

American Kennel Club, Inc.
Board of Directors – Special Committee
DNA Advisory Committee
January 01, 2001 – December 31, 2002

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DNA ADVISORY COMMITTEE
FINAL REPORT
TO THE BOARD OF DIRECTORS
THE AMERICAN KENNEL CLUB, INC.

September 04, 2002

Origin of the Committee: On 18 December 2000, Chairman David C. Merriam created the Committee with the following Mission and Assignment:

PURPOSE:

The DNA Advisory Committee will advise the Board of Directors on new developments in DNA research and their application to AKC operations. It will also survey other scientific developments relevant to the AKC mission. It is expected that the Committee will present various options, if they exist, as to DNA applications to AKC functions.

OPERATION:

This Committee of ten will meet two or, at most, three times per year, preferably on days close to the Delegate Meetings. Expenses and honorariums will be paid. The Committee will meet for two years at which time the Board of Directors will determine whether it shall continue and for how long. A written report following each meeting will be submitted to the Board. AKC Executive Secretary James Crowley will assist as Secretary to the Committee. The Committee should not involve itself with the staff in the current DNA operations. I would hope that the Committee members would be of open mind and not carry into the Committee preconceived agendas.

Members of the Committee: Dr. James Edwards, Chairman, Mr. Don Adams, Dr. Sheldon Adler, Dr. Carmen Battaglia, Dr. Marcia Eggleston, Mr. Robert Kelly, Dr. Suzanne McKenna, Mr. Robert Slay, Ms. Patti Strand, Mrs. Connie Vanacore.

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Special Introduction

On behalf of all Members of the Committee, I thank the Board for allowing us to focus on the mutually enhancing crossroads of DNA and the breeding/advancement of purebred dogs.

The Committee was charged with presenting recommendations involving an understanding of DNA and its applications to the mission of the AKC from a broad perspective. Additionally, Mr. Merriam specifically requested that "...various options..." be presented regarding our recommendations. Finally, (perhaps the most difficult part of the charge) we were specifically encouraged to, "...be of open mind and not carry into the Committee preconceived agendas."

The Committee has been very well served by the action of the Board which resulted in the production of a report by M. E. Watanabe Consulting, Inc., on March 15, 2002, entitled, "Mammalian Reproductive Biology and Advanced Mammalian Breeding Technologies: Are These Applicable to Canines?" In our recommendations, we have referred to the document as the 'Watanabe Report.'

I believe we have accomplished the mission as defined, and that this 'Report' will effectively serve the Board today and tomorrow. In some cases and for some topics we have given only background information and comments; in others we have also provided specific recommendations, often listing and ranking options for your consideration. The role of leadership in the world of purebred dogs requires creativity, understanding, commitment, dedication, and the willingness to provide alternatives within the system when accommodation strengthens the whole of the system. Leadership in the application of DNA technologies to purebred dogs has been established by the American Kennel Club. It is essential to remember the special obligations we have today as the result of bold actions of yesterday. It is equally important to establish for the future policies that underwrite in new ways the principles of breeding systems that have served purebred dogs for centuries.

Respectfully submitted,

J. W. Edwards, Ph. D.
Professor of Biology, Emeritus (Salem College)
Director, AKC DNA Operations, Retired
Chairman

Topic: Bioethics

Background/Comments. Some Parent Clubs have ‘Codes of Ethics’ that define behavior across a spectrum of conditions involving the breeding of dogs. Should the AKC become involved in these issues? Indeed, England’s Kennel Club has adopted a policy, which denies registration to dogs of a breed with a specific genetic defect. One of the conspicuous comments regarding options for the future is the importance of not being seduced by technology. Purebred dogs in the U. S. A. have reached the twenty-first century without the imposition of value judgments and restrictions on breeding by the AKC.

Recommendation. Breeders need options, not restrictions, and the role of the AKC in the future should be to provide as much information as possible to breeders on a voluntary basis as they select the future breeding stock for their breeds.

Topic: Biotechnology

Background/Comments. The Watanabe Report comments on some of the options for the future regarding breakthroughs in canine genetic technologies - molecular screens for genetically mediated diseases, followed by somatic cell gene therapy to correct problems, and perhaps eventually even germ cell gene therapy. Genetic tests for genetic diseases are a reality today – albeit not a robust one. The AKC Canine Health Foundation deserves recognition for the leadership it has exercised in these matters. Somatic cell gene therapy has been successful in two cases, but, of course, such changes alter only the non-reproductive target cells of the individual, with no improvement for the next generation. Gene therapy in germ cells lacks any realistic future for a variety of reasons common across mammalian species. One question that must be asked is easily understood by the dog world: are somatic cell changes analogous to drugs, and are they alterations that exclude dogs from competition and/or all other events? These matters are probably best faced one at a time as they arise, in the same way that alterations for other hereditary problems - e.g., entropion, dentition – have been handled by the AKC in the past.

Recommendation. Biotechnology will gradually change the breeding options for dogs, but the fundamental rules of AKC registration will not require modification. However, the Board may wish to focus separately on the impact of Biotechnology in eligibility for conformation and all other events.

Topic: Cloning

Definition: using the genetic constitution of an individual dog (i.e., the donor of the DNA/nucleus) to create an offspring that is genetically identical to the donor.

Background/Comments. Few topics have received as much coverage by the general media as has ‘cloning.’ The Committee has received up-to-date information on this matter from a variety of resources, including the Watanabe Report. It is now time to adopt an AKC policy on cloning.

Recommendation (majority) Alternative 1. The AKC Mission states it will sanction dog events that promote interest in and sustain the process of breeding for type and function of purebred dogs. The use of cloning technology to create an identical copy of a dog runs counter to the tradition and spirit of the AKC. Therefore, AKC policy excludes cloned dogs from registration.

Recommendation (minority) Alternative 2. The AKC stands for the breeding of better dogs, and clones represent an exception, which should be considered. The AKC recognizes that cloned dogs are of serious interest to the scientific community and some dog owners. Human happiness has many correct descriptions and an abundance of life-history time frames. Whereas purebred dogs are much more than just members of families and there may be practical uses for cloned dogs in service to mankind, and whereas we reside in America – the land of freedom and opportunity, the AKC will extend its registration services to eligible purebred cloned dogs. Such clones will be given unique registration identifiers and will be eligible for reproduction; they will not be eligible for conformation and/or performance competitions. The extension of only the rights of registration and reproduction is an adaptation and recognition that the world forever changes, and that definitive, reasonable, exceptional leadership sometimes requires accommodation.

Recommendation (minority) Alternative 3. Few topics have commanded the attention of dog breeders, fanciers, and the public in general as has the matter of ‘cloning.’ The AKC is the unquestioned leader in all facets of the world of purebred dogs, and it, therefore follows, that it must continue to lead with distinction as advancements are made. Accordingly, when the possible registration of a cloned, purebred AKC dog becomes a reality – such is not now the case – the Board of Directors will consider its registration and the limitations, if any.

Topic: DNA Database

Background/Comments. AKC is the only registry in the world that both collects DNA samples and, as a part of its registration process, uses them to verify the integrity of its registry. The AKC now houses the largest collection of canine profiles in the world. As

such, the specific information is released only to owners mailing samples to the AKC for processing. The confidentiality and integrity of the specific information contained therein has been and will continue to be maintained as a priority by the AKC.

Topic: DNA and Ownership/Storage

Background/Comments. The Committee wrestled with the current AKC policy statement concerning the ownership and use of DNA samples. Everyone agreed that the use of the term ‘ownership’ was a potential red flag and should be avoided if possible. It was the consensus that it was much more important to define what the DNA sample could be used for and who could use it. Accordingly, the current ‘DNA Ownership Policy Statement’ should be replaced as follows.

Recommendation: AKC DNA Usage Policy Statement. DNA samples are used by the AKC solely for the purposes of providing genetic identity and parentage verification. The permission of the registered owner(s) of the dog and the AKC is required should there be any request for the use of the stored DNA samples. The DNA samples will be stored at the discretion of the AKC.

Topic: DNA Profiles and Registration

Subtopic 1: Advancement of DNA Markers

Background/Comments. The AKC Parent Breed Club Program (1998-2000) examined 17 pairs of genetic markers among 100 breeds, constituting the largest such study in the history of purebred dogs. The analysis has revealed that an enhanced AKC set of DNA markers will be put into operation in the near future, with possibly the addition of a gender marker.

Recommendation. Ongoing analysis of the parentage genetic markers and their functionality in purebred dogs must continue to be supported by the AKC and its primary provider of services. As cases of highly line-bred progeny arise, nothing is more essential than guaranteeing that the DNA profiles and parentage verifications are unique and sufficient.

Subtopic 2: Audit of the Registry

Background/Comments. One-third of the litters registered by the AKC are produced by kennels subject to the Compliance Audit Program (i.e., they produce 7 or more litters per

year and are subject to AKC inspections). In 1998 the net percentage of litters excluded based on DNA testing was 10% (i.e., 90% integrity). In 2001 the net percentage of litters excluded was 4.4% (95.6% integrity). The integrity of AKC registration papers has been substantiated by the Compliance Audit Program.

Recommendation. The AKC has established and invested significantly in the Compliance Audit Program, which verifies parentage on a random basis during kennel inspections. As appropriate, the focus can be expanded to include targeted specific subdivisions. Of course, the voluntary DNA programs provide additional information concerning the registry and its integrity.

Subtopic 3: Breed Specific Request (Bernese Mtn Dogs)

Background/Comments. The Bernese Mountain Dog Club of America has been very active for years in regard to creating a database for their dogs. This is the first Club that has specifically requested that DNA profiles for all breeding stock be initiated as a pilot program for their breed. However, the requirement for DNA profiles may negatively impact the one-time breeders and non-breeders who simply want a purebred dog.

Recommendation. All registration practices should be uniform and consistent and not directed to a single breed. Consequently, the Committee recommends that the request for instituting a pilot program requiring DNA profiles for all breeding stock of Bernese Mountain Dogs be denied.

Subtopic 4: Foundation Stock Service (FSS)

Background/Comments. One way to guarantee the integrity of the registry for the new breeds being admitted is to require DNA profiles for all breeds entering the FSS. The majority of the Committee expressed reservations about establishing a breed-specific requirement for those breeds only at an additional cost of \$30-35 per dog.

Recommendation. All registration practices should be uniform and consistent and not directed specifically to FSS breeds. Thus, DNA profiles should be encouraged on a voluntary basis, but not be required for FSS breeds. A new program to inform FSS breed clubs of the voluntary program is needed.

Subtopic 5: Frequently Used Sires Program (FUSP) and Effect on Third Parties

Background/Comments. It has been demonstrated that the effect on third parties of the FUS program has been minimal. The program as adopted has substantially guaranteed

that sires producing seven or more litters in a lifetime or more than three litters in a calendar year would have DNA profiles in the AKC database. FUSP sires produced 45% of the litters registered since the inception of the Program. Such profiles are used to guarantee parentage when opportunities arise as offspring and/or dams are tested. This Program, the Compliance Audit Program and the Voluntary Program have resulted in more than 200,000 genotypes on file in the AKC DNA database. Less than 0.25 percent (0.0025) of litters registered since July 2000 which were sired by FUS are on hold because DNA has not been received. If the litter owner complains that the sire owner refuses to comply with the requirement, the AKC can (and has) placed the sire on referral and registered the litter for the sake of third party dog owners.

Subtopic 6: ILP and Rescue Dogs

Background/Comments. What is the possibility of using DNA profiles on ILP and Rescue dogs to establish parentage? The Committee agreed that there is at this time an insufficient database to even consider this; while the DNA Database is equipped to verify parentage, it is not equipped to assign parentage. It was also pointed out that even if parentage could be established, there were still other issues like chain of ownership and dogs deliberately sold without papers.

Subtopic 7: Imports

Background/Comments. The Committee considered the question of whether DNA profiles should be required for imports, initially believing that imports are breeding stock. A data analysis of dogs imported between 1995 to 1999 was used as a focus of the discussion. Each year AKC registers an average of 4,421 imports. Forty-four percent of the males and forty percent of the females had no AKC registered litters. AKC does register a total of 8,961 litters attributable to imported dogs each year (64% had imported sires and 36% had imported dams). Thirteen percent of the imported males had 7 or more litters and thus fall under the FUS policy. While imports came from 68 countries, 33% of the total came from Canada. There was concern about whether requiring DNA profiles would affect AKC's reciprocal agreement with Canada; the Committee was assured that it would not. However, it was pointed out that residents of Canada and Mexico are able to register dogs that never leave those countries, so that they are technically not imports.

Recommendation. That the AKC initiate a dialog with all major foreign registries regarding DNA profiles with the goal of adopting mutually acceptable registration policies concerning genetic identity and parentage. A proactive effort to share information should be given a new emphasis, based on the future direction of the biotechnical sciences. The Committee does not recommend the adoption of a new policy that DNA profiles be required of imports.

Subtopic 8: Mandatory DNA Programs – Should They Be Expanded?

Background/Comments. The Compliance Audit Program is the first mandatory AKC program requiring DNA profiles to verify parentage; however, all of the costs of this Program are paid by the AKC. The Frequently Used Sires Program is the first AKC program (excluding the frozen semen program) requiring DNA profiles for sires that is paid for by the owners/breeders of the sire, and obviously results in a significant increase in the total cost of registration. The FUSP requires DNA profiles for sires producing seven or more litters in a lifetime or more than three litters in a year. When DNA profiles first became available, the discussions involved: (1) possibly requiring profiles on all registered dogs, (2) possibly requiring profiles on all breeding stock, (3) requiring profiles at some specified number of litters (e.g., 3) sired or produced. Option (1) quickly disappeared, since most dogs do not produce litters, and thus have no negative impact on the integrity of the registry. Option (2) – DNA profiles for all breeding stock is still championed by some, but one statistic has significantly impacted this matter: last year, 69% of the breeders that registered litters with the AKC registered only one litter that year. There is concern that requiring an additional \$70/80 fee to DNA test the sire and dam could result in the loss of that litter registration to AKC. Option (3) – Requiring new mandatory programs for sires and/or dams – is theoretically available, but without substantial support from the Committee. The Committee believes that there are sufficient mandatory programs in place to protect the integrity of the registry. When the AKC instituted its first DNA program in 1996, it began a process that has unfolded with careful concern: the AKC was aware that one major equine registry tried and failed to institute a DNA program. AKC’s working philosophy from the beginning was ‘proceed with caution.’ And at every juncture, at the unfolding of every new DNA requirement or option, the DNA world for canines was impacted and changed. We have now reached a DNA stratum where voluntary DNA programs can lead the way. The AKC, parent breed clubs, breeders, and owners can voluntarily take advantage of the DNA programs and guarantee the integrity of their pedigrees. The reality of today has transformed the reality of yesterday – as is always the case.

Recommendation. That the AKC expand the voluntary DNA programs – NOT the required DNA programs (see below).

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Subtopic 9: Voluntary DNA Programs – Should They Be Expanded?

Background/Comments. The Parent Breed Club Program permitted the AKC to directly communicate with 100 clubs during the years of 1998, 1999, and 2000. More than nine thousand DNA samples were taken among the breeds, and seventeen microsatellite markers were run for each sample. Every dog sampled resulted in the production of a DNA profile. Greater than 99% of parentage verifications succeeded. The investment of resources and money in this program – many believe – played a major

role in helping breeders and owners understand that ‘DNA in dogs is o.k.’ – and that the AKC was only interested in helping underwrite pedigrees with profiles. Breeders have come to understand that there are no concerns about parentage, and, thus, the serious purpose of breeding better dogs based on verified pedigrees is the direction for today and tomorrow. The Committee believes that maximum creativity and resources must be directed now to encourage the voluntary use of DNA. Accordingly, the Committee has appended to this Report a ‘White Paper – Methods to Encourage the Voluntary Use of DNA’ to facilitate the implementation of this recommendation.

Recommendation. The Committee is unanimous in believing that AKC should do everything possible to encourage the voluntary use of DNA. Refer to the Appendix of this Report for the Committee’s ‘White Paper’ dealing with this matter.

Topic: Genetic Testing

Background/Comments: The AKC has championed the use of cheek swabs in the collection of DNA samples for parentage. Is it possible that a simple check-off box could be added to the AKC DNA Certification Program Sample Submission form, to enable owners to donate their dog’s DNA for research?

When the AKC Canine Health Foundation was established, all matters dealing with research in genetics and health became their responsibility. The AKC, thus, specifically, has only used DNA for genetic identity and parentage – and it is essential to maintain that philosophy for the future. The commitment to the fancy in the beginning was that samples collected by AKC would only be used for one specific purpose (identity and parentage) and the fancy relies on the AKC to maintain that posture as a matter of principle.

The other reason that a check-off box is inappropriate, is that the collection of DNA samples without informative pedigrees is at least questionable, often not useful, and can be misleading. The present system of having researchers work directly with breeders and Parent Clubs to develop breed-specific databases deserves continued support.

Breeders need and deserve to see the establishment of genetic tests that will underwrite their breeding programs in essential ways. These tests in the best of all worlds will be reliable and inexpensive. Working with Parent Clubs, the AKC Canine Health Foundation is perfectly positioned to advance these causes. However, the AKC needs to understand its options in regard to such issues. Now is the time to decide whether or not the AKC will use its resources to develop comprehensive databases – or whether other organizations will do so.

Recommendation. The voluntary storage and retrieval of information useful to breeders, including the results of genetic tests, advances the causes of the AKC. Accordingly, the establishment of comprehensive databases is required. Cooperation among the AKC, breeders, the Canine Health Foundation, Parent Breed Clubs, and organizations such as CERF and OFA can lead the way to important, enhanced options for the breeders of tomorrow.

Topic: Health

Background/Comments: Solving today's life-threatening health issues must be one major concern for an institution founded on the principle of 'breeding better dogs.' When the AKC created the AKC Canine Health Foundation it took a gigantic step in the right direction, and the results to-date are well known. The continued annual financial support of the CHF has earned the highest praise from the breeders and Parent Clubs – and justifiably so. Having done so much, having invested so much, and with so much yet to be done, is there a role for the AKC in regard only to the storage and retrieval of canine health information? Should the AKC now be directing its attention to providing – in the future – the results of health (and genetic) tests when such information is readily provided by the breeder on a voluntary basis?

Recommendation. That the Board investigate the present options regarding the storage and retrieval of health information, with the goal of providing a comprehensive solution in concert with breeders, Parent Breed Clubs, the Canine Health Foundation, and all other interested parties (e.g., CERF, OFA, etc.)

Topic: Surrogacy

Definition: the dam of the litter provides the eggs and the substitute (surrogate) females receive the embryos and provide gestation and whelping of the litter.

Background/Comments. This reproductive option (embryo transfer) is available for several mammalian species (including humans). There have been successful embryo transfers in dogs, however the technology is still at the research stage (the Watanabe Report). The essential negative side of surrogacy is that exceptional resources are required to obtain offspring from a specific bitch, and, if the reasons for her inability to produce offspring are hereditary, the line is going down a reproductive road that will continue to demand excessive resources. The essential positive side of surrogacy is that accidents happen, and an entire line of breeding females may become extinct unless the option of surrogacy is provided. In purebred dogs, once a line is extinct – either by normal reproduction or by surrogacy if the offspring are denied registration – that amount of genetic variation is lost forever.

Recommendation (majority) Alternative 1. In the best of worlds, individual genetic variation is priceless and unique; thus, a procedure that preserves a female line which otherwise would be lost forever to the breed should be provided, and such is consistent with the tradition and spirit of the AKC in that extinction of that line was avoided. The Committee recommends that surrogacy be permitted only under conditions that preserve

genetic variation for the future and guarantee that additional generations of surrogacy will be unnecessary. It also potentially strengthens the integrity of the registry.

(1) The requests for surrogacy that may be considered fall into the ‘accident’ category – that is, the dam’s reproductive system produces viable eggs, but the gestational/whelping processes are contraindicated.

(2) DNA testing for the sire, dam, surrogate, and all puppies is required.

(3) The dam and surrogate must be of the same variety/breed.

(4) Sequential generation approvals for the use of surrogates are contrary to the intent of this policy.

Recommendation (minority) Alternative 2. The use of Surrogate Dams, not currently possible, is contrary to the normal breeding of dogs for type and function. Thus, it runs contrary to the tradition and spirit of the AKC. Accordingly, some members of the Committee recommend that offspring produced by surrogacy be denied AKC registration.

Appendix:

(1) 'White Paper – Methods to Encourage the Voluntary Use of DNA'

Part 1. DNA Profiling: For the Betterment of the Breed

Part 2. Ways AKC Can Increase Voluntary Participation in the DNA Program

(2) AKC History of DNA and its Use in Correcting Pedigrees (07/18/2001)

DNA Profiling: For the Betterment of the Breed

Breed to improve! This is the motto of the responsible breeder. With a focus on the preservation and advancement of their breed, responsible breeders strive to maximize the expression of positive traits and minimize the expression of negative traits. Health, temperament, and performance are of key importance when selecting a breeding pair. To this end, breeders are willing to pay a high price for a dog/bitch from a championship lineage and/or with genetic health certifications to introduce into their breeding program. Because breeders rely on pedigrees to make informed decisions, pedigree accuracy is critical to successful breeding. If a dog’s pedigree has been inaccurately recorded, the desired results will likely not occur and negative traits may be propagated. The breeder will wonder what went wrong because the breeding looked so good “on paper”.

DNA-based parentage verification adds integrity to pedigrees. Parentage verification will determine, with greater than 99% confidence, whether a dog is from the tested sire and dam. It is a powerful tool that can be used to ensure your breeding decisions are based on accurate pedigree information, enabling you to be a more responsible breeder. This article will describe the DNA profiling process, indicate some benefits of DNA profiling, and suggest ways in which breeders and clubs can promote DNA profiling through means of programs, awards, and incentives.

DNA Profiles Explained

The technology used by the AKC to generate DNA profiles is the same as that employed by law enforcement agencies throughout the world. How does this work? In humans and dogs alike, each gene is present as two copies called alleles (depicted as letters in the following example). For each gene, offspring receive one allele from each parent in a random process. The diagram below illustrates the four possible combinations of alleles (the four shaded blocks) for offspring of this sire and dam.

For technical reasons, scientists do not use actual genes to generate DNA profiles. They use other DNA sequences referred to as markers, which are inherited just like genes. Each marker resides at a specific location or locus (plural: loci) on a chromosome. The AKC uses ten markers to generate a DNA profile, which is referred to as a genotype. Because the markers used to generate the genotypes are not genes, AKC DNA profiles do not provide any information about the conformation of a dog, the presence or absence of genetic diseases, or other inherited traits.

Gene (or marker)		Dam	
		G	L
Sire	A	AG	AL
	C	CG	CL

Parentage Verification

Parentage can be verified by comparing the genotypes of sire, dam, and offspring at all 10 markers in the example below. At the first locus (labeled L1), the sire can contribute either a B or E to each pup, and the dam can contribute either a B or F. Pup 1 has EF (E from the sire, F from the dam). Pup 2 has BF (B from the sire, F from the

dam). Pup 3 has CD, neither of which is present for the sire or the dam. When an allele from the sire or dam does not match with the pup, this is called an exclusion. If we continue this analysis across all ten loci, we see that the alleles for pups 1 and 2 are consistent with the dogs being the offspring of the sire and dam (they are *included*). Pup 3, however, is *excluded* at four loci (shaded, in the example below), indicating that this pup cannot be the offspring of the sire and dam tested. It's that simple!

Locus	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
Sire	BE	FG	BC	HH	EE	HH	GI	BB	CD	AA
Dam	BF	DG	BC	DG	EE	GG	II	BB	CD	AB
Pup 1	EF	DG	CC	DH	EE	GH	GI	BB	CD	AB
Pup 2	BF	DG	BB	DH	EE	GH	GI	BB	CD	AA
Pup 3	CD	BE	BB	DD	EE	CH	GI	BB	CD	AA

DNA Profiles: Additional Benefits

In addition to the ability to verify parentage, there are other benefits to having your dog DNA profiled by the AKC. It is estimated that 1.5 to 2 million companion animals are stolen each year. A DNA profile is a permanent form of tamper proof identification. It can be used to establish the identity of a dog that may have been lost or stolen, and subsequently recovered. DNA profiling can also be used to verify stud service when breeding has been done off-site and to verify artificial insemination. Health registries such as the Canine Health Information Center (CHIC) require a form of permanent identification for registration. A DNA profile will satisfy this requirement. DNA profiles can also be used to verify that the correct dog's DNA was tested when screening for the presence of disease-related genes. Repeating the DNA profile on the same sample of DNA used for the genetic test would establish that the DNA sample came from the dog in question.

The Role of Clubs in Promoting DNA Profiling

Given the positive impact DNA-verified parentage can have on breeding programs, many AKC Clubs have established programs that promote and recognize DNA-profiled dogs. These programs educate members of the fancy, as well as the public, about the desirability of DNA certification. Ultimately, this will result in informed and accurate breeding decisions, thereby safeguarding the future of your breed. As the dog buying public becomes more educated about the importance of genetic health testing and

sound breeding practices they will seek to purchase dogs whose parentage has been verified. This will ultimately put a premium on progeny from litters that have been analyzed by DNA profiling. You can make this happen. The following is a list of ways your Club can promote DNA profiling.

At Shows

1. Note AKC DNA profile numbers in the show catalog
2. Require an AKC DNA profile number for all dogs advertised in the show catalog
3. Require that entries be AKC DNA Certified to be eligible to compete in non-regular classes. For example, in 2000, the Irish Setter Club of America required that all entries at their National Field Trial be DNA certified.
4. Require that entries have their parentage verified via AKC DNA Certification to be eligible to compete in certain non-regular classes. For example:
 - a. Require that the dog, bitch, and the get be AKC DNA Certified to be eligible for the stud dog and brood bitch classes;
 - b. Require that the sire and dam of a litter nominated for Futurity class be AKC DNA Certified for the litter to be eligible (can also require DNA for the litter members)
5. Host AKC DNA Certification clinics at shows and subsidize the cost of DNA profiling by paying a portion of the DNA profile fee. For example, at the 2002 Dachshund Club of America (DCA) Specialty Show, the DCA paid \$10 towards the AKC DNA certification of each dog sampled at the show.
6. Provide annual awards for the high scoring/winning AKC DNA profiled dogs.

Club Recognition Programs

7. Maintain an up-to-date list of AKC DNA profiled dogs on your club's web site. See example below.
8. Maintain an up-to-date list of dogs that have had their parentage verified via AKC DNA certification on your club's web site.

Dog's Registered Name	Owner	AKC DNA Profile #	Parentage Verified
Gene O'Type	C. Lupus	V12345	no
Allela	C. Lupus	V12346	yes

9. Start a "DNA Certified Kennel" program: Recognize kennels that AKC DNA profile 100% of their breeding stock (and litters). Include this information in your breeder referral program.
10. Include a requirement for AKC DNA profiling of breeding stock in your Code of Ethics.
11. Include a segment about AKC DNA profiling and parentage verification in your club's breeders' and/or public education program(s).
12. Incorporate AKC DNA profiles as a component of existing versatility and attainment programs; progeny recognition program; breeder of merit; sire/dam of merit, etc.
13. Require a DNA profile for eligibility for Sire/Dam Hall of Fame.
14. Require DNA profiling of breeding stock for eligibility for Breeder Hall of Fame.

These are just a few ways you can promote AKC DNA profiling and ensure the integrity of your pedigrees. The AKC has demonstrated its commitment to facilitating the voluntary use of DNA Certification in a number of ways: lowering the price of DNA Certification to \$35 per dog through the new Prepaid DNA Test Kit; offering a discounted price of \$30 per dog to AKC Parent Breed Clubs for clinics at National Specialty shows; and offering discounted DNA Certification in conjunction with the AKC Booth at large all-breed shows. AKC DNA profiles have never been more affordable and the AKC DNA Department now offers a Parentage Evaluation Service, as well as AKC DNA Parentage Certificates. Take the technological leap, and substantiate the integrity of your breeding program. It is time to raise the bar and set the example for others to follow.

Ways AKC Can Increase Voluntary Participation in the DNA Program

1. Add space on the official AKC Entry Form for exhibitors to enter the DNA profile number and ask the clubs/superintendents to print them in the catalog if entered on the Entry Form
2. List the top ten DNA certified breeds in the AKC Gazette each month and on the web site
3. Include DNA profile numbers in the catalog for the AKC/Eukanuba National Invitational Championship
4. Develop an educational packet and/or Powerpoint show about DNA and supply it to all clubs
5. Institute a \$5 discount DNA Certification coupon for females on the AKC web site
6. Continue to offer discounted DNA at Nationals
7. Initiate a dialog with MMI Genomics regarding sharing/licensing the alphabetic allele calling system internationally so AKC can position these markers as the international standard
8. Purchase an AKC DNA Booth to increase exposure of and lend credibility to the DNA Program. The booth can be sent to the following locations to distribute educational material, take discounted DNA samples, and enable the public to interact directly with DNA staff members:
 - a. AKCCHF National Parent Club Conference
 - b. AKC/Eukanuba National Invitational Championship
 - c. Other AKC National Events, e.g., AKC Pointing Breed Gun Dog Championships
 - d. Major dog shows with large entries
 - e. American Veterinary Medical Association (AVMA), and other relevant professional societies
9. Develop an AKC DNA logo that can be used to advertise in catalogs, magazines, etc. to indicate that a dog has been DNA-profiled
10. Institute a “litter rate” for DNA (will require some form of on-dog ID to correctly match profiles to the pups) – maybe team up with CAR

11. Include a handout suggesting how to advertise pups – “parents AKC DNA-certified” “AKC DNA verified” with the DNA certificates
12. Make clubs aware that they can add DNA profile numbers to their entry forms and indicate DNA certifications in show catalogs
13. Recognize breeders that DNA all their breeding stock; recognize breeders that follow up to ensure that their pups are DNA certified; publish a list of “DNA Certified Breeders” and recognize these breeders with a “Certificate” for that year. The list of certified breeders should be published each year and included as a handout in the program for the AKC/Eukanuba National Invitational Championship.

For example:

Breeder Certification for 2002

This certifies that AKC has recognized Jane Doe as a breeder that DNA certified the sires and dams of all litters she registered with the AKC during 2002. The AKC supports breeders in their efforts to ensure the accuracy of their pedigrees by DNA profiling their breeding stock.

Signed _____ *AKC seal here*



The American Kennel Club

Internal Memorandum

HISTORY OF DNA AND ITS USE IN CORRECTING PEDIGREES

At the December 13, 1988 meeting, the Board adopted a staff recommendation to allow ***Deoxyribonucleic Acid (DNA) Testing*** to verify parentage in selective cases involving challenged identity of individual dogs and litters. The policy stated that the cost of the DNA testing would be borne by the party or parties requesting the test, that the veterinarian who drew the blood sample attest to the identity of the dog; that pictures be taken at the time that the blood was drawn; that the sire and dam and all puppies be tested and that if the DNA analysis concluded that the litter had been sired by more than one (1) male then the litter would not be registerable and, if registered, the litter registration would be canceled.

In February of 1996, the Board adopted a policy whereby the registration of a dog could be corrected in cases where the sire or dam could be ascertained by DNA verification. The guidelines dictate that the policy must be applied to cases arising from a complaint driven investigation or inspection; that samples be taken in an approved manner; that the samples be sent to a recognized laboratory for analysis; and that the litter is produced by only one (1) sire.

Following a Pilot Program in 1997, a DNA Compliance Audit Program was placed in effect January 1, 1998 whereby kennels which produced seven (7) or more litters per year or are involved in the brokering or auctioning of dogs are randomly selected for DNA collection, the cost of which is borne by the AKC. If the test results conclude that a single litter is excluded, the litter is placed on referral and will be canceled in forty-five days unless the owner requests re-testing and pays a \$250 reinspection fee. If the correct sire can be determined through this procedure, the litter is corrected, the owner is scheduled for a reinspection, and is subject to disciplinary action if another exclusion is found. If two (2) or more litters are excluded in a three (3) year period, *Chapter 4, Section 6* of the “*Rules Applying to Registration and Discipline*” is invoked, and no registration applications concerning the individual are processed and the matter is referred to the Management Discipline Committee for the appropriate action.

Effective April, 1998, the Board approved a Certification Program whereby samples are submitted on a voluntary basis. A DNA Profile Number is assigned and added to all future AKC registration materials and pedigrees for registered dogs that are “AKC DNA Certified”. The unique number identifies the genotype

of the dog and may be used to verify the parentage of a litter. The customer is issued an “AKC DNA Certificate.”

The Board also approved the Parent Club Program to help secure the support of the fancy. It was determined that collections would be taken at national specialties during 1998, 1999 and 2000. AKC would assist in guaranteeing that the genetic markers, used for identification and parentage verification, are the most appropriate for all AKC breeds. Registered dogs participating in this program are “AKC DNA Certified.”

During 1997, the Board approved a policy to allow for the registration of a litter produced by an AKC sire and dam in a country with no approved registry if DNA evidence is conclusive.

In 1998, the Board adopted a policy which states that “AKC DNA Certification” is required for all stud dogs whose semen is collected for fresh extended and/or frozen use, including foreign stud dogs whose semen is collected for importing to the U.S., after October 1, 1998.

In June, 1998, the Board reaffirmed the six uses of DNA by the AKC: (1) The Compliance Audit Program, (2) The Certification Program, (3) The Parent Club Program, (4) Special Investigations, (5) Customer Initiated DNA Cases, (6) Use of Fresh Extended and Frozen Semen.

In September, 1999, the Board reviewed one facet of its policy concerning customer-initiated DNA testing, and changed it to read as follows: “The litter is eligible for registration if the one sire is proven by DNA testing to be the actual sire of the purebred litter.”

In December, 1999, the Board approved a transformational policy for parentage verification across all DNA Programs. Whereas the DNA Certification and Parent Breed Club Programs were not adopted with stated guidelines for action regarding parentage verification, and whereas it has been shown that DNA Certifications are useful for verifying parentage, it was approved that, as the DNA database permits, parentage verifications for registered litters will occur. Further, if exclusions are found breeders will be notified, and every effort will be made to cooperate with the breeders in establishing correct parentage based on additional information and submitted DNA samples. Litter corrections will be made based on DNA profiles, unless it is established that the litter has multiple sires. Litters that cannot be corrected will, unfortunately, be cancelled. These policies to become effective for litters whelped on or after January 1, 2000.

In January, 2000, the Board approved a Frequently Used Sires Program. Effective for litters whelped on or after July 1, 2000, AKC DNA Certification is required for stud dogs that have sired seven or more litters in their lifetime, or more than three in a calendar year. The requirement is considered met when a DNA sample, the accompanying paperwork, and the required \$40.00 fee are received by DNA Operations. The parentage verification policies of all current

DNA programs will be applied to the Frequently Used Sires Program, as will the discipline policies of the Compliance Audit Program. Any stud dog already DNA Certified through AKC's Certification Program or the Parent Breed Club Program has met the requirement. Any excess revenue over expenses from this plan will be placed in a special reserve, which will be used to fund registration integrity programs.

In May, 2000, the Board adopted the following registration policy. To insure the integrity of the AKC registry, in cases where the identification of the sire is in question, or for litters with more than one sire, registration will depend on AKC certified DNA parentage verification in every such case. The effective date is September 1, 2000 and will be retroactive for 24 months. This policy supercedes the previous Board policy prohibiting the registration of litters with multiple sires. At the June meeting an administrative fee of \$200 over and above the regular litter registration fee was approved for multiple sired litters.

CORRECTIONS OF PEDIGREES

The AKC has historically (before DNA testing) allowed the correction of a registered dog or litter in cases where the owner comes forward and provides a reasonable explanation for the error, as well as copies of the appropriate breeding records. This procedure is currently being followed in cases of customer initiated corrections.

The AKC has thoroughly demonstrated the added benefit of DNA parentage verification for correcting pedigrees and ensuring the integrity of the Stud Book. The voluntary use of the DNA Certification program before registering a litter can guarantee that the information going into the Stud Book is one-hundred percent accurate. Coupled with the Compliance Audit Program and the Frequently Used Sires Program, the AKC's DNA Programs are comprehensive and offer parentage verification services both voluntarily and compulsorily to all AKC customers, while ensuring that these services are not abused by indiscriminate breeding practices.

DNA SERVICE PROVIDERS/LABORATORIES

Celera AgGen (previously known as PE Zoogen and PE AgGen) of Davis, California, has been selected as the primary service provider by AKC. All DNA Profiles obtained in the Compliance Audit Program, Parent Breed Club Program, and the AKC DNA Certification Program use the canine genetic markers developed by Celera AgGen. However, should questions arise about genetic identity, parentage verification and/or Celera AgGen analysis, the AKC accepts results provided by other laboratories using the same or different sets of canine markers.

DNA OWNERSHIP

In January, 2000, the Board approved the following policy statement: "While DNA samples are the property of AKC for the purpose of providing genetic identity and parentage verification, the permission of both the owner of the dog

and AKC would be required should there be any request for any other use of the archival samples.”

In June, 2000, the Board adopted the following policy statement on the use of DNA to supercede any previous statement. While DNA samples may be used by AKC for the purposes of providing genetic identity and parentage verification, the permission of the registered owner or owners of the dog would be required should there be any request for any other use of the archival sample.

USE OF SURROGATE DAM

[from the Board minutes, December 13, 1999]

Dr. Battaglia gave a report from the Business and Planning Committee.

There was discussion on a request that a breeder be permitted to use a surrogate dam to produce a litter using the fertilized egg from a nine-year-old Labrador Retriever bitch. Following a motion by Dr. Battaglia, seconded by Mr. Marden, it was VOTED (unanimously) to grant the request on a one-time trial basis utilizing the following criteria:

The sire, dam and surrogate dam must be AKC registered Labrador Retrievers, with AKC DNA profiles on file. Each member of the resulting litter must be DNA tested before the litter is AKC registered. The application to register the litter must include a statement, certified by a veterinarian as to the date the eggs were collected, inseminated, and implanted. Parentage by the indicated biological sire and dam will be verified by DNA testing.

NEW MANDATORY DNA INITIATIVES

[from the Board minutes, October 9, 2000]

The Board adopted the following statement on the use of DNA in the registry:

The present policy of the Board is that for the next two years there will be no new mandatory DNA programs. AKC management will seek new ways to encourage the use of voluntary DNA Programs.

DNA ADVISORY COMMITTEE

[from the Board minutes, October 9, 2000]

There was a discussion on strategy for using DNA in the registry in the future. Following a motion by Mr. Menaker, seconded by Dr. Mays, it was VOTED (unanimously) to have the Chairman appoint a Board/AKC staff/Delegate Committee, with additional outside scientific experts to look at how DNA technology can and should be utilized in the future.