

## **KC Breed Health Coordinator Seminar - 18 November 2011**

### **Mate Select and Estimated Breeding Values (EBVs)**

**Dr Sarah Blott**

The Kennel Club Genetics Centre at the Animal Health Trust

- Breed health is a balance between reducing the prevalence of existing diseases and maintaining long-term health by managing the loss of diversity or rate of inbreeding.
- The online tool 'Mate Select' is designed to help breeders achieve this balance.
- Phase 1 of Mate Select, launched in May 2011, is concerned with the management of inbreeding. In phase 2 we will be launching estimated breeding values (EBVs), to help breeders reduce the prevalence of hip and elbow dysplasia by using more accurate genetic evaluation of risk. Phase 3 will introduce 'optimum contribution' technology allowing the use of selection to reduce inherited disease while at the same time managing the rate of inbreeding.

### **Managing the rate of inbreeding**

- Inbreeding is a risk factor for the emergence of new inherited disease.
- The goal is to constrain the rate of inbreeding to no more than 0.5% per generation, which is equivalent to an effective population size of at least 100
- Mate Select will aid breeders to minimize the coefficient of inbreeding (COI) for matings and, eventually, to optimize the genetic contributions made by individual dogs.
- In many breeds the current rate of inbreeding is above the target level of 0.5% per generation.
- It is hoped that by using Mate Select breeders will be able to bring the rate of inbreeding back on target.

## Improved selection for health

- Inherited diseases can be classified as either single gene or complex diseases. DNA tests provide an effective means of identifying clear, carrier and affected individuals for single gene disease. Complex diseases are more difficult to deal with and require a different type of tool known as an estimated breeding value (EBV).
- EBVs strip away environmental effects and are a measure of the genetic risk of an individual. Using EBVs to make mating decisions will be more accurate than using the observed phenotype (e.g. hip score) and will lead to faster progress in reducing the prevalence of disease.
- A dog's EBV will allow it to be placed on a scale of liability, identifying those individuals at highest risk of passing on the condition and those at lowest risk.
- A puppy's EBV will be the average of its parents' EBVs. A dog's EBV can change during its lifetime, as more information becomes available. The accuracy of the EBV also increases as more information is added. Dogs with a large number of screened offspring will have the highest accuracies. In some cases the accuracy may reach over 90%.
- EBVs can be generated for many diseases. However, it is important to consider the type of data that is required. There must be minimal bias in the data: affected and unaffected diagnoses must be equally likely to be submitted to the database. Mechanisms must be in place to allow routine and regular updating of the database. The disease diagnosis or phenotypic evaluation must be consistent and provided by a person trained in the diagnosis or evaluation of the condition. Quantitative measurement is preferred, if appropriate, rather than a simple affected/unaffected status. Finally, a reasonable proportion of the population must be measured to ensure that the resulting EBVs have a sufficient level of accuracy to be useful to breeders.

*Dr Sarah Blott, KC Genetics Centre at the Animal Health Trust*