

# How can we take care of health, welfare and diversity of breeds?



## INTRODUCTION

In 1992 the *European Convention for the protection of pet animals* was developed by The Council of Europe, and the Convention has later been signed and ratified by a majority of European countries.

The Convention concerns general animal welfare, but it also includes a statement on breeding:

*Any person who selects a pet animal for breeding shall be responsible for having regard to the anatomical, physiological and behavioural characteristics which are likely to put at risk the health and welfare of either the offspring or the female parent (Article 5).* A number of hereditary diseases and conditions, as well as breeds at risk have been listed. Thus, breeding of companion animals is of concern not only to the dog world, but also to the authorities.

The responsibility for establishing good procedures in dog breeding, including evaluation of breed standards, screening programmes and breeding advice, has to be shared between bodies that determine the breed standards, the FCI, the National Kennel Clubs, breeders, judges at dog shows and the veterinarians.

Ellen Bjerås  
Vice President FECAVA

\* Held during the 10th FECAVA / 29th WSAVA / 7th Hellenic Congress hosted by HVMS (Greece) in Rhodes October 8, 2004.

# BREEDING HEALTHY DOGS – A BREEDERS PERSPECTIVE

Astrid Indrebo, PhD, Veterinary Scientific Director, Norwegian Kennel Club  
Norwegian School of Veterinary Science, PO Box 8146 Dep., N-0033 Oslo, Norway  
E-mail: astrid.indrebo@veths.no

## I N T R O D U C T I O N

The goal in dog breeding is *functionally* healthy dogs with a construction and a mentality typical to the breed. This should be a common goal for all breeders, regardless of breed or nationality. *Knowledge, education, honesty* and *cooperation* are keys to achieve this goal. There must be cooperation between breeders of a specific breed, breeders of different breeds and between breeders and scientists – both on a national and an international level. The national kennel clubs and FCI (Federation Cynologique Internationale) have a significant responsibility, as do the national and international veterinary associations. Regulations and restrictions in dog breeding should be based on scientific and practical knowledge as well as common sense. Strict breeding regulations do not necessarily result in healthy dogs, but may in fact have the opposite effect. It is not enough to take only some details into consideration when selecting dogs for breeding; both the individual dog and the breed must be looked upon in its entirety. Too stringent demands in eradication programmes might eradicate the best breeders and excellent breed representatives instead of the disease.

Breeding dogs is a hobby for most breeders. As conscientious breeders we spend a lot of time, effort and money on our dogs. We do this for the love and affection for both the breed and the dogs. Our wish is to create the best dogs in terms of health, type, construction, mentality and working abilities that represent the best of the breed. Many breeders dedicate almost their entire life trying to reach this goal. We want to cooperate with the scientists to benefit our dogs – and to benefit science. Do not eliminate us by making impossible demands!

## FUNCTIONALLY HEALTHY DOGS

Ideally, the goal should be to breed *genetically* healthy dogs. But do such dogs really exist? Probably not, if we had the means to look close enough. The same probably goes for other animals and humans. Today more than 370 genetic diseases are known in dogs, and the mode of inheritance is known for more than 200 of these. Some of the diseases have major influence on health; others might be interesting only from a scientific point of view. Does it really matter if a dog carries a single gene for an autosomal recessively inherited disease? Not for the dog itself, and for the offspring it will only matter if they are homozygotes for the disease.

A basic demand in breeding should be that only functionally healthy dogs should be used for breeding. In order to make progress the dams and sires should come from the best half of the population. Thus, the overall breeding programme should not exclude more than 50% of the breed population in a country.

## SCREENING PROGRAMMES

A screening programme for a disease implies a recommendation to examine a lot of dogs of the breed in question for a specific disease, independent of clinical signs. Results of the screening are used in breeding programmes. In order to be efficient, this programme should fulfil some basic demands:

- The disease has major impact on the dog's functional health
- The disease has relatively high heritability
- There must be accurately described procedures and methods on how to perform the test required for establishing a diagnosis, as well as for the interpretation of the results

In Norway there are screening programmes with results recorded in the database of the Norwegian Kennel Club (NKC) on hip dysplasia, elbow dysplasia, hereditary eye diseases and results of some DNA-tests in specific breeds. The dogs that are screened must be identified with tattoo or microchip. All members of NKC have free access to the database.

One problem with breeding programmes based on screening results, is that there is too much focus on one or a few selected diseases and too little on other problems that may have more harmful impact on the dogs' health and welfare. Statistics from the largest Norwegian company for dog insurance (Gjensidige NOR) shows that problems in the stifle joint is the most common skeletal disease, and that skin problems are more common than all skeletal diseases together. It may be possible to create effective screening programmes for most of the stifle problems, but it may be impossible to initiate efficient screening programmes for most of the skin diseases.

## NATIONAL DISEASE REGISTER

Do we need additional screening programmes? Most of these programmes are expensive, and if the owner is expected to adhere to a lot of screening requirement, it may result in poor compliance, fewer diagnoses and less reliable statistics. What we need is a national disease register based on veterinary diagnoses which are linked to the identification of the diseased dog. This register could be used to

- survey the general health condition in the dog population, including infectious diseases
- survey the occurrence of inherited diseases in individual breeds
- collect and give information on individual dogs to be used in the breeding programmes

To attain full advantage of the register, selected individual data should become available to the breeders. This is difficult due to the demand of veterinary professional secrecy; thus, the owner's permission for the veterinarian to report to the register would be necessary. However, if the result of an owner's cooperation is that the dog in question as well as its relatives is banned from breeding, future cooperation with the breeder may become impossible. Nobody wants to be punished for being honest.

However, if the aim of the register is to obtain information without necessarily excluding dogs from breeding, the diagnoses in the register could still be of help in the breeding of healthy dogs. The basic recommendation should be that *only functionally healthy dogs should be used for breeding*. It is my true belief that no conscientious breeder really wants to breed diseased dogs. Based on this register, the breeders would have a valuable tool in selecting dogs for breeding. They would have a great opportunity to avoid combining dogs from families with the same disease, and thereby reducing the risk of diseased offspring. If the breeders were allowed to use the register in this way, most of them would be happy to cooperate with the register and encourage owners of dogs from their kennel to allow the veterinarians to report to the register.

## ERADICATION PROGRAMMES AGAINST HIP DYSPLASIA (HD)

HD was the first genetic disease to be subjected to an eradication programme in many countries. From the middle of 1970s radiographic screening of the coxofemoral joint has been performed as part of the effort to eradicate HD in dogs in several countries around the world. To have a dog diagnosed as free of HD was of uttermost importance for breeders as well as owners. If the hips were good, the dog could be used for breeding. It seemed to be the common opinion that the dog was healthy if the hips were normal, and the dog was diseased if it was diagnosed with HD. But we know today that most of these "diseased" dogs are functionally healthy, if the dog has a good overall functional construction. We also know that a dog free of HD can be diseased in a lot of other respects. The efforts to eradicate HD might actually have caused deterioration in the dogs' overall health because other mental and physical health problems have received little or no attention in the breeding programmes.

The realistic goal concerning HD should be a reduction of the prevalence of both HD and of functionally diseased dogs, not eradication of HD. But have the so-called "eradication programme" improved the status of the hips? In some breeds in some countries there might be some improvement, but the data from the NKC shows depressingly low or no improvement, despite the fact that more than 50 breeds are obliged to have known HD status in order to have offspring registered in the NKC. For most of these breeds 40-60% of the dogs are x-rayed, and nearly all breeding animals are free of



*'Our goal should be to breed functionally healthy dogs'*  
(Photo courtesy of Vibeke Brath)

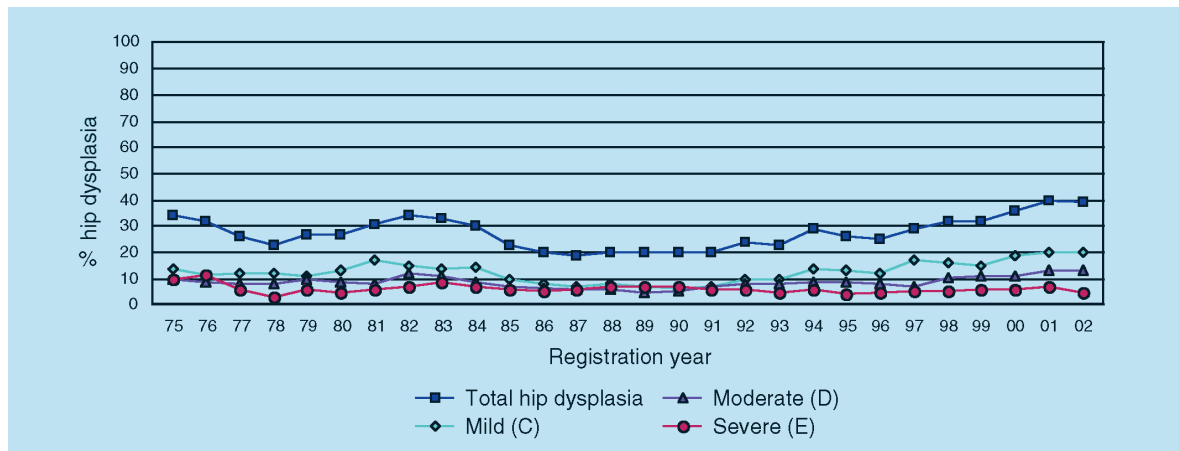


Figure 1. The prevalence of hip dysplasia in German Shepherds in Norway from 1975-2002, based on radiographic screening of the coxofemoral joint. The total number of registered dogs of the breed in this period is 68002, of which 29855 were examined (44%). During the first 10 years (1975-84) 35% of the breed were examined, and 48% in 1986-2002. (Data from the Norwegian Kennel Club, [www.nkk.no](http://www.nkk.no))

HD. Figure 1 shows the results from the German shepherd, the most numerous breed in Norway. A large majority of the dogs that are used for breeding have normal hips; very rarely dogs with mild degree (C) are used. The figure shows a small improvement from 1985 to 1991, but since then there has actually been an increase in the prevalence of HD. The changes are mainly due to changes in the frequency of mild form. The frequency of medium (D) and severe (E) HD has been rather stable since 1975. These disappointing results have cost the breeders and the owners a large amount of money, and have most probably cost the breed a lot of excellent breeding dogs. It is of major importance for the breeders and their advisers to realise that there is more to health than simply the absence of H.D.

## INDEX-BASED BREEDING

There might be multiple reasons for the depressing results in the eradication program for HD. Results of scientific studies suggest that HD, diagnosed by radiographic screening, is a polygenetic trait [1]. Heritability estimates for HD ranging from 10 to 60% have been obtained in studies of various populations and breeds [1-4]. For elbow dysplasia studies shows heritability estimates from 20 to 40% [5, 6].

In many breeding programmes, too much effort is put on the hip result of the breeding animal itself, the phenotype, and too little on the result of the relatives, which gives a far better estimate for the dog's genotype. A breeding value (index) has to some extent been available, but in most countries this index has been based only on a few individuals, mainly the animal itself and some of its offspring. In order to improve the results of the breeding programme, the index values must give a better estimate for the dog's phenotype, based also on the hip score of the dog's relatives. In index-based breeding the specific combination of animals used for breeding might be

more important than the status of the dog itself. If the index for the combination is better than the average of the breed, the result should be a reduction in the prevalence of the disease. But to obtain this goal, the statistics must give a true picture of the population. The index values should be based on both national as well as international data for the dog and its family.

## DO SCREENING PROGRAMMES MAKE THE DOGS MORE "DISEASED"?

Statistics based on screening are often used by the media and others to determine if a breed is "healthy" or "diseased". This is a problem; it can encourage the breeders and the owners not to register the results from dogs with diseases such as HD, elbow dysplasia, spondylitis etc. because positive diagnoses may give a bad impression of the breed. As breeders we repeatedly hear that mixed breeds are far healthier than purebred dogs. This misconception may be due to the fact that there are no screening programmes for mixed breeds; they are only examined if they have a clinical problem.

## STATISTICS ARE TOOLS – NOT GOALS

A database must consist of as many reliable results as possible. The statistics must be considered a tool to breed healthy dogs; good statistics are not a goal in itself, but means for improving the dogs' functional health. The aim of statistical information should be to make a better tool for breeding purpose, by facilitating selection of the right combination of animals instead of eradicating from breeding dogs that in other aspects are excellent dogs. This would



## The FECAVA Symposium 2004

result in better cooperation from the breeders, more reliable statistics, and, finally, dogs with better functional health.

## FACTORS OTHER THAN INHERITANCE

Based on the heritability estimates for HD, 40-90% of the difference between individuals is due to other causes than inheritance. So far too little attention has been paid on these "other causes". In Norway an observational study *Skeletal lesions in growing dogs with regard to nutrition, growth rate and environmental factors* was started in 1998, in order to study factors that influence lameness in young growing dogs. More than 600 privately owned dogs of four large breeds are followed from birth to 24 months of age. Hopefully, this project will give valuable information also on the influence of non-genetic factors on the development of skeletal diseases like HD, elbow dysplasia and enostosis, and provide important contributions to breeding and raising healthy dogs.

## DNA-TESTS

The development of DNA-tests for inherited diseases will play a major role in future dog breeding. Some tests are available today, and many more are expected in the near future. These are excellent tools for dog breeders. The results of the tests can tell us if a dog is a homozygote for a specific disease and will develop the disease, if it is a heterozygote carrier that will give diseased offspring if mated to another carrier, or if the dog is free of the defective gene.

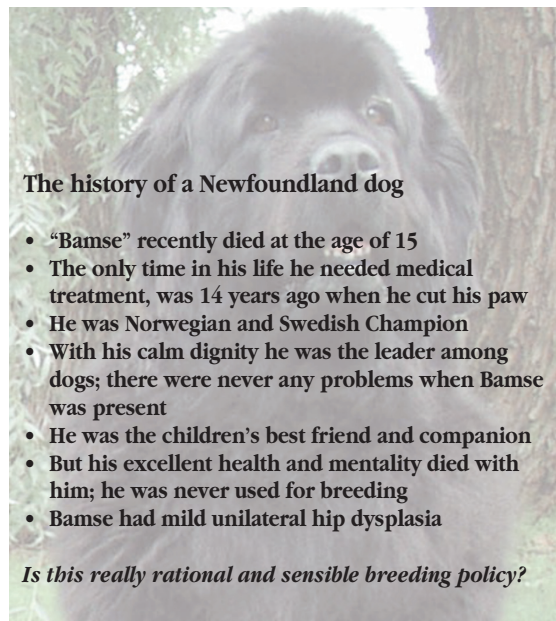
But how do we use the results of a DNA-test in breeding? Based on these tests we can eradicate the gene responsible for the disease from the population after very few generations. However, for most diseases a control programme will be far more beneficial to the breed, because it would not necessarily exclude otherwise excellent animals from breeding. With reliable tests we can control a recessively inherited disease in a population so that all offspring will be unaffected by the disease although the disease gene still exists in the population in heterozygous animals. They will not be "genetically healthy", but they will be functionally healthy dogs.

The basic ethical rule is that only functionally healthy animals should be used for breeding. Therefore homozygotes for the disease should not be bred. But the goal is functionally healthy offspring, and some genes cause disease later in the dogs' life. In some few cases it might be beneficial for the breed to use these homozygotes for breeding. Given they are mated to dogs that do not carry the disease gene, none of the offspring will get the disease. Testing is not necessary; they will all be carriers.

Heterozygote dogs can be used for breeding if bred to a dog that is not carrying the disease gene. All the offspring will

have to be tested, and approximately 50% will be carriers. If two dogs free of the gene are mated, the offspring do not have to be tested; all will be genetically normal for the specific disease.

Thus, reliable DNA-tests will make it possible to control the disease in the population without excluding excellent dogs from breeding.



### The history of a Newfoundland dog

- "Bamse" recently died at the age of 15
- The only time in his life he needed medical treatment, was 14 years ago when he cut his paw
- He was Norwegian and Swedish Champion
- With his calm dignity he was the leader among dogs; there were never any problems when Bamse was present
- He was the children's best friend and companion
- But his excellent health and mentality died with him; he was never used for breeding
- Bamse had mild unilateral hip dysplasia

*Is this really rational and sensible breeding policy?*

## MATADOR BREEDING – "POPULAR SIRE SYNDROME"

In matador breeding one dog is allowed to have too many offspring relative to the breed population. If a large portion of dams are mated to a single stud dog, the gene pool will drift in that dog's direction and there will be a loss of genetic diversity in the breed. The recommendation in NKC is 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. This implies that if the average number of puppies registered yearly in a breed is 400, no dog should have more than 100 offspring in his lifetime.

In Norway this is a recommendation, not an absolute demand. In some cases it might be beneficial for the breed to use an old stud dog a bit more than the 5%-recommendation suggested, maybe by using frozen sperm from an outstanding stud dog which died years ago. At this time, we will know a lot about both the dog itself and his offspring.

Too strict demands in breeding programmes will result in too strong selection. This will encourage matador breeding and result in limited heterogeneity in the breed, which might result in inbreeding depression. Loss of genetic diversity results in a dramatic reduction in the possibility of progress in

breeding. There will be a great risk of concentrating undesirable genes in the population, as there is no way to ensure that any dog is free of every undesirable gene.

## MENTAL HEALTH

The importance of producing mentally healthy animals must never be forgotten in breeding and raising dogs. The environment in which puppies are raised during their first months of life is of uttermost importance for the rest of their lives. Their genetic makeup is the basis for normal breed specific behaviour, but the environmental exposure, to being handled and stimulated by their mother, breeder and others to develop social sense and response is conducive to raising functionally mentally healthy dogs.

## SUMMARY

Cooperation between breeders, breed clubs, kennel clubs and scientists is of vital importance for breeding healthy dogs. As breeders we want the opportunity to breed functionally healthy dogs, based on education, information and common sense. We do not want stringent demands that will eradicate both the conscientious breeders and their dogs, and increase the number of irresponsible breeders who neither care about cooperation with Kennel Clubs or scientists, nor about their dogs or offspring, but breed dogs merely for the purpose of

earning money. Only functional healthy dogs should be used for breeding, and both the dogs and the breed should be looked upon in its entirety. We bred complete dogs – not hips, elbows or eyes!

## REFERENCES

- [1] SWENSON (L.), AUDELL (L.), HEDHAMMAR (A.) - Prevalence and inheritance of and selection for hip dysplasia in seven breeds of dogs in Sweden and benefit:cost analysis of a screening and control program. *J. Am. Vet. Med. Assoc.*, 1997, **210**, 207-214.
- [2] HEDHAMMAR (A.), OLSSON (S.E.), ANDERSON (S.A.) et al - Canine hip dysplasia: Study of heritability in 401 litters of German Shepherd dog. *J. Am. Vet. Med. Assoc.*, 1997, **174**, 1012-1016.
- [3] LINGAAS (F.), HEIM (P.) - En genetisk undersøkelse av hoftelddysplasi i norske hunderaser. *Nor. Vet. T.*, 1987, **99**, 617-623.
- [4] LINGAAS (F.), KLEMMETSDAL (G.) - Breeding values and genetic trend for hip dysplasia in the Norwegian Golden Retriever population. *J. Anim. Breed Genet.*, 1990, **107**, 437-443.
- [5] SWENSON (L.), AUDELL (L.), HEDHAMMAR (A.) - Prevalence and inheritance of and selection for elbow arthrosis in Bernese Mountain Dogs and Rottweilers in Sweden and benefit:cost analysis of a screening and control program. *J. Am. Vet. Med. Assoc.*, 1997, **210**, 213-221.
- [6] GRØNDALEN (J.), LINGAAS (F.) - Arthrosis in the elbow joint of young rapidly growing dogs: a genetic investigation. *J. Small Anim. Pract.*, 1991, **32**, 460-464.



**Quality Equipment. An Investment for life ...**

Shor-Line Ltd, Units 39A/39B, Vale Business Park, Llandow, Cowbridge, Vale of Glamorgan, CF71 7PF, United Kingdom

Tel: +44 (0) 1446 77 20 41

Fax: +44 (0) 1446 77 36 68

**www.shor-line.co.uk**

**e-mail: Quality@shor-line.co.uk**

If you are planning to build or develop a new or existing Veterinary facility and you would like to receive the 2005 NAVC Hospital Design Proceedings as sponsored by Shor-line, then e-mail Design@shor-line.co.uk, giving your name and address.