



# D.N.A.

As promised last month, we now commence our DNA open forum with Mr Bob Maver (ANKC)

First up, **National DOG** asked Mr Maver to comment on these statements currently in circulation.

**GTG web site:** Genetic Science Services is now the exclusive provider of canine DNA testing services for Greyhounds Australasia and the Australian National Kennel Council for parentage, pedigree and disease testing

**GTG's Expertise in Animal DNA Testing** (document) : GTG is the exclusive DNA testing service provider for the Australian National Kennel Council for all registered pedigree dogs in the country, and Greyhounds Australasia for parentage, pedigree and inherited disease testing.

Mr Maver replied:

Concerning your enquiries re the wording on the website and in the document, The GTG/GSS statement on exclusivity is not accurate and has been corrected. It was a misunderstanding within a part of their organisation. The position is:-

GTG is acting as service provider to ANKC as agreed in acceptance of the program put forward to ANKC at the May, 2004 meeting. GTG will provide a full service for DNA profiling and parentage testing of breeding stock, together with providing a range of genetic disease tests. Each ANKC Member Body has the opportunity to participate in DNA collection and administration of the profiling/parentage program.

ANKC has a duty of care to make all reasonable efforts to ensure accuracy of the register and pedigree assurance. This is the point of parentage testing, and for this to occur it is only possible if all DNA profiling is on the one database. GTG has established this operational database using the "gold standard" MMI markers as used by AKC, but as an ISAG member GTG is able to use ISAG markers for compatibility

with other overseas organisations. Data will be downloaded to ANKC according to their requirements.

ANKC's objective in relation to genetic disease testing is to use DNA tests where available to prevent occurrence of hereditary diseases and bring those tests to Australian breeders at lowest cost. Official recognition of disease test results must always require compliance with protocols to provide certainty and avoid errors. The principle relating to testing by other laboratories is quite clear as previously stated (ND February issue):

*"Owners may use disease tests offered by any recognised test laboratory but for ANKC purposes and pedigree clearance of offspring for such diseases, DNA collection must comply with ANKC's protocols, for positive identification and minimisation of human errors."*

Disease clearance of offspring from clear parents is an important feature of the ANKC program as this eliminates the need for the expensive disease tests provided there is parentage verification. DNA profiling and parentage verification is part of the wider DNA program for pedigree assurance of breeding stock, so that in the main disease tests will only be necessary in one generation.

**And now to the questions for May.**

## Question 1.

**Please describe for us the objectives - the eventual benefits for the Australian dog world - of the ANKC DNA Program.**

There are three important objectives in the DNA program:-

(a) *Accuracy of the ANKC register and pedigrees of breeding stock*

Agricultural geneticists have found the typical parentage error in purebred animal populations is 10%. The shock to ANKC and breeders was finding this applies to dogs with release of the hard data of a 10% parentage error found in the AKC survey of litters in the USA. ANKC, its Member Bodies and breeders have a duty of care and to make all reasonable efforts to ensure accuracy of the register and pedigrees.

Breeders use pedigrees as a key element in selection of breeding stock and matings. What use are pedigrees with a probable 10% parentage error in each mating? The ANKC program is directed at verifying pedigrees of breeding stock so that breeders deal with facts. DNA profiling with parentage testing is now the standard, scientific means of pedigree assurance in breeding purebred animals world-wide, eg. horses, cattle, sheep and zoo animals. It is now being applied in dogs in many countries under various schemes, but arguably the ANKC program is the most cost effective in achieving accuracy of the register and pedigrees of breeding stock. With time, accuracy will spread across the complete pedigree.

(b) *Increased DNA testing for prevention of hereditary diseases*

We must continue to work to reduce hereditary diseases in purebred dogs, for the sake of the dogs, breeders and puppy buyers. The incidence of hereditary diseases has been a point of attack from breeders of crossbreeds, RSPCA and others. Where available, genetic tests for hereditary diseases are the most effective means of disease prevention. Publication of the canine genome has accelerated research into such diseases. However in the main disease tests are owned by overseas laboratories and are quite expensive, providing a major barrier to their wide use in Australia. An objective of ANKC's DNA program is to have a significant range of these tests available in Australia at reasonable cost. Genetic Technologies Limited (GTG) was selected as service provider for the DNA program because of its strong background in DNA profiling/parentage testing for animals and humans, but also its ability to introduce a range of genetic disease tests using its world patent position to negotiate cross-licences with overseas laboratories. The combined volume of DNA profiling and disease testing makes a low price structure to possible. Through its patent position GTG was able to negotiate rights to use the superior MMI markers and is expecting to add to its range of disease tests in the short term. This will bring disease tests within a reasonable price range and allow wider use in disease prevention.

A significant cost saving from integration of parentage testing and disease testing under the program is that disease clearance for offspring of genetically clear parents is possible using parentage testing alone, making disease testing a one generation event in the main.

(c) *Marketing opportunities*

Under the program, dogs and bitches will be elevated to "Stud Book" registration where they:-

\* have been parentage checked

\* comply as parents within any litter registration limitations on genetic disease status which apply to the breed at the time, such limitations having been accepted on the vote of owners as per current ANKC practice.

Credibility of ANKC and purebred dogs was heightened with the announcement of the DNA program in 2004, as indicated by the very favourable response from media, public and veterinary profession. Stud Book registration should add further to this credibility as the public understands the concept of the Stud Book as an elite category signifying quality, providing opportunities for the ANKC to promote purebred dogs in general and for breeders as an extra assurance of quality to puppy buyers, eg. "From stud book registered stock". It makes a good selling point. (See further under Question 5 below.)

*Editor/moderator: Bob, there are several statements in this paragraph which I would ask you to address in writing for us along with your answers to next month's questions.*

*Firstly, on what published sources do you base your statement: Agricultural geneticists have found the typical parentage error in purebred animal populations is 10%? Surely we are concerned specifically with the purebred canine population and would need to know how many PUREBRED DOGS have been surveyed in order to produce a statistic of importance to US? ie a 10% error across the board in ALL animals has little bearing for our own area of interest. Also it seems to us that the statement above **What use are pedigrees with a probable 10% parentage error in each mating?** is completely misleading. We can find no published evidence whatsoever that a probable 10% error can occur **in each mating**. Surely this is also scare mongering? And without scientific basis? (Readers, please see our article by Dr Carmen Battaglia on the AKC Frequently Used Sires programme published in our October issue, page 32 where the specific and accurate results and percentages of the AKC test programme for FUS are published. We are unaware of any other AKC test programme on the error of parentage having been conducted but please Bob advise us if our understanding is wrong and direct us to the published material).*

*We would also like to know how the ANKC intends to ... **have a significant range of these tests available in Australia at a reasonable cost?** The achievement of this objective would be most welcome but those at the mineface with testing their dogs feel this statement is extremely ambitious within the foreseeable future.*

*I am afraid I must also ask on what you base the idea that the ANKC's credibility has been enhanced by the announcement of the DNA Program? Given the attitude of some State Controls and the response of many of those who have attended ANKC/GTG seminars, we cannot see this to be the case. Many breeders in fact feel it is casting aspersions on their honesty and integrity, which to date, as acknowledged elsewhere in your article here, have over many years produced outstanding animals competing highly successfully on the world stage.*

## Question 2.

**The Kennel Club (UK) and the American Kennel Club have both implemented DNA Programs. As I understand it, the KC (UK) program encourages DNA Profiling of breeding stock and promotes DNA testing for inherited disease, but on a voluntary basis. The ANKC Program closely resembles the AKC's. Please explain for us your reasons for modelling the ANKC Program on the American program.**

The KC (UK) does encourage DNA profiling on a voluntary basis, but after some years has only a few hundred on record, so that it does little for improving accuracy of the register. DNA testing for diseases is also mainly voluntary but after review of the ANKC program by their Genetics Coordinator, Dr Jeff Sampson, certain specific disease status limitations will be introduced, eg. as of 2005, CLAD carriers in Irish Setters will not be registered. GTG may already have more profiles on its data base than the KC (UK) due to the ready acceptance by breeders of the ANKC program commencement in January 2006.

The AKC program is solely based on DNA profiling/parentage testing to improve accuracy of the register from the low base of 10% error. A compulsory program was introduced for litters of 'Frequently Used Sires' to be parentage tested. This has reduced the parentage error to around 5% and it has been successful in correcting parentage in most of those. It is covering around 45% of total litters, which means it is providing parentage verification for maybe half of the next generation of breeding stock. AKC uses the superior MMI marker system for by far the largest canine database in the world.

The ANKC program is different to both of the above - it is unique, with clear objectives in relation to parentage verification of all future breeding stock, advantages from integration with disease testing and potential marketing benefits as discussed above. Dr Sampson critically reviewed the ANKC program and gave it full marks, stating he would like to introduce it in the UK immediately without change.

*Editor/moderator: Bob, we recently asked Dr Sampson to provide the statistics at The Kennel Club (UK) and his reply was .... In total I would estimate that we have profiled around 3000 dogs in the UK, with approximately half being done using the ISAG marker system, so it would appear the KC IS making progress without enforcing compulsory testing.*

## Question 3.

**The proposed methodology for collecting swab samples for DNA profiling under the ANKC DNA Program is, I think, well known to most breeders. Basically this involves collection of swabs by persons approved to do so, from positively identified dogs (dogs identified by microchip or tattoo). How will the DNA profile data be handled after the samples have been processed through the laboratory? The administration of results would seem to be complex, both from the information storage side as well as from the information retrieval side. Who is to hold the data and in what form?**

It is fundamental that, as the service provider, GTG, holds the operational database. This must include all DNA profiles of breeding stock to allow parentage testing and all profiles on the database must be obtained using the same marker system for parentage testing to be possible. GTG will retain all DNA samples for further use if needed for other tests, and are able to provide MMI or ISAG profiles for export/import purposes depending on the country concerned. GTG will download results to ANKC as required. GTG has a successful IP program as used for all human and animal profiling/parentage testing. For ANKC purposes there is separation on a breed by breed basis and including automatic parentage testing. There is an urgent need for ANKC to upgrade its data processing to link this data into the present system for full data utilisation, but this is not a valid reason for holding up progress on the program and achievement of its objectives.

## Question 4.

**The proposed Stud Book. The ANKC DNA Program (as summarised in the 2004 Conference summary) requires that (as of 1/1/2008) all parents must be Stud Book Registered for litters to be eligible for registration. What effect, if any, do you think this will have on the gene pool for individual breeds?**

The Stud Book concept has been well received in discussions with owners. Stud Book registration is a bonus marketing enhancement, signifying a dog has been parentage checked and has acceptable disease status for breeding where required under litter registration limitations (see Question 1 above). There are once-only costs involved in satisfying these requirements, but for breeding stock these can be offset against the stud fees earned or puppies produced over the animal's life. If as predicted the whole program results in higher demand then any costs may be offset by increased volume or reduced price.

In the short term, some breeders will be reluctant to qualify their dogs for breeding, with a potential reduction in the gene pool. However, if the predicted credibility and marketing of purebred dogs improves then demand for puppies should increase, resulting in more breeding stock and a larger gene pool (see Question 5). Another factor is that imports of frozen semen are common today and used increasingly to add significantly to our gene pools. The critical issues relate more to attracting more owners and participants as discussed below.

*Editor/moderator: Sorry Bob, there are some statements in this paragraph also that I cannot let go unchallenged! Firstly ..... **some breeders will be reluctant to qualify their dogs for breeding**.... we personally are fortunate to have chosen breeds with few serious hereditary problems and touch wood in our own lines so far nothing we know of, although obviously if we tested for everything possible we might find something. However on behalf of those like us who are involved with breeds outstanding for their genetic health, I must question the term **RELUCTANT TO QUALIFY THEIR DOGS FOR BREEDING**. Our dogs in our opinion are extremely well qualified for breeding, or we would not be doing it! I am sure also that many breeders would join us in asking the further question **QUALIFY FOR BREEDING IN WHOSE OPINION?** Secondly, the statement ... **then demand for puppies should increase, resulting in more breeding stock and a larger gene pool**. If I have 10 dogs in my kennels and I interbreed them, the "gene pool" is the total genetic content of my dogs. I can't increase it except by out cross. By extension, the gene pool of a given breed is the total genetic content of breeding stock at any given time. The more diverse the gene pool, the stronger the breed. If **some breeders are reluctant to qualify their dogs for breeding, with a potential reduction in the gene pool**, the loss of diversity in the breed pool cannot be retrieved. Surely this is basic population genetics? The breed pool is not increased, simply by increasing the number of dogs retained for breeding.*

