Selective Breeding - Diseases in Purebred Dogs and Cats

Hip dysplasia in German Shepherds, polycystic kidney disease in Persian cats and urinary stones in Dalmatians are just a few of the diseases suspected of having an inherited basis.

Purebreds are potentially at higher risk for inherited diseases because individuals of the same breed are alike, not only in their external traits, but also their internal ones. The genetic makeup of animals affects temperament, internal body structures and even responses to infectious agents. As the animals of a particular breed become more similar, so will the genes that determine their potential for disease.

A parent may carry a "recessive" gene that leads to dwarfism, although that parent shows no sign of dwarfism (the animal's other gene may be normal and "dominant," thus masking the recessive gene). The less genetic diversity among members of a breed, the more likely both animals in a breeding pair may contribute genes that could lead to disease in their offspring. Also, as genetic diversity becomes limited within a group of individuals, it may be more difficult to breed “bad” genes out of the population.

Recently, there has been a push to get more funding for research on inherited diseases of purebreds. There are now about 30 DNA tests (including parentage, coat color, and certain metabolic and vision disorders) available to breeders of dogs. Ever wonder if your purebred dog could be a show dog -- or just look like one? Well, according to experts, not just any good-looking pooch can succeed on the canine runway -- and your dog might just be happier if it doesn’t. Like the painfully thin models that grace the covers of fashion magazines, dogs bred for competition must conform to a strict physical standard in an industry that has increasingly allowed their appearance to triumph over their function – with sometimes horrific results.

What has brought about the problems of the purebred dog? Well, there are two direct causes, one stemming from the other.

1. The Pursuit of Standards: Each breed has its standard - the exact appearance and proportions dictated by breed clubs are used when judging at dog shows.

Dalmatians show a genetic predisposition to blindness and deafness

You look at the teeth, head, eyes, ears and neck size. The dog can’t be too fat or too thin, it must move well. Then you pick out the dog that is closest to the standard for its breed.

A “good personality” is not going to win ribbons for a dog who doesn’t meet the physical standard. Once an owner has their show animal up to the standard, he or she should put the dog in the ring five to 10 times. If it wins a few times, find out its faults and then breed it to a dog that doesn’t have those faults.

Standards were originally obtained from the jobs each breed was meant to do. For example, Newfoundland dogs, originally draft dogs, needed heavy shoulders and strong backs in order to pull loads of wood. By trying to breed dogs to fit the physical appearance of the best working dog, humans have created dogs whose deformed bodies would never allow them to work. “The North American German Shepherd is a mess," says Stanley Coren, dog expert. “It has this sloping back and it doesn’t have the power to do what it’s supposed to.” People bred it for the wrong thing – look, rather than function. The German Shepherd is not the only example of a dog bred to meet an impractical standard. There’s also the Old English Bulldog, which breathes with difficulty because of an excessively pushed-in nose, and the Bloodhound whose long back makes it prone to painful slipped spinal disks.

2. Inbreeding: A common practice in breeding dogs can include mating a dog with its own grandchildren, and even with closer relatives. Generations later, the effect on a dog population’s *inbreeding coefficients* – the numerical representation of common heritage – is staggering.

"In some breeds, each dog has an inbreeding coefficient of 25%," says Dr. John Armstrong, professor of biology at the University of Ottawa and leader of the Canine Diversity Project. "That’s what you would get if you mated a brother and sister or a mother and son. We would throw up our hands in horror if it was humans."

Understanding why inbred dogs have problems isn’t too hard. A lack of genetic diversity in a population makes it more likely for two parents to carry the recessive genes for the same abnormality, which is then expressed in the offspring who inherit both genes. When there’s a popular male, with many good traits, everyone wants to mate their dog with it. A couple of generations later, the popular father is everyone’s

grandfather. Two breeds that have suffered from the popular dad phenomenon are the Shetland Sheep Dog and the Standard Poodle. In fact, any black standard poodle alive today can trace two-thirds of its heritage back to one place: Vancouver's Wycliffe Kennel. The Wycliffe Kennel had good-looking dogs in the 1950s and everyone wanted one. That narrowed the heritage for the breed.

The results of in-breeding are appalling. German Shepherds, Golden Retrievers, Dobermans and others suffer hip dysplasia and other crippling joint disorders. Almost all Collies either have eye problems or carry genes for such problems. Cocker spaniels are prone to "rage syndrome," where they will viciously attack humans they otherwise love. Blindness, deafness and bleeding diseases haunt other breeds. Many large breed dogs live only six or seven years. All in all, pure-bred dogs suffer from at least 300 genetic disorders.

Hip dysplasia is common in several large breeds

While the causes are complicated, and the results horrendous, solutions to the problem of in-breeding are difficult to find. Cross-breeding, breeding one breed to the other to get rid of a genetic defect, has not been successful. That's often because the defect may be linked to a *good* trait that makes up part of the breed's standard. Dalmatian breeders tried to breed pointers to get rid of a uric acid metabolism problem that all pure-bred Dalmatians have. The problem turned out to be linked to the spotting pattern. Nobody wants a Dalmatian without the right spots, so the new dogs were never accepted.

What drives people to prefer purebreds over mongrels? Purebreds provide predictability with respect to size, color, thinking and desires. Mixed-breed dogs are great, and they tend to live longer, but you don't really know what you're going to get.

Watch these videos to further explain selective breeding and to help answer the questions on the work sheet.

www.youtube.com/watch?v=W_CnR0Ak604

http://www.youtube.com/watch?v=ryryABlFx98

Name: _____

Selective Breeding Worksheet

1. Inherited traits, received from parents, are carried by what? _____

2. One strategy for selective breeding is in-breeding. In breeding is the breeding of closely related organisms and is used to retain desirable traits. What will happen to an undesirable trait carried by the inbred animals? _____

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3. A purebred creature, crossed with a purebred of the same stock, will always produce what? _____

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4. Another strategy for selective breeding is hybridization: Crossing two different, but genetically related species. If crossing two hybrids with a desired trait, will all the hybrid offspring have the desired characteristics? Use a Punnett Square to help you analyze the result. (Use the following alleles: **e=good egg layer**; **E=poor egg layer**) _____

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5. What were the two desirable traits Sally Fox was trying to select for? _____

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6. What must have happened for green cotton to appear?_____

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