An Unpublished Editorial

by Debby Rothman

In response to “Ethics and Renal Dysplasia” published in the first edition of the reissued Lhasas Unlimited I must make two points. One, any and all marker tests are inherently flawed. Two, my data furnishes evidence all currently available DNA tests don’t test for RD. To eliminate dogs from breeding programs based on this test *will* further damage gene pools.

For almost 3 years Julie Timbers and I supplied kidney tissue, complete with diagnosis, taken by wedge biopsy from nearly 40 dogs. Both biopsy and marker status are available on 30 of the dogs, the most complete data of its kind available. Judge for yourself. Look at the table. FIVE DOGS CARRY NO MARKER; THREE ARE AFFECTED, TWO ARE NORMAL. TWELVE DOGS CARRY ONE MARKER; SEVEN ARE AFFECTED, FIVE ARE NORMAL. THIRTEEN CARRY BOTH MARKERS; SEVEN ARE AFFECTED, SIX ARE NORMAL. No matter the marker status approximately half the dogs are affected and half are normal.

There’s an inherent problem with using marker tests for selection within a breeding program. A marker is simply a piece of DNA located on the same chromosome near the suspect gene. Theoretically markers indicate the probability of the presence of the suspect gene. Using marker tests will select against the marker, but not necessarily against the culprit gene. Direct DNA tests are far better because the culprit gene is identified. I would *never* base my breeding program on a marker test. What if the suspect gene isn’t the culprit gene? What other genes are you inadvertently selecting for or against because those genes are located near the marker?

The relationship between the marker and the suspect gene is never 100% because in cell miosis the chromosomes recombine and these two genes can become separated. For example, let’s consider an 80% relationship. This means that 80% of the time the marker is there, the gene is also there. It also means that 20% of the time, the gene may be there, but the marker is not. Or the marker may be there, but the gene is not. The 20% error rate works both ways.

Now let’s apply the 80% relationship to a population of 100 dogs. 50 of them are found to carry the marker. We sterilize the 50% carrying the marker. All 50 of the dogs left have no marker, but 10 still carry the gene because of the 80% relationship. And 10 of our 50 sterilized dogs don’t have the bad gene. (Sorry about that multiple Best In Specialty winner who is now a bit light in the knickers!) By now the test is entirely useless: there is no marker left to test for and the gene is still carried by 20% of the population. Leaving us in the same situation we began with! Our remnant population has a lower carrier rate; 20% instead of 50% but without knowing the mode of inheritance where do we go from there? Marker tests are questionable tools at best.

Direct DNA tests are the tools of choice because the culprit gene is identified. Either the dog has it or it doesn’t. The Lhasa Apso Club of Central Colorado has chosen to support current research efforts by Dr. Mary Whiteley. The club has donated nearly $2,000 for reagents in order for Dr. Whiteley to begin her work developing a direct DNA test.

As breeders we're expecting the molecular geneticists to be our knights in shining armor, arriving to save the day, our breeding programs and purebred dogs from genetic disease. We expect our difficulties to be over just as soon as a DNA test is available. DNA tests are tools to be used by the breeder, simply an additional tool to add to our toolbox. Like any powerful tool it is capable of great harm if used by those who do not understand it's power. Unless the impact of DNA tests on population genetics is clearly understood,

these tests can be like a chain saw in the hands of a 5 year old. Inappropriate use of DNA tests, particularly marker tests, without the guidance of experts in the field of population genetics, has the potential for wholesale genetic slaughter.

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