Description of programmes in the Nordic countries to reduce the frequency of intervertebral disc disease (IVDD) in the dachshund population.

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1. Introduction

The Nordic countries have a long history of close collaboration in almost every aspect of importance for a society. This is due to the geographical proximity, shared history and values, peaceful and friendly neighborship, mutual trade agreements, open borders and to a certain extent shared languages. In the canine world, the national kennel clubs have established a common organisation called the Nordic Kennel Union. The members are Denmark, Finland, Iceland, Norway and Sweden. At the level of dachshund, the Nordic collaboration is informal, but vivid. It includes the Nordic countries apart from Iceland, as there is no dachshund club.

The dachshund population is generally a healthy breed with few serious health issues. However, research shows that approximately 15-20% of the dachshund population develops intervertebral disc disease (IVDD). Each of the Nordic countries has its own programme aimed at reducing the number of dachshunds affected by the disease. These programmes are developed based on research, alongside an interest and understanding of the importance of decreasing IVDD cases. Nonetheless, we cannot deny that the increased focus on IVDD prevention programmes is partly influenced by the emerging trends in health and welfare policies within the Nordic countries. Society's heightened attention to dog health and welfare has increased pressure on breeding organisations to enhance their efforts to improve health and welfare programmes. This is not an issue confined to the Nordic countries; it has become a global concern. As the Nordic countries are always influenced by European policy development, we are closely monitoring current discussions in Germany—the birthplace of the dachshund breed—as well as dialogues in other European nations and the EU regarding animal health and welfare.

In this close Nordic relationship, dachshund breeders, owners, and associations across the Nordic countries have a long-standing and strong history of collaboration, including the exchange of genes, participating in each other’s dog shows, blood track competitions, special Nordic dog shows, Nordic hunting tests for dachshunds, and Nordic blood track competitions. Due to the strong ties between dachshund clubs in the Nordic region, we aim to work more closely together to reduce the number of IVDD cases in dachshunds. Sharing information is vital in this effort. Therefore, the purpose of this document is to provide comprehensive information about what each dachshund club or association in the Nordic countries is doing to prevent intervertebral disc disease. In this way, we can learn from each other and discuss how to improve our programmes. The document also emphasises the strong connection between research and the development of prevention programmes, which further supports research-based breeding.

As mentioned earlier, we are monitoring discussions on animal health and welfare in Europe. One reason for producing this document in English is to allow other countries to access information about our prevention programmes and perhaps inspire new developments in this field. Based on this, the document will be shared with both the other member states in Welt Union Teckel – the International Dachshund Club Association, and with other dachshund clubs that are not members.

The primary focus of this document is on the x-ray screening programmes. Nevertheless, the latest action line – genetic testing – is also given significant attention. Other action lines are mentioned more briefly.

The document is divided into nine chapters. Each Nordic country presents its own information in the following alphabetical order:
- Denmark
- Finland
- Norway
- Sweden

About the statistical information
Please note that tables and figures are based on numbers from 1st January 2009 until 30th June 2025. Thus, the last year includes only the first six months.

Terminology
Different researchers have used various terms for calcified intervertebral discs and for conditions such as disc herniation or disc protrusion. Therefore, it is important to clarify which specific terminology is used in this document for these two cases.

Intervertebral disc calcification (IDC) is the term used in this document for a condition that may lead to disc herniation.

In some charts in this document, the letter *K* appears followed by a number, such as K0. The letter K is an abbreviation used in the local languages of the Nordic countries and is equivalent to the letter C in IDC. When a number follows this letter, it indicates the number of calcified intervertebral discs.

Intervertebral disc disease (IVDD) refers to cases of disc herniation or protrusion discussed in this document. For your information, other terms are also used interchangeably in research literature, such as IDD and *intervertebral disc herniation* (IDH*).*

Terminology related to genetic testing
Gene: A segment of DNA that codes for a specific trait or protein.
Allele: Different versions of the same gene
Variant/Mutation: A change in the DNA sequence.

Abbreviations
The Danish Dachshund Club – DGK
The Finnish Dachshund Club – FTK
The Norwegian Federation of Dachshund Clubs – NDF
The Swedish Dachshund Club – SvTk

The Danish Kennel Club – DKK
The Finnish Kennel Club - FKK
The Norwegian Kennel Club – NKK
The Swedish Kennel Club - SKK

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2. IVDD in dachshunds

From substantial research, we know that the prevalence of IVDD in Dachshunds is estimated to be around 15-20 % (Hansen, 1952, Priester, 1976, Ball et al., 1982, Nilsson, 2001, Jensen et al., 2008, Bergknut et al., 2012, Andersen and Marx, 2014, Packer et al., 2016). The disease is painful, debilitating and for some Dachshunds, euthanasia remains the only option.

As breeding organisations, we have a duty to promote the breeding of healthy dachshunds. We aim to tackle this issue ourselves, but the welfare of our dogs also concerns the wider community. In recent years, several cases have emerged of authorities taking action against what is considered problematic breeding - for example, in the Netherlands, Germany, and Austria. In Norway, a lawsuit from 2023 shows that greater attention must be paid to health aspects in dog breeding (ref. Appendix 1). In Denmark, a new animal welfare law came into effect on 1st July 2025. The specific requirements of these laws remain unclear, but it is expected that some legal standards will apply to dog breeding, including for dachshunds. In Finland, a new animal welfare law came into effect on 1st January 2024. Following a decision by the members of the Finnish Dachshund Club in April 2024, x-raying all dachshunds before breeding became mandatory in early 2025. The content of the upcoming breeding regulation is not yet known, but the report "Improving the enforcement of Finnish animal welfare legislation related to animal breeding," authored by Katariina Mäki and Riitta Kempe, suggests that restrictions based on spinal imaging results may be introduced.

The importance of the relationship between calcified discs and IVDD

In the Nordic countries, our efforts to decrease the frequency of IVDD are based on research showing a strong correlation between the number of calcified intervertebral discs and the incidence of IVDD (Jensen et al., 2008; Lappalainen et al., 2014). The findings from Jensen et al. are presented in Table 1 below.

Back status/K-numbers	Number of dogs with prolapse	Number of dogs without prolapse	Total
Free (0)	1 (8 %)	11 (92 %)	12
Mild degree (K1-K2)	2 (14 %)	12 (86 %)	14
Moderate degree (K3-K4)	7 (44 %)	9 (56 %)	16
Severe degree (>K5)	12 (63 %)	7 (37 %)	19
Total	22 (36 %)	39 (64 %)	61

Table 1: Relationship between calcified discs and disc herniation (Beck, 2006).

The left column in Table 1 shows the back status/K-number. The next column lists the number of dogs with prolapse, followed by a column indicating dogs without prolapse. The

final column displays the total number of dogs in each group. As shown in the table, among the 12 dogs with K0, 1 developed prolapse, while 11 did not. For the 19 dogs with K5 or higher, 12 developed IVDD, and 7 did not. Overall, of the 61 dogs examined in the study, 36% developed IVDD, while 64% did not.

Lappalainen et al., 2014 conducted a similar study with comparable findings, see Table 2.

Back status/K-number	Number of dogs with prolapse	Number of dogs without prolapse	Total
Free (K0)	2 (5 %)	42 (95 %)	44
Mild degree (K1-K2)	18 (25 %)	55 (75 %)	73
Moderate degree (K3-K4)	8 (30 %)	19 (70 %)	27
Severe degree (>K5)	17 (55%)	14 (45 %)	31
Total	45 (26 %)	130 (74 %)	175

Table 2: Relationship between calcified discs and disc prolapse (Lappalainen et al., 2014)

The two studies show the same trend. Furthermore, a British study from 2024 identified the same pattern (Dachshund Health Uk, 2024). A study conducted by Andersen and Marx (2014) on dachshunds' back health included 153 dogs:

- A total of 117 owners responded with details about their dogs' status regarding prolapse (response rate of 76%).
- They correlated the dogs' K-numbers and back index with the presence of disc herniations, yielding the following result:
    - Dogs with five or more calcified discs had an eleven times higher risk of disc herniation compared to dogs with fewer than five calcifications.
    - Dogs with back indexes below 100 have a 15 times higher risk of disc herniation than those with back indexes above 100.
- The prevalence of disc herniation in the three hair types was 16% (wire), 17% (long), and 21% (smooth), respectively.

Additionally, this study supports the idea that a higher K-number increases the risk of the dog developing IVDD.

Breeding recommendation

Considering the studies mentioned above and the research indicating that IVDD has a strong hereditary component (Lappalainen et al., 2015), measures should be taken. Consequently, the Nordic countries offer X-ray screening to assess the number of calcified discs in Dachshunds.

If the X-ray shows calcified intervertebral discs, it is important to recognise that this does not necessarily mean the dog is ill; it should be viewed as a potential risk factor. The X-ray results are vital for breeders to consider when selecting dogs for breeding purposes. Our goal is to choose dogs with low numbers of calcified discs, although this might reduce genetic diversity. Therefore, we also emphasise that if a dog with a higher number of calcified discs possesses traits of significant importance for the breed overall, it may still be used for one litter, provided the mate has zero or a low number of calcified discs.

To illustrate breeding advice based on the knowledge described above, we have borrowed the figure below from the Kennel Club in the UK, ref. Table 3. We have

The grades indicate the number of identified, calcified discs:

Grade 0 = 0
Grade 1 = 1-2
Grade 2 = 3-4
Grade 3 = 5 or more

Calcification Grade for each dog		DOG ONE (sire or dam)			
		Grade 0	Grade 1	Grade 2	Grade 3
DOG TWO (sire or dam)	Grade 0				
	Grade 1				
	Grade 2				
	Grade 3				

Table 3: The correlation between the number of calcified intervertebral discs and potential incidents of IVDD (The Kennel Club 2023) (The figure is modified due to coherent use of terminology.)

The Kennel Club explains that the green colour indicates the lowest risk of breeding dogs affected by IVDD. The amber colour shows a higher risk of producing puppies that may develop IVDD. The red colour signals a high risk of producing puppies that could develop IVDD. These matings are not recommended. IVDD can seriously impact a dog's health and welfare, so a mating with a high risk of producing affected puppies should never be deliberately undertaken.

In Denmark, Finland, and Norway, screening programmes using X-ray to detect potential calcified intervertebral discs have been available since the early 21st century. Sweden launched its programme in 2021. To participate in the screening, dachshund owners purchase a requisition from the kennel club and bring it, along with their dog, to an approved clinic for X-ray screening. The dog must be sedated. The X-rays are sent to a trained reader or evaluator, approved by the kennel club, who specialises in this type of X-ray. The results are publicly accessible through the kennel clubs' database.

Another breeding tip, especially popular in Sweden, is to avoid breeding dogs that have had IVDD or come from a family with IVDD. To support this, it is advised to breed only dogs that are at least three years old. These dogs' parents will then be at least six years old, and it is often possible to gather information confirming they have not experienced back problems. Both the Norwegian and Swedish breeding clubs also have systems for voluntary reporting of IVDD cases to databases managed by the kennel clubs.

Safeguarding the quality of interpretation of spinal X-rays in dachshunds
Spinal X-ray results of dachshunds that are recorded in the kennel clubs must comply with certain requirements. The veterinarian conducting the X-ray must follow an agreed-upon procedure. The veterinarian evaluating the X-ray must be trained for this task and accredited by the kennel clubs. As of 2025, three veterinarians are trained and accredited by the kennel clubs to evaluate the X-rays: Vibeke Frøkjær Jensen conducts evaluations for Denmark and Norway. Anu Lappalainen and Vilma Reunanen conduct evaluations for Finland and Sweden. The three evaluators are members of the IVDD group under the Scientific Committee in the Nordic Kennel Club Union (NKU).'

New developments
In 2023, both Finland and Norway introduced a new screening programme in the form of a genetic test. Likely, the FGF4-12 gene variant has the greatest influence on whether a dog develops a disc herniation. Therefore, reducing the frequency of FGF4-12 is also a way to tackle the issue. Given the very low frequency of the normal gene (wild type) in the Dachshund population, any change must happen very slowly. Nonetheless, efforts should be aimed at increasing the frequency of the wild type. The fact that not all Dachshunds develop IVDD, even if they carry one or two copies of FGF4-12, suggests that other factors, such as additional modifying genes, also play a role in the risk.

Based on data collected in Denmark, Finland, Norway, and Sweden, researchers have published a scientific article focusing on the relationship between X-rays and genetic testing. The article is openly accessible to anyone interested in reading it by clicking on the title below.

The relationship between radiographic disc calcification score and FGF4L2 genotype in dachshunds
Stacey Sullivan, David Redden, Froydis Hardeng, Malin Sundqvist, Michelle Kutzler

Auburn University has published a “Breeder Summary” that is easier to read than the scientific publication. Please find the Breed Summary in Appendix 3. The data confirmed with a high degree of certainty that dachshunds with zero or one copy of CDDY have fewer calcifications (lower K-number) and therefor a lower risk of prolapse/IVDD. Dogs with only one copy of the CDDY allele scored similar to the dogs with no CDDY allele.

From 2025, genetic testing will be implemented in all the Nordic countries in various ways.

Safeguarding the quality of interpretation of genetic testing in dachshunds
Genetic CDDY testing results for dachshunds recorded in the kennel clubs must meet specific requirements. A veterinarian is responsible for conducting the testing. The test must be analysed by a laboratory accredited by the kennel clubs.

Where do we go from here?
Since many Dachshunds will still carry one or two copies of FGF4-12 for generations to come, the genetic testing described earlier cannot replace X-ray screening. Alongside reducing the prevalence of FGF4-12, we must also select dogs with a lower risk of prolapse from those still carrying FGF4-12 through X-ray screening. Therefore, the most effective approach to improving back health in Dachshunds is to:

- Minimise the risk among dogs that still carry FGF4-12 by x-raying them and breeding only those with no or few calcified intervertebral discs. If a dog with a higher number of calcified discs possesses traits that are of great importance for the breed in a broader context, then this dog could be used for one litter if the partner dog has zero or a low number of calcified discs.

- Gradually decrease the frequency of the underlying risk factor, FGF4-12, by DNA testing selected dogs, and prioritise using dogs that carry at least one copy of the normal gene variant in breeding.

3. History

This chapter offers information about the initiation and progression of the x-ray screening programmes in the Nordic countries.

3.1 Denmark

Both anecdotes and evidence show that it has long been known there was a problem with the dachshund's back. In the past, people simply accepted this as a sad fact.

After the middle of the last century, increased prosperity led us to move in large numbers to suburban housing estates, where the dachshund jumped onto our beds and sofas. As a result, less acceptance of our dogs' suffering emerged. Members of the Danish Dachshund Club started to expect (demand) that the club take action to address the issue.

The club established its first health committee in the mid-1980s. The committee initiated its work with a literature review. It revealed that there was considerable knowledge about the occurrence and treatment, but less about heredity and prevention.

In 1993-1994, the committee gathered material on 25 litters of short-haired dachshunds, each containing at least one puppy with IVDD. This material was utilised for a veterinary paper published in 1995 by (Andersen, 1995). The encouraging conclusion of the study was that predisposition to IVDD is mostly hereditary, with the environment likely having a smaller impact than previously thought.

In this study, a theory about serum albumin was tested but could not be confirmed. The Danish Kennel Club (DKK) provided financial support.

An interesting observation was that breeders were more likely not to use females for breeding if they had suffered from IVDD, while they were willing to use males that had suffered IVDD.

The material also included a litter in which one of the puppies had been exported abroad. Nothing was known about this one as to whether it had suffered from IVDD. All the other puppies in the litter were known to have had IVDD. The mother of the litter later had a litter of eight puppies with another male dog; none of these puppies had IVDD. This example reinforced the notion of a strong hereditary component.

Inspired by, among other things, the aforementioned Frøkjær Jensen, she chose to write her PhD dissertation on back disorders in dachshunds. In May 1995, the club's magazine called for dogs to participate in a project on back disorders in dachshunds. The study built upon earlier research by, among others, Havránek-Balzaretti (1980) and Stigen (Stigen, 1991, Stigen and Christensen, 1993). Dachshund owners readily offered their dogs for the project. Participation was quite high, with over one hundred dogs involved. Many dogs were X-rayed multiple times to monitor the development of the calcifications over time.

Frøkjær Jensen's project yielded positive results early on, and she informed the dachshund club about this. Her most notable breakthrough with Havranek-Balzeretti and Stigen was identifying the optimal period for doing spinal X-ray (2-3½ years, later 2-4 years). She also demonstrated very high heritability, partly due to a focus on excellent image quality.
But how can we turn the promising results into a screening programme that works? The DKK, Frøkjær Jensen, and the veterinary college provided invaluable assistance and recommended, among other things:

- Learn from the experiences — both positive and negative – of other screening programmes, especially HD.
- Image quality is crucial (supervision for veterinarians).
- Vets' understanding and loyalty are important.
- Information for members, especially breeders, is important.
- Before implementing any screening programme, an incidence study should be conducted to enable measurement of its effects many years later.
- Avoid "pre-imaging"
  - Pre-imaging occurs when a dog undergoes imaging before the official examination. Pre-imaging is problematic because:
    - It subjects the dog to pointless discomfort. The discomfort is minor but unnecessary, and thus unacceptable.
    - It is a poor investment. The diagnostic uncertainty prior to the dog reaching 24 months of age is considerable.
    - Unnecessary X-ray images should be avoided to maintain X-ray hygiene.
    - We breed within a community, and all results are important to know - not only for the owner but also for other breeders of the breed.
    - Selecting the material can harm indexing.
- In other words, pre-imaging is unethical and just cheating. As a result, the Danish rules for participation specify that dogs previously examined for calcification screening are not allowed to participate.

In a series of articles based on Frøkjær Jensen PhD in 2000, it was demonstrated that there was a basis for introducing a screening programme (Jensen and Arnbjerg, 2001, Jensen and Ersbøll, 2000, Jensen and Christensen, 2000, Jensen, 2001). A course was held for veterinarians on recording techniques. An agreement was reached with the Veterinary Association regarding price and terms. Registration was arranged in DKK's database, Hundeweb. Lectures and a seminar were organised for club members. Articles were written for the members' magazine and much, much more. It truly requires a lot to convert research findings into a screening programme that can operate effectively in practice.

In 2001, Schriver Nilsson conducted a population study on wire-haired dachshunds born in 1991 (Nilsson, 2001). The study revealed an overall incidence of 20.3%.

Everyone who participated in Frøkjær Jensen's project was informed about their dog's result and was offered the option to have the result registered in DKK's database. Almost everyone

agreed. There was a noticeable tendency for those who declined to be those whose dogs had poor results.

In 2002, we were prepared to offer X-ray examinations as an open offer to all DKK-registered dachshunds. The club provided a financial subsidy if you were a member.

In 2006, Beck investigated the relationship between calcification and IVDD. The study showed a strong correlation – among dogs with few calcifications, very few had IVDD, whereas as many as 63% of the dogs with five or more calcifications had IVDD (Beck, 2006).

In 2009, the then board of the Danish Dachshund Club decided to apply to DKK to make back examinations mandatory. DKK approved the application, and X-ray screening became a requirement for all dachshunds. Dogs that were older than 3½ years at the time and therefore too old to be included were not covered by the restriction, resulting in a so-called "free litter" - that is, X-ray screening was only a requirement if a dog was to have more than one litter. There was no requirement concerning status.

In 2013, the restriction was lifted while awaiting the results of a new research project 100 (Andersen and Marx, 2014). X-ray screening was now once again only a recommendation. The project mainly aimed to investigate the incidence of IVDD and the correlation between the number of calcifications and the risk of IVDD.

In 2014, Andersen and Marx defended their master's degree dissertation. They found that the incidence of wire hair was 16%, long hair was 17.43%, and smooth hair was 21.57%. They discovered that dogs with five or more calcifications had an eleven times higher risk than dogs with fewer than five calcifications, and that dogs with an index below 100 faced a risk more than fifteen times greater of IVDD compared to dogs with an index of 100 or more (Andersen and Marx, 2014).

In 2017, a new breeding restriction was introduced that made X-ray screening mandatory for all male dogs. There was no requirement based on status.

2019. Once again, a new restriction. Everyone – including bitches – had to undergo X-ray screening. Requirements and recommendations concerning status and index were also introduced.

2021. Adjustments: Relaxations regarding foreign, non-examined dogs and changes prioritising individual status more than index.

2025. In Denmark, new legislation has been introduced concerning dog breeding. The legislation encompasses a wide range of dog breeds and mixes, including dogs that lack a pedigree or are not registered with the DKK. Generally, no dog may be used for breeding if it exhibits obvious hereditary traits that could endanger the health of future offspring.

Consequently, parent animals must undergo specific health examinations before they can be used for breeding.

Dachshunds with 0-4 calcifications can be used freely for breeding. Dogs with more than 4 calcifications may have a maximum of one litter. The partner may then have a maximum of 2 calcifications.

Throughout the entire period, Vibeke Frøkjær Jensen has been responsible for reading all X-rays in Denmark.

3.2 Finland

Spinal x-ray screening of dachshunds began in 1998 as a research project, involving 124 miniature dachshunds. Subsequently, the screening programme was adopted by the Finnish Dachshund Club (FTK). Dogs of all ages were graded for intervertebral disc calcifications (IDC) based on the number of calcified discs. The results also indicated whether the dog was x-rayed within the recommended age of 24-42 months.

The spinal radiograph protocol was transferred to the Finnish Kennel Club's (FKK) control on 1st June 2013, and at the same time, dogs also began receiving grades for three other conditions[1]. The FKK records the results for all dogs over 24 months of age. In November 2022, FKK reintroduced the back index for intervertebral disc calcification. In Finland, there is no upper age limit for spinal imaging. However, the age at imaging influences the reliability of the assessment, which is indicated alongside the index value that describes breeding value. Veterinarian Anu Lappalainen has been grading spinal images from the outset. In addition to her, veterinarian Vilma Reunanen also started evaluating back x-ray images in 2023.

The breed club FTK had been providing financial support for spinal imaging for many years. However, since 2023, this support became taxable, leading to a decline in applications. Some local dachshund clubs also offered spinal imaging support alongside the FTK's assistance. The breed club's financial support could only be granted when spinal imaging was voluntary. Consequently, support payments ceased in 2024, as imaging became mandatory from the start of 2025.

[1] lumbosacral transitional vertebra (LTV), vertebral anomaly (VA), and spondylosis (SP).

3.3 Norway

Veterinarian Øyvind Stigen at the Norwegian School of Veterinary Science (NVH) wrote in an article in Dachshunden in 1987 that they were working on a survey of intervertebral disc herniation in dachshunds. In this regard, they planned to X-ray 250-300 dogs. In 1991, Stigen submitted a report on calcified intervertebral discs in young Dachshunds. Recruiting dogs for spinal X-rays was slow, and it wasn't until 9th March 2001, that a breeder seminar on disc herniation in Dachshunds was held. The invited experts at the meeting were veterinarian Øyvind Stigen, who had obtained a doctorate on the topic, and veterinarian Olav Nørgaard from Denmark. The breeder seminar gathered 43 members. On 22nd September 2001, the first official result of spinal X-ray of dachshund was registered in Norway.

To encourage dachshund owners to have their dogs undergo spinal X-rays, members have accessed financial support from the Norwegian Federation of Dachshund Clubs (NDF), and several of our 16 local clubs have also arranged their own initiatives. In January 2010, recognising that the back problem was more significant than initially thought, a letter was sent to 1.700 dachshund owners who owned a total of 2.200 dachshunds aged 2-4 years, urging them to have their dogs undergo spinal X-rays. NDF provided financial support even to non-members at that time.

From the first day until 14th May 2020, veterinarian Øyvind Stigen from NMBU School of Veterinary Science served as the reader of the X-rays. He was succeeded by veterinarian Marte Ottesen from 17th June 2020, who continued until 9th February 2021. Following this period until the autumn of 2021, there was no reader until veterinarian Vibeke Frøkjær Jensen from Denmark undertook the role.

Breed-Specific Breeding Strategy (RAS)

RAS was developed in 2015 and features a comprehensive and clear chapter on disc herniation and spinal X-rays. The chapter is based on well-established research. It explains both the problem and how the results of spinal X-rays can serve as an effective means of preventing disc herniation. RAS emphasises that a key goal is for all parent dogs to have a known spinal status, and it suggests several measures to increase participation in the spinal programme. Despite RAS, participation in the spinal X-ray programme remains insufficient. As a result, the number of X-rayed dogs is still too low to create a reliable index for breeders. Following a Court Case in 2023 (ref. Appendix 1), a new breeding programme for dachshunds will be introduced by the Norwegian Kennel Club (NKK) and the Norwegian Federation of Dachshund Clubs. The court case has defined the NKK as a breeding organisation responsible for overseeing all breeding programmes across breeds in Norway. Stricter rules are now in place for data registration and preventing breeding that could harm the breed's health. The work on the Norwegian dachshund programme is scheduled for late 2025 to early 2026. Alongside the NKK programme, the Norwegian Federation of Dachshund Clubs is working on a strategic document called "the whole dog," which outlines how to breed dachshunds considering all aspects of the dog—mentality, health, conformation, working trials, and genetic variation—equally.

The period from May 2022 to April 2024
The meeting of the leaders of the local dachshund clubs (KL) on 23rd April 2022, and the decisions made at the Dachshund Congress (the annual general assembly) on 24th April 2022, took the initiative to start a project that could provide more data and insight over a three year period:

> *KL recommends that the board (NDF/HS) place extra emphasis on spinal X-rays from 2022 to 2025 for all dachshunds aged 2-4 years. We advise a substantial increase in the proportion covered by spinal X-rays, along with a unified financial solution for all clubs. This should be funded from our reserves, and KL suggests a maximum participant fee of 1000 NOK.*
> *An action plan, in collaboration with the clubs, should be created for informing puppy buyers to demand spine X-rays from breeders.*
> *Based on the data collected during this period, SU (the health committee) must draw a conclusion and present it for the further development of the breed. SU is requested to use existing data as a factual basis.*

The Dachshund Congress decided to allocate an additional € 12.840 in addition to the € 2.568 proposed for the spine program.

The Dachshund Congress held the following day made the necessary budget decisions to ensure financial support so that more people choose to X-ray their Dachshunds.

2022 NDF's Breeding Recommendations for spinal X-ray
NDF's breeding criteria and recommendations were updated on 16th May 2022. It is advised that both parents have a known spinal status, with X-rays taken between the ages of 2 and 4 years. The decision to make spinal X-rays a recommendation rather than a requirement is a politically influenced one. We have both large and small breeders and individual members who express scepticism about spinal X-rays as a method; consequently, they do not X-ray. Several strong voices argue that if spinal X-rays become a breeding requirement, breeders may stop breeding altogether or only breed family dogs that are not registered. Due to this disagreement, we believe that making X-rays a requirement could lead to unintended consequences, and we are more likely to recruit better breeders if we keep it as a recommendation.

The statistics show a significant increase in the number of X-rayed dogs, although there is still a considerable way to go before reaching a level high enough to establish a reliable index. We also notice several breeders who previously did not X-ray starting to do so.

Action Plan - Follow-up of the Club Leaders' Statement
An action plan for promoting the spinal X-ray of a dachshund was developed with the following aim:

The aim of NDF's action plan is to help achieve the objectives and priorities related to the spinal health of the Dachshund within the Breed-Specific Breeding Strategy (RAS).

Topics in the plan:

- Information for breeders, dog owners, and puppy buyers about the importance of spinal X-rays
- Knowledge development
- Measures on social media and in the member magazine
- Knowledge webinars
- Financial support for members who X-ray their dachshunds
- Collaboration with external actors such as Pyramidion and Aninova
- Nordic cooperation
- Genetic testing

One of the objectives in RAS (and consequently in the action plan) is to X-ray enough dogs to develop an index. Since the start until 23rd July 2023, 990 dogs have been X-rayed. In the winter of 2023, an index was created. However, with so few dogs X-rayed, the reliability is too low for the index to be usable. To meet the goal of establishing an index in 2023, approximately 300 more dogs need to be X-rayed.

2022-2025 Financial Support for Conducting Spinal X-rays

Regarding financial support, NDF offers its members a subsidy covering 50% of the cost for spinal X-rays at a veterinarian, up to 2,000 NOK. The dog owner’s co-payment is set at 1,000 NOK. From 2025, the subsidy will be 500 NOK if the X-ray costs 2000 NOK or more. The condition is that the dog is within the correct age range (2-4 years), and a referral must be obtained through NKK (Norwegian Kennel Club) before the X-ray examination. Only readings conducted by NKK's reader are valid and can be registered in Dogweb.

Evaluation of the Action Plan

The action plan was reviewed at the club leaders' meeting in 2023, and there was agreement to continue following it. The Dachshund Congress also approved the necessary budget framework for financial support for members who X-ray their dogs in 2023. The Dachshund Congress decided to continue with an economic subsidy for spinal x-rays in 2024; the subsidy is 500 NOK if the x-ray costs over 2000 NOK.

The Genetic Route 2023

In June 2023, we received a proposal from one of NKK's veterinarians for a new project with a preliminary title, "Proposal for DNA-based measures for improved spine health in Dachshunds." The proposal is based on exploiting the fact that, in the Nordic Dachshund population—particularly among wire-haired Dachshunds—there is an occurrence of the normal/wild-type gene variant (N) of FGF4 on chromosome 12, as opposed to the retrogene (CDDY).

In October 2023, we began the genetic testing, which is still ongoing. During 2023-2024, extensive testing took place. The NDF and the NKK subsidised the effort to map the prevalence of the normal/wild-type gene (N-gene) in the Norwegian dachshund population. The effort resulted in 1306 Norwegian dachshunds being tested; 17% carried the normal/wild-type gene. Among these, 29% of smooth-haired normal dachshunds and 26% of wirehaired normal dachshunds had the N-gene. Longhaired dachshunds showed 14% in standard size and 9% in dwarf/rabbit size. The small wirehaired variety found none, and from crossbreeding with longhairs, four small smooths were born, resulting in 5% with the N-gene.

3.4 Sweden

The possibility to officially screen dachshunds in Sweden emerged during the summer of 2021. Until then, dachshund owners who wanted to x-ray their dogs had done so either by travelling to neighbouring Nordic countries or by x-raying at "their veterinarian" in Sweden and sending the images to be evaluated in another Nordic country.

The program was initiated by the Breeding Committee of the Swedish Kennel Club (SKK), emphasising the need to tackle IVDD, the importance of considering scientific research, and the desire to align with Nordic neighbours and their IVDD initiatives.

The official opportunity to purchase a requisition for X-ray at the SKK for an IDC reading was introduced in agreement with the Breeding Committee of the Swedish Dachshund Club (SvTk) in June 2021. The programme was launched, with the first readings and results being registered in June 2021.

Information about the new possibility to x-ray your dachshund was presented in the member magazine "Taxen", on the webpage and social media of the SvTk and of course also on the webpage of the SKK.

Currently (October 2025), there has been no financial support for dog owners who undergo an X-ray investigation. It is perhaps fair to note that this is still early in the timeline of the new programme. The issue of financial support will likely be reviewed as the evaluation process of the programme progresses.

A fair question is why Sweden began offering official x-ray screening through the Kennel Club so much later than its Nordic neighbours. It was clear early on that gaining acceptance among breeders for an x-ray screening programme was quite challenging. It was also argued that it was "suspicious" to have the x-rays evaluated by a foreign reader. "Why could not this competence be found in Sweden?" Some others also pointed out the option of waiting longer to see what results the programmes in other countries produced. This approach would prevent us from repeating "beginner's mistakes" that might have been made by our neighbours. It has been important for the SvTk to follow and study the work and outcomes in our neighbouring countries.

What can be said about the current situation is that the discussions have matured and progressed, and a new perspective on the issues is emerging. In any case, the matter of acceptance among breeders and dachshund owners remains an important factor to consider. Many are still sceptical about what a screening can genuinely reveal concerning the dog being screened and its standing as a breeding animal.

4. Current status

This chapter is divided into four sections and four sub-sections. Each country describes the current status of their programmes regarding radiography as either mandatory or recommended actions. This is followed by details of the programmes and related research activities. In addition to research, health investigations are also included.

4.1 Denmark:

4.1.1 Radiography as mandatory or recommended action

Spinal x-ray imaging is mandatory.

4.1.2 Details of the programme

The Danish Dachshund Club has developed the following breeding requirements concerning dachshund screening for IDC 2021:

> ***Breeding requirements.***
> *Offspring can be given a Pedigree if, before the breeding, both parents have a DKK registered spine screening. The screening must have taken place when the dog is between 24 and 48 months old. Dogs which have been graded K0 (no calcification), K1 (one calcification), K2 (two calcifications), K3 (three calcifications) and K4 (four calcifications) can be used in breeding without any restrictions.*
>
> *Exceptionally dogs with a screening result of K5 (five calcifications) or more may be used in breeding if the breeder finds that the dog's total contribution to the breed will be positive. In this case the breeding partner must always have been graded with K0, K1 or K2, and the breeder may be asked to reason his/ her choice to the DKK.*
>
> ***Dogs without a spine screening, born before 1.1.2017.***
> *Exceptionally dogs which are four years at the time when the breeding requirements came into force, and which therefore cannot be screened, may be used in breeding if the breeder finds that the dog's total contribution to the breed will be positive. In this case the breeding partner must always have been graded with K0, K1 or K2, and the breeder may be asked to reason his/ her choice to the DKK.*
>
> *The breeding requirements concern all Danish owned dogs as well as foreign owned breeding dogs located in Denmark on an outline statement.*
>
> ***Breeding recommendations.***
> *To be given Basic Plus Pedigrees, apart from the above breeding requirements, the following demands must be fulfilled:*
>
> 1. *Both parents must have a DKK registered spine screening of K0, K1 or K2, or the average of the screening of both parents must be 100 or above at the time of breeding.*
>
> 2. *Concerning wire-haired dachshunds: At least one of the parents must be registered genetically free from CRD-PRA and OI in Denmark.*

Mating with foreign stud dogs.
At the time being, the DKK registers spine screening results from Norway, Sweden, Finland and England. Foreign males which have a DKK registered spine screening meet the same breeding requirements as Danish dogs.

Foreign males which do not have a DKK registered spine screening may be used in breeding if the breeder finds that the dog's total contribution to the breed will be positive. In this case the breeding partner must always have been graded with K0 – K4, and the breeder may be asked to reason his/ her choice to the DKK.

(Source: Danish Dachshund Club)

The breeding requirements are also presented in a flow chart, ref. Appendix 3.

For spinal X-ray results to be recorded in Hundeweb, the dog must be of the appropriate age (2-4 years), and a referral must be issued through the DKK prior to the examination. Only readings performed by an authorised DKK reader are valid and can be registered in Hundeweb, and all results are documented and published in Gravhunden (Danish Dachshund Club Magazine). Only veterinarians with an agreement with the DKK who have completed an approved X-ray course are permitted to take these images.

4.1.3 The effects of the programme

Table 4 presents the number of x-rayed dachshunds from 2009 to 30th June 2025. The figures for miniature and rabbit-sized dogs are combined for each type of fur.

year	MW+RW	W	MS+RS	S	ML+RL	L	**TOTAL**
2009	7	42	3	16	25	8	**101**
2010	24	50	10	22	34	9	**149**
2011	20	36	14	26	28	11	**135**
2012	12	31	6	11	28	4	**92**
2013	8	27	0	12	8	6	**61**
2014	12	20	1	7	8	5	**53**
2015	9	21	0	4	7	4	**45**
2016	12	33	0	18	10	2	**75**
2017	15	23	1	3	11	5	**58**
2018	20	32	1	15	14	6	**88**
2019	26	34	9	12	29	10	**120**
2020	17	29	8	27	23	14	**118**
2021	24	53	6	13	25	11	**132**
2022	23	48	9	17	32	9	**138**
2023	27	41	8	27	35	12	**150**
2024	11	46	9	21	28	19	**134**
2025	4	20	2	12	12	8	**58**
TOTAL	**271**	**586**	**87**	**263**	**357**	**143**	**1707**

Table 4: Number of dogs x-rayed per year per population 2009-30th June 2025 in Denmark

Table 4 indicates that from 2009 to 2023, 1.515 dogs were X-rayed. The majority of these dogs are wire-haired dachshunds of the standard size, followed by miniature and rabbit-sized long-haired dachshunds. Next are miniature and rabbit-sized wire-haired, then standard smooth-haired, standard long-haired, and finally miniature and rabbit-sized smooth-haired dachshunds. The smooth-haired variant is the least common among the breed categories listed in the table, which is also reflected in the number of registered dachshunds with the DKK.

The table also shows a significant decline in the number of X-rayed dogs between 2012 and 2018. From 2019 onwards, the number of X-rayed dogs has risen each year.

Figure 1 below illustrates the information in Table 3 differently.

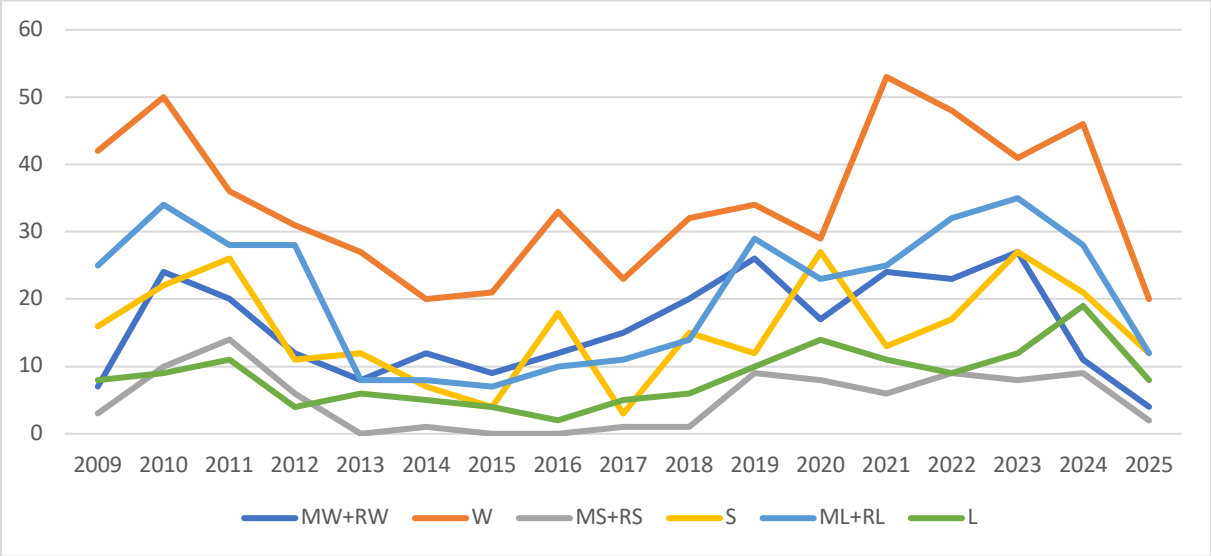

Figure 1: Number of dogs radiographed per year per population 2009-30th June 2025 in Denmark

Figure 1 displays the IDC degrees of dogs radiographed from 2009 to 30th June 2025 across different dachshund breeding populations. The number of dogs in each population is shown on the left, with the percentage of the IDC degree on the right. The peaks at both ends are quite noticeable.

Between 2012/2013 and 2018, there was a notable decrease in the number of dogs examined. The reason is likely that during this period, X-ray was only recommended and not mandatory.

Table 5 shows the IDC degrees of the dachshunds that were x-rayed in 2009-2025.

	MW+RW	%	W	%	MS+RS	%	S	%	ML+RL	%	L	%	total	%
IDC 0	51	18,8	127	21,7	6	6,9	33	12,5	66	18,6	20	14,0	303	17,8
IDC 1	100	36,9	219	37,4	25	28,7	73	27,8	153	43,2	61	42,7	631	37,0
IDC 2	60	22,1	144	24,6	26	29,9	71	27,0	82	23,2	33	23,1	416	24,4
IDC 3	60	22,1	96	16,4	30	34,5	86	32,7	53	15,0	29	20,3	354	20,8
total	271		586		87		263		354		143		1704	

Table 5: IDC degrees of dachshunds x-rayed in 2009-30th June, 2025 per dachshund breeding population in Denmark.

Table 5 reveals a notable difference between the variants. The proportion of dogs with more than 4 calcifications is considerably higher in the short-haired variants, compared to the other coat types. In the long-haired variants, a higher proportion of dogs with few calcifications is found in the small variants than in the large ones, whereas in the wire-haired variants, the trend is reversed.

It is still too early at the population level to observe progress resulting from back examinations. This is mainly due to the aforementioned changes between voluntary and compulsory measures, but primarily because breeding takes time. Dogs must be at least two years old at the time of the X-ray and must have offspring that are also at least two years old, have been examined, and produced offspring. However, we know:

- that dogs with few calcifications have a low risk of disc herniation and that dogs with many calcifications have a high risk of disc herniation. This has been confirmed by several studies in both Denmark and Finland.
- that there is high heritability - offsprings after dogs with many calcifications have a high risk of also having many calcifications and offsprings after dogs with few calcifications have a good chance of having few calcifications. This has also been documented - but not yet at population level.

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4.2 Finland

4.2.1 Radiography as mandatory or recommended action

X-ray screening remained a recommendation until the end of 2024, as the decision to make it mandatory for breeding dogs must be made at the general meeting of the FTK, where the majority had opposed mandatory imaging until 2024.

Following a decision by the FTK general meeting in April 2024, it became mandatory to screen all dachshunds before breeding, except for dogs over 8 years old without IVDD symptoms, from 1st January 2025.

4.2.2 Details of the program

FTK encouraged its members to have their dogs radiographed by offering financial support and has aided its local clubs in organising radiography events. Litters with both parents radiographed were granted free access to the Finnish Dachshund Club's puppy list before spinal imaging became mandatory.

Since spinal imaging is now mandatory for dogs used in breeding, the highest permissible result for access to the puppy list and the stud dog list is K7. However, the imaging result of the parents does not influence registration. It is advised that dogs with an IDD result of K10 or higher are not used for breeding. A dog with an IDD3 result is recommended to be paired with a dog whose result is IDD0 or IDD1.

4.2.3 The effects of the programs

In Finland, there is no upper age limit for spinal x-rays in Dachshunds. Consequently, the results are presented in two tables by population and year. Table 6 includes all dogs with an official spinal imaging result since 2009, whilst Table 7 covers only dogs imaged at 24–48 months of age. Table 7 has been compiled in the same manner as in Denmark, Norway, and Sweden to facilitate comparison. For clarity, all imaged dogs are also listed separately in Table 6, as the actual number in Finland is considerably higher.

YEAR	MW+RW	W	MS+RS	S	ML+RL	L	TOTAL
2009	7	52	4	17	24	40	144
2010	16	56	1	20	24	28	145
2011	9	52	4	29	32	38	164
2012	7	54	3	18	36	42	160
2013	5	20	3	16	28	27	99
2014	8	42	7	19	52	23	151
2015	7	23	2	15	25	14	86
2016	4	17	9	15	35	13	93
2017	7	17	7	12	36	20	99
2018	5	16	3	20	35	10	89
2019	9	20	8	29	29	6	101
2020	9	19	11	24	40	10	113
2021	13	35	17	26	32	10	133
2022	13	32	22	33	35	13	148
2023	21	59	31	63	54	26	254
2024	60	160	64	92	70	40	486
2025	60	138	41	81	48	65	433
TOTAL	**260**	**812**	**237**	**529**	**635**	**425**	**2898**

Table 6: Number of dogs x-rayed at the age from of 24 months and older per year per population 2009-30th June 2025 in Finland

Table 7 indicates that from 2009 to 30th June 2025, 2.405 dogs were X-rayed at the same age used in other Nordic countries.

YEAR	MW+RW	W	MS+RS	S	ML+RL	L	TOTAL
2009	7	40	3	15	21	30	116
2010	14	46	1	12	18	21	112
2011	8	37	3	25	23	38	134
2012	6	49	3	13	25	33	129
2013	4	18	1	13	23	25	84
2014	8	38	6	16	46	23	137
2015	7	21	2	12	24	14	80
2016	5	13	9	14	31	11	83
2017	7	9	7	11	32	20	86
2018	6	12	2	15	28	9	72
2019	9	18	8	23	24	6	88
2020	9	18	11	24	38	9	109
2021	12	33	14	24	29	9	121
2022	11	24	19	29	35	10	128
2023	19	51	30	57	50	23	230
2024	45	113	57	79	59	35	388
2025	44	88	35	59	39	43	308
TOTAL	**221**	**628**	**211**	**441**	**545**	**359**	**2406**

Table 7: Number of dogs x-rayed at the age of 24-48 months per year per population 2009-30th June 2025 in Finland

Table 7 shows that the breed with the highest number of x-rayed dogs is the wire-haired standards, followed by long-haired miniature and rabbit-sized dogs. Next are the smooth-haired standard-sized, long-haired standard, miniature, and rabbit-sized wire-haired dogs, with the smallest numbers of miniature and rabbit-sized smooth-haired dachshunds. The table also indicates a decline in the number of x-rayed dogs during the period from 2015 to 2018.

Figure 2 below presents the information in Table 7 in a graphical format. It should be noted that the figures for 2025 only cover half a year (data collected on 30th June 2025). During the observation period, imaging activity has evolved differently across various populations. Table 6 and Figure 2 also show a decline in the number of X-rayed dogs during the period 2015-2018.

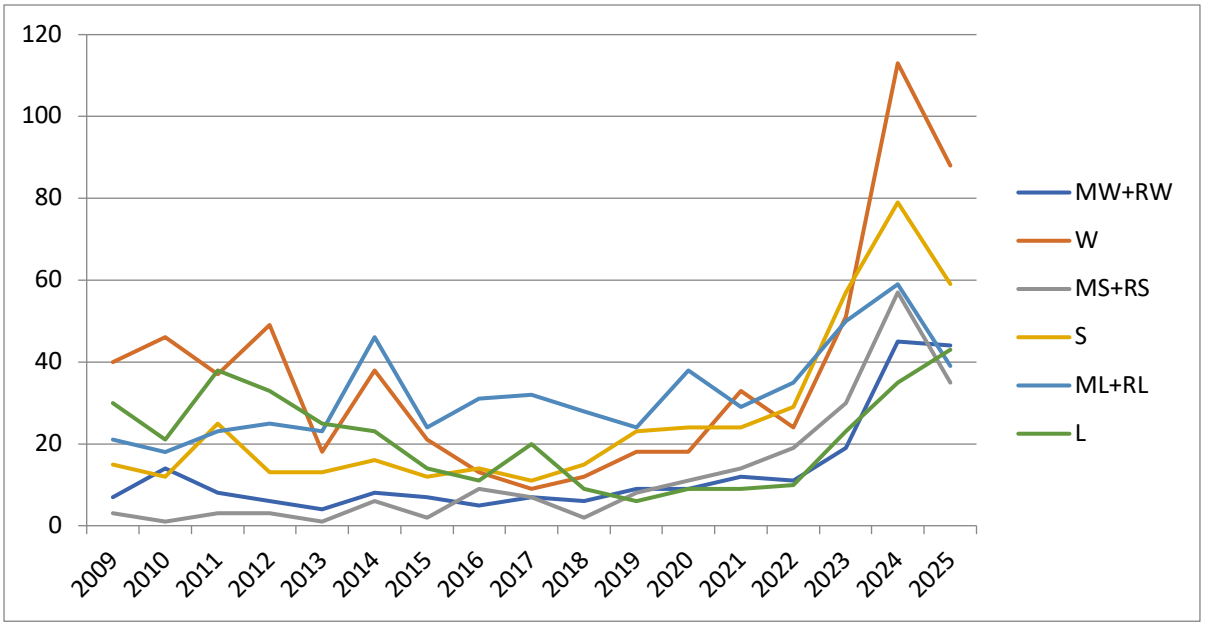

Figure 2: Number of dogs radiographed per year per population 2009-30th June 2025 in Finland

A general trend is noticeable in the most numerically common type, the standard wire-haired dachshunds: their imaging activity decreased, especially in relation to registration numbers, but from 2023 onwards it has risen sharply.

In another large population, the standard smooth-haired dachshunds showed low imaging activity for a long period. However, from 2023 onwards, it has also begun to increase significantly.

Among standard long-haired dachshunds, imaging activity was relatively high at the start of the observation period. It then declined to its lowest point during 2019–2022 but has since begun to recover.

In miniature dachshunds, the long-haired variety has consistently been the most actively imaged, showing the highest proportion of imaged dogs relative to the population size. Conversely, imaging activity among miniature smooth-haired and wire-haired dachshunds has remained very low throughout most of the period, with an upward trend only beginning in the 2020s.

Figure 2 indicates that X-ray screening has not been systematically used as a tool for breeding. Therefore, it is currently impossible to determine its intended effect. Long-haired miniatures are the only population where results have been systematically utilised for breeding purposes; within this group, improvements in IDC grades are observable. However, in 2023, when more dogs from lines that had not previously undergone x-ray examination were assessed, a higher percentage of IDC3 was noted compared to lines where dogs have been x-rayed for several generations. This pattern is evident across all breeding populations.

We don't know whether the number of affected dogs has increased because the FTK only has a vague idea of that. Owners have been encouraged to report their dogs' health, but very few have done so. It is also possible for owners to report the cause of death in the FKC KoiraNet database, but those reports do not specify if the dog had IVDD unless that was the cause of death.

Table 8 displays the IDC degrees of dogs radiographed as of 30th June 2025, within the dachshund breeding population. The number of dogs in each group is on the left, and the percentage of each IDC degree is on the right.

	MW+RW	%	W	%	MS+RS	%	S	%	ML+RL	%	L	%	total	%
IDC0	27	12,2	180	28,7	30	14,2	97	22,0	166	30,5	80	22,3	580	24,1
IDC1	62	28,1	179	28,5	49	23,2	142	32,2	193	35,4	130	36,2	755	31,4
IDC2	47	21,3	137	21,8	49	23,2	92	20,9	94	17,2	86	24,0	505	21,0
IDC3	85	38,5	127	20,2	83	39,3	110	24,9	92	16,9	63	17,5	560	23,3
total	221		628		211		441		545		359		2405	

Table 8: IDC degrees of dachshunds radiographed in 2009-30th June 2025 per dachshund breeding population

Table 8 demonstrates that significant differences exist between the variants. The lowest proportion of IDC0 results appears in wire-haired miniature dachshunds and smooth-haired miniature dachshunds, while among wire-haired standard dachshunds, the proportion of IDC0 is the highest in the populations. The findings with the highest score are underlined. In the miniature wire-haired and smooth-haired groups, it is IDC3. In other variants, the most common finding is IDC1. Overall, the most frequent result is IDC1.

4.2.4 Research activities that have been conducted in Finland:

Lappalainen, A., Norrgård, M., Alm, K., Snellman, M. & Laitinen, O. 2001. Calcification of the intervertebral discs and curvature of the radius and ulna: a radiographic survey of Finnish miniature dachshunds. Acta Veterinaria Scandinavica, 42, 1-8.

Lappalainen, A. K., Mäki, K. & Laitinen-Vapaavuori, O. 2015. Estimate of heritability and genetic trend of intervertebral disc calcification in Dachshunds in Finland. Acta Veterinaria Scandinavica, 57, 6.

Lappalainen, A. K., Vaittinen, E., Junnila, J. & Laitinen-Vapaavuori, O. 2014. Intervertebral disc disease in Dachshunds radiographically screened for intervertebral disc calcifications. Acta Veterinaria Scandinavica, 56, 7.

Reunanen, V. L. J., Jokinen, T. S., Hytönen, M. K., Junnila, J. J. T. & Lappalainen, A. K. 2023. Evaluation of intervertebral disc degeneration in young adult asymptomatic Dachshunds with magnetic resonance imaging and radiography. Acta Veterinaria Scandinavica, 65, 42.

Rohdin, C., Jeserevic, J., Viitmaa, R. & Cizinauskas, S. 2010. Prevalence of radiographic detectable intervertebral disc calcifications in Dachshunds surgically treated for disc extrusion. Acta Veterinaria Scandinavica, 52, 1-7.

Rosenblatt, A. J., Lappalainen, A. K., James, N. A., Webster, N. S. L. & Caraguel, C. G. B. 2018. Scorer and modality agreement for the detection of intervertebral disc calcification in Dachshunds. Acta Veterinaria Scandinavica, 60, 11.

4.3 Norway

4.3.1 X-ray as mandatory or recommendation action.

The X-ray programme in Norway is regarded as a recommendation. It is advised that both parents should be aware of a known spinal status, and the X-rays should be taken between the ages of 2 and 4 years.

4.3.2 Details of the programme

To have the results of a spinal X-ray screening registered in Dogweb, the dog must be aged between 2 and 4 years, and a referral must be obtained through the NKK (Norwegian Kennel Club) prior to the X-ray examination. Only readings performed by an NKK-appointed reader are valid for registration in Dogweb. Additionally, only veterinarians who have an agreement with the NKK and have completed an approved X-ray course are permitted to take this type of images.

4.3.3 The effects of the programme

Table 9 displays the number of x-rayed dachshunds from 2009 to 30th June 2023. The figures for miniature and rabbit-sized dogs are combined for each coat type.

YEAR	MW+RW	W	MS+RS	S	ML+RL	L	TOTAL
2009	6	4	12	1	8	6	**37**
2010	3	46	5	7	40	23	**124**
2011	7	16	7	11	19	19	**79**
2012	9	32	7	15	29	25	**117**
2013	4	4	2	16	14	14	**54**
2014	1	13	3	5	9	9	**40**
2015	8	10	2	2	7	11	**40**
2016	4	3	1	4	9	14	**35**
2017	5	6	2	2	4	13	**32**
2018	1	7	0	2	9	13	**32**
2019	6	2	2	2	6	15	**33**
2020	4	2	1	1	7	8	**23**
2021	6	8	0	7	10	14	**45**
2022	10	21	9	18	39	32	**129**
2023	10	20	0	14	55	31	**130**
2024	5	16	8	15	38	36	**118**
2025	0	3	0	3	6	6	**18**
TOTAL	**89**	**213**	**61**	**125**	**309**	**289**	**1086**

Table 9: Number of dogs x-rayed per year per population 2009- 30th June 2025 in Norway

Table 9 shows that from 2009 to 30 June 2025, 1.086 dogs were X-rayed. Most of the X-rayed dogs are long-haired Dachshunds of standard size, followed by miniature and rabbit-sized ones. Next are standard wire-haired, standard smooth-haired, miniature wire-haired, miniature smooth-haired, and rabbit-sized wire-haired Dachshunds. The smooth-haired variety is the least common among the breed types in the table, which is also reflected in the number of registered Dachshunds with the NKK.

The table also shows a significant decline in the number of X-rayed dogs between 2013 and 2021. The number of X-rayed dogs in 2022 and 2023 has more than doubled compared to 2021, which we attribute to the impact of the new spine X-ray programme adopted in 2022. The action plan was reviewed at the club leaders' meeting in 2023, and there was agreement to continue following it. The Dachshund Representative Council also approved the necessary budget framework for financial support (maximum self-payment of 1000 NOK, possible subsidy of 2000 NOK) for members who X-ray their dogs in 2023. The Dachshund Representative Council decided to continue with an economic subsidy for spinal X-rays in 2024. From 2025, the subsidy will be 500 NOK if the X-ray costs more than 2000 NOK. From this year, we see a decrease in the number of X-rayed dogs, probably due to reduced subsidies and the project being completed.

Figure 3 below presents the information in Table 3 in a different way.

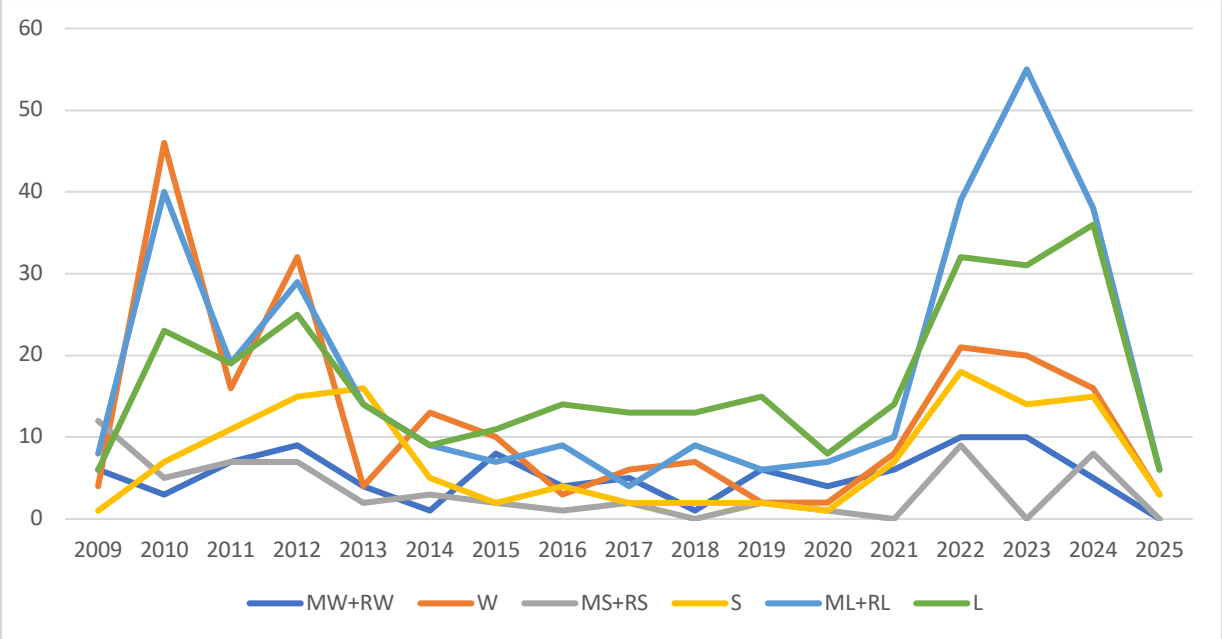

Figure 3: Number of dogs radiographed per year per population 2009-30th June 2025 in Norway

Variation in the Number of X-rayed Dogs

Figure 3 illustrates significant fluctuations in the annual number of Dachshunds undergoing X-ray screening. For instance, in 2008, 7 Dachshunds were X-rayed; in 2010, the number rose

to 110, and in 2012, it increased further to 119. However, there has been a notable decline since then. In 2020, only 23 dogs underwent spinal X-rays.

With the new reader introduced in autumn 2021 (veterinarian Vibeke Frøkjær Jensen), the number of X-ray examinations began to rise, but there was no significant increase. At the same time, it became clear that the quality of some images submitted to the new reader was inadequate, and in several cases, new images were requested.

There have also been instances where the photographing veterinarian did not follow the proper procedure and took too few images. In such cases, the new reader returned the images. This caused some concern not only among Dachshund owners but also among several veterinarians. Some have ceased X-raying Dachshunds when the goal is to detect possible calcified intervertebral discs. The information we have from NKK suggests that fewer images are now being returned, indicating that veterinarians have improved their practices.

Table 10 displays IDC grades of dogs radiographed from 2009 to 30th June 2025, based on the dachshund breeding population. The number of dogs in each group is on the left, with the percentage of each IDC grade on the right.

	MW+RW	%	W	%	MS+RS	%	S	%	ML+RL	%	L	%	total	%
IDC0	21	25	91	42,1	7	12,1	28	24,2	104	33,9	87	30,6	338	31,7
IDC1	34	40,5	71	32,9	17	29,3	44	37,9	110	35,8	117	41,2	393	36,9
IDC2	14	16,6	34	15,7	13	22,4	18	15,5	53	17,3	42	14,8	174	16,3
IDC3	15	17,9	20	9,3	21	36,2	26	22,4	40	13	38	13,4	160	15
total	84		216		58		116		307		284		1065	

Table 10: IDC degrees of dachshunds radiographed in 2009-30th June 2025 per dachshund breeding population in Norway.

Table 10 shows that from the start of the programme until July 2025, approximately 1.065 Dachshunds have undergone spinal X-rays. Currently, we do not have statistics showing changes in the number of calcified intervertebral discs; however, we are working to develop that.

Regarding the number of dogs with disc herniation, we only started to access data on this in 2022. The diagnosis of disc herniation is not required for reporting in DogWeb. However, work is in progress on a new system for recording diagnoses, which may eventually give us data on this.

4.3.4 Research activities that have been conducted in Norway.

The reports authored by F. Lingås are comprehensive health assessments based on surveys. questionnaire including questions regarding IVDD.

Lingås, F. 2019a. Helse- og atferdsundersøkelsen hos korthåret dachs [Health and behaviour survey in short-haired dachshund]. Oslo: NMBU.
Lingås, F. 2019b. Helse- og atferdsundersøkelsen hos langhåret dachs [Health and behaviour survey in long-haired dachshund]. Oslo: NMBU.
Lingås, F. 2019c. Helse- og atferdsundersøkelsen hos strihåret dachs [Health and behaviour survey in wire-haired dachshund]. Oslo: NMBU.
Stigen, Ø. 1991. Calcification of intervertebral discs in the dachshund: a radiographic study of 327 young dogs. Acta Veterinaria Scandinavica, 32, 197.
Stigen, Ø. 1996. Calcification of intervertebral discs in the dachshund: a radiographic study of 115 dogs at 1 and 5 years of age. Acta Veterinaria Scandinavica, 37, 229.
Stigen, Ø. & Christensen, K. 1993. Calcification of intervertebral discs in the dachshund: an estimation of heritability. Acta Veterinaria Scandinavica, 34, 357-361.
Stigen, Ø., Ciasca, T. & Ø., K. 2019. Calcification of extruded intervertebral discs in dachshunds: a radiographic, computed tomographic and histopathological study of 25 cases. Acta Veterinaria Scandinavica, 61, 9.
Stigen, Ø. & Kolbjørnsen, Ø. 2007. Calcification of intervertebral discs in the dachshund: a radiographic and histopathologic study of 20 dogs. Acta Veterinaria Scandinavica, 49, 1-7.

4.4 Sweden

4.4.1 X-ray screening as mandatory or recommended action

In Sweden, breeders and dog owners are entirely voluntary and free to decide whether to have their dachshund undergo an IDC screening. The SvTk considers that the process in Sweden is at an educational stage, where spreading knowledge and raising awareness among breeders and owners is the main goal. The breed club also believes it is important to gain as much acceptance as possible before making any recommendations on this matter.

4.4.2 Details of the programme

It has been possible for many years in Sweden to report dogs affected by IVDD to the SvTk. The appeal has been addressed to breeders or dog owners, requesting them to fill in a form with information about age, name, registration number, location of the IVDD, whether an operation has been performed, or if euthanasia had to be chosen. Reported cases of IVDD/Disc prolapse among dachshunds, as of 24th September 2025:

September 2025	
Smooth-haired miniature	28
Smooth-haired standard	78
Long-haired miniature	27
Long-haired standard	16
Wire-haired miniature	19
Wire-haired standard	187
Total reported cases of IVDD	**355**

Table 11:Reported cases of IVDD/Disc prolapse among dachshunds, per 24th September 2024

Agria Breed Profile

Agria, the largest animal insurance company in Scandinavia, has long provided statistics on diagnoses in the project Agria Breed Profiles. Data on the diagnosis “disc/back pain” among dachshunds is available dating back to 1995. The trend has been consistently positive, with a decline in these issues compared to the breed's average. Table 12 displays the relative risk for diagnosis “disc/back pain” among dachshunds in Agria Breed Profiles.

1995-2006	**2006-2011**	**2011-2016**	**2016-2021**
4,2	3,9	3,3	2,8

Table 12: The level of higher risk, compared to the nominal average breed.

4.4.3 The effects of the programme

Since the official IDC screening became available in Sweden in June 2021, approximately 290 dachshunds have been X-rayed. Refer to Table 13 for annual figures.

YEAR	MW+RW	W	MS+RS	S	ML+RL	L	TOTAL
2009	0	1	3	0	0	0	4
2010	3	1	1	0	0	1	6
2011	1	0	0	0	1	0	2
2012	5	2	4	1	8	1	21
2013	6	3	10	1	14	0	34
2014	7	0	2	1	9	1	20
2015	10	5	7	1	15	1	39
2016	10	2	0	1	6	2	21
2017	14	4	4	2	11	4	39
2018	11	2	0	2	16	5	36
2019	14	2	0	2	11	8	37
2020	2	0	1	1	10	8	22
2021	19	6	1	3	16	10	55
2022	15	3	1	3	20	11	53
2023	17	8	6	7	20	17	75
2024	20	5	12	8	22	18	85
2025	10	5	5	0	14	13	47
TOTAL	**164**	**49**	**57**	**33**	**193**	**100**	**596**

Table 13: Number of dogs x-rayed per year per population 2009-30th June 2025 in Sweden

The official programme for x-raying dachshunds, initiated through a requisition from The SKK, was launched in June 2021. The table above shows increased activity over the last three years. Data from previous years, dating back to 2009, come from a private initiative by members who kept statistics on all Swedish dachshunds examined in other countries (since there was no Swedish system in place). As a result, the numbers can be seen as “older” and ‘more recent’, with a notable shift in 2021. The table is of interest because it allows comparisons with other countries and because it is generally agreed that the private data collection prior to 2021 was a very thorough and complete coverage of Swedish dogs appearing in Danish, Finnish, or Norwegian records.

As shown by Figure 4 below, there has been a rising trend in the number of dogs x-rayed annually in Sweden. The miniature and rabbit-sized wire-haired dachshunds, along with their long-haired counterparts, are among those reaching the highest levels. This was also the case before Sweden introduced the official X-ray programme through the SKK in June 2021.

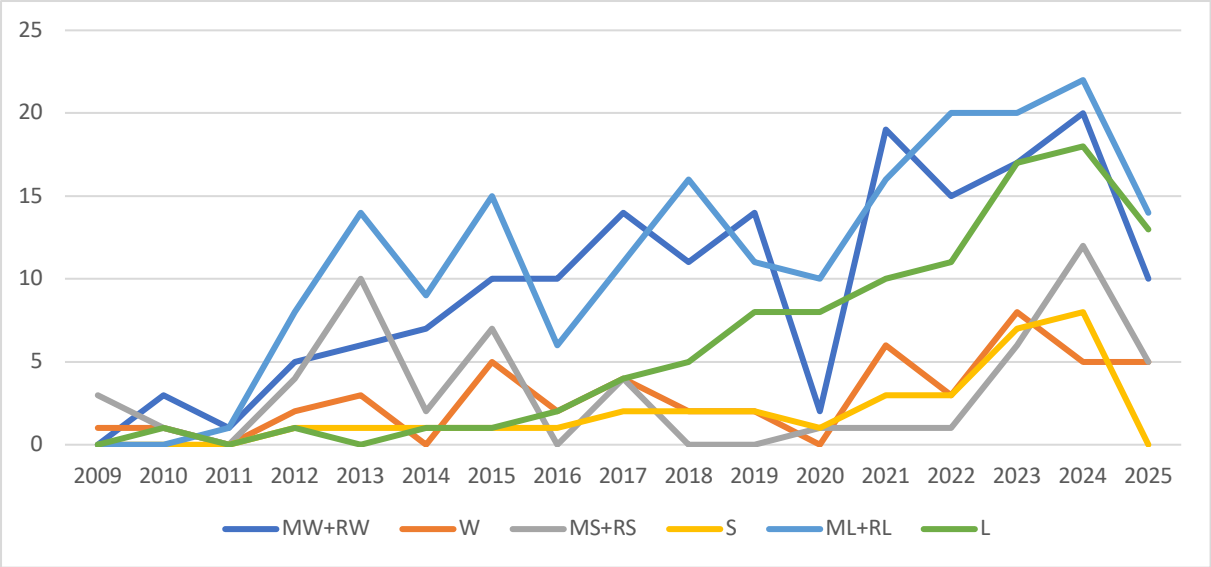

Figure 4: Number of dogs radiographed per year per population 2009-30th June 2025 in Sweden

When observing Figure 4, it is important to remember that Sweden's official programme was introduced only in June 2021. Data before this date comes from a private initiative to gather information on Swedish dachshunds screened abroad. We can see that after the programme's launch in 2021, the curves trend upwards for all varieties except for the long-haired miniatures and rabbit-sized types. The long-haired standard is the most consistently rising variety and has been actively screened for several years.

	MW+RW	%	W	%	MS+RS	%	S	%	ML+RL	%	L	%	total	%
IDC0	31	18,9	15	30,6	8	14,0	10	30,3	50	25,9	26	26,0	140	23
IDC1	62	37,8	18	36,7	12	21,1	7	21,2	68	35,2	27	27,0	194	33
IDC2	27	16,5	8	16,3	11	19,3	8	24,2	34	17,6	23	23,0	111	19
IDC3	44	26,8	8	16,3	26	45,6	8	24,2	41	21,2	24	24,0	151	25
total	164		49		57		33		193		100		596	

Table 14: IDC degrees of dachshunds radiographed in 2009-30th June 2025 per dachshund breeding population in Sweden.

From Table 14, we see that well over 55% of the screened dachshunds in Sweden have had IDC0 or IDC1 as results. The figure—higher than our Nordic neighbours—of around 25% for dogs with severe levels of calcification (IDC3) may need to be understood in the context that Sweden has only recently begun selecting stud animals using this method. Over time, the hereditary aspect will most likely lead to a lower number.

5. Future plans

This chapter provides information on new developments in the prevention of IVDD.

5.1 Denmark

Work is ongoing on various aspects of DNA related to IVDD. The research remains in its early phases.

The Danish Dachshund Club is involved in a research project on developing breeding programmes for dogs. The aim of the project is to identify and outline what is necessary to establish a breeding programme that positively impacts the health of the Danish dog population. The case study focuses on a breeding programme operating since 2009 within organised dachshund breeding. It includes X-raying the dogs' backs to detect calcifications in the intervertebral discs. There is a well-documented link between the number of calcifications and the risk of disc herniation. From the case study, several factors and challenges are identified that may influence the implementation of a breeding programme and the selection of breeders. The project is anticipated to conclude in early 2026.

It is possible to perform genetic testing for the FGF4 gene. As Table 15 shows, 12 dachshunds are tested.

	MW+RW			W			MS+RS			S			ML+RL			L					
Year	**tested**	N/CDDY	N/N	**tested**	N/CDDY	N/N	**tested**	N/CDDY	N/N	**tested**	N/CDDY	N/N	**tested**	N/CDDY	N/N	**tested**	N/CDDY	N/N	**total tested**	**N/CDDY**	N/N
2024	**0**	0	0	**1**	1	0	**0**	0	0	**1**	1	0	**0**	0	0	**1**	1	0	**3**	3	0
2025	**5**	0	0	**0**	0	0	**0**	0	0	**1**	0	0	**0**	0	0	**3**	0	0	**9**	0	0
Total	**5**	0	0	**1**	1	0	**0**	0	0	**1**	0	0	0	0	0	**4**	0	0	**12**	**3**	0

Table 15: Number of CDDY tested dachshunds in Denmark and dogs with normal allele (numbers for 2022 is merged with the numbers for 2023. The table was updated 30th June 2025.

A completely new law on dog breeding came into effect on 1 July 2025 (see page 14). Work is ongoing on its implementation and any subsequent measures.

5.2 Finland

In Finland, a new animal welfare law came into effect in 2024. Its regulations will not be implemented simultaneously because they are not yet ready. However, it is likely that the legislation will require a significantly stronger focus on improving spinal health. Mandatory screening for breeding dogs is set to begin in early 2025. Due to considerable variation in screening activity and results among different dachshund populations, FTK has proposed a gradual tightening of requirements in their spinal health strategy (attached). Whether this proposed strategy will be accepted by authorities remains uncertain.

In addition to the radiographic approach to addressing the IVDD problem, we have also initiated a genetic approach. FTK has negotiated a discounted price with Laboklin laboratory for IVDD, PRA, and OI genetic tests for its members. The results will be stored in MäykkyNet and/or KoiraNet databases, making information about dogs with normal genes accessible to everyone. Additionally, all spinal imaging results can be found on MäykkyNet, also those older ones which are not visible in KoiraNet.

Table 16 displays the number of CDDY-tested dachshunds in Finland and dogs with the normal allele (recorded in MäykkyNet as of 29th August 2025):

	MW+RW			W			MS+RS			S			ML+RL			L					
Year	**tested**	N/CDDY	N/N	**tested**	N/CDDY	N/N	**tested**	N/CDDY	N/N	**tested**	N/CDDY	N/N	**tested**	N/CDDY	N/N	**tested**	N/CDDY	N/N	**total tested**	**N/CDDY**	N/N
2023	**33**	0	0	**116**	28	2	**14**	0	0	**95**	20	3	**45**	6	0	**48**	8	0	**351**	62	5
2024	**29**	0	0	**217**	73	6	**31**	2	0	**170**	64	8	**141**	50	4	**88**	20	0	**676**	209	18
2025	**10**	0	0	**99**	47	3	**9**	4	0	**73**	35	4	**74**	37	3	**33**	12	0	**298**	135	10
Total	72			432			54			338			260			169			1325	406	33

Table 16: Number of CDDY tested dachshunds in Finland and dogs with normal allele (numbers for 2022 is merged with the numbers for 2023. The table was updated 29th August 2025.

Table 16 shows that the majority of the tested dogs are wire-haired standards and smooth-haired standards. Dogs carrying the normal allele have been found in all standard populations and in the long-haired miniatures. Through crosses between different dachshund varieties, including various sizes and coat types, and transfers from one size variety to another, the normal allele has also been introduced into miniature smooth- and wire-haired dachshunds.

Even though dogs with the normal gene will have few calcifications, it is important to remember that offspring that do not get the normal gene can still have many calcifications. It is important to know the status regarding the results of spinal X-rays of other dogs in the bloodline. This is because the normal allele in an N/CDDY dog may mask the effect of the CDDY allele, which can still appear in the offspring. In Finland, such cases have been observed, where an N/CDDY dog with few calcifications has produced CDDY/CDDY offspring with many calcifications. It is also important to remember that CDDY/CDDY dogs with a low K-number probably have other genes (not identified yet) that reduce their number of calcified discs.

Due to the high number of IDC grade 3 dogs, especially in miniature and rabbit smooths and miniature and rabbit wires, we still need tools beyond X-raying and genetic testing to breed dachshunds with healthier backs. In the summer of 2025, the Finnish Dachshund Club introduced its own health database, where owners can report their dog's health issues throughout the dog's life. This initiative aims to promote greater openness within the breed regarding health concerns.

5.3 Norway

NKK has indicated that they will start the work on the breeding program for dachshunds in collaboration with NDF at the end of 2025. This is closely tied to the new regulations for dog breeding that has been in progress for a few years since the court case (cavalier/bulldog). NDF is currently working on our strategic document "the whole dog" (replacing RAS together with NKK's breeding program). NDF wants emphasis on all the elements that are important for breed preservation; health, mentality, genetic variation, confirmation (shows) and hunting (trials).

From January 2025 genetic testing for CDDY/normal gene is recommended by the Norwegian Dachshund Club Federation. This is strongly supported by scientific research proving that one or two copies of the normal allele on FGF4-12 reduces the number of spinal calcifications (Sullivan et al., 2024). The NDF only subsidises testing entire litters where at least one parent carries the N-gene. The subsidy is 200 NOK for each puppy that is officially registered with the result in Dogweb. NDF has arranged a discounted genetic testing price with Laboklin in Germany (413 NOK), and the results can be registered in NKK's Dogweb (using a requisition purchased from NKK). The NKK automatically registers all puppies from two CDDY/CDDY parents as CDDY/CDDY in Dogweb. NDF has decided that all our statistical data will be derived from Dogweb; this decision provides data on the number of dogs with known gene status rather than the number physically tested. In the first half of 2025, 269 new dogs with known gene status were added in Dogweb; the total number of dachshunds with known gene status is now 1575, with 17 % carrying the N-gene. We observe an increase in the percentage among longhairs—normal size at 15% and dwarf/rabbit at 12%.

Table 17 displays the number of CDDY-tested dachshunds in Norway and dogs with normal alleles (registered in Dogweb 30th June 2025).

	MW+RW			W			MS+RS			S			ML+RL			L					
Year	tested	N/CDDY	N/N	tested	N/CDDY	N/N	tested	N/CDDY	N/N	tested	N/CDDY	N/N	tested	N/CDDY	N/N	tested	N/CDDY	N/N	**total tested**	**N/CDDY**	N/N
2023	5	0	0	8	0	0	14	0	0	7	0	0	36	3	0	30	4	0	**100**	7	0
2024	44	0	0	290	72	3	85	4	0	209	52	9	316	27	0	362	50	1	**1306**	205	13
2025	12	0	0	90	21	3	31	0	0	40	10	0	72	18	2	24	5	0	**269**	54	5
Total	61	0	0	388	93	6	130	4	0	256	62	9	424	48	2	416	59	1	1675	266	18

Table 17: Number of CDDY-tested dachshunds in Norway and dogs with normal allele. The table is updated at 30th June 2025.

In Table 17, we observe that 17 % of the dachshunds tested in Norway possess a normal allele. To date, there are no miniature/rabbit smooth- or wirehair dogs with the normal allele. In miniature/rabbit smooths, the allele has been introduced through crossbreeding with longhair. The NDF has issued specific breeding recommendations based on the latest research (Sullivan et al., 2024) and in collaboration with the veterinarians at the NKK.

Breeding recommendations for N/CDDY and N/N dachshunds, made by NKC and NDF 2025

The prevalence of the normal gene is found to be 18% in the Norwegian tested population. Breeding to preserve the normal gene should aim for a wide spread of the gene within the different bloodlines without limiting the genetic variation in the breed. Breeding to preserve the normal gene should aim for the use of as many related N/CDDY dogs as possible with no or few common bloodlines with their partners.

a) ***N/N mated to CDDY/CDDY*** *– all offspring should be tested officially in dogweb, all the puppies will be N/CDDY.*
b) ***N/CDDY mated to spinal x-rayed CDDY/CDDY*** *– all offspring should be tested officially in dogweb. Statistically 50% will be N/CDDY (like gender distribution in a litter).*
c) ***N/CDDY can be mated to N/CDDY****, this is planned together with the dachshund health committee to ensure gene variation to the greatest extent possible, and to ensure that it is beneficial to the breed. Especially important with the longhairs and all the smaller sizes (due to few bloodlines with normal gene).*
d) ***Dogs that are spinal x-rayed with over medium degree can be used for breeding with a partner with the normal gene****. It is the breeder that must consider if the dog has so many positive traits that it should be used for breeding. Dogs with over medium degree in spinal x-ray should have few litters as well as contribute to gene variation in the breed. The breeder should ensure that at least one puppy is saved for further breeding.*
e) N/CDDY and N/N dogs should not have more than one litter with the same partner.
f) ***Crossbreeding between sizes*** *– It is a good idea to crossbreed with sizes to achieve more unrelated bloodlines that are N/CDDY. When crossbreeding miniature with standard the smaller N/CDDY puppies should continue in miniature breeding and the larger in standard breeding.*
g) ***Crossbreeding between coats*** *– It is a good idea to crossbreed with coat varieties to achieve the presence of the normal gene in all varieties, and at the same time ensure genetic variation within each variety. Smooth haired dachshunds can be crossbred to wire- or long-haired dachshunds, wire haired dachshunds cannot be crossbred to long haired dachshunds. In litters from crossbreeding, the N/CDDY puppies should contribute to the breeding of the variety where they belong according to their coat. For crossbreeding between smooth and long-haired dogs it could take two generations to get long-haired puppies if the smooth haired does not carry the gene for longhair.*

The goal is to gradually increase the prevalence of the normal gene in the varieties of the breed. While doing this the breeding from CDDY/CDDY dogs HAS to continue. If there is too much focus on breeding for the normal gene the genetic variation within

the breed will decrease, which will be very unfortunate for the breed in the future, and could result in other challenges like inbreeding depression, increase of diseases and more.

All breeding on N/CDDY dogs should aim for one or two N/CDDY puppies being used in further breeding. To gradually increase the prevalence of the normal gene in the dachshund breed N/CDDY and N/N dogs should on average have more offspring than CDDY/CDDY dogs. It is very important to keep in mind that males do not sire too many offspring. It is particularly important to avoid excessive use of males at a young age.

5.4 Sweden

The X-ray route

Looking ahead, an important goal is to further promote information about the x-raying possibility. An increase in x-rayed dogs will be beneficial for everyone as the statistical data gradually grows. The Swedish Dachshund Club currently does not financially support dog owners with the x-raying costs. However, this issue must be revisited and reassessed as time passes and the programme develops.

The genetic route

We notice a significant interest among dog owners regarding the genetic test for "the wild gene". As it turns out, the SKK cannot currently present results of the FGF4-12 test in Hunddata.

The issue of the proper Swedish registration for the genetic test FGF4-12 remains a high priority for the SvTk. During the autumn and winter of 2024-2025, it will be further discussed with the SKK, with the aim that the national kennel club will begin registering test results. In October 2024, as a temporary solution, the SvTk decided to launch testing for dog owners and to start a register of dachshunds tested in Sweden. The number of tested dacshunds is presented in Figure 5 below.

	MW+RW			W			MS+RS			S			ML+RL			L					
Year	tested	N/CDDY	N/N	tested	N/CDDY	N/N	tested	N/CDDY	N/N	tested	N/CDDY	N/N	tested	N/CDDY	N/N	tested	N/CDDY	N/N	**tested**	**N/CDDY**	N/N
2024-2025	27	1	0	280	132	7	39	3	0	243	127	16	94	5	0	72	3	0	**755**	**271**	**23**

Figure 5:Number of CDDY-tested dachshunds in Sweden and dogs with normal allele, updated 30th June 2025

The reporting route

The reporting route will be maintained, as it provides highly valuable information. Not only regarding IVDD, even though this is the most serious health issue to address.

Increased age for debut as breeding dogs
For almost two decades, the SvTk has recommended that dogs and bitches make their breeding debut at the age of 3 years. This will then ensure that grandparents are at least 6 years old when a litter is planned. At this age, many dogs with back problems will have shown symptoms, allowing the breeder to make an aware and informed decision whether to breed or not on individuals that have affected relatives.

Any other business
Of the highest importance and influence is, of course, the interest shown by authorities and animal welfare organisations regarding the breeding of household pets, the competition among animals, and the overall wellbeing of all animals kept by humans. The difficult but very crucial task is, if possible, to stay a step ahead in these matters, which is on our table.

6. X-ray: Mandatory or not mandatory?

Many years ago, it was debatable whether the spinal problem in dachshunds even existed. Likewise, some believed that although the spinal issue was present, it was inherent to the breed, and nothing could be done to address it. Today, people are better educated and more informed, and attitudes towards animal welfare as our responsibility have thankfully evolved. As a result, such viewpoints are now rarely advocated.

The common starting point is recognising that our breed has a spinal problem and that it is our duty to address this issue. We need to find the most effective way to reduce the number of dogs affected by IVDD. So far, our main tool has been the spinal examination. How can it be used most effectively? Should we rely on voluntary participation, or is a breeding restriction necessary?

Arguments for X-ray screening not to be mandatory:

- Considerations for dogs. Dogs may experience discomfort during a spinal examination. Some breeders prefer not to subject their dogs to this discomfort.
- Considerations for puppy buyers. By opting not to conduct a spinal x-ray, puppy buyers avoid receiving information about potential poor spinal results in the parents, thus preventing concerns that this knowledge might cause.
- Considerations for breeders. Breeders save money on examination costs and avoid the need to exclude dogs with poor results from breeding, as well as the discomfort associated with procedures they dislike. Ultimately, in the worst case, the breeder avoids feeling compelled to discontinue organised breeding.
- Consideration of genetic variation. If breeders who choose not to have their dogs examined cease organised breeding, it could reduce the number of dogs available for breeding within our pedigree dog community, potentially negatively impacting genetic diversity.
- Consideration for kennel and breed clubs. It would be detrimental for kennel and breed clubs if a larger number of breeders withdraw from the clubs and organised breeding.
- Consideration for the reputation of the breed and the club. Both could suffer if it becomes evident that internal divisions and disagreements exist regarding health improvement efforts breed.

Arguments for X-ray screening being mandatory:

- Consideration for the dogs. It is hard to justify not doing everything possible to prevent breeding that could produce puppies at high risk of developing IVDD.
- Consideration for puppy buyers. If not all parent dachshunds are examined, some puppy buyers may risk purchasing a puppy from a breeder who has not examined the parents. It is difficult to explain to a puppy buyer that they were simply unlucky to purchase a puppy from unexamined parents or parents with poor spinal health.

- Consideration for breeders. It is difficult and feels unfair for breeders who perform spinal examinations to bear the cost of the examination and the responsibility of removing dogs with poor spinal health from breeding, while their fellow breeders do not face the same expenses and issues. Unequal requirements and conditions risk causing discord and negative discussions among breeders.
- Considerations for genetic variation. If x-raying is voluntary, it becomes difficult to prevent the formation of two separate subpopulations – one for dogs that have undergone spinal examination and one for dogs that have not. This is not ideal. The best approach is for everyone to work together and utilise as many different, good dogs as possible in breeding.
- Considerations for kennel and breed clubs. It is challenging for clubs to promote puppies from dogs that have undergone spinal examination, while also explaining to our community and puppy buyers that we include those who do not use spinal examinations or who breed dogs with poor spinal status.
- Considerations for the reputation of the breed and the club. We must demonstrate to our community that we take the breed's issue with IVDD seriously. It is challenging to explain and justify why we do not use a tool that is suitable for reducing the incidence of dogs affected by IVDD.

Another factor to consider is the recent introduction of genetic testing aimed at identifying dachshunds with the N-gene. This development will influence the debate on the advantages and disadvantages of mandatory X-rays.

7. Making data publicly available

The results from both x-ray screening and genetic testing must be publicly accessible, enabling breeders to select suitable dogs and allowing puppy buyers to check, for example, the health status of parent dogs. Data should also be readily available to researchers and the general public. Making data publicly accessible is one way to promote transparency in dog breeding.

In all four Nordic countries, the national kennel clubs provide websites with comprehensive and easily accessible details on all registered dogs.
Denmark www.hundeweb.dk
Finland www.jalostus.kennelliitto.fi
Norway www.dogweb.no
Sweden www.hunddata.se and www.avelsdata.se

On these sites, one can find results from dog shows, hunting tests, and mental assessments. They also provide health information, such as eye screenings, patella test results, and IVDD screenings. The sites are accessible to everyone. However, Denmark's Hundeweb requires a membership to log in. A very useful feature is the ability to perform "test matings" between two individuals to predict the inbreeding percentage in a litter.

The site that is probably the most developed and user-friendly at this stage is Finland's. So, let us use them as an example. More information on how to navigate this site:

The FKK's database is available at www.jalostus.kennelliitto.fi. It operates in Finnish, Swedish, and English. To view information about a specific breed, first select the FCI group from the drop-down menu, then choose the breed in the second drop-down menu. You can search for dogs by name or registration number. On a dog's page, you will find all its health, trial, and show results, pedigree, a list of siblings, and possible offspring.

To search for the results of an entire breed, you can use the buttons at the top centre: Latest Litters, Trials, Results, Shows, Health, Champions, Imports. To find spine x-ray results for 2023, for example, you must first select the year 2023 and then click all the other boxes except spine. CDDY genetic test results can only be found here.

Another way to search is via advanced search. First, you must go to Breed-related settings and select the health results you want to search. Only results for hips, knees, spine, heart, and eyes can be searched at the advanced level.

The sites of other countries provide similar information and are just as easy to navigate once you attempt to use them. However, they are not available in English, which makes the Finnish site a significant advantage.

8. How can we see results from our efforts?

When can we expect to see results from our efforts?

The X-ray route

In Denmark, a study was carried out in 2001 to investigate the frequency of intervertebral disc disease (IVDD) among wire-haired dachshunds born in 1991. At the time of the study, the dogs were 10 years old. Questionnaires were sent to a sample of 250 owners, with a response rate of 72%. The proportion of dogs diagnosed with IVDD during their lifetime was 15.7%. Additionally, 4.6% of the dogs had shown symptoms of the disease, but it had not been diagnosed by a veterinarian. This results in a total occurrence of 20.3% (Nilsson, 2001).
It would be helpful to conduct a similar study again. If such a study takes place in, for example, 2026, it would include dogs born in 2016. In 2016, Denmark registered 196 wire-haired standard dachshund puppies. Of these, 96 (49%) had parents that were both screened, and the screened parents had an average of 1.35 calcifications. Therefore, a lower frequency would likely be expected compared to the dogs from 1991.

Due to, for example, the current GDPR regulations, it could be challenging for the clubs themselves to conduct such a study. We will depend on interest from researchers. It would be desirable if we could find additional ways to monitor our efforts, such as ongoing monitoring using geometric index or other measures.

The genetic route

Genetic testing is still in its early stages. Predictions about what to expect will be based on some assumptions that might prove different as the project progresses. However, based on the current figures in Norway, it is possible to try to give an example of how the conservation efforts and the desired increase in the prevalence of the gene might develop.

The basis for this prognosis is solely on the Norwegian dachshund population. In July 2025, calculations indicate that the prevalence of the normal gene is about 15% across all dachshund varieties. According to NKK's geneticist, this would mean about 30% of all registered litters the following year will have at least one parent carrying the N-gene.

If we assume that breeders follow the breeding recommendations provided by NKK and NDF, we can estimate that an average of two puppies carrying the N-gene will be used for breeding. Calculating exponential growth (188 litters in 2024), this would result in a 13,8% increase when the next generation reaches maturity about two years later. Following this logic, it could be possible for nearly 100% of all litters to have at least one parent carrying the N-gene around 10 years from now. Any addition of the N-gene from foreign dogs would accelerate this progress. This is, of course, a mathematical calculation that does not account for all the decisions breeders must make when selecting dogs for breeding. It also does not consider that some varieties already have a significantly higher prevalence of the N-gene. Neither does it factor in any new imports with the N-gene, which could make a difference.

The breeding recommendations suggest that as many N-gene carriers as possible should be available for further breeding, and that breeders should be very aware of the need to maintain maximum genetic diversity.

A guideline suggested by NKK geneticist:

> *A dachshund carrying the N-gene which is used for breeding once should not be used again with the first partner's, parents, siblings, half-siblings or offspring.*

The need for crossbreeding between different varieties is also a factor that might cause some varieties to increase the prevalence of the gene more or less quickly than others. Currently, both miniature- and rabbit-size smooth and wire varieties face the challenge of finding ways to introduce N-gene carriers into their breeds. For smooth miniatures and rabbits, crossbreeding with standard smooth and long-haired miniature/rabbits could be possible. For wire miniatures and rabbits, the options are currently standard wire or standard smooth, given the absence of dogs carrying the N-gene in miniature and rabbit smooth varieties. Considering the wire coat and the number of standard wires carrying the N-gene, crossbreeding with standard wire might be the best solution to achieve the desired coat type and carry the N-gene.

Making this kind of mathematical prediction is not to be considered a definitive conclusion about how the development will unfold. It simply explains how it could work statistically, giving us an idea of the time frame to expect. The prediction only applies to litters where one parent carries the N-gene; it is likely that there will also be litters with both parents carrying the N-gene. Future generations after 2024 will provide more accurate data for better predictions.

9. Summary and Conclusion

Both spinal X-rays and genetic testing for dachshunds are research-based measures aimed at preventing disc herniation. Spinal X-rays started as a pioneering effort in the early 2000s. Today, all Nordic countries, as well as the United Kingdom, Germany, the Netherlands, and Spain (and perhaps other countries we are unaware of), recommend and offer spinal X-rays for dachshunds. Genetic testing is based on research conducted by, among others, at the University of California in the USA. Genetic testing is also available for dachshunds in Denmark.

There are many good reasons to perform spinal X-rays. On an individual level, it provides information about whether a dog has an increased or decreased risk of developing disc herniation during its lifetime. Breeders can use the results of spinal X-rays as one of several important factors in selecting breeding animals. High participation in the spinal X-ray programme and proper use of the results will contribute to better spinal health in dachshunds. An important goal of spinal X-rays is to achieve sufficient participation in the programme so that an index can be developed to assist in breeding. Denmark has achieved this goal.

There are also valid reasons to perform genetic testing to identify the normal gene. By breeding dachshunds with the normal gene, the gene will spread through the breed, helping to decrease the incidence of disc herniation.

Changing heritable traits in a population can take a very long time. It is work that requires strong support, endurance, and patience from all involved parties. Therefore, it is crucial that dachshund clubs take responsibility for implementing the programmes. Successful dissemination of information is also essential. This document shows, among other things, that there is a lot of research on various aspects of disc herniation in dachshunds and the use of spinal X-rays. The challenge lies in making enough information available in a way that reaches all dachshund owners. This is an exceptionally large task that should not be underestimated. It is also undeniable that financial support schemes help increase the number of dogs undergoing spinal X-rays.

Sometimes, maintaining transparency about spinal X-ray results has been challenging. All officially interpreted spinal X-ray images are published in the country's kennel club data systems for each dog. Some breeders worry that a high number of calcified intervertebral discs might harm their reputation, while others worry they should stop using a particular dog for breeding. The greatest challenge in such situations is the lack of transparency in breeding practices. Transparency is essential for making good decisions and promoting a healthy breed. Breeding should benefit the breed as a whole, not just individual breeders' self-interests.

We have not encountered the same challenges concerning transparency in genetic testing. The results are published not only for each dog but also on dedicated lists. However, some breeders are concerned about genetic variation within the breed and the use of dogs with the

N-gene, which might otherwise not be considered for breeding due to confirmation. There has been discussion about mentality and the importance of not compromising key elements in the breed standard. The goal is, of course, to continue breeding according to the same standard with the N-gene, but it is equally important to remember that a dog without show or trial merits can still contribute to breeding to maintain the degree of genetic diversity needed to keep the dachshund breed healthy. Show titles and hunting test titles are not hereditary. Emphasising good health and genetic diversity is essential. Mentality must remain a priority; dogs used for breeding should consistently display a typical, confident, and outgoing dachshund attitude.

We hope this document will be enlightening not only for our Nordic readers but also for dachshund owners and their organisations in other countries. We are very interested in receiving information about how other nations evaluate disc herniation in dachshunds and what measures are being implemented. By sharing information across countries on specific topics, we can learn from each other and build beneficial collaborations for the breed.

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Appendix 1: Lawsuit against the NKK, the Norwegian Cavalier Club and the Norwegian Bulldog Club

Breeding of the Cavalier dog breed is in violation of the Animal Welfare Act, while breeding of English Bulldogs is possible under a specific breeding program.

Supreme Court judgment of October 10, 2023, HR-2023-1901-A, (case no. 23-004643SIV-HRET), civil case, appeal against judgment.

I. Norwegian Kennel Club, Norwegian Cavalier Club, A, B, C (lawyer Anette Fjeld) against the Norwegian Animal Protection (lawyer Emanuel Feinberg)

II. Norwegian Animal Protection (lawyer Emanuel Feinberg) against the Norwegian Kennel Club, Norwegian Bulldog Club, D, E, F (lawyer Anette Fjeld)

The Norwegian Animal Protection sued the Norwegian Kennel Club, Norwegian Cavalier Club, Norwegian Bulldog Club, and six breeders because it believes that continued breeding of the dog breeds Cavalier King Charles Spaniel and English Bulldog is in violation of § 25 of the Animal Welfare Act. The reason is that these dog breeds are particularly prone to disease, partly due to targeted breeding for specific physical traits.

The Supreme Court has ruled that continued breeding of Cavaliers is in violation of the law, while breeding of English Bulldogs under a specific breeding program will be lawful.
The Supreme Court confirms that the courts can impose a ban on breeding certain breeds under § 25 of the Animal Welfare Act and that the Norwegian Animal Protection had the right to bring such a lawsuit.

Under § 25 of the Animal Welfare Act, breeding that negatively affects the functions of animals or reduces the possibility of natural behaviour is prohibited. A holistic assessment based on knowledge of breeding and genetics shall be conducted, where the type of stress or disease for the animals, the cause of the condition, and the purpose of the breeding are central. One threshold cannot cover all breeding situations. The threshold for production animals will generally be higher than for pets.

Almost all dogs of the Cavalier breed have specific neurological conditions because the skull is too small for the brain, leaving insufficient space for the nervous system. These conditions can lead to the disorders Chiari-like malformation pain (CM-P) and symptomatic syringomyelia (SM-S), causing pain to the dogs. When at least 15 percent of the dogs develop these disorders, further breeding of the Cavalier breed, as it stands today, will be in violation of § 25 of the Animal Welfare Act. There is no evidence of significant improvement in the short term through specific breeding programs.

Regarding English Bulldogs, the Supreme Court states that the condition Brachycephalic Obstructive Airway Syndrome (BOAS) in grades 2 and 3 is so severe that when a significant proportion of the dogs are affected, continued breeding will generally be in violation of § 25 of the Animal Welfare Act. BOAS is a syndrome that causes breathing difficulties for the

dogs and is partly associated with the compressed snout. Because a breeding program initiated by the kennel club has shown promising results in reducing severe BOAS, continued breeding following this breeding program will not be in violation of the law.

The judgment was pronounced by dissent. Two judges have a different view on the threshold and believe that it has not been exceeded for Cavaliers either.

The judgment provides guidance for the understanding of § 25 of the Animal Welfare Act. Read the full decision from the Supreme Court (HR-2023-1901-A). [in Norwegian language only]

Legal Area: Animal Welfare Act § 25. Civil Procedure.
Key Paragraphs: 122, 146, 176
Judges: Bull, Bergh, Østensen Berglund, Thyness, Hellerslia

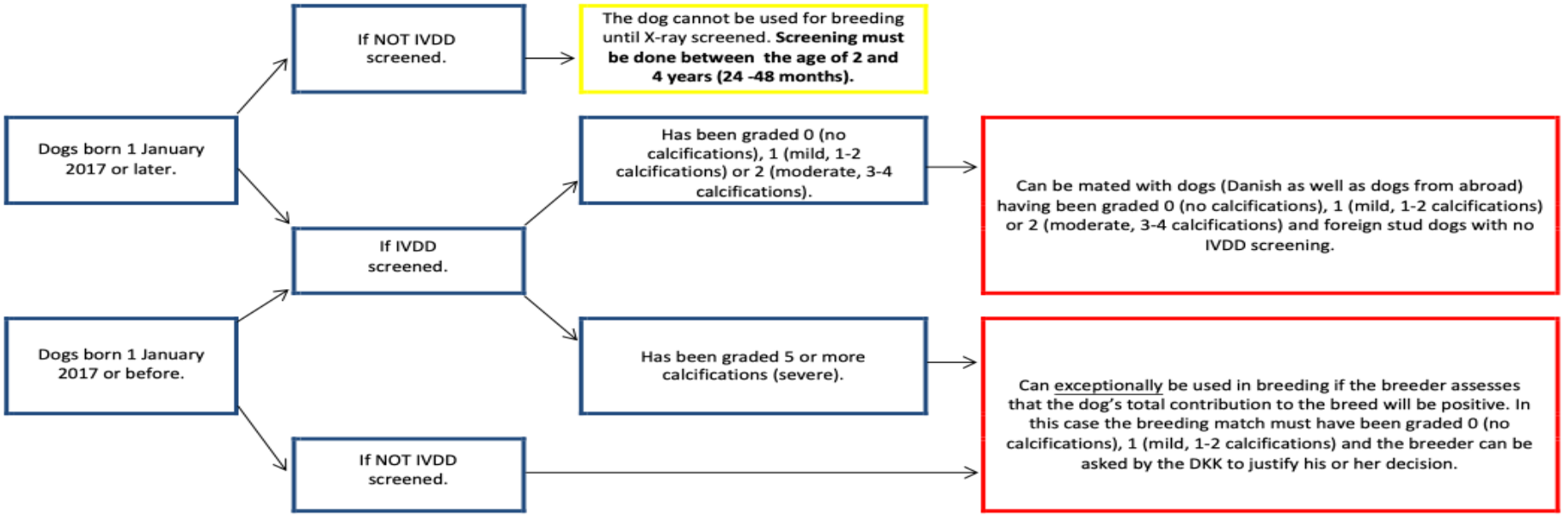
Source: The Norwegian Supreme Court (https://www.domstol.no/no/hoyesterett/avgjoreler/2023/hoyesterett-sivil/HR-2023-1901-A/)

Appendix 2 Flow Chart Diagram – Danish Breeding Requirements

FLOW CHART in effect from 1 January 2023
Which dog can I use as a match?
The breeding requirements comprise all Danish owned dogs as well as foreign owned breeding dogs in Denmark with a Declaration of disposal.

In order to be given a Basis Plus pedigree, in addition to the below mentioned breeding restrictions, the following must be respected:

1. **Both parents have no calcifications (grade 0) or 1-2 calcifications (mild, grade 1) registered at the DKK or the average of the spine index from both parents is ≥ 100 at the time of breeding.**
   Further requirements for wire-haired dachshund:
2. **At least one of the parents is registered genetically free from crd PRA at the DKK.**
3. **At least one of the parents is registered genetically free from OI (Osteogenesis Imperfecta) at the DKK.**



Basis pedigrees (Basis registration papers) are given to offspring when both parents apply to the breeding restrictions.

Basis Plus pedigrees (Basis Plus registration papers) are given to offspring from parents which apart from applying to the breeding restrictions also apply to the breeding recommendations.

A Basis Plus pedigree (Basis Plus registration papers) will be endorsed: This dog is bred according to the recommendations from DGK (The Danish Dachshund Club) and DKK (The Danish Kennel Club).

Exceptionally is to be understood in such a way that the parent dog with 5 or more calcifications is to be kept in mating quarantine until half of the litter has been screened for IVDD with a reasonable result.

At the present the DKK registers screening results from Norway, Sweden, Finland and England. Foreign stud dogs with a registered screening at the DKK are subject to the same breeding requirements as Danish dogs. If a foreign owned stud dog is screened in Denmark and the result is registered at the DKK, he can be used on the same terms as a Danish owned stud dog.

2024-04-14

Appendix 3 Breeders Summary of the paper ***There is a gene dose effect for cddy-associated disc disease risk in dachshunds***

This is a Breeder Summary of the paper entitled "The Relationship Between Radiographic Disc Calcification Score and FGF4L2 Genotype in Dachshunds," authored by Stacey Sullivan, David Redden, Froydis Hardeng, Malin Sundqvist, Michelle Kutzler.

Study Background: Some traits in animals are determined by genes and these are referred to as genetic traits. Genes are inherited in pairs of alleles (gene copies, with the possibilities being 0, 1 or 2 gene copies). When a gene is "dominant" the trait it controls is present or absent based on the presence or absence of the gene which means that 1 or 2 copies of the gene results in the presence of the trait in the animal. However, some dominant traits show a "gene dose" effect. This means that when an animal has 2 copies, the trait is expressed maximally in the animal, but with one copy, the trait is expressed to a lesser extent.

Chondrodystrophy (CDDY) is a gene that results in short limb length in dogs. It also increases risk of intervertebral disc disease (IVDD). It has been reported to be dominant for both traits (short limb length and IVDD risk). While most dachshunds (85%) have two copies of the CDDY gene, some dachshunds inherit one copy (N/CDDY), and some inherit no copies (N/N).

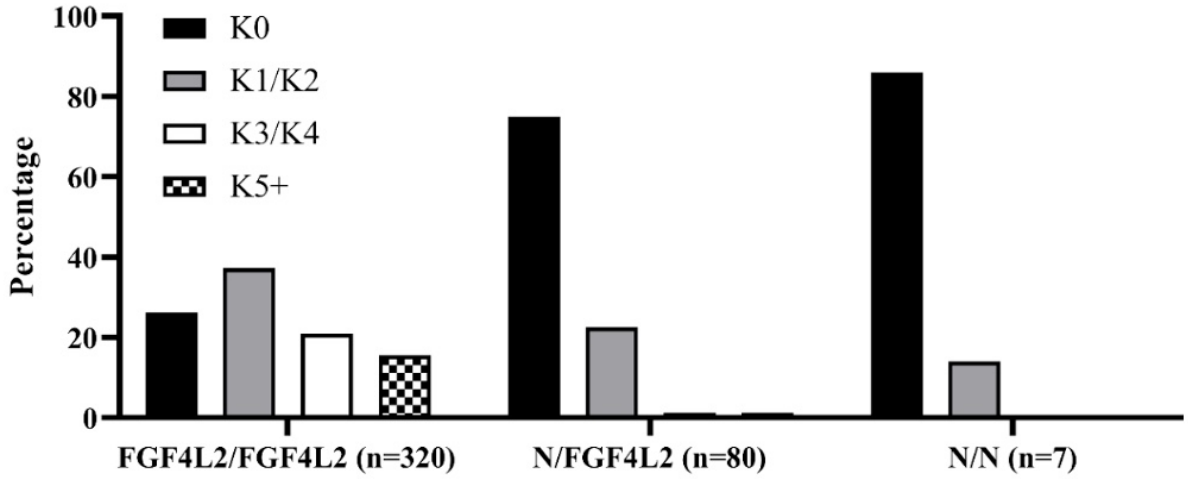
In many countries, dachshund spinal health breeding schemes are in place. These schemes are based on the dog's Radiographic Disc Calcification Score. To obtain this score, spinal x-rays are taken between ages 2 – 4 years. The number of calcified discs seen on these x-rays is the Radiographic Disc Calcification Score, also known as the K-number (K-n). A dog that is K0 has no calcifications, a dog that is K1 has one calcification, and so on. In the scientific literature, it has been determined that a lower K-n correlates to a lower likelihood of symptomatic disc disease as follows:

K0 = 7% risk of symptomatic disc disease = very low risk
K1 or K2 = 12% risk of symptomatic disc disease = low risk
K3 or K4 = 23% risk of symptomatic disc disease = dachshund breed average
K5+ = 69% risk of symptomatic disc disease = very high ris

Study Questions and Results: There has been some evidence published in the scientific literature that suggests a gene dose effect for CDDY in dogs. This study sought to determine whether there is a gene dose effect for IVDD risk in dachshunds. The authors looked to see whether dachshunds with zero or one copy of CDDY (N/N or N/CDDY dachshunds) have better spinal scores (i.e. lower risk of symptomatic disc disease) than CDDY/CDDY dachshunds. The data confirmed with a high degree of statistical certainty that dachshunds with zero or one copy of CDDY have fewer calcifications (lower K-n) and therefore a lower risk of symptomatic disc disease. In fact, dachshunds in this study with only one copy of CDDY had such good spinal scores that they were similar to dachshunds with no copies of CDDY. However, a limitation of this study is there were only 7 N/N dogs included in the study (due to the rarity of this genotype). A second larger study that includes more N/N dachshunds would increase the statistical certainty of this finding, but because N/N dogs don't carry CDDY and its associated disc disease risk, it would be expected that all or most N/N

dogs will have low K-n (meaning the study conclusions would not change, we would just have more statistical certainty).

The graph below visually represents the finding that dogs with N/N or N/CDDY have much lower K-n scores overall, which is expected to mean less symptomatic disc disease.



Dachshund breeders can immediately employ this data by identifying each dog's genotype for CDDY (FGF4L2) and selecting for mates with at least one N where possible to maximize the likelihood of producing puppies with a lifetime of decreased disc disease risk.

You may not realize you have an "N" dachshund! Because multiple genes are responsible for limb length in dogs, and a different gene (CDPA) that nearly all dachshunds carry is a stronger gene for determining short limb length, N/CDDY dachshunds are indistinguishable from CDDY/CDDY dachshunds. Because there is so little data on the limb length of N/N dachshunds, it is impossible to say whether they appear taller, but dachshunds with only one copy of CDDY are winning in show rings every day!

This Breeder Summary was written by: Stacey Sullivan and Kat Meyers

This project was a collaborative effort of Auburn University College of Veterinary Medicine, Oregon State University College of Veterinary Medicine, the Norwegian Federation of Dachshund Clubs, and the Swedish Dachshund Club.