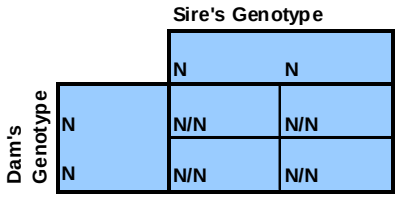
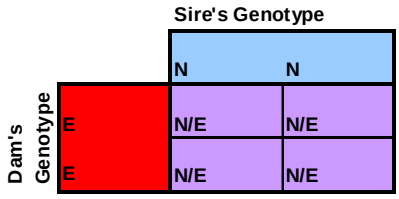
Implications of the EIC Mutation for Breeding

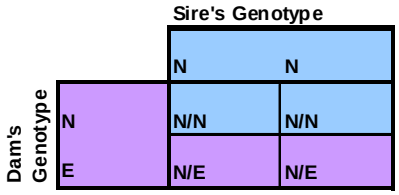
Breeding two clear dogs



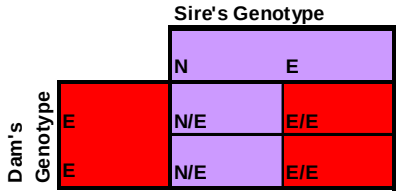
Breeding a clear dog to an affected dog



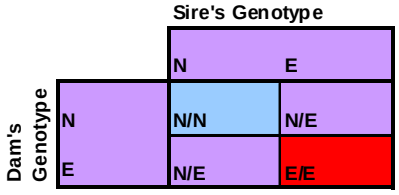
Breeding a clear dog to a carrier dog



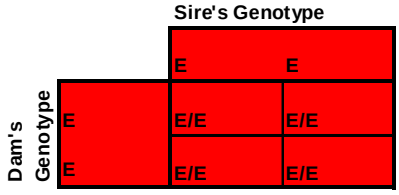
Breeding a carrier dog to an affected dog



Breeding two carrier dogs



Breeding two affected dogs



One way to present the probability that puppies with EIC will be produced from the mating of parents of each of the three possible genotypes is shown above. Each parent, depending on its genotype, will contribute either the E or the N form of the EIC gene to a puppy. This in turn will result in that particular puppy's own genotype of N/N, E/N, or E/E. Each of the four squares shown for each of the six possible matings in the Figure represents a 25% chance for producing a pup with that genotype. Thus, the matings resulting in one, two or four red squares will **on average** produce litters containing 25%, 50% and 100% EIC affected pups, respectively.

For example, breeding an E/N sire to an N/N dam can only produce puppies that are E/N or N/N, and according to our current data that supports a recessive mode of inheritance, none would be susceptible to EIC (2 blue squares and 2 purple squares). On the other hand, breeding an E/N sire to an E/E dam gives a 50% chance that a puppy will have EIC, since puppies can be either E/N or E/E (2 purple squares and 2 red squares). All puppies from the mating of two E/E parents will be E/E and thus likely be susceptible to EIC (four red squares).

Mating an E/E parent to a clear N/N parent would not produce affected puppies (four purple squares), but all would be carriers.

Lastly, and very importantly, we do not recommend selecting dogs for breeding based solely on their both being N/N for the DNM1 gene. Such a drastic strategy, although more quickly eliminating the possibility of producing E/E genotypes and EIC affected dogs, also has the undesired result of loosing many of the outstanding exercise and performance traits expected of many lines of Labrador Retrievers. A better approach would enable the continued use of some of the many excellent E/N and E/E dogs by mating them to N/N dogs. This would produce litters without EIC and a choice of dogs to progressively decrease the frequency of the E form of the DNM1 gene by future matings to N/N dogs.