

Healthy Breeds and Breeding Recommendations

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Much of the effort to create and maintain healthy breeds involves countering much of the conventional wisdom that breeders and veterinarians have developed in the past, Dr. Bell said.

Many breeders are committed to genetic diversity, and are concerned that closed studbooks will lead their breeds to doom and gloom. Some have responded by favoring assortative mating and outbreeding to the most distant genetic relations.

However, based on average 10-generation inbreeding coefficients for different breeds, Dr. Bell said breeding choices have no impact on genetic diversity. It is no surprise that breeds with very small gene pools have higher coefficients, and vice versa: The more important question is “what falls off the back, earlier on in a breed’s formation.” Inbreeding depression and hybrid vigor are not based strictly on homo or heterozygosity. “It really is all about knowing what deleterious recessives your breeds carry.”

Genetic research is beginning to demonstrate the importance of missing some alleles, like those that predispose the Akita and some other breeds to autoimmune disease. The broader challenge for any breed is to work away from any deleterious alleles that are present. While some breeds can thrive with a higher inbreeding coefficient, others will do poorly due to a higher number of deleterious recessives.

Dr. Bell cited the popular sire syndrome as the biggest challenge to genetic diversity. When a great stud comes along, “his genes get spread far and wide across the gene pool.” The breed loses much of its diversity, and the stud’s deleterious recessives emerge several generations later. In addition to the “bottleneck effects” that result, the breed also loses the influence of quality dogs that should not have been pushed aside.

The clear conclusion is that “genetic diversity is breeder diversity,” reflected in a healthy range of opinions on what constitutes the ideal dog. If some breeders decide to linebreed, some elect to outbreed, and others orient their breeding programs to meet a variety of specific objectives, “that’s what will maintain the diversity in your gene pools,” Dr. Bell said. “It’s going to be the most important mechanism for maintaining a healthy breed.”

A crucial advantage for breeding programs is that “predictability is the hallmark of genetic disease,” Dr. Bell said. Problems can be diagnosed prior to onset, and breeders can intervene to prevent the expression of a genetic disease or trait and forestall its reintroduction to future generations.

But the familiar breeding recommendations are often less effective than they should be. A decision not to breed two dogs that have a common recessive gene will stop that gene from being expressed in the next generation, but will not prevent it propagating to future generations. Spaying and neutering a group of animals and starting fresh will be not only impractical or objectionable for many breeders, but impracticable, if it means learning a new set of genetic variables from the ground up. "If you wanted someone else's lines you would have had them in the first place," Dr. Bell said.

With that in mind, Dr. Bell said he orients his breeding recommendations to help breeders improve their lines "and not lose the ancestry you love, enjoy, and may have had in your home for 20 or more years." It may mean deciding not to breed a particular dog, "but you can still carry on that line." The end objective must always be to maintain and enhance the quality of the breed, which means looking at the entire animal and making decisions that will not limit genetic diversity.

To control genetic disease, the top priority is to reduce the frequency of dogs that carry defective genes. However, with tests available for more and more genetic disorders, the range of available animals becomes more limited. "All of a sudden, we're not making our breeding decisions based on quality, on the one we really wanted to breed to in the first place, because we limited ourselves in the past by maintaining high carrier frequencies." The breeders' challenge is to select against carriers now, in order to open up more choices for future generations.

The situation becomes even more difficult with dominant genes in breeds with relatively small populations. The ideal is to replace an affected sire with one that is unaffected, particularly for late-onset diseases, but the option may not always be available. "It's a difficult ethical decision to make."

Dr. Bell emphasized that it will be impossible to deal with problems in specific breeds as long as they are kept secret.

Discussion

A participant asked how to phase out a condition that has 48% frequency in a breed with other common genetic diseases. Dr. Bell recommended collecting pedigree information and trying to breed families with lower frequencies. "No one said it's easy," he said. The decisions are not easy or automatic.