He – Hereditary & Genetic Diseases - FECAVA Symposium

HEALTHY DOG BREEDING – THE VALUE OF BREEDING PROGRAMMES

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The last 10-15 years there have been major development in veterinary medicine, giving us the knowledge, equipment and medicine to diagnose and treat a large number of diseases. Moore dogs are diagnosed and treated – giving the impression that dogs are more diseased than a decade ago. Has all our effort in regulating breeding through screening, breeding programmes and advices failed? On the other hand, advanced treatment allows even diseased dogs to live a longer and happier life, so maybe breeding programmes are less important than they used to be? But again, on the other hand, advanced possibility for diagnosis should give us a great tool in preventing hereditary diseases and diseases with genetic disposition that are provoked by the environment. This can partly be done through screening programmes, but they have obvious limitations. Screening programmes are available only for a small number of diseases, and these are not necessary the most important diseases for the dogs' functional health. And for diseases like hip dysplasia (HD) and elbow dysplasia (ED), where the environment plays a major role in forming the dogs' phenotype, the screening result of a dog does not necessary tell the truth about the dogs genotype. Index based breeding will hopefully be a valuable tool in the future breeding programmes on polygenetic diseases, as an index is based not only on the dog's own screening result and the result of offspring, but also on a large number of ancestors and relatives.

A unique tool in future breeding would be a test showing the dogs' genotype. At the moment such DNA tests are available for some monogenetic diseases, and more tests will be available in the future. But there will probably always be a lot of important health issues that cannot be measured by DNA tests or screening results. Nevertheless, these health issues must still play an important role in breeding programmes.

Indexes and DNA results must not replace other aspects in breeding programmes or the use of common sense, but should be supplements to reach the common goal: Functionally healthy dogs with a construction and a mentality typical to the breed.

What is a breeding programme?

A breeding programme should be a guideline for dog breeders. Some ethical aspects should be the same for every breed, in addition to important breed specific health issues. The programme should consist of both basic demands that must be fulfilled in order to register puppies, and recommendations on how to breed, how to select dogs for breeding and how to do the right combinations. Eradication of genetic diseases and breeding only genetically healthy dogs is a totally unrealistic goal. Too strict regulations and demands in breeding programmes could have the opposite effect, as it will exclude too many dogs, reducing the breeding population and result in inbreeding.

Education of dog breeders is basic in order to succeed with a breeding programme. The breeders have a large responsibility, both to the dogs, the owners and the society. Both kennel clubs and breed clubs must play an important role in educating breeders; **knowledge** is vital to succeed.

Another key word to success is **cooperation** to the benefit of dogs' health. There must be cooperation between kennel clubs, breed clubs and scientists. For cooperation to succeed, we must respect and trust each other; **honesty** is vital for success.

Reliable statistics based on **screening** is an important tool. So are the **DNA tests**. The results of both screening and DNA tests should be registered in a kennel club **register, open to the public**. True **identification**, microchip or tattoo, is vital to any breeding programme. A **national disease register** based on veterinary diagnosis linked to the identification of the dog would be very beneficial to breeding programmes.
A breeding programme based on knowledge, cooperation, honesty, reliable results from screening and DNA-test, and hopefully in the future also from a national disease register, combined with other important health issues, including mental health, should have every possibility to be beneficial for breeding healthy dogs.

Basic rules and recommendations for breeding healthy dogs

1.The breeding programme should not exclude more than 50% of the breed; the breeding stock must be selected from the best half of the population.
2.Only functionally, clinically healthy dogs should be used for breeding; dogs with chronic diseases should never be bred unless we know for sure that heritability plays no role in causing the disease. If a dog suffers from a disease that is suspected, but not proven, to be inherited, the dog should not be used for breeding. If close relatives of such a dog are used for breeding, they should be mated to dogs from bloodlines with low or no occurrence of the same disease.
3. Avoid matador breeding. A basic recommendation should be that no dog should have more offspring than equivalent to 5% of the number of puppies registered in the breed during a five year period.
4. A bitch that is unable to have normal birth, due to anatomy or inherited inertia, should be excluded from breeding – no matter the breed.
5. A bitch that is unable to take care of the newborn puppies, due to mentality or inherited to agalactia, should not be used for breeding.
6. Dogs with a mentality atypical for the breed, aggressive dogs, should not be used for breeding.
7. Screening results for polygenetic diseases should be used for preparation of an individual index, based on both national and international screening results. The breeding combination should have an index better than the average for the breed.
8. Results from DNA tests should be use to avoid breeding diseased dogs, not necessarily to eradicate the disease.
9. The raising of puppies, with correct feeding, environmental exposure, stimulation by their mother, breeder and others to develop social sense and response, must be basic in every breeding.

If these simple basic rules and recommendations are implied in a breeding programme, we would attain considerable improvement of dogs' health. Breed specific health issues should be added in order to make an even greater improvement of the health.

National health committees

Each kennel club should have their own health committee, giving advice to breed clubs on health issues. The Norwegian Kennel Club (NKC) has only few registration restrictions and gives the breed clubs more responsibility for the details in the breeding programmes. We put a lot of effort in educating the breed clubs and the breeders. It is our true believe that it is better to include as many breeders as possible in organized in the kennel club work and to educate them on how to breed healthy dogs, instead of excluding too many dogs and to many breeders due to heavy restrictions. We can only influence the breeders that cooperate with the kennel club. In Norway a large majority of pure bred dogs are registered in the kennel club, in some breeds close to 100%.

The Nordic Kennel Union (NKU)

The Scandinavian countries cooperate in health issues through the NKU Scientific Committee. The members are mainly scientists who are appointed by their kennel club. Subcommittees are working with DNA-tests and HD-index. NKU has an HD/EA panel, consisting of the veterinarians that are responsible for reading radiographs for official HD and ED diagnose in each country.

DNA-tests

The number of DNA-tests is rapidly increasing. To be beneficial for healthy dog breeding, the DNA test must represent a disease that is harmful for the dog; we must test our dogs due to a health problem – not mainly because there is a test available. All the results must be available to the breeders; there must be a reliable register for the result of every dog that is tested, not only the dogs that are free of the specific gene causing disease. The dog must be identified with microchip or tattoo.
In Norway the veterinarians employed by the NKC decides, together with the breed club, which DNA-test that are important for the breed and then make an agreement with a laboratory that do the testing. A specific form can be obtained from the NKC database; the dog owner fill in the registration number of the dog, and a complete form containing all the dogs' data from the data base, including the ID-number, is then sent

immediately by e-mail to the owner. By signing this form, the owner allows the test result to be public in the database. The veterinarian checks and states the dog's identity. The sample must be mailed by the veterinarian, not by the owner. The test result is sent from the laboratory both to NKC and to the owner.
The results of DNA-tests can contribute to healthy dog breeding as part of a breeding program. We will know whether a dog is a free of the gene causing a recessive disease, a carrier or if it will develop the disease. Through selective breeding, we can assure that at least one parent of a litter is free of the gene causing the disease, resulting in puppies which will not develop the disease. We do not have to exclude the carriers from breeding. This is basic in NKC breeding policy.

Screening for hip and elbow dysplasia

To be useful in international breeding programmes, the score from screening for HD or ED should be the same for the same dog, no matter where the dog is diagnosed. Minimum age, position of the dog when radiographed, technical demands, depth of sedation and reading the result should be uniform in every country.
Figure 1 shows the screening results of Bernese Mountain Dogs registered in NKC from 1986-2005. 64% of dogs registered in this period have an official ED result. In the period '86-'97, 66% were diagnosed as free. The average ED score was 0.53. In 1999, there is an obvious improvement of the ED status. From '99-'05, 82% are diagnosed as free, and the average ED score is 0.27. Is this the result of the breeding programme? Probably it is not due to genetics. From 01.01.2000 the minimum age for official ED status was lowered from 18 to 12 months, due to Scandinavian harmonization. As the ED score is based mainly on arthrosis, it is not surprising that the score is improving when dogs are examined at lower age. This shows the importance of early harmonization; if the protocol differs between countries, the screening results will not be compatible, and preparation of international indexes would not be reliable.
The main issue of NKU HD/ED Panel is to harmonize the protocol for screening for these diseases in Scandinavia, and hopefully the same harmonization will be valid also in other FCI countries and the rest of the dog world.

Screening for inherited eye diseases

The same disease should have the same diagnose in every country. This is an important issue for European College of Veterinary Ophthalmologists (ECVO) and for the European Eye Group, consisting of both eye panellists and kennel club representatives. To succeed in harmonization, it is important to have common education for eye panellists, and a common international form for diagnosing and reporting the results of an eye examination to the national register. The ECVO form will hopefully be used by an increasing number of countries in near future.

The kennel club database open to the public

Access to information about the individual dog, its ancestors and offspring is important in breeding programmes. The NKC database contains every available information on any dog registered the last 30 years. To be useful in breeding programmes, these data must be available to the public. The NKC database is open to all members of the NKC, breed clubs and veterinarians. Pedigree, screening results, DNA results and results from dog shows and other competitions like obedience, hunting etc can be obtained from the database.

Summary

Breeding programmes can be valuable for breeding functionally healthy dogs. These should be guidelines and not contain too stringent demands. Every dog should be identified with chip or tattoo. The protocol for screening results should be the same for all countries, and national and international indexes should be performed for polygenetic diseases. Results of DNA-tests should be used to avoid breeding diseased dogs. When selecting dogs for breeding, the dog and the breed should be looked upon in its entirety. The goal should be functionally healthy dogs with a construction and a mentality typical to the breed.

Figure 1. The prevalence of elbow dysplasia in Bernese Mountain Dogs in Norway 1986-2005, based on radiographic screening. Total number of dogs of this breed registered in this period is 5818, of which 3743 (64%) were examined. (Data from the Norwegian Kennel Club, May 2006, www.nkk.no)