings were printed in a several issues of Dog World Magazine.

More fantastic information can be found here (DogPlay) and at a couple links at the bottom.

The concept of hybrid vigor assumes that a crossbred animal (and this term is most often used in discussing dogs) will be healthier than a purebred. In reality, this is often false.

In order to be a hybrid, an animal must be the product of two different species: donkey and a horse, offspring is a mule; lion (m) and a tiger (f), offspring is a liger; tiger (m) and lion (f), offspring is a tigon; wolf and domestic dog, offspring is called a wolf hybrid. Remember high school Biology, animal classification: Kingdom, Phylum, Class, Order, Family, Genus, and Species? Each animal in the crosses mentioned share the same Family (*Equus, Felis, Canis*) but are different species. The offspring are hybrids. Domestic dogs are the same species *familiaris*. When you cross breed domestic dogs (*Canis familiaris*), you are within the same species; therefore, not creating a hybrid.

Hybrids are not problem free. In Ligers, no fertile male has ever been found and necropsies have proven sterility in them. Other issues in ligers and tigons: ligers may be prone to gigantism and tigons may be prone to dwarfism. Both hybridizations have shown an increase in cancer rates and decrease in lifespan. (Tiger Territory, M. Annabell, 2001). In wolf/dog hybrids, there are often behavioral issues. The domestic dog differs greatly in behavior from a wolf. Dogs were bred to be cooperative with humans while wolves fear humans and try to avoid us. Even domestic Wolves are far different from dog in terms of behavior. Dogs often accept leadership happily while adult wolves will fight for leadership within the pack. The wolf/dog hybrid can be a time bomb temperamentally when they hit full maturity. Wolves also differ from dogs in other ways including: skull structure, nutritional needs, estrus cycles, etc. (Canine Hybrid Issues Surrounding the Wolf Dog , M. Sloan, J. Moore Porter, 2001)

Returning to the domestic dog: *Canis familiaris*. A breed is not a separate species, it is just a set of genes specifically bred to exhibit certain traits like the coat an Old English Sheepdog has or the build of a Rottweiler. With *C. Familiaris*, we just took traits in dogs of the same species and developed them to various breeds. An example that may clarify this: all humans are Homo sapiens regardless of color, eye shape, etc. Nature helped develop certain traits to best suit the environment the H. sapiens were developing in. All domestic dogs are *C. Familiaris*; we just developed them into different breeds. Species is the same but there are differences based on need.

What determines a breed in the loosest sense is that when bred to another of the same breed, you will end up with the same traits. When you breed a German Shepherd Dog to another GSD, you only get GSDs. You will not get something that looks like a Labrador Retriever. If you cross a GSD and a Lab, you can get offspring that look more GSD, more Lab or resemble both parents in varying ways. With purebreds you have a predictable outcome. With crosses, you do not. It takes many generations to fix the traits in a new breed – not just four or five. For example, the Shetland Sheepdog, a breed from the Shetland Isles is NOT a miniaturized Collie. But the Sheltie is a breed that is only about 100 years old – relatively new. Collie was crossed into the early Sheltie to add to certain traits, but this also added the problem of oversized Shelties – something breeders have struggled with for many decades to correct due to the infusion of Collie blood into a developing breed.

Crossbred dogs such as the Cock-a-poo are NOT hybrids nor are they breeds. The Cock-a-poo Club of America states in its guidelines that in order to be a cock-a-poo, that you breed Cocker (American or English) to a Toy or Miniature Poodle. This is not a breed; it is a cross – a mutt. Cock-a-poos may look very Poodle, very Cocker or somewhere in between. Even a Cock-a-poo bred to a Cock-a-poo is not a breed. Remember, it can take decades or more to get true-breeding traits – or to repair damage done when something else is crossed in during the early history of a breed just beginning to come together.

There is research that states the domestication of what we know today as a dog may have started longer ago that assumed – maybe as much as 100,000 years ago based on mitochondrial DNA studies of wolves and dogs. (The Truth About Dogs, S. Budiansky, 1999) No one really knows for certain when wild canines began domesticating themselves or we began domesticating them. Therefore, the creation of specific breeds is relatively new in the grand scheme of the history of the domestic dog. Bones of truly domesticated dogs were found dating back to as early as 5,000 BC. Ancient pictures show dogs that were of definite sight hound type. (Dogs of Ancient Egypt, J. Dunn).

Back to Hybrid Vigor: is it true? No. Returning to the cock-a-poo example. Poodles and Cockers have many of the same health problems; therefore, a cross of them might actually stand a higher risk of inheriting a problem than a purebred pup from a good breeder. Some of the problems in both breeds are: hip dysplasia, progressive retinal atrophy, epilepsy, poor temperaments, allergies, skin and ear problem, Legg-Calve-Perthe's, luxating patellas, hypothyroidism, cryptorchidism, gastric torsion (Cock-a-poos, Cindy Tittle Moore, 1997). Yes, things like ear infections, allergies, temperaments and gastric torsion have hereditary as well as environmental influences.

Now, why did I state a cross might stand a higher risk of a hereditary problem than a dog from a good breeder? Rarely do people breeding crosses do any health tests – genetic or otherwise. They assume that an annual veterinarian visit and shots are all that is needed. Maybe for a pet dog, but breeders need to consider the genetic health of puppies produced. Things such as Hip and Elbow Dysplasia, Luxating Patellas, various eye problems, von Willebrand's (a bleeding disorder) and Thyroid function are common in many, many breeds and crosses. The myth that purebreds are unhealthy or nasty came

about due to bad breeders who either did not care about health testing or who were ignorant and felt that dogs who show no outward signs of a problem do not have it. A purebred dog from a good and educated source has a greater chance of being healthier than a crossbred.

So, the next time you hear about hybrid vigor and how mutts are healthier, remember this: hybrid vigor as related to dogs is a myth.

On to the example!

So not to offend anyone involved with various breeds, I am going to use fictional breeds. In keeping with simple explanations, I am going to use a simple dominant/recessive issue. Bear in mind, most things regarding dogs are polygenetic; this means there are various gene pairs involved. The more genes, the more complex. However, for here: simple Punnet Squares would predict simple explanation with what ideally would come from a four-pup litter. Remember, dogs do not read the books and nature is funny. A litter can end up with all clear, all carriers, all affected or any combination of them.

Person has four dogs:

- Two Belgian Chocolate Hounds - BCH - (male and female from unrelated litters)
- One French Caramel Terrier – FCT - (male)
- One Mexican Vanilla – MV - (female)

The breeder thinks it would be neat to "create" a few "new breeds" (designer mutts) so he wants to cross:

BCH x MV and create ChoVans

FCT x BCH and create ChoCars

He assumes that since he is crossing breeds that health is no worry, after all he knows from reading things on line that crosses are healthier. In addition, he got his dogs from friends who made sure the parents all saw the vet regularly and certainly the vet would know if the dogs were not healthy.

Belgian Chocolate Hounds have a genetic issue called Purple Blotch Syndrome (PBS). This is a recessive problem and causes varying degrees of purple blotching and hair loss at the site. All of the parents showed no blotches so it was assumed they were fine. In one litter that produced the BCH male, the parents were carriers. The male inherited both recessives. However, PBS affects to varying degrees, some affected dogs have no apparent signs. This BCH had no blotches. The litter the female was from the sire was clear and the dam a carrier. This female is a carrier.

BCH male – pp (affected)

BCH female – Pp (carrier)

PBS has never been documented in the other breeds owned.

The ChoVan litter produced four puppies. All are PBS carriers. No puppy is affected because the disease is recessive – but they all carry the PBS gene. Technically, the pups are healthier than the PBS parent is because they will not be affected. The ChoCar litter produces four puppies as well. Two puppies are clear and two are carriers.

ChoVan Litter – Pp, Pp, Pp, Pp ChoCar litter – PP, PP, Pp, Pp

As luck would have it, one ChoVan pup was kept and one ChoCar pup was given to a friend who was interested in breeding. The ChoVan pup is a carrier and as luck would have it, the ChoCar pup was one of the two carriers.

When they grew, the two friends crossed the pups together. In the litter of four puppies, there was one clear, two carriers and one affected with PBS.

ChoVan Pp x ChoCar Pp – PP, Pp, Pp, pp

Now, during this time, the FCT and MV were crossed to create French Vanillas. Again, assumption was the pups would be healthier. However, both breeds are known to have Crazy Butt Syndrome (CBS). Both of these dogs are carriers of it. In the litter of FVs, one was clear, two were carriers and one was affected.

Yes, these are made up breeds with made up health issues, but the reality is there. This happens daily when dogs are bred: pure or cross.

When breeders cross breeds together, are they truly creating healthier offspring or just putting undesired genes into a new generation of dogs? The more this is done, the greater the chances of a health issue exploding even in a crossbred population.

Next time someone insists crosses are healthier than purebreds please remember basic genetics. It really is not true. A crossbred dog can have the same chance of inheriting a health issue as a purebred if the genetics are right or wrong depending on your point of view.

Regardless of what is being bred, health and genetic testing is necessary.

FMI on hybrid vigor and how it is misused in dogs, please read:

http://www.bullmarketfrogs.com/pages/generalarticles/caninebreedingprograms.htm

http://www.bulldoginformation.com/breeding-myths.html

and read from the late, great canine geneticist Dr. George Padgett who discovered over a hundred hereditary health issues in crossbred dogs.