Skema til afrapportering af ViD-projekter
Videncenter for Dyrevelfærd
2024-2027

1. Projekttitel:
BOAS screening of three dog breeds in Denmark: further implementation, documentation of effect and investigation of breeders' and owners' attitude towards the screening program.

2. Projektstart og afslutning:
1/1-2024 – 31/3 - 2025

3. Projektleder og projektdeltagere (titel, navn, adresse, tlf., e-mail)**:**
Projektleder:
Professor Merete Fredholm, Københavns Universitet (KU), Institut for Veterinær- og Husdyrvidenskab (IVH), Grønnegårdsvej 7, 1870 Frb. C, tlf.: 20133395; e-mail: mf@sund.ku.dk
Projektdeltagere:
Lektor Camilla Vibeke Sichlau Bruun, IVH, KU, e-mail: cvb@sund.ku.dk;
Lektor Helle Friis Proschowsky, IVH, KU, e-mail: hfp@sund.ku.dk
Professor Peter Sandøe, IVH og Institut for Fødevare- og Ressourceøkonomi (IFRO), KU, Rolighedsvej 23, 1958 Frb. C, e-mail: pes@sund.ku.dk
Lektor Thomas Bødker Lund, IFRO, KU; e-mail: tblu@ifro.ku.dk
Post.doc. Svenja Springer, Vet. Med. Uni, Veterinaerplatz 1, 1210 Vienna, Austria; e-mail: Svenja.Springer@vetmeduni.ac.at
Lektor Jakob Willesen, Institut for Klinisk Veterinærmedicin (IKV), KU, Dyrlægevej 16, 1870 Frederiksberg C, e-mail: jw@sund.ku.dk

4. Baggrund for projektet (Kort beskrivelse af, hvorfor dette projekt blev i gang sat):

BOAS

Brachycephalic obstructive airway syndrome (BOAS) is a respiratory condition occurring in several brachycephalic (short muzzled) dog breeds. Examples of such breeds include French bulldogs, English bulldogs, Pugs, Boston terriers, Shih Tzu, and Pekingese. These breeds are characterized by having very short snouts and skull. This conformation largely increases the risk of compromised breathing, mainly because the internal soft tissue in the nose and larynx obstructs the limited airway space. Moreover, many of these dogs have pinched nostrils and a narrow trachea, which may further exacerbate their breathing difficulties. The most frequent symptoms of BOAS are strenuous and loud breathing, exercise intolerance and difficulties cooling down in warm weather due to poor ability to pant. The most common forms of treatments are a surgical reduction of the soft palate and/or widening of the nostrils [1-3].

BOAS grading

Although sharing brachycephalic features, brachycephalic dogs are not all equally affected by BOAS. Some have almost no clinical signs of BOAS whereas others are either moderately or severely affected.

At Cambridge University, Jane Ladlow and colleagues have developed a Respiratory Function Grading Scheme (RFG) for assessing the degree of BOAS in individual dogs.

So far, the scheme is validated in three breeds: French bulldogs (FB), English bulldogs (EB) and Pugs, but it is expected to be approved for grading other brachycephalic breeds as well. The scheme is being tested with the aim of including 14 other breeds: Affenpincher, Boston terrier, Boxer, Cavalier King Charles spaniel, Chihuahua, Douge de Bordeaux, Griffon (3 variants), Japanese Chin, Maltese, Pekingese, Pomeranian, Shih tzu, and Staffordshire bull terrier.

The grading is performed by a specially trained veterinarian and consists of an evaluation of the dog's respiratory function before and after a three minutes' moderate trot. The following parameters are assessed: breathing difficulty, breathing noise from larynx and throat, mucosal color, incidence of fainting, nostril stenosis (open/pinched) and signs of BOAS correcting surgery. Dogs must be at least 12 months old at the time of screening.

Based on the examination the dog is assigned one of four grades:

Grade 0 (BOAS free, clinically unaffected)

Grade I (mild BOAS, clinically unaffected)

Grade II (moderate BOAS, clinically affected)

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Grade III (severe BOAS, clinically affected) [4]
Compared to the more objective whole-body barymetric plethysmography the grading system has a sensitivity of 93 % [5]
BOAS grading serves as a low cost means of assessing a dog's respiratory health and the possible need for treatment. In addition, the grading system is also used to assess the suitability for use of dogs in breeding programs aimed at limiting the occurrence of BOAS in future generations of dogs.
In The Danish Kennel Club (DKC) BOAS grading was made mandatory in August 2023 for all French and English bulldogs and Pugs used for breeding, and only BOAS grades 0 and 1 are accepted for breeding offspring with a KC pedigree [6]. It is expected that this breeding program can improve the overall respiratory health in these breeds. However, the use of BOAS grading for this purpose has not yet been validated.
The mentioned breeding program of course only applies to dogs with a pedigree in the DKC and the grading results are entered in a database managed by the DKC.
In Denmark, however, the majority of dogs of these three breeds are not registered in DKC. In the table below, the number of dogs registered in 2024 in the Danish Dog Registry (DDR) and the in DKC, respectively are listed for each breed.

	DDR 2024	DKC 2024	% DKC
English bulldog	235	94	40
French bulldog	1531	165	11
Pug	321	67	21

Dogs outside the DKC can also be BOAS graded and the grading results from these dogs are entered in a database established in 2023 and managed by the University of Copenhagen. In order to raise awareness about the grading possibility among dog owners outside DCK, a campaign has been conducted both via relevant Facebook groups and by posters and flyers in veterinary clinics.

5. Beskrivelse af projektets formål og hypoteser samt materialer og metoder:

Project aim

The overall aim of this project is to strengthen the health of French bulldogs, English bulldogs and Pugs in Denmark by the following actions:

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1. Maintaining the existing system for BOAS screening of dogs outside the Danish Kennel Club (DKC)

2. Continue to collect knowledge about the extend and results of BOAS screening within and outside Denmark

3. Promote the screening system among breeders and owners of the three breeds

4. Reanalyze results from a master project documenting the attitude towards the BOAS screening among owners of French bulldog and add to these with an investigation of the attitudes among breeders. Publish these results in international and Danish journals.

5. Contribute to the public debate about short-nosed dogs and other challenges in healthy dog breeding

6. Design an evaluation study of the BOAS screening program based on BOAS screening results of offspring of screened parents

7. On top of this it has been agreed that the project team should deliver help to the authorities by writing a report covering among other things criteria for dog breeding in upcoming legislation

6. Oversigt over projektets samlede resultater:

1. Maintaining the existing system for BOAS screening of dogs outside the Danish Kennel Club (DKC)

In 2023 a database was established to store BOAS grading results from dogs outside DKC (BOAS - Internetbase). The database is continuously being supported based on the current project.

In Denmark, 12 veterinarians are trained to perform BOAS grading. They have all been introduced to the system and are all registered as users.

2. Continue to collect knowledge about the extend and results of BOAS screening within and outside Denmark

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At the moment, the RFG scheme is used in 17 countries: Australia, Austria, Belgium, Czechoslovakia, Denmark, Germany, Ireland, Mexico, Netherlands, New Zealand, Norway, Portugal, Rumania, Sweden, Switzerland, USA and Hungary. It is also the BOAS-grading systems recommended by the international dog association, FCI.

Results from Denmark

Among dogs outside DKC, 49 had by end of March 2025 been graded with the following results:

BOAS grade	English bulldog n = 10	French bulldog n = 26	Pug n = 13
0	5 (50%)	12 (46.2%)	7 (53.8 %)
1	5 (50%)	13 (50.0 %)	6 (46.2%)
2	0	1 (0.04%)	0
3	0	0	0

Grade 0 and 1 is generally recommended/accepted for breeding, which means that none of the tested English bulldogs and pugs were excluded. Among the small number of non-DKC registered graded dogs, only 1 is not accepted for breeding.

Among dogs registered in DKC, 331 have been graded with the following results:

BOAS grade	English bulldog n = 109	French bulldog n = 146	Pug n = 76
0	33 (30.3 %)	66 (45.2%)	27 (35.5%)
1	66 (60.6 %)	66 (45.2%)	44 (57.9%)
2	10 (9.1%)	14 (9.6%)	5 (6.6%)
3	0	0	0

Among the BOAS-graded DKC registered dogs, 9.1% of the English bulldogs, 9.6% of the French bulldogs and 6.6% of the pugs were not approved for breeding.

Results from Norway

In Norway around 100 veterinarians have been trained to perform the BOAS grading. So far 1159 BOAS gradings have been performed in the period from September 2019 to February 2025 with the following results:

BOAS grade	English bulldog n = 225	French bulldog n = 705	Pug n = 229
0	68 (30.2%)	267 (37.9%)	46 (20.1%)

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1	114 (50.7%)	339 (48.1%)	121 (52.8%)
2	33 (14.7%)	87 (12.3%)	56 (24.5%)
3	10 (4.4%)	12 (1.7%)	6 (2.6%)

Among the BOAS-graded NKC registered dogs, 19.1% of the English bulldogs, 14% of the French bulldogs and 27.1% of the pugs were not approved for breeding. These figures are higher than the Danish results.

Results from Sweden

In Sweden 41 veterinarians perform the gradings. However, 7-8 of these vets grade the majority of the dogs.

To ensure a uniform assessment of the dogs, the Swedish Kennel Club (SKC) arranged an online "calibration" in 2024, where most of the grading veterinarians participated. In February 2025, they invited to a physical "calibration" where 18 veterinarians participated.

SKC started recording BOAS grading results in spring 2023 and until now (February 2025) the following results from 599 dogs have been registered:

BOAS grade	English bulldog n = 56	French bulldog n = 350	Pug n = 193
0	10 (17.9%)	172 (49.1%)	68 (35.2%)
1	38 (67.9%)	145 (41.4%)	93 (48.2%)
2	7 (12.5%)	30 (8.6%)	31 (16.1%)
3	1 (1.7%)	3 (0.9%)	1 (0.5%)

Among the BOAS-graded SKC registered dogs, 14.2% of the English bulldogs, 9.5% of the French bulldogs and 16.6% of the pugs were not approved for breeding. These figures are lower than the Norwegian results but higher than the Danish results for English bulldog and Pug. For French bulldog, Sweden and Denmark are similar.

Results from Finland

A slightly modified version of the RFG scheme is used in Finland, where 11 veterinarians perform the gradings. Dogs must be 18 months old before they are tested.

The test is composed of three observations:

1) A 1000 m brisk walk after which the dog should recover to pre-walk status regarding heart rate, body temperature and general condition within

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15 minutes. The result of the exercise test can be approved or failed (or discontinued, e.g. due to respiratory difficulties) [7].
2) BOAS severity grading is performed by evaluating upper respiratory noises before and after exercise using a four-grade scale: no, mild, moderate, or severe [8]
3) Nostril stenosis is evaluated (open, mild, moderate, or severe stenosis) and the cranio-facial ratio may be measured (optional) [9]
The test is mandatory in the Finnish Kennel Club (FKC) before breeding for English bulldog, Continental bulldog, French bulldog, Pug, Shih tzu, Pekingese and Griffon. The exercise test must be passed for all seven breeds. Only the Pekingese and Shih Tzu club forbid using dogs with moderate or severe BOAS grading results.
Even if it is not mandatory, the test is also eligible for Boston terrier, Japanese Chin, Cavalier King Charles spaniel and Affenpincher [7, 10]
From 2017-2020 only the part of the exercise test results mentioned under 1) were recorded. From 2020 and onwards also the BOAS grades were stored.
The screening program has recently been evaluated [10]. Among French bulldogs, English bulldogs and Pugs only a small percentage (4, 11 and 3 %, respectively) failed the exercise test (indicated in bold in the table below). However, for the same breeds a much larger percentage (22, 29 and 31 %, respectively) had moderate or severe clinical BOAS based on evaluation of upper respiratory noise:

Breed	Failed exercise test	Passed exercise test
French bulldog (n = 311)	11 **(4 %)**	300 (96%)
English bulldog (n=245)	28 **(11%)**	213 (87%)
Pug (n=206)	6 **(3%)**	197 (97%)

BOAS grade	French bulldog (n= 266)	English bulldog (n=217)	Pug (n=179)
0	98 (37 %)	54 (25 %)	36 (20 %)
1	109 (41 %)	100 (46 %)	87 (49 %)
2	48 **(18 %)**	48 **(22 %)**	36 **(20 %)**
3	11 **(4 %)**	15 **(7 %)**	20 **(11 %)**

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It was therefore concluded that the exercise test alone was not effective enough to identify dogs clinically affected by BOAS. A more efficient strategy would be to consider the severity of upper respiratory signs (BOAS grade) and nostril stenosis together in breeding animals.
Based on recorded BOAS grades from parents and offspring, rough heritability estimates of the BOAS grade have been calculated. BOAS grades from 277 French bulldogs (FB), 221 English bulldogs (EB), 182 Pugs, 56 Griffons, 55 Boston terriers, 21 Cavalier King Charles spaniels, 13 Shih Tzus and 12 Japanese Chins were included in the calculations resulting in the following heritability estimates: [10]

Heritability estimate	Pair type	No. of parent-offspring pairs	Breeds
0,48	1 parent per offspring	304	FB, EB, Pug
0,39	Both parents per offspring	68	FB, EB, Pug
0,58	1 parent per offspring	338	FB, EB, Pug, Griffons, Boston Terrier, Cavalier King Charles spaniel, Shih Tzu and Japanese Chin

Altogether, these results indicate medium-to-high heritabilities which is promising for the use of a functional test of respiratory health as a selection tool.

3. Promote the screening system among breeders and owners of the three breeds
It has been decided to postpone the further promotion of the BOAS grading system for a number of reasons.
First, a questionnaire study has been carried out among breeders of brachycephalic dogs to supplement the master project from last year. Some of the questions address the breeders' knowledge about BOAS grading. It would probably have affected the responders' answers if we simultaneously promoted the screening system in the same Facebook groups as were used to distribute the questionnaire.
Second, we expect to contribute to the communication of the new legislation coming into force by July 1st. We believe that it is better to promote

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the BOAS-grading system in connection with information about the new rules.
Finally, we have spent time and energy on the report about healthy breeding, which was not originally part of the present project, and thus decided to reduce the part about promoting the screening system.

4. *Reanalyze results from a master project documenting the attitude towards the BOAS screening among owners of French bulldog and add to these with an investigation of the attitudes among breeders. Publish these results in international and Danish journals.*

Reanalyzing the results from a master project
The data from the master project by Rafn, Lotze and Sandahl have been reanalyzed and described in a paper entitled "Perception of health problems in French bulldogs and attitudes towards BOAS-grading among Danish owners". The paper has been submitted to the journal *Frontiers in Veterinary Science* but has not been published yet. The abstract is included below.

Abstract

The French bulldog is among the most popular dog breeds in many countries, but they are also affected by a range of health problems. A key problem for this breed is Brachycephalic Obstructive Airway Syndrome (BOAS), and a possible way to improve this situation in future is selection based on BOAS grading. However, making effective changes in breeding requires a demand for more healthy dogs. Discrepancies between objective health parameters and owner-perceived health status are well-known not only among owners of brachycephalic dogs. In this survey-based study, we therefore assessed the health conditions reported by owners as well as their overall perception of health at both breed and individual dog level. We also examined how the presence of health problems influenced the owners' willingness to reacquire or recommend the breed. Finally, we investigated the French bulldog owners' knowledge of and attitudes toward BOAS grading as a means to enhance respiratory health in their dogs.

The questionnaire resulted in 452 completed responses from owners of French bulldogs in Denmark. The most common health problems were allergies (36.7%), breathing problems (29.6%), and back problems (19.0%). In total, 56% of the owners stated that French bulldogs are less healthy than other breeds, while 64% considered their own French bulldog to be healthier ($p<0.001$) than other individuals of the same breed, and only 8% perceived their own dog to be less healthy. Reports that a dog snores when

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awake (p<0.001), has heat intolerance (p<0.001), wheezes (p=0.005), grunts (p=0.010), or has sleep problems (p=0.029) correlated with perceived breathing problems. The higher the level of experienced health problems, the less likely the owners were to reacquire the breed (p<0.001) or recommend it to others (p<0.001). Two thirds of the owners had heard about BOAS grading and around 80% expressed a positive view of the test. They believed it should be used for all breeding animals and expressed a preference for puppies from BOAS-graded parents when acquiring another French bulldog.
The study confirms the tendency of owners to normalize the health problems of their own dogs. However, it also reveals that owners of severely affected dogs react negatively to this normalization and that owners generally support initiatives like BOAS grading to mitigate breed-specific health problems in the future.

Study among breeders

The master project also included a survey among breeders of French bulldogs but received very few responses from breeders outside the Danish Kennel Club. As part of the current project, we conducted the survey again. While we received a higher number of responses, we faced the same challenge in reaching breeders outside the organized dog world. This second questionnaire aimed at breeders of all three brachycephalic breeds and a total of 67 breeders completed the survey. The distribution among the three breeds mimics the registration figure with most French bulldog breeders (52%), followed by pug breeders (29%) and English bulldog breeders (19%). Again, the majority of the respondents were breeding within the Danish Kennel Club (64%) followed by no organizational relationship (13%), "Den Danske Hundeforening" (9%), "Danske Hundeejeres Landsforening" (5%), Foreign Pedigree organizations (5%) and "do not wish to answer" (3%). The data has not been analyzed in detail yet as we are in the process of evaluating whether there are enough responses at all to make statistically significant conclusions. However, one striking result is the breeder's perception of the overall health of the breed. Here, 64% state that the health of their breed is equal to all other breeds, 10% claim their breed to be healthier and 6% much heathier. Nearly all respondents have heard of BOAS-grading (93%) and the general attitude is positive. A total of 89% agree that it is a good initiative and 87% believe that BOAS-grading can increase the health of the population. When it comes to legislation, 78% of the breeders agree that BOAS-grading should be regulated by the law and include all dogs regardless of pedigree or organization.

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The low number of responses from breeders outside the Danish Kennel Club is surprising giving the fact that for instance 90 % of the French bulldogs entering the Danish Dog Registry each year do not have a pedigree from the Danish Kennel Club. A possible explanation could be that a large proportion of the dogs are imported and not bred in Denmark. An analysis of the distribution of country codes – the first three digits of the chip number – for the relevant breeds would contribute to answering the question. We have reached out to the Danish Dog Registry to get access to data, but this has not been successful so far. The first three digits from the chip numbers are not sensitive in relation to GDPR, so we hope to reach an agreement in the near future. The information will be relevant to monitor the development before and after the new legislation comes into force. If the number of imported brachycephalic dogs from countries with no health screening increases, the expected effect on the health of the Danish population will be reduced.

As an alternative to data from the Danish Dog Registry, we have collected data from the University Hospital for Family animals and from a veterinary clinic on Amager with the following results:

Amager veterinary clinic

Origin	English bulldog n = 44	French bulldog n = 75	Pug n =55)
Danish	30 (68.2%)	59 (78.7%)	46 (83.6%)
Not Danish	14 (31.8%)	16 (21.3%)	9 (16.4%)

University Hospital at KU/SUND

Origin	English bulldog n = 253	French bulldog n = 1365	Pug n =499
Danish	131 (51.8%)	854 (62.6%)	320 (64.1%)
Not Danish	39 (15.4%)	161 (11.8%)	50 (10.0%)
No data available	83 (32.8%)	350 (25.6%)	129 (25.9%)

In both samples, English bulldog has the highest percentages of imported dogs. There were relatively many dogs which did not have a chip number registered at the University Hospital, and this may explain the lower number of imported dogs here. In the master study by Rafn, Lotze and Sandahl, 4.4% of the respondents stated that they acquired their dog from abroad. However, data from the Dog Registry will give a better picture of the situation.

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5. Contribute to the public debate about short-nosed dogs and other challenges in healthy dog breeding

The title of this year's public animal welfare seminar on 4 November 2024, "Misforståede mutanter eller forkælede familiedyr?", organized by the Centre for Companion Animal Welfare in collaboration with the Knowledge Centre for Animal Welfare was inspired by a previously published paper "Pampered pets or poor bastards" and healthy breeding was part of the program. Professor Dan O'Neill, RVC, London, UK gave the talk "Facing up to the problems of modern dog breeding – an epidemiological approach", and Helle Friis Proschowsky talked about the available tools to promote healthy breeding of dogs. The program was closed with a panel discussion about healthy breeding among Christine Fossing (Danish Veterinary Association), Jørgen Hindse (Danish Kennel Club), Jens Jokumsen (Animal Protection Denmark), Anne Sofie Munk Kruse (Danish Veterinary and Food Administration) and Helle Friis Proschowsky University of Copenhagen) [11]

Peter Sandøe has participated in an episode of the podcast "Genstart" with the title "Et rigtigt hundeliv" [12]. In the program Sandøe explains how bulldogs have become popular due to their cute, flat faces and low activity level and the prize the dogs pay by not being able to breathe normally.

Peter Sandøe and Helle Friis Proschowsky have written a chronicle in the newspaper Politiken: "Racehunde og hundeavl skal forandres for at bevares" [13]

The same article was published in Dansk Veterinær Tidsskrift: "Vil racehunde, som vi kender dem i dag, snart være levn fra fortiden?" [14]

In the article, the authors discuss pedigree dog breeding and argue that even though it started with a purpose of securing healthy dog breeds, now legislative interventions are necessary to protect pedigree dogs from suffering due to extreme phenotypes and hereditary diseases.

The article is based on an international paper with Helle as first and Peter as last author, which has been widely cited in debates about dog breeding in other countries [15].

6. *Design an evaluation study of the BOAS screening program based on BOAS screening results of offspring of screened parents*

As mentioned earlier, the effect of using BOAS-grading in a breeding program has yet to be confirmed. A modified version of the BOAS grading scheme has, however, been evaluated in Finland with promising results. In

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this study it is shown that BOAS grade has a medium to high heritability which supports the notion that the use of grading for breeding will improve the health in the brachycephalic breeds. Nonetheless, it will only be possible to verify if genetic improvement is gained by using BOAS-grading as a selecting tool, if a sufficient number of offspring from BOAS-graded parents are evaluated.
In Denmark, BOAS-grading has been offered since 2023 and moreover, dogs must be > 12 months old before they can be graded. Currently, 89 litters (26 English bulldogs, 43 French bulldogs, and 20 Pugs) after graded parents have been produced in DKC from May 2024 onwards. However, in order to do a reliable evaluation of the breeding program, grading of a larger number of offspring is needed.
Today, BOAS-grading is mainly used by breeders to test breeding animals, but it would be beneficial to get BOAS-grading results from entire litters of graded parents. One way of reaching a sufficient number of graded dogs after graded parents is by offering a free BOAS grading for these dogs. It is planned to apply for funding for this project to run in 2026.
In addition, we have contacted the Swedish and the Norwegian Kennel Clubs, who are also collecting BOAS-grading data, and it has been agreed in the future to share data in order to use a combined dataset for analyzing the effect of the breeding program based on BOAS-grading.

7. Contribution to the new legislation on healthy dog breeding
In February 2024 the government published the Animal Welfare Agreement describing a list of specific initiatives to improve the welfare of both production animals and pets [16]. One of the initiatives is to curb extreme dog breeding.
An advisory report has been made covering three topics; recommended age for weaning in rabbits, regulation of the current rules for tying up dogs and proposals for breeding programs and screenings to reduce the incidence of some of the most common and debilitating genetic conditions [17]. The initiative has also been discussed at stakeholder meetings and the combined input was used by the Danish Veterinary and Food Administration when they formulated a draft for the new legislation about healthy breeding which was sent out in hearing in March and is expected to come into force by July 1st 2025.

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7. Diskussion, konklusion og perspektivering (herunder forslag til opfølgende projekter)**:**

Discussion

So far 380 Danish dogs have been BOAS graded. The percentages of dogs with moderate BOAS are below 10% and no dogs have been assigned grade 3 (severe BOAS). The percentages of dogs with moderate or severe BOAS are higher in both Sweden (10-14%), Norway (14-27%) and Finland (22-31%).

Since dog breeding is international, it is unlikely that Danish dogs are healthier than dogs in the other countries. One explanation can be that in Denmark, dogs with moderate or severe BOAS are not being BOAS graded because the owner knows that the dog will not pass. Adding to this, it must be expected, that some of the dogs with severe BOAS have had corrective surgery, which automatically disqualifies the dog as a breeding dog, making BOAS grading redundant. This tendency, however, should be expected in all countries.

Another explanation could be, that Danish veterinarians are less critical when grading. Whether this is true or not, it raises the question about calibration. In Denmark, a limited number (12) of veterinarians are educated to perform BOAS grading. The limited number should ensure a critical number of BOAS gradings per veterinarian to keep up the routine. In Sweden, both an online and a physical "calibration" has been arranged for grading veterinarians. This ought to be done in Denmark as well to secure an even and uniform grading of the dogs irrespective of the grading veterinarian.

The small number of graded dogs (49) outside DCK reflects the fact that for now it is voluntary. With the new legislation on healthy dog breeding, BOAS grading will be mandatory for all breeding dogs of these breeds, resulting in more non-DKC-dogs being graded.

The preliminary data illustrating the origin of dogs bred outside DKC shows that at least a certain percentage of dogs are imported. If the tendency is, that the parents of imported dogs have not been screened, this may have a negative impact on the health of the Danish dogs.

The questionnaire study performed among owners and breeders of brachycephalic dogs demonstrates strong support for initiatives such as BOAS grading to address and reduce breed-specific health problems in the future. It also highlights a common tendency among owners to normalize their own dogs' health issues. However, owners of severely affected dogs often react negatively to this normalization.

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The Finnish evaluation study has shown that BOAS grade is estimated to have medium to high heritability. Even if they do not apply the Cambridge RFG-system, the BOAS grading part of their evaluation resembles the RFG to a large degree. This allows for optimism regarding the BOAS grading system applied in Scandinavia as well as many other countries.
The next important step to ensure that the severe health issues are re-solved in the brachycephalic dog breeds is to establish a study in which a large number of dogs after BOAS graded parents are graded. Because dogs with moderate or severe BOAS cannot be used for breeding in DKC, there will only be litters after grade 0 and 1 available for an evaluation study of the breeding program. But if only a sufficient number of offspring are available for grading, it will enable us to reveal whether BOAS grading can improve the breathing health of these dog breeds.

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8. Populærvidenskabeligt dansk resumé (max 500 ord)**:**

Hunderacer med meget kort næse og kranie – såkaldte brachycephale hunderacer – er disponerede for vejrtrækningsbesvær. Denne form for arveligt betinget vejrtrækningsbesvær kaldes BOAS. Det gælder f.eks. fransk og engelsk bulldog og mops. Det er dog langt fra alle brachycephale hunde, der udvikler BOAS. Graden af BOAS kan afgøres vha. en såkaldt BOAS-graduering. Dette er en undersøgelsesmetode, der er blevet udviklet på Cambridge universitet – foreløbig til de ovennævnte 3 racer. Hunde med BOAS grad 0 eller 1 må bruges i avl, hvorimod hunde med grad 2 eller 3 ikke må. Hvorvidt avlsprogrammet kan forbedre disse racers vejrtrækningssundhed generelt, er endnu ikke blevet bekræftet.

I Danmark er hunde i Dansk Kennel Klub (DKK) blevet gradueret siden august 2023, og i 2023 blev der oprettet en database til at registrere BOAS-bedømmelsesresultater fra hunde uden for Dansk Kennelklub.

Der er indsamlet data på BOAS graduering af de tre racer fra Danmark (n=380, hvoraf 49 er uden for DKK), Norge (n=1159), Sverige (n=599) og Finland (n=662). I Finland benyttes en anden form for BOAS-graduering,

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som dog har ligheder med ”Cambridge-modellen”. Andelen af hunde med grad 2 og 3 varierer mellem de 4 lande: 6-10% (Danmark), 10-14% (Sverige), 14-27% (Norge) og 22-31% (Finland).
Data fra kandidatprojektet af Rafn, Lotze og Sandahl er blevet re-analyseret og beskrevet i en artikel med titlen "Perception of health problems in French bulldogs and attitudes towards BOAS-grading among Danish owners ". Artiklen er blevet indsendt til Frontiers in Veterinary Science.
Som en del af det nuværende projekt har vi udført endnu en spørgeskemaundersøgelse blandt opdrættere, også med opdrættere uden for DKK. Der var dog et begrænset antal svar fra den sidstnævnte gruppe (67). Blandt opdrætterne mener 64%, at deres races sundhed er lig med alle andre racer, 10% hævder, at deres race er sundere, og 6% mener, at deres race er meget sundere. Næsten alle respondenter har hørt om BOAS-bedømmelse (93%), og den generelle holdning er positiv.
Der er afholdt en konference i regi af Center for Familiedyrs Velfærd vedrørende sund avl; Peter Sandøe har deltaget i en episode af podcasten "Genstart" med titlen "Et rigtigt hundeliv"; Peter Sandøe og Helle Friis Proschowsky har skrevet en kronik i avisen Politiken: "Racehunde og hundeavl skal forandres for at bevares". Den samme artikel blev offentliggjort i Dansk Veterinær Tidsskrift: "Vil racehunde, som vi kender dem i dag, snart være levn fra fortiden?".
Den type BOAS-graduering, som anvendes i Finland, er blevet evalueret, og i studiet har man vist, at BOAS-bedømmelse har en middel til høj arvelighed. Det sandsynliggør, at vejrtrækningssundheden kan forbedres over tid, når kun hunde med BOAS grad 0 og 1 bruges i avl. Et tilsvarende studie planlægges udført på danske, norske og svenske data, når tilstrækkeligt mange kuld efter BOAS-graduerede forældre er blevet født.
I forbindelse med regeringens Dyrevelfærdsforlig, har vi udarbejdet en rådgivende rapport, som omfatter 1) fravænningsalder hos kaniner, 2) opbinding af hunde og 3) avlsprogrammer, der kan reducere forekomsten af invaliderende lidelser hos hunde.

9. Populærvidenskabeligt engelsk resumé (max 500 ord)**:**

Dog breeds with a very short nose and skull – the so-called brachycephalic dog breeds - are predisposed to breathing difficulties, which is called BOAS. Examples are French and English bulldog and Pug. Far from all brachycephalic dogs develop BOAS. The degree of BOAS can be deter-

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mined by BOAS grading the dog; a research method that has been developed at Cambridge University for these three breeds. Dogs with BOAS grade 0 or 1 may be used for breeding, whereas dogs with grade 2 or 3 may not. Whether the breeding program can improve these breeds respiratory health in general has not yet been confirmed.
In Denmark, dogs in the Danish Kennel Club (DKC)have been graded since August 2023, and in 2023 a database was created to record BOAS evaluation results from dogs outside the DKC.
BOAS grading data from the three breeds have been collected in Denmark (n=380, of which 49 are outside DKC), Norway (n=1159), Sweden (n=599) and Finland (n=662). In Finland, another form of BOAS grading is used, which has similarities with the "Cambridge model". The proportion of dogs with grade 2 and 3 varies among the 4 countries: 6-10% (Denmark), 10-14% (Sweden), 14-27% (Norway) and 22-31% (Finland).
Data from the candidate project by Rafn, Lotze and Sandahl have been reanalysed and described in an article entitled "Perception of health problems in French bulldogs and attitudes towards BOAS-grading among Danish owners". The article has been submitted to Frontiers in Veterinary Science.
As part of the current project, we have supplemented the project with an additional questionnaire among breeders outside DKC, which, however, did not yield enough answers (67). Among the breeders, 64% believe that the health of their breed is equal to all other breeds, 10% claim that their breed is healthier, and 6% believe that their breed is much healthier. Almost all respondents have heard of BOAS assessment (93%), and the general attitude is positive.
A conference on healthy breeding was held under the auspices of the Center for Companion Animal Welfare; Peter Sandøe has participated in an episode of the podcast "Genstart" with the title "Et rigtigt hundeliv"; Peter Sandøe and Helle Friis Proschowsky have written a chronicle in the newspaper Politiken: "Racehunde og hundeavl skal forandres for at bevares". The same article was published in Dansk Veterinær Tidsskrift: " Vil racehunde, som vi kender dem i dag, snart være levn fra fortiden?".
The type of BOAS grading used in Finland has been evaluated, and in the study it has been shown that BOAS grading has a medium to high heritability. Thus, it is likely that respiratory health can be improved over time, when only dogs with BOAS grades 0 and 1 are used in breeding. A similar study is planned to be carried out using Danish, Norwegian and Swedish data, when a sufficient number of litters after BOAS-graded parents have been born.

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In connection with the government's Animal Welfare Act, we have prepared an advisory report, which includes 1) weaning age for rabbits, 2) binding of dogs and 3) breeding programs that can reduce the occurrence of disabling disorders in dogs.

10. Redegørelse for hvordan projektet og projektets resultater har været eller forventes offentliggjort, herunder oplæg på konferencer, videnskabelige publikationer, populærvidenskabelige publikationer, opslag på sociale medier (fra personlig profil eller Fødevarestyrelsens profil) eller presseaktiviteter (aktiviteter med ViD som afsender skal koordineres af ViDs sekretariat):

Se punkt 6 ovenfor.

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