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Ministerie van Landbouw, Visserij, Voedselzekerheid en Natuur

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To the State Secretary for Agriculture, Fisheries, Food Security and Nature

Advice of the Director of the Office for Risk Assessment & Research on the risks of harmful external characteristics in dogs and cats

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Advice of BuRO

To the State Secretary for Agriculture, Fisheries, Food Security and Nature

Breeding for harmful external characteristics in dogs and cats poses welfare risks. Objective reference and assessment frameworks are needed to reduce these risks. Such quantitative frameworks can support the establishment of science-based welfare limits and standards set by policymakers, as developed for brachycephalic (short-snouted) dogs. In the transition towards more animal-centered breeding practices, the animal takes center stage, its intrinsic value is recognized, and its integrity is respected.

Based on the current risk assessments for dogs and cats, I make the following recommendations to the State Secretary for Agriculture, Fisheries, Food Security and Nature:

1. Based on the underlying risk assessments, develop reference and assessment frameworks for harmful external characteristics, one for dogs and one for cats. Take into account the accumulation of welfare risks due to the presence of multiple harmful external characteristics per animal.
    a. To this end, carry out additional research to determine the minimum physical conditions necessary to meet the physical, physiological and behavioural needs of dogs and cats.
    b. Establish and validate relevant welfare indicators for each harmful external characteristic.
    c. Based on these welfare indicators, establish the necessary welfare thresholds, such as those for brachycephalic (short-snouted) dogs.
    d. Develop a monitoring and registration system for harmful external characteristics in dogs and cats, for policy and oversight purposes. Explore to what extent already existing systems such as the identification and registration of animals (I&R)[1] and PETscan[2] can support this. Record relevant welfare consequences, including the

[1] Identification and registration of animals | RVO.nl

[2] PETscan.

prevalence and degree of occurrence of harmful external characteristics within this system.

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Until this is implemented:

2. Use the greatest welfare risks (see Table 1 and Table 2 in the findings) associated with breeding for external characteristics in both dogs and cats to prioritise policy development within this area. Begin drafting a policy regulation on brachycephalic cats, similar to that for brachycephalic dogs, as soon as possible.
3. In addition to breeding, ban displaying and keeping cats with short and crooked front legs. Consider introducing a similar ban on breeding two parent dogs with the merle coat colour, due to the negative impact on the welfare of all homozygous merle pups.
4. Utilise the expertise and influence of, among others, the KNMvD and veterinarians
    a. to counteract the normalisation of harmful external characteristics in society, and
    b. to assess the current population of dogs and cats in relation to harmful external characteristics by means of a baseline study.
5. Focus on providing effective information to pet owners about harmful external characteristics and welfare problems.
6. Continue to work, including at European level, to combat the illegal trade in dogs and cats with harmful external characteristics.

Yours sincerely,

Prof. Dr. Dick T.H.M. Sijm
Director, Risk Assessment & Research Office

Structure

This document consists of two parts: the *advice of BuRO* and the accompanying *rationale*. The first part provides a brief summary of the entire study. It begins with the BuRO's advice to the State Secretary for Agriculture, Fisheries, Food Security and Nature. It then sets out the grounds for the advice, the approach taken and its scope, the main findings and the answers to the research questions, before presenting the conclusion.

The second part provides the rationale of the advice and has its own table of contents. The rationale starts by describing the context (Chapter 1) in which welfare risks due to external characteristics occur, including a general introduction to the topic, an explanation of the genetic background of external traits in dogs and cats, and the existing legal frameworks and regulatory oversight concerning harmful external traits. The approach (Chapter 2) is then further specified. A summary of the risk assessments (Chapter 3) is then provided. In addition, by explaining the importance of welfare indicators (Chapter 4), outlining the uncertainty analysis (Chapter 5) and describing discussion points with conclusion (Chapter 6), it becomes clear how BuRO came to the advice in the first part. The document concludes with the reference list (Chapter 7) and the annexes (Chapter 8).

The full risk assessments of harmful external characteristics in dogs and cats are included in the annexes (Annex A and Annex B). These contain the full description of the risk assessment steps per animal species and the full list of references used. In addition, the annexes also include the technical reports (results) of the Expert Knowledge Elicitations (EKE) (Annex C and Annex D). Finally, Annex E provides a glossary of terms and definitions used in this report.

Context

When choosing a dog or a cat, the appearance of the animal is regularly taken into account (Morel et al., 2024). For example, people may choose short-snouted dogs or cats with forward-folded ears because they find them cute. However, several of these external (breed) traits are associated with an increased risk of impairment of the welfare of these animals and are then referred to as harmful external traits. Owners of, for example, short- snouted dogs may not be sufficiently aware of the suffering of these animals (Packer et al., 2019). However, providing information on impairment of animal welfare to animal owners does not seem to have sufficient effect to reduce the demand for certain dog and cat breeds with harmful external characteristics (Bognár & Kubinyi, 2023). Therefore, in January 2023, the Minister of the then Ministry of Agriculture, Nature and Food Quality (LNV) informed House of Representatives of the Minister's intention[3] to push for a ban on keeping and displaying pets with harmful external characteristics, starting with dogs and cats. In order to shape these prohibitions, the intention is to develop a list of harmful external characteristics that can be objectively identified as causing suffering in individual animals.

The former Minister of Agriculture, Nature and Food Quality stated that the ban on keeping pets with harmful external characteristics should apply to pets with harmful characteristics causing serious suffering to any animal with that characteristic, if well-founded and enforceable. The external characteristics that cause chronic suffering in an individual animal must be visible / objectively identifiable at any age. The ban on displaying prohibits participation in competitions, exhibitions and inspections with dogs and cats with harmful external characteristics which, as a result of these characteristics, have an increased risk of welfare impairment. The Office for Risk Assessment & Research (BuRO) of the Netherlands Food and Consumer Product Safety Authority (Nederlandse Voedsel en Waren Autoriteit (NVWA)) has been asked to examine the external characteristics of dogs and cats in relation to animal welfare. Pending this study, a ban on keeping cats with forward-folded ears and hairless cats (lack of coat) was announced in autumn 2025. That prohibition entered into

[3] Animal welfare | House of Representatives of the States General (28286-1288)

force on 1 January 2026[4]. A campaign has also been launched to encourage informed choices when choosing a pet[5].

Approach

BuRO carried out a science-based risk assessment with the aim of identifying harmful external characteristics that pose a risk (impact x probability) to the welfare of dogs and cats in the Netherlands. Breeds have explicitly not been chosen as a starting point for the research, as harmful external characteristics are often not exclusive to a specific breed and can also be present in mixed breeds.

A literature review on the external characteristics of dogs and cats and the associated adverse welfare consequences (see Annex A and Annex B) was conducted, complemented by two Expert Knowledge Elicitations (EKE) (see Annex C and Annex D) to overcome knowledge and data gaps and set priorities. The results from the EKEs then served as input for a risk assessment according to the EFSA methodology (EFSA Panel on AHAW, 2012a), which systematically characterises hazards, welfare consequences including prevalences, exposure to hazards and the resulting risks to animal welfare.

Expert Knowledge Elicitation
BuRO selected independent experts, for both species, with relevant veterinary, expertise in animal science or a relevant specialist field, knowledge of the dog and/or cat population in the Netherlands and understanding of impact, duration and prevalence of welfare problems. Through nominations, both both expert groups were expanded to a minimum of five participants, coming from research, education and practice.

The experts selected the most relevant external characteristics from a longlist drawn up by BuRO through literature review. In doing so, they looked at the expected welfare impact and the extent to which the characteristics are present in the Netherlands. There was no limit on the number of external characteristics to be selected. Experts were asked to select up to three welfare consequences per external characteristic. In estimating the impact of these welfare consequences, they relied on the impact they considered to be most prevalent in animals with that characteristic. Therefore, the estimated prevalence of the welfare impact caused by a characteristic reflects the prevalence of that welfare consequence with that welfare impact. Only welfare consequences with a high impact (≥ 5) are included in the full risk assessment. This approach was chosen to balance completeness and feasibility but may lead to an underestimation of the risk per characteristic. This is because not all possible (degrees of) welfare consequences have been taken into account, the variation in welfare impact in individual animals is not considered, and welfare consequences with an impact below 5 have not been fully assessed, while they can contribute to the overall risk of a characteristic to the welfare of dogs and cats in the Netherlands.

To assess exposure, in addition to estimating how common the characteristics were, experts were also asked to estimate the composition of the Dutch population of dogs and cats. This was done to estimate the size of the groups of purebred animals and mixed breeds (subpopulations) within the total population of dogs and cats. For each trait, the experts were then asked to estimate the subpopulation in which it was most common. This approach has a certain degree of circularity, as the starting point of the advice is the external characteristics selected by breeders. The added value of this analysis lies in revealing patterns that transcend breed boundaries and potential

[4] Bulletin of Acts and Decrees 2025, 288 | Overheid.nl > Official announcements

[5] Campaign by LVVN Ministry: get a good deal to buy a pet beforehand

misclassification. Misclassification refers to situations where, if a characteristic occurs primarily in random mixed breeds, breeders may not be consciously selecting for that characteristic.

Scope
The risk assessment focusses on harmful external characteristics in dogs and cats; other hereditary diseases of dogs and cats not directly related to appearance are not included in the current risk assessment. The harmful external characteristics result from targeted breeding for appearance, are visible when the animal is standing still and have welfare consequences for the animal concerned.

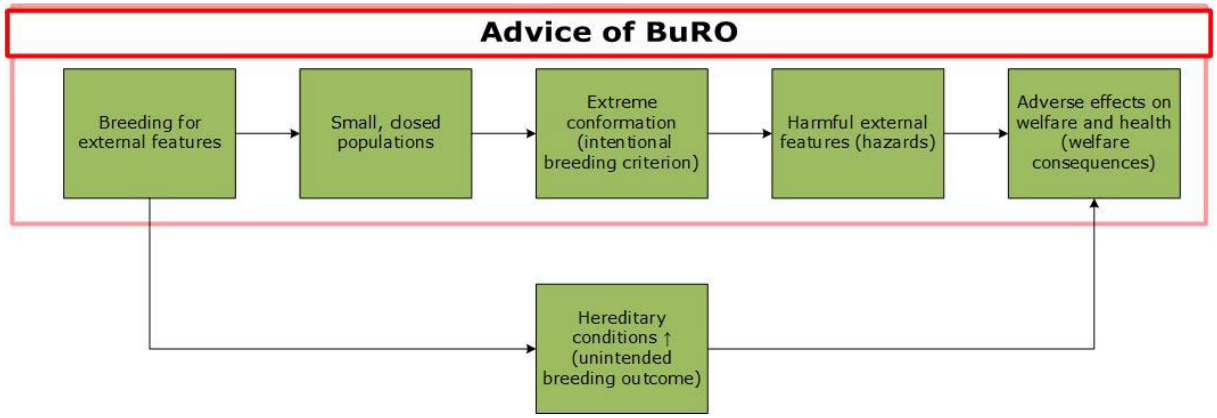

Figure 1 Overview of the scope of the BuRO's advice on harmful external characteristics (red border). The individual components in the flow chart have been assessed within context and not in isolation.

Possibilities to reduce welfare consequences (e.g. veterinary procedures) are not taken into account in this assessment. Although breeding for external traits also raises ethical and legal questions due to the intrinsic value of animals, BuRO focuses primarily on the scientific assessment of animal welfare risks. Ethical aspects and potential compromises to the integrity of the animal, where relevant, are mentioned and included in the interpretation of the findings but do not form a separate part of the risk assessments. The definition of animal welfare based on Broom (1986) serves as a starting point in these risk assessments (EFSA Panel on AHAW, 2012a): "The welfare of an individual is its state as regards its attempts to cope with its environment". BuRO regards good health as a prerequisite for good welfare.

Peer review
The content of these risk assessments has been subjected to external peer review.

Findings

The findings below are based on the risk assessments on (breeding for) external characteristics in dogs and cats (see Annex A and Annex B) and therefore also follow the structure of the risk assessment. The general findings concern both dogs and cats. Specific findings for dogs and cats, respectively, are described thereafter.

General findings dogs and cats

<u>Hazard identification</u>

- Humans intentionally breed dogs and cats for external characteristics, which can be harmful to the welfare of the animals. Some characteristics are the result of excessive selection for

appearance (overtyping), such as very short noses (brachycephaly) and miniature animals (very small body).

Hazard characterisation (effect)

- Breeding for external characteristics using animals from the same group can increase the occurrence of diseases that adversely affect animal welfare.
- The prioritised harmful external characteristics are visible when the animal is standing still (e.g. brachycephalic skull shape), but the burden experienced by the animals is not always directly visible to all (e.g. exercise intolerance due to lack of oxygen).
- The severity of welfare impairment varies among animals with the same harmful external characteristic.
- Animal-based indicators, including physiological or behavioural indicators, can provide information on the extent of welfare impairment caused by harmful external characteristics in individual dogs and cats (see Chapter 4 in the rationale). These indicators often lack validation, standardisation and established thresholds for identifying and quantifying welfare impacts due to harmful external characteristics.

Exposure assessment (probability)

- For harmful external characteristics inherited by monogenic inheritance the appearance of the offspring is more predictable. However, for most of the characteristics assessed, the genetic basis is complex. The harmful phenotype (external characteristic) does not always follow automatically from the genotype (genetic makeup), because the actual expression in offspring depends on multiple genetic, biological and environmental factors.

Risk characterisation (probability x effect)

- Having a brachycephalic cranial shape (round head with short flat nose) poses the greatest risk to the welfare of dogs and cats arising from breeding for external characteristics.
- All harmful external characteristics prioritised in the risk assessment can have a high welfare impact on individual animals. The size of the risk of these prioritised harmful external characteristics is mainly determined by the degree of presence of characteristics in the current dog and cat population in the Netherlands; the more animals with a prioritised characteristic, the greater the risk.

Dogs

There are around 1,9 million dogs in the Netherlands. It is estimated that there are more purebred dogs (65%, 1,2 million dogs), of which nearly 40% (475,000) have a pedigree, than mixed breeds (35%, 0,7 million dogs).

Hazard identification

- A list of 26 harmful external characteristics has been drawn up for dogs from the literature review. Experts have prioritised nine harmful external characteristics based on relevance to welfare (see Table 1).

Table 1 Prioritised harmful external characteristics in dogs ranked from relatively highest risk to relatively lowest risk to the welfare of the entire dog population in the Netherlands.

Prioritised harmful external characteristics
Brachycephalic skull shape ('short- snouted)
Abnormal eyelid position
Skull shape: small and round (< 10 kg body weight)

Body type: very small (< 3 kg body weight)
Body type: chondrodystrophy ('short legs')
Skin folds/excess skin
Tail shape: corkscrew
Body type: angular forelimb deformities
Coat colour: (double) merle (homozygous)*

*There is no intentional breeding of the double merle coat colour. The merle coat colour is the intentional breeding purpose (heterozygous genotype) and generally does not affect welfare. The welfare impact is experienced by dogs with the homozygous merle genotype and a predominantly white coat.

Hazard characterisation (effect)

- All welfare consequences related to the external characteristics of dogs have a high welfare impact. The double merle genotype (predominantly white coat, sometimes with a few merle spots) is estimated to have a high welfare impact on *all* animals, but the double merle colour is not intentionally bred.

Exposure assessment (probability)

- The nine prioritised external characteristics are estimated to be mainly found in purebreds, both with and without pedigrees, and less in mixed breeds. There is a wide presence of harmful external characteristics throughout the Dutch dog population.

Risk characterisation (probability x effect)

- The brachycephalic skull shape has the greatest negative effect on welfare if dogs have this characteristic. In addition, the characteristic occurs most common, occurring in an estimated 285,000 dogs (15 %) in the Netherlands. It is therefore the characteristic with the highest estimated welfare risk.

Cats

There are around 3 million cats in the Netherlands. There are currently estimated to be more random-bred cats (2,4 million cats, 80%) than selectively bred cats (0,6 million cats, 20%).

Hazard identification

- From the literature review, a list of 16 harmful external characteristics has been drawn up for cats. Experts have prioritised nine harmful external characteristics based on relevance to welfare (see Table 2).

Table 2 Prioritised harmful external characteristics in cats ranked from relatively highest risk to relatively lowest risk to the welfare of the entire cat population in the Netherlands.

Prioritised harmful external characteristics
Brachycephalic skull shape (short- snouted)
Long (woolly) hair
White coat (with 1 or 2 blue eyes)
Lack of coat
Forward-folded ears
Dwarfism/short-leggedness
Abnormal tails (partially or totally missing)

Backward-curled ears
Short and crooked front legs *

* *It is unclear whether this characteristic is intentionally bred.*

Hazard characterisation (effect)

- All welfare consequences related to external characteristics of cats have a high welfare impact. The characteristic short and crooked front legs is estimated to have a high welfare impact on *all* animals.

Exposure assessment (probability)

- There is (yet) no widespread presence of harmful external characteristics in the entire Dutch cat population.
- Seven out of nine prioritised characteristics are estimated to be concentrated in the selectively bred cats (both with and without pedigrees and their crossbreeds) and less in random-bred cats. The characteristic white coat (with 1 or 2 blue eyes) is estimated to be more present in random-bred cats. For the characteristic short and crooked front legs, this is unknown.
- The characteristic short and crooked front legs is estimated to be very rare in the Netherlands.

Risk characterisation (probability x effect)

- The brachycephalic skull shape has the greatest negative effect on welfare if cats have this characteristic. The characteristic is also relatively common, occurring in an estimated 225,000 cats (7.5 %) in the Netherlands. It is therefore the characteristic with the highest estimated welfare risk.
- The long (woolly) hair characteristic is the welfare risk that is present in the largest number of cats in the Netherlands (300,000 cats; 10 %). The impact on welfare within the Dutch cat population is estimated to be low, due to the relatively lower welfare impact and the fact that not all cats with long hair suffer from physical discomfort.

Research Questions and Answers

BuRO answered the research questions asked by LVVN by means of a literature review, expert estimates and risk assessments (see Chapter 2 in the rationale). The summary of the results can be found in Table 5 and Table 6. The arguments for the answers are set out in the rationale and annexes to the advice.

1. What are the external characteristics of dogs and cats that lead to welfare impairment?

Scientific literature has identified 26 external characteristics that can lead to welfare impairment in dogs. Experts have prioritised nine external characteristics from this list based on their expected relevance (expected impact on welfare and occurrence in the Netherlands) for the welfare of dogs in the Netherlands. For cats, 16 external characteristics have been identified according to the same criteria, nine of which have been prioritised by experts.

The external characteristics causing serious impairment of welfare for dogs are presented in Table 1, ranked from relatively highest risk to relatively lowest risk. For cats, these are shown in Table 2. This ranking takes into account the severity and duration of the welfare effect of a characteristic on an individual animal, the proportion of animals with the characteristic that suffer these effects, and the proportion of animals in the Netherlands with the characteristic.

The external characteristic brachycephalic skull shape represents the highest animal welfare risk for both the total population of dogs and the total population of cats in the Netherlands. There are

relatively many animals with a brachycephalic skull shape in the Netherlands. Of the animals with a brachycephalic skull shape, there are relatively many who experience a reduction in welfare due to this characteristic.

2. To what extent do these external characteristics lead to welfare impairment?

All harmful external characteristics assessed, both for dogs and cats, have a high welfare impact (score 5, 6, or 7 out of a maximum score of 7) due to health problems and limitations on species-specific behaviour. This means that individual animals with that characteristic may experience a significant welfare reduction. According to the experts, the characteristic of short and crooked front legs in cats and the double merle genotype in dogs reduce welfare in 100% of the animals with the characteristic. For short and crooked front legs in cats, it is unclear to what extent this characteristic is intentionally selected for. The homozygous merle genotype, which results in a predominantly white coat, is not an intended breeding result, but a possible consequence of breeding for the merle coat colour (heterozygous genotype).

The (combined) welfare effect indicates how much welfare reduction is expected to occur within the population of animals with a given external characteristic. Account has been taken of the impact of the welfare consequences selected, how often they occur in animals with the characteristic and the number of different welfare consequences taken into account for that characteristic. The welfare consequences selected were chosen by experts on the basis of their expected relevance to welfare and level of presence in the Netherlands. Table 3 and Table 4 contain the prioritised harmful external characteristics of dogs and cats, respectively, ranked from the relatively highest to lowest (combined) welfare effect in the exposed population (the group of animals with the characteristic).

Table 3 Prioritised harmful external characteristics in dogs ranked from relatively highest to lowest (combined) welfare effect in the dog population with that characteristic.

Prioritised harmful external characteristics
Brachycephalic skull shape ('short- snouted')
Coat colour: (double) merle (homozygous)*
Abnormal eyelid position
Skull shape: small and round (< 10 kg body weight)
Skin folds/excess skin
Body type: very small (< 3 kg body weight)
Tail shape: corkscrew
Body type: chondrodystrophy ('short legs')
Body type: angular forelimb deformities

*There is no intentional breeding of the double merle coat colour. The merle coat colour (heterozygous genotype) is the intended breeding purpose and generally does not affect welfare. The welfare impact is experienced by dogs with the homozygous merle genotype.

Table 4 Prioritised harmful external characteristics in cats ranked from relatively highest to lowest (combined) welfare effect in the population of cats with that characteristic.

Prioritised harmful external characteristics
Short and crooked front legs*
Brachycephalic skull shape ('short- snouted')
Backward-curled ears
Dwarfism/ short-leggedness
Forward-folded ears
White coat (with 1 or 2 blue eyes)
Abnormal tails (partially or totally missing)
Lack of coat
Long (woolly) hair

*It is unclear whether this characteristic is intentionally bred.

The risk to the overall population also takes into account how common the external characteristic is in the dog or cat population in the Netherlands (see Table 1 and Table 2 for the ranking of characteristics based on risk). A characteristic may therefore have a high (combined) welfare effect on the animals possessing the characteristic (the exposed population) but may still pose a relatively low risk for the total dog or cat population if the characteristic is rare.

3. How can these characteristics be objectively assessed?

The way in which harmful external characteristics can be objectively assessed varies from one characteristic to another. Some characteristics, such as forward-folded ears of cats, are binary; they are clearly either present or absent on visual inspection. Other characteristics, such as brachycephalic skull shapes, occur in degrees and require a standardised assessment scale and/or an additional assessment of the actual welfare consequences. According to BuRO, the degree and thus the definition of extremity of most of the characteristics cannot be determined without taking into account the severity of the negative impact on animal welfare. Such assessment is complex because clinical and behavioural signs are not always unambiguously visible in each animal or at any age. In theory, genotyping can provide an objective test, but this often only says something about the likelihood that an animal possesses a characteristic, not about the degree or severity of the welfare impairment.

It was not possible to establish a clear-cut definition for all characteristics that also encompasses the threshold for harmfulness (see Table 5 and Table 6). In the case of continuous characteristics, such as a brachycephalic skull shape, the impact on welfare varies from animal to animal. Measurements such as the craniofacial ratio (CFR) provide an indication of anatomy, with low values being strongly associated with a high risk of health and welfare problems. A link between a characteristic and the likelihood of suffering is necessary to determine the extent to which an individual animal suffers from that characteristic.

The welfare impairment of individual animals can be determined by using welfare indicators; indicators measured on the animal provide the most direct information. In this context, a summary table has been drawn up for both dogs and cats, based on the scientific literature, containing animal-based indicators that provide information on the extent to which an individual's welfare is compromised (see Annex A and Annex B). Physical, physiological and behavioural indicators can serve as objective measurement tools, if subjected to further standardisation and validation. These can then be used in monitoring, quantitative risk assessment and the development of policy

measures, such as bans on keeping or displaying animals, by helping to further define continuous or difficult-to-delineate harmful external characteristics based on functional impairment or impairment of welfare.

Objective assessment of a characteristic and its consequences, for example by combining genetics and (animal) indicators, does not appear sufficient for policy decisions on bans on keeping and displaying, and should be complemented by a normative choice as to what degree and likelihood of welfare impairment are considered acceptable at policy level. As long as the selective breeding of companion animals continues and does not take sufficient account of any harmful effects on animals, this standard-setting is imperative. This requires an assessment framework with a reference framework to determine whether a characteristic leads to an unacceptable risk to welfare, including health, or compromised integrity of the animal.

Table 5 Objective description of the harmful external characteristics of dogs visible (phenotypically) from a still image of a dog. The characteristics developed as a result of selection. This table has been compiled by BuRO based on the risk assessments, the Expert Knowledge Elicitation (EKE) and literature review.

Harmful external characteristics in dogs	Objective description of the harmful external characteristics visible from a still image of an animal	(Combined) welfare effect *	Risk score (population) **
Brachycephalic skull shape ('short- snouted')	Short broad skull. The snout is (very) short, pointing upwards and flat, and the shape of the head is round with an undershot jaw. The ratio of snout length to skull length (craniofacial ratio or CFR) is less than 0,5. Does not meet the existing enforcement criteria[9].	6.5	0.98
Abnormal eyelid position	A conformational defect on one or both eyelids (e.g. a diamond-shaped eye) leading to entropion and/or ectropion. Both lower and upper eyelids can be abnormally positioned. Entropion is the inward rolling or curling of one or both eyelids. Ectropion is the rolling or curling of the eyelid outwards with the inside of the eyelid (conjunctiva) visible and exposed to the outside air. Both eyelids droop.	3.75	0.23
Skull shape: small and round (< 10 kg body weight)	A small round skull and a body weight of up to 10 kg. There is a dome-shaped skull with a convex and high forehead, with a noticeable rounding of the skull roof in relation to the base of the skull. The back of the head is too small. The eyes protrude. It concerns the ratio between the width and length of the skull. The maximum ratio has not been set.	3.6	0.22
Body type: very small (< 3 kg body weight)	A very small body up to 3 kg body weight, where the length of the legs is proportional to the body (normal legs). Small (round) skulls are also often seen in	1.9	0.19

	these dogs. A small body type is not objectively defined.		
Body type: chondrodystrophy ('short legs')	Short legs due to abnormal skeletal development visible as shortening of long bones (dachshund-like dogs). The length of the legs is not objectively defined.	0.72	0.06
Skin folds/ excess skin	An excess of skin resulting in skin folds or wrinkling over the whole body or certain parts of the body, for example the head or around the tail area. Maximum skin wrinkling is not objectively defined.	2.15	0.06
Tail shape: corkscrew	A short tail that rolls/curls in on itself in multiple places, creating a corkscrew shape. No objective criteria have been established.	1.4	0.04
Body type: angular forelimb deformities	Deviations in the shape of the front legs. In serious cases this can lead to significant angular forelimb deformities (curved front legs). No objective criteria have been established.	0.4	0.02
Coat Colour: double merle (homozygous)	A predominantly white coat with small merle patches scattered throughout the coat. The merle coat colour (heterozygous genotype) consists of randomly distributed areas with full pigmentation, combined with areas of lighter, diluted pigmentation. The base colour of the merle pattern is always the dark colour black, brown/red or grey/blue. No objective criteria have been established.	5	≤ 0.0003

* The (combined) welfare effect is a measure of the welfare impairment caused by a characteristic in the animal population with the characteristic. This effect ranges from 0 to 7 with one prioritised welfare consequence and can reach up to 21 when three welfare consequences have been prioritised (see Table 7 in the rationale).

* * The risk score is a product of the (combined) welfare effect and exposure (share of dogs with a characteristic in the total population of dogs in the Netherlands). The risk score ranges from 0 to 7 for one prioritised welfare consequence and can reach up to 21 when three welfare consequences have been prioritised.

Table 6 Objective description of the harmful external characteristics of cats visible (phenotypically) from a still image of a cat. The characteristics were created as a result of selection. This table has been compiled by BuRO on the basis of the risk assessments, the Expert Knowledge Elicitation (EKE) and literature review.

Harmful external characteristics in cats	Objective description of the harmful external characteristics visible from a still image of an animal	(Combined) welfare effect *	Risk Score (population) * *

Brachycephalic skull shape ('short-snouted')	The length of the muzzle and the skull is (significantly) shortened, as is the distance from the nose to the eye. As a result, the skull is rounded. The position of the jaws (particularly the upper jaw) is tilted upwards. This occurs to varying degrees. In extreme cases, the upper part of the nasal bridge protrudes above the lower eyelid margin (Peke facial type); the muzzle is then set back, creating a sort of upturned nose. The muzzle length to skull length (craniofacial ratio) has not been objectively defined for cats.	11.54	0.87
Long (woolly) hair	A long coat with woolly hair (e.g. the Persian). Long (woolly) hair cannot be clearly defined because objective criteria are lacking. Various hair length thresholds (> 20 mm, > 30 mm and > 40 mm) are used in the literature to define 'long'.	1	0.1
White coat (with 1 or 2 blue eyes),	In animals with a completely white coat, the pigment is missing in the hair, resulting in a uniform white colour. At least one eye is blue.	2	0.04
Lack of coat	Partially or totally hairless. These are hairless cat breeds or cats that resemble them. Hairless or naked cats are often not completely hairless. On parts of the body, such as the nose, ears, tail and toes, a thin layer of downy hair may be present, or some tufts of hair may be present. The hairs are thinner, grow less readily and fall out more easily. This causes hair loss, despite hair growth. In some cases, the whiskers and tactile hairs may be completely missing or not functional. This characteristic is defined in the keeping ban as a cat that permanently has no functional coat or whiskers and tactile hairs [4].	1.95	0.01
Forward-folded ears	Ears folded forward. Kittens with folded ears appear to have a normal upright ears up to around 4 weeks of age. The ears then start to fold forward and are permanently folded around the age of 12 weeks.	2.1	0.001
Dwarfism/ short-leggedness	Short legs. There is disproportionate dwarfism, where the long bones of the front legs and hind legs are shortened, while other parts of the body are of normal proportions. The hind legs are often slightly longer than	2.58	0.0002

	the front legs, which means that the back is inclined. There are no objective criteria.		
Abnormal tails (partially or totally missing)	Cats without a tail or a partially missing tail with or without a kink. Anomalies are not objectively defined.	1.96	0.00002
Backward-curled ears	Backward curled ears. Up to an age of approximately 12-16 weeks, the ears appear relatively normal externally, after which the curling is clearly and permanently present. However, there may be differences in the extent of curling in different cats.	2.75	0.000008
Short and crooked front legs	Cats with short and crooked front legs and normal hind legs. The bone may be shortened or absent altogether. The front legs are non-functional.	18.4	0

* The combined welfare effect is a measure of the welfare impairment caused by a characteristic in the animal population with the characteristic. This effect ranges from 0 to 7 with one prioritised welfare consequence and can reach up to 21 when three welfare consequences have been prioritised (see Table 9 in the rationale).

* * The risk score is a product of the (combined) welfare effect and exposure (share of cats with a characteristic in the total population of cats in the Netherlands). The risk score ranges from 0 to 7 for one prioritised welfare consequence and can reach up to 21 when three welfare consequences have been prioritised.

Conclusion

Breeding for external characteristics, with the ever-increasing exaggeration of breed characteristics (overtyping), has a significant negative impact on the welfare of both dogs and cats. These harmful external characteristics cause health problems and can limit animals' ability to perform species-specific behaviours. All harmful external characteristics assessed in the present risk assessments (Annex A and Annex B) result in a significant welfare risk (probability x effect) for dogs and cats. The brachycephalic skull shape poses the greatest risk to both species. Regardless of the degree of the welfare risks associated with harmful external characteristics in dogs and cats, it is clear that all prioritised harmful external characteristics can already have a major negative impact on the welfare of individual animals. To reduce welfare risks, a mitigating approach is required primarily for dogs, whilst a preventative approach is required primarily for cats, as the harmful external characteristics are already widespread, particularly in dogs. A structural approach to addressing the identified risks to the welfare of dogs and cats requires an assessment framework with a reference framework to determine whether an external characteristic leads to an unacceptable risk to welfare, including health, or compromised integrity of the animal.

These risk assessments identified the risks to dogs and cats from breeding for external characteristics. In addition to the recommendations at the beginning of this document, including on the establishment of an objective reference and assessment framework, it would be important to also carry out research on hereditary diseases that are unrelated to, or not directly related to, the selection for external characteristics, but which may pose significant welfare risks for dogs and cats.

Rationale

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1 Context of the welfare risks due to external characteristics

External characteristics of dogs and cats selected for breeding may be related to welfare impairment. To put the results of the risk assessment into perspective, this chapter outlines the broader context in which these characteristics have emerged and evolved. It also provides an overview of the institutional and legal frameworks within which these breeding practices take place. It also briefly addresses the international challenge in this area.

The information in this chapter is based on a exploratory review of scientific literature, relevant legislation and regulations and grey literature. Unlike the literature review carried out for the risk assessments of specific characteristics, this section does not have the character of a systematic literature review. The primary aim is to describe the context in which the identified welfare risks occur.

1.1 Selective breeding for external characteristics in dogs and cats

Dogs show considerable variation in appearance (*Canis familiaris*), from the Chihuahua to the Great Dane, with differences in weight, height, skeletal and skull shape. This diversity is the result of intensive artificial selection within closed breeding populations (Bannasch et al., 2020). Systematic breeding of purebreds began in the mid-19th century, with pedigrees and kennel clubs such as the Kennel Club (1873) (Sandøe et al., 2015; Proschowsky et al., 2025) and in the Netherlands the Dutch Kennel Club (1902) (Raad van Beheer, 2025a). With the emergence of the first dog shows, the selection pressure shifted from functional characteristics, such as hunting and guarding, to external characteristics (Sandøe et al., 2015). The Fédération Cynologique Internationale (FCI) is the world umbrella organisation for purebred dogs, with over 100 registered national kennel clubs and contract partners (one per country). The FCI currently recognises 359 breeds (FCI, 2025).

Unlike dogs and farm animals, which have been selected for specific functions and complex behavioural and production traits for centuries, cats have undergone little selection for function. As a result, genetic diversity in domestic cats (*Felis catus)* remained relatively high, as they were not bred within small populations. In cats, intensive artificial selection has taken place almost exclusively within purebred cat populations, which were mainly bred for aesthetic characteristics such as coat colour and coat structure. Some of these breeds already existed as a natural variant before organised breeding began. The other breeds have emerged in recent decades, often as a result of simple monogenic mutations (changes in one piece of genetic material) from those 'natural breeds' (Lyons & Kurushima, 2012). Currently, there are approximately 40 and 70 recognised cat breeds, depending on the umbrella organisation (FIFe, 2025; TICA, 2025).

Breeding animals for specific characteristics can be accompanied by hereditary diseases. Genetically inherited diseases in dogs and cats can be roughly divided into two categories. On the one hand, these conditions arise directly from breeding for external characteristics specified in breeding standards, such as the brachycephalic skull shape associated with dystocia (birthing problems), corneal lesions and the brachycephalic obstructive syndrome (BOS). On the other hand, these are conditions that are not directly visible, such as immune-mediated and endocrine diseases (Ackerman, 2021). However, breeding for the appearance of animals within a limited population results in a small gene pool, unintentionally increasing the prevalence of these invisible hereditary conditions (Ackerman, 2021; Morel et al., 2024).

Harmful external characteristics are those which limit physical and physiological functions and the execution of certain behaviours. Although there is public discussion on this topic, data and objective criteria to determine the presence and nature of these characteristics and thus the actual impact on animal welfare are often lacking (Asher et al., 2009; Collins et al., 2011). However, experts agree that harmful external characteristics cause important welfare impairments in dogs and cats (Buckland et al., 2014; Rioja-Lang et al., 2019; Rioja-Lang et al., 2020).

1.1.1 Developments in selective breeding for external characteristics

The trend towards extreme appearances was driven by breeding standards, but mainly by their interpretation by breeders and judges. As the appearance of show winners became the new standard, the ideal gradually shifted to increasingly extreme shapes, while the official standards themselves often hardly changed (Morel et al., 2024; Proschowsky et al., 2025; Roberts et al., 2025). As a result, many dog and cat breeds experienced a clear trend towards further exaggeration of breed characteristics, resulting in so-called hypertypes (overtyping), extreme phenotypes exceeding the breeding standard. This hypertyping is potentially harmful to the health and welfare of the animal (Morel et al., 2024).

1.1.1.1 Dogs

The popularity of dog breeds is not primarily driven by health or welfare considerations, but rather by fashion, aesthetics and social factors (Ackerman, 2021; Bongers & Ruitenburg, 2024; Packer et al., 2024; Proschowsky et al., 2025). Films showing dogs as heroes are followed by a significant increase in registrations with the American Kennel Club for that breed (Weir & Kessler, 2022). Celebrities who own dogs of certain breeds also influence the popularity of a breed (Addley, 2024). Social media is very likely to play an important role here (Roberts et al., 2025). Increased breed popularity means that the number of dogs with a particular characteristic will increase (Ackerman, 2021) and the welfare burden due to harmful external characteristics in that animal population may increase.

The most popular dog breeds in the Netherlands are the labrador, the golden retriever and the Australian shepherd (Raad van Beheer, 2026). A 2023 study by Puppyplaats (Puppyplaats, 2024) found the labradoodle (poodle and Labrador) to be the most popular. The popularity of designer mixed breeds such as labradoodles and cockapoos partly stems from the assumption that mixed breeds are healthier than purebreds. However, this assumption is not correct: for most conditions, the crossbreeds differ little or not at all from their parent breeds, and sometimes score even worse (Bryson et al., 2024). A recent Dutch case study of a labradoodle and a cockapoo highlights the importance of breeding with a focus on health and behaviour for the welfare of the animals (Gardeweg et al., 2025). Short- snouted dogs also remain popular in the Netherlands (Bongers & Ruitenburg, 2024), despite the many welfare problems these dogs experience due to their appearance.

1.1.1.2 Cats

For cats, welfare problems due to harmful external characteristics may increase; there is evidence of an increase in demand for selectively mixed (breed) cats, such as those with a short snout (Cats Protection, 2025; Roberts et al., 2025). Cats with brachycephalic skull shape also have many health problems due to their appearance (Morel et al., 2024). Among the breeds (or variants of breeds) not yet fully recognised by both FIFe and TICA, international organisations that define breeding standards and organise cat exhibitions, the distinguishing features are morphological variations in coat colour, coat type and other characteristics, such as abnormal forms of tail or abnormal limbs. This seems to indicate that the existing trend toward selecting cats based on distinctive external characteristics continues unabated.

In the purebred cat scene, there are several breeding organisations, all with their own rules and pedigree registration. As a result, there is less visibility of numbers of purebred cats with pedigree in the Netherlands and it is not clear whether the trend towards more purebred cats with generally more harmful external characteristics also occurs in cats. The most popular cat breeds in 2023 were according to Mundikat: the British shorthair, the Maine coon, the ragdoll, the Siberian cat (incl. Neva masquerade) and the Russian blue[6]. These popular breeds do not necessarily reflect the total population of selectively bred cats in the Netherlands. It is not known which designer mixed breeds

[6] Communication Mundikat – November 2024

are most popular within the cat breeding industry, but it is likely that the harmful external characteristics of breeds used for this purpose will manifest themselves in the offspring, as is the case for dogs. Multiple harmful characteristics may even occur together, as is the case, for example, with the bambino sphynx (bullycat, which results from a cross between a sphynx (‘naked cat’) and a munchkin cat (‘dwarf cat’)).

1.2 Genetics

Genetics plays a central role in the origin of harmful external characteristics in dogs and cats; therefore, this topic is briefly explained here.

A gene is a piece of DNA encoding for a particular phenotype (external appearance), property or characteristic. A gene may exist in different variations, called alleles. The combination of these alleles (the genotype) significantly determines the appearance or external characteristic of an animal (the phenotype). In mammals, offspring receive a set of genes from the mother and a set of genes from the father. Where an animal has two identical alleles for a specific gene, the animal is homozygous for the characteristic; with two different alleles of the specific gene, the animal is heterozygous for the characteristic (Lyons, 2012; Gough et al., 2018; Ackerman, 2021).

Many genetic variations in dogs and cats are spontaneously produced by mutations in the DNA. When such variations result in visible external characteristics, they may spread by selective breeding and may be found in multiple breeds and mixed breeds. At the same time, long-term selection for specific external characteristics, often within relatively closed breeding populations, has resulted in limited genetic variation within many breeds. Small effective population sizes and other processes, such as the popular sire effect, bottlenecks and founder effects, increase the likelihood that recessive variations are expressed in homozygous form. This increases the likelihood of inherited conditions and can contribute to the creation or amplification of harmful characteristics (Gough et al., 2018; Broeckx, 2020; Ackerman, 2021; Morel et al., 2024).

Some external characteristics are determined by one gene (monogenic) (Nicholas et al., 2013), while others are determined by multiple genes (polygenic) and are therefore more genetically complex (Nicholas et al., 2024). Dominant traits are expressed when one copy of the related allele has been inherited. Recessive characteristics are only reflected when both copies of the recessive allele are present. Characteristics that are dominant or monogenic are easier to select for in a targeted way. This allows them to spread faster in a population than recessive or polygenic characteristics, depending on breeding practice and selection (Lyons, 2012; Gough et al., 2018; Ackerman, 2021).

The frequency of a risk allele in a population determines the genetic space available for selection. At low allele frequencies, selection by genotype (animals not carrying or carrying one copy) may reduce the prevalence of the risk allele (Batcher et al., 2019; Bellamy & Lingaas, 2020). Animals with the same genotype (same allele combination) for a given characteristic do not always exhibit this in the same way or to the same extent in their phenotype (Broeckx, 2020). The distinction between penetrance (expression or non-expression) and expressivity (degree of expression) shows that genetic abnormalities do not always manifest themselves unambiguously. This makes prediction and selection complex. In addition to the genetic basis, environmental factors and epigenetic regulation also play a role in the final expression of genes and related characteristics (Ackerman, 2021).

Genetic tests make it possible to detect specific gene mutations. However, these tests do not provide complete assurance on the clinical health or future disease risk of an animal. Test results can be false positive or false negative, and many conditions are polygenic or breed specific. There is a chance that the assumption that ‘tested’ means ‘healthy’ creates an unjustified sense of security. Therefore, careful interpretation and breed-specific validation are essential (Broeckx, 2020; Ackerman, 2021). Within a balanced breeding programme, genetic tests are used as part of a broader assessment of breeding suitability, aimed at responsible breeding decisions, including clinical conditions without available genetic testing (Morel et al., 2024). In the Netherlands, the Dutch Kennel Club carries out mandatory DNA pedigree checks on dogs, while the Expertise Centre for Veterinary Genetics (Utrecht University) develops genetic tests for specific hereditary conditions in dogs and cats.

1.3 National and international public and private frameworks and regulatory oversight

1.3.1 Laws and regulations

Article 2.6 (2) of the Animals Act[7] provides a basis for legislation on animal breeding in the Netherlands. That law provides that rules may be laid down on the prohibition of the breeding or use for breeding purposes of animals with a particular condition or external characteristic that adversely affects their welfare or health, or that of their offspring. Breeders may also be asked to first carry out research on the animals they wish to breed with to see if there are any diseases or hereditary problems that could affect the welfare of the animals.

Article 3.4 of the Animal Keepers Decree[8] gives effect to this provision. This Article stipulates the following:

1. It is prohibited to breed companion animals in a manner that harms the welfare or health of the parent animal or its offspring.
2. In any case, in the breeding referred to in the first paragraph, the following shall be prevented to the extent possible:
    a. serious hereditary abnormalities and diseases are passed on to or may develop in offspring;
    b. physical characteristics are passed on to or may develop in offspring that have harmful effects on the animals' well-being or health;;
    c. serious behavioural abnormalities are passed on to or may develop in offspring;
    d. reproduction occurs in an unnatural manner;
    e. the number of litters or offspring produced by a companion animal adversely affects the health or well-being of that animal or its offspring.

In 2023, the Policy Rule for Brachycephalic dogs[9] was adopted pursuant to Article 3.4 of the Decree on animal keepers**Fout! Bladwijzer niet gedefinieerd.**. It lays down criteria for the enforcement of the breeding ban on extremely brachycephalic dogs. The assessment is made based on multiple welfare-related external characteristics, including the craniofacial ratio (CFR), which makes it possible to determine per individual dog whether breeding is allowed.

Since 1 January 2026, it has been explicitly forbidden from a welfare point of view to keep cats with folded (forward and backward) ears and/or hairless cats. Cats demonstrably microchipped before that date are covered by transitional provisions and may be kept. Since that date, these cats have also been prohibited from participating in competitions, exhibitions and inspections[10].

National regulations vary greatly between Member States. Although many countries already have some form of national legislation on breeding for external characteristics, enforcement is not considered to be truly effective in any country. Some of the problems are (Eurogroup for Animals, 2023):

- Lack of knowledge and training among supervisors and enforcement officers
- Lack of definition of legal limits (when is a characteristic harmful?),
- Normalisation of extreme external characteristics within society,
- No fines or fines that are too low (not sufficiently dissuasive),
- Import and trade loopholes (animals with prohibited characteristics can simply be retrieved from abroad).

[7] Animals Act

[8] Decision on animal keepers

[9] Policy rule for brachycephalic dogs

[10] Amendment of the Animal Keepers Decree

It is important that policies for supervisors are enforceable (e.g. there are clear criteria), practicable (sufficient staff and resources are available) and fraud-proof (animals and their origins are traceable).

On 7 December 2023, the European Commission published a proposal for new EU legislation[11] on animal welfare of dogs and cats and their traceability. The proposed regulation aims to improve the welfare of dogs and cats and combat the illegal trade in companion animals by harmonising rules for breeders, importers and sellers. It is also proposed to introduce mandatory identification and registration in a European database. The improved level of traceability should reduce the spread of animal diseases and better inform consumers about the origin of their pet. The rules constitute minimum standards; Member States may set stricter requirements. The provisional agreement on this EU regulation was reached on 25 November 2025, and states, with regard to breeding for harmful external traits, that breeders must ensure that they do not select genotypes or phenotypes with detrimental effects on the welfare of dogs and cats or their offspring and that close inbreeding is prohibited. The proposal was adopted at the time of writing this report but has not yet formally entered into force[12].

The remaining EU legislation related to dogs and cats only applies to animals intended for scientific purposes[13], or transported for commercial[14] or non-commercial[15] purposes. There is also EU legislation on movements of dogs and cats in the context of animal diseases (mainly rabies)[16].

Finally, the Netherlands signed the European Convention for the Protection of Pet Animals in 1987 and ratified it in 2022[17]. The Convention entered into force for the Netherlands on 1 July 2023. The Netherlands is therefore formally bound by the Council of Europe's minimum standards for the keeping, breeding, trading and boarding of pet animals. These standards also provide an international reference framework against which future policy choices can be assessed.

1.3.2 Private frameworks

The Dutch Kennel Club on Kynology has been the central organisation for the organised dog scene in the Netherlands since its official establishment in 1902 (Raad van Beheer, 2025b). This organisation manages the Dutch dog studbook and is responsible for registering, chipping and recording purebred dogs with pedigrees. The Dutch Kennel Club is an association of associations and represents more than 300 breed associations, kynologist clubs and special associations. The organisation is a member of the Fédération Cynologique Internationale (FCI). The FCI is the world umbrella organisation for purebred dogs, with over 100 national members and contract partners (one per country). The FCI currently recognises 359 breeds. The breeding standards are drawn up by the country of origin of the breed and published, translated and updated in cooperation with FCI committees (FCI, 2025). The Netherlands has nine national breeds for which breed standards have been drawn up in the Netherlands: stabijhoun, wetterhoun, the markiesje, Nederlandse kooikerhondje, Hollandse herdershond, Saarlooswolfhond, Drentsche patrijshond, Nederlandse schapendoes and the Hollandse smoushond, of which only the markiesje has not been assigned an FCI number and therefore has no internationally recognised breed status.

In the Netherlands, there are around 400.000 purebred dogs (with pedigrees) out of a total of 1.9 million dogs and around 32.000 purebreds with pedigree are registered every year. The Dutch Kennel Club draws up rules for and supervises the breeding, registration and inspection of purebred dogs

[11] Proposal for a Regulation on the welfare of dogs and cats and their traceability

[12] Procedure File: 2023/0447 (COD) | Legislative Observatory | European Parliament

[13] Directive 2010/63/EU

[14] Regulation (EC) No 1/2005

[15] Regulation (EU) No 576/2013

[16] Regulation (EU) 2016/429

[17] European Convention for the Protection of Pet Animals (ETS No. 125)

and organises trainings to become a judge and provide information to, among others, breeders (Raad van Beheer, 2025b).

Unlike the purebred dog sector in the Netherlands, which is highly centralised and standardised by the Dutch Kennel Club, the purebred cat sector consists of a collection of different, independent associations. There are several cat breeding associations, each with its own rules and pedigree registration. Maintenance, recognition or establishment of a cat breed is therefore much less uniform than it is for purebred dogs. Some Dutch cat associations are affiliated to major international federations, such as the Fédération Internationale Féline (FIFe, 2025), a major international federation of European origin, or The International Cat Association (TICA, 2025), a large organisation originating in North America. Finally, there is the Federatie Nederlandse Katten verenigingen (FNK, Federation of Dutch Cat associations). The FNK is a consultation platform with the aim of joining forces in the field of advocacy, for example in contacts with public authorities or in the field of animal welfare (FNK, 2025).

1.3.3 Supervision by NVWA and LID

The NVWA supervises animal welfare and animal health of dogs and cats at breeding and trading establishments, where infringements are regularly detected (NVWA, 2024b). This includes, amongst others, breeding with animals with extreme external characteristics or inherited conditions. Since 2021, the NVWA has also supervised via the internet, including prohibited breeding involving certain cat breeds (such as the Scottish fold and the bambino sphynx). In addition, special attention has been paid through various media to breeding with dogs with too short a snout. This breeding is not allowed[9].

The NVWA enforces regulations in accordance with the specific intervention policy for animal welfare (NVWA, 2024a), through which various enforcement measures can be taken, such as issuing an official warning or imposing a fine. In addition, compliance assistance can be provided to the audited companies to support them in improving their way of working.

At the end of 2024, responsibility for overseeing the breeding of cats with harmful external characteristics was transferred to the National Animal Welfare Inspection Service (Landelijke Inspectiedienst Dierenwelzijn (LID)) and the Netherlands Enterprise Agency (Rijksdienst voor Ondernemend Nederland (RVO)). The NVWA has continued to cooperate with both parties for some time in the area of internet trade. The NVWA and the LID have both been designated as supervisory authorities for the breeding of dogs and have shared this task among themselves and regularly consult on the manner of enforcement.

1.3.4 An international challenge

The problems of harmful external characteristics in dogs and cats transcend the national context through cross-border trade, breeding and movement of animals. A ban on keeping such animals would restrict this; it will no longer be possible to import animals with harmful external characteristics. Work on this issue is also ongoing in other European countries. In Germany, for example, the Qualzucht-Evidenz Netzwerk (Quen), a non-profit organisation of veterinarians, biologists, geneticists and animal welfare experts, aims to provide clarity on visible and hidden genetic disorders so that authorities, veterinarians, courts and policymakers can use it when applying animal welfare and breeding legislation. In the United Kingdom, the Innate Health concept has recently been developed (All-Party Parliamentary Group for Animal Welfare (APGAW), 2026a). Innate health is the ability of a dog to perform all natural bodily functions and behaviours, without limitations due to its physical build (conformation). The Innate Health Assessment was developed by the Royal Veterinary College and is based on more than 15 years of VetCompass research. Based on this, ten criteria have been drawn up to identify harmful physical traits (conformation defects) and to prevent the use of these animals in breeding. Through an online tool with 10 questions, breeders and (future) owners can perform this assessment to guide them in making breeding choices or choosing a particular dog (All-Party Parliamentary Group for Animal Welfare (APGAW), 2026b). The European Food Safety Authority’s animal welfare network also indicates that this topic is receiving broad

attention across multiple member states (EFSA Network on Risk Assessment in Animal Health and Welfare, 2024).

2 Approach

2.1 Risk assessments

In this report, based on risk assessments (see Annex A for dogs and Annex B for cats), BuRO provides an overview of the nature and severity of the risks to the welfare of dogs and cats in the Netherlands through the selection for external characteristics.

The risk assessments were carried out on the basis of the methodology of the European Food Safety Authority (EFSA) for animal welfare (EFSA Panel on AHAW, 2007); EFSA Panel on AHAW (2012b); (EFSA Panel on AHAW, 2012a). EFSA's methodology is in line with the Food Code (Codex Alimentarius)[18] and Regulation (EC) No 178/2002:[19]

1. Hazard identification: the threats (hereinafter hazards) to animal welfare identified by scientific experts and/or described in international scientific literature. This risk assessment concerns the external characteristics selected by the experts (see Annex C and Annex D).

2. Hazard characterisation: the effect produced by the hazards. It describes the welfare consequences (welfare impact consisting of severity and duration of welfare consequences, and the prevalence of welfare consequences) of exposure to the hazards and briefly addresses the relevance of the threats to animal welfare. This risk assessment addresses the prioritised welfare consequences of the characteristics, including prevalence of these welfare consequences (see Annex C and Annex D).

3. Exposure assessment: the likelihood of the hazards (their appearance) and the percentage of animals exposed to them. For animal welfare, this refers to the occurrence of circumstances, situations and practices (frequency and duration) that may affect the welfare of the animals. The exposure in this risk assessment is defined as the number of dogs or cats in the Netherlands with the harmful external characteristic within the total population of dogs or cats (see Annex C and Annex D). In that regard, it is irrelevant whether the individual animal experiences a reduction in welfare as a result of the characteristic. The degree of presence of a characteristic in a population of dogs or cats does not indicate the severity of the potential welfare reduction caused by that characteristic in individual animals or in the population of animals with the characteristic.

4. Risk characterisation: the overall assessment of nature and severity (impact) per hazard together with its likelihood in the Netherlands, using steps 1, 2 and 3. In this risk assessment, the risk can be understood as a measure of the expected welfare loss in the total population of dogs or cats caused by a specific characteristic.

2.2 Literature review and Expert Knowledge Elicitation (EKE)

Both a literature review (see Annex A and Annex B) and an Expert Knowledge Elicitation (EKE) were used to inform risk assessments (EFSA, 2014; EFSA Scientific Committee, 2018b;2018a), with scientific insights complemented by expert judgement (see Annex C and Annex D). For this purpose, BuRO selected independent experts for both animal species with relevant veterinary, animal sciences or specialist expertise, knowledge of the Dutch dog and/or cat population and understanding of impact, duration and prevalence of welfare problems. Through nominations, both expert groups were expanded to a minimum of five participants, coming from research, education and practice.

[18] fao.org/fao-who-codexalimentarius/en/

[19] Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. Document 32002R0178.

2.3 Databases containing genetic information and population data

There are various sources of information on genetic conditions in dogs and cats, ranging from academic and non-profit databases such as Labgenvet, OMIA (Online Mendelian Inheritance in Animals) and DogWellNet to university DNA diagnostic labs and providers of commercial tests. These sources vary in depth, type of information and target group. They provide a broad and accessible landscape of services and data that can be used in practice (Silversides, 2025).

OMIA (Nicholas et al., 2025) is a digital catalogue of hereditary diseases and other animal characteristics, with associated genes and variants in different animal species. It contains extensive information on hereditary conditions and external characteristics in dogs (*Canis lupus familiaris*) and cats (*Felis catus*). The dog is the most documented animal species within OMIA, with over 900 registered phenotypes, more than half of which are linked to one or more genetic variants. Over 450 phenotypes have been described for the cat, also partly linked to genetic variants. The database describes, among other things, external characteristics such as brachycephaly, short-leggedness (chondrodystrophy), forward-folded ears and different coat colours. OMIA is a valuable source for mapping the genetic background of external characteristics that may contribute to welfare consequences in dogs and cats. The information is science-based and linked to literature.

PETscan is the diagnostic registration system developed at the Genetics Expertise Centre at the Faculty of Veterinary Medicine, Utrecht University (Expertisecentrum Genetica Diergeneeskunde, 2025). In the PETscan system, veterinarians using the system record diagnoses of dogs and cats presented to them for consultation. The data collected with PETscan are used to gain insight into the diagnoses registered by veterinarians in dogs and cats. PETscan can investigate and monitor the incidence of hereditary diseases. Where possible and relevant, the information from OMIA and PETscan has been used in the underlying risk assessments (see Annex A and Annex B).

2.4 EFSA Animal Welfare risk assessment network

In March 2024, EFSA's Animal Welfare Risk Assessment Network sought additional (scientific) information on welfare risks related to breeding in dogs and cats in other EU Member States. Information on related projects was obtained from different Member States (EFSA Network on Risk Assessment in Animal Health and Welfare, 2024). This information has been used, where relevant, for the risk assessment and the advice of BuRO.

2.5 Scope

This study focuses on harmful external characteristics in dogs and cats; other companion animals and other species are not included. In this context, harmful external characteristics are defined as a result of targeted breeding for a given external appearance, visible on an animal that is standing still and potentially resulting in welfare consequences. The risk assessment examines harmful external characteristics, not the health of specific breeds. Where breeds are mentioned as examples, this serves only to illustrate how a characteristic can manifest itself. This does not mean that the characteristic is limited to a particular breed. For this reason, images have not been included, as they could unintentionally draw attention to specific breeds rather than on the harmful external characteristics themselves.

Dogs and cats may have multiple harmful external characteristics at the same time, but this risk accumulation has not been considered in this risk assessment. One impact score per welfare consequence was estimated by the experts. Variations in the impact (and possible prevalence) of the same welfare consequence are not included. As a result, the actual impact of the welfare consequences of harmful external characteristics may have been underestimated.

Heritable conditions that are not directly related to appearance are excluded from the scope of this risk assessment. The existence or absence of veterinary possibilities (medication, surgery, minor procedures) to alleviate the welfare impairment does not play a role in the assessment of the harmful external characteristics according to the risk assessment methodology and has therefore not been taken into account in the current risk assessment.

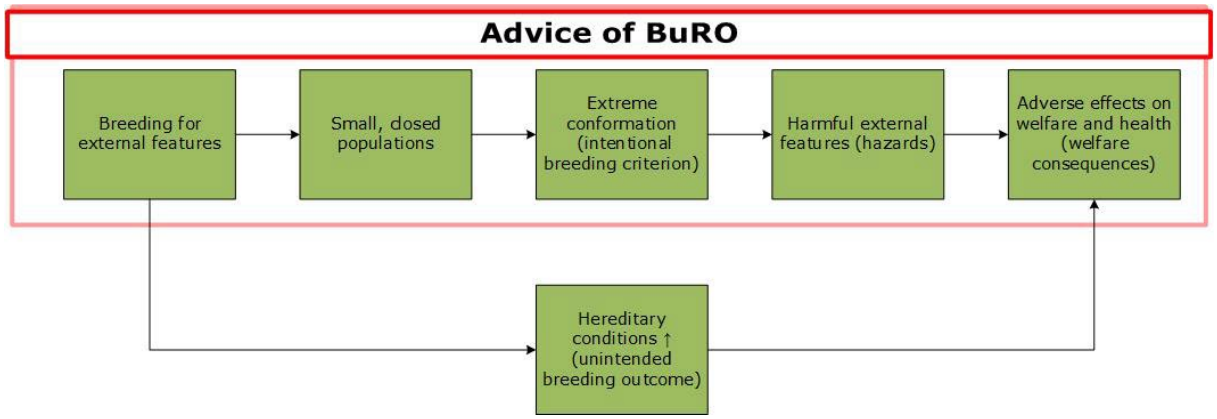

Figure 2 Overview of the scope of BuRO's advice on harmful external characteristics (red border). The individual components in the flow chart have been assessed in relation to one another and not in isolation.

To provide a starting point for the objective identification of characteristics, the nature of each characteristic was considered: is it binary, or does it vary in degree? The inventory of methods to objectively determine the presence of a harmful external characteristic in an individual animal is limited to exploring welfare indicators and possibilities to measure these indicators. The method of measuring these welfare indicators may go beyond the visual verification of the external characteristic by any person, for example through diagnostics by a veterinarian or digital techniques. The development of these methods, including validation in practice, is not performed in the underlying risk assessments.

Animal welfare is a broad concept for which different definitions exist in the literature (Voogt et al., 2023). In its risk assessments, BuRO follows the framework also used by EFSA, based on the definition of Broom (1986): "The welfare of an individual is its state as regards its attempts to cope with its environment" (EFSA Panel on AHAW, 2012a).

Animal health is often defined as the absence of disease and the presence of normal biological function and physiological balance (homeostasis). These definitions focus primarily on the physical performance of the animal (BuRO, 2024). However, health impairment can lead to pain, discomfort and other welfare consequences and is therefore an important part of animal welfare (Blokhuis et al., 2023; BuRO, 2024; RDA, 2026).

Breeding for external characteristics has scientific, legal and ethical dimensions. Animals have an intrinsic value. This is laid down in Article 1.3 of the Animals Act**Fout! Bladwijzer niet gedefinieerd.** and means that the intrinsic value of the animal must be taken into account in any weighing of interests. Selection on the basis of external characteristics, which do not provide any functional benefit to the animal itself and may entail welfare risks, therefore raises ethical questions about the justification of such breeding purposes (Sandøe et al., 2015; Van Hagen & De Gier, 2018). While these dimensions are relevant to the social and policy considerations regarding breeding for external characteristics, BuRO's risk assessments focus primarily on the scientific assessment of risks to animal welfare, including animal health.

3 Summary of the risk assessments

The risk assessment inventoried and characterised (3.1.1 for dogs and 3.2.1 for cats) the hazards, i.e. the harmful external characteristics, and associated welfare consequences, i.e. the impact of the harmful external characteristics on the welfare of dogs and cats. An assessment has been made of the burden on an individual dog or cat of an animal welfare consequence caused by the external characteristic. The report also describes how many animals suffer from the welfare consequence(s)

if they possess the characteristic. Finally, consideration has been given to the distribution of the welfare consequence in the animal population with the characteristic. The exposure to the hazards (harmful characteristics) is then summarised (3.1.2 for dogs and 3.2.2 for cats). It shows how many dogs or cats with a certain characteristic are present in the Netherlands. In the risk characterisation (3.1.3 for dogs and 3.2.3 for cats), the (combined) welfare effect of a harmful external characteristic in the population of dogs and cats with a certain characteristic is compared to the total number of dogs and cats in the Netherlands. This determines the animal welfare risk of an external characteristic.

For more detailed information on, for example, the external characteristics and their welfare consequences, factors that influence the impact of the welfare consequences, and the occurrence of harmful external characteristics in dogs and cats in the Netherlands, please refer to the full risk assessments and the EKE technical reports (see Chapter 8 in the rationale).

The risk assessments for dogs and cats have been carried out separately. Therefore, characteristics that are phenotypically similar between species, such as chondrodystrophy in dogs and dwarfism/ short-leggedness in cats, have not been merged together but assessed per animal species. This is in line with the chosen methodology, in which characteristics have been identified and assessed by the species-specific expert groups. The composition of these expert groups partly overlapped but was not entirely the same.

3.1 Dogs

3.1.1 Hazard identification and characterisation for dogs: Harmful external characteristics and welfare consequences

Experts have identified different external characteristics of dogs as harmful to welfare. From the longer list (26 characteristics), compiled from literature review, nine external characteristics have been prioritised by the experts (see Annex C). These were considered by the experts to be the most relevant for the welfare of dogs in the Netherlands. The prioritised characteristics are those that are expected to result in one or more welfare consequences with a high negative welfare impact (score of 5, 6 or 7 out of a maximum of 7) on an **individual** dog.

In dogs, the external characteristics prioritised by experts relate to the body type, the skull shape, the tail shape, eyelid position, the skin and the coat.

The **body type** refers to dogs with the following characteristics:

- angular forelimb deformities,
- chondrodystrophy (disproportionate dwarfism),
- very small dogs with a body weight of < 3 kg.

The **skull** shape has the following characteristics:

- small and round, with the dog weighing < 10 kg,
- brachycephalic (short- snouted).

As regards **the tail**, it takes the shape of a:

- corkscrew.

In the case of the **eyelid position**, these are two characteristics that have been combined by the experts, as they lead to the same welfare consequence:

- entropion & ectropion.

The **skin** has the following harmful external characteristics:

- skin folds/ excess skin

The harmful external characteristic relating to the coat is:

- coat colour double merle

Table 7 provides an overview of the hazard identification (the harmful external characteristics) and hazard characterisation (the negative consequences (welfare consequences) that dogs with the characteristic may experience). For the welfare consequences selected by the experts, the impact (severity and duration) on welfare and prevalence (the percentage of dogs with the characteristic that suffer welfare impairment because of it) are shown. One impact score per welfare consequence was estimated by the experts. The prevalence shown refers to the occurrence of that welfare consequence with this specific impact score.

All nine prioritised characteristics have welfare consequences with a high welfare impact on individual dogs. In **individual animals**, the highest welfare impact is caused by respiratory problems due to a brachycephalic skull shape (Table 7). The welfare consequences of intervertebral disc herniation (due to chondrodystrophy), Chiari malformation (CM) and syringomyelia (SM) (due to a small round skull), eye problems (due to a brachycephalic skull shape) and thoracic and lumbar hemivertebrae with clinical signs (due to a corkscrew tail) score high as well (Table 7).

Table 7 Overview of the prioritised harmful external characteristics for dogs with the associated welfare consequences, their estimated welfare impact and estimated prevalence and resulting welfare effect when the dogs possess the characteristic. Ranked from highest to lowest (combined) welfare effect in the dog population in the Netherlands with the characteristic. BW = body weight.

External characteristic	Welfare consequences	Welfare impact on the individual	Prevalence (%) in exposed population (distribution)	Welfare effect exposed population	Combined welfare effect exposed population
Brachycephalic skull shape ('short-snouted')	Respiratory problems	7	50 (25-75)	3.5	
	Eye problems	6	35 (10-60)	2.1	
	Ear problems	5	18 (5-30)	0.9	
	Combined welfare effect				***6.5***
Coat colour: Double Merle (homozygous)	No eyes or rudimentary eyes	5	100 (100-100)	5	
Abnormal eyelid position	Inflammation of the eye (entropion & ectropion)	5	75 (50-100)	3.75	
Skull shape: Small and round < 10 kg BW	Chiari malformation (CM) and syringomyelia (SM)	6	60 (30-80)	3.6	
Skin folds/ excess skin	Skin problems, dermatitis	5	43 (25-60)	2.15	

Body type: Very small < 3 kg BW	Dental abnormalities	5	35 (20-50)	1.75	
	Skull and vertebral abnormalities	5	3 (1-5)	0.15	
	Combined welfare effect				***1.9***
Tail shape: corkscrew	Skin problems	5	15 (5-20)	0.75	
	Thoracic and lumbar hemivertebrae (clinical)	6	10 (5-15)	0.6	
	Combined welfare effect				***1.4***
Body type: chondrodystrophy ('short legs')	Intervertebral disc herniation (herniation of the nucleus pulposus in the neck or back)	6	12 (5-25)	0.72	
Body type: angular forelimb deformities	Joint problems & impaired locomotion	5	8 (5-25)	0.40	

In order to compare in **the population of dogs with the characteristic** the contribution of different welfare consequences to welfare reduction due to harmful external characteristics, the impact of the welfare consequences has been multiplied by the prevalence (the percentage of dogs with the characteristic that experiences the estimated welfare impact). This is referred to as the welfare effect in this risk assessment. If the experts selected more than one welfare consequence for a characteristic, the welfare effects of the individual consequences were added together (the combined welfare effect). Among the fully assessed characteristics the brachycephalic skull shape characteristic has the highest combined welfare effect (respiratory, eye and ear problems) and therefore has the potential to cause the highest contribution to welfare reduction due to harmful external characteristics in the dog population in the Netherlands. The top 5 separate welfare consequences with the highest welfare effect in the population are (see Table 7):

- no eyes or rudimentary eyes due to double merle (homozygous) genotype[20]
- eye inflammation due to entropion and ectropion due to an abnormal eyelid position
- Chiari malformation (CM) and syringomyelia (SM) due to a small round skull (body weight < 10 kg)
- breathing problems due to a brachycephalic skull shape
- skin problems/dermatitis due to skin folds/excess skin.

[20] Dogs with a homozygous genotype dogs (double merle) are not intentionally bred. These dogs do not have the desired merle coat but are predominantly white.

3.1.2 Exposure dogs: percentage of animals with harmful external characteristics

Reliable data on the actual number of dogs in the Netherlands are scarce. This risk assessment is based on an estimated population of 1,9 million dogs in the Netherlands. Of the 1,9 million dogs, it is estimated that one quarter are purebred dogs with pedigrees, four out of ten resemble purebred dogs but have no pedigrees (look-alikes), and more than one third are mixed-breed dogs (Figure 3). The exposure (the percentage of dogs in the total dog population that possess the characteristic) to the harmful external characteristic has been estimated by the experts and is reflected in percentages (Figure 4) and numbers of dogs that have these characteristics (Table 8). The harmful external characteristics assessed here are not evenly distributed across these different sub-populations. For example, one characteristic may be more common in animals with a pedigree, the other more common in look-alikes (Table 8).

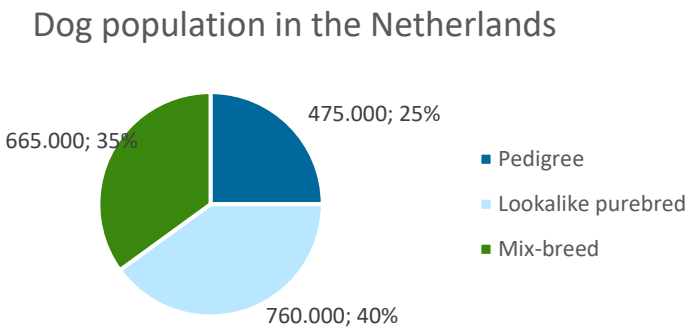

Figure 3 Estimated distribution of the dog population in the Netherlands, divided into dogs with pedigrees, dogs without pedigrees (look-alikes) and mixed-breed dogs (including designer crossbreeds)

In dogs, the most common harmful external characteristics are estimated to be the brachycephalic skull shape and a very small body with a body weight of up to 3 kg (Figure 4, Table 8). This concerns approximately 285,000 and 190,000 dogs respectively. An external characteristic that is currently rare or virtually absent in dogs in the Netherlands is the double merle genotype (a few dozen dogs (< 0.005 %) in the total population)[20]. All prioritised characteristics are mainly found in purebreds (pedigree and/or look-alikes) and less in mixed breeds.

For some of the harmful external characteristics of dogs, one genetic variant plays an important role in the formation of the phenotype. This applies to the characteristic of angular forelimb deformities, (double) merle coat colour and a corkscrew tail. Some of these variants show dominant, incompletely dominant or semidominant inheritance. This means that one copy of the gene variant in question may already be sufficient to cause a phenotypic effect. Chondrodystrophy, or dwarfism, is also dominant but can be caused in dogs by variants in two different genes. The literature review also shows that angular forelimb deformities and chondrodystrophy are genetically linked. These characteristics may derive from partly the same genetic background.

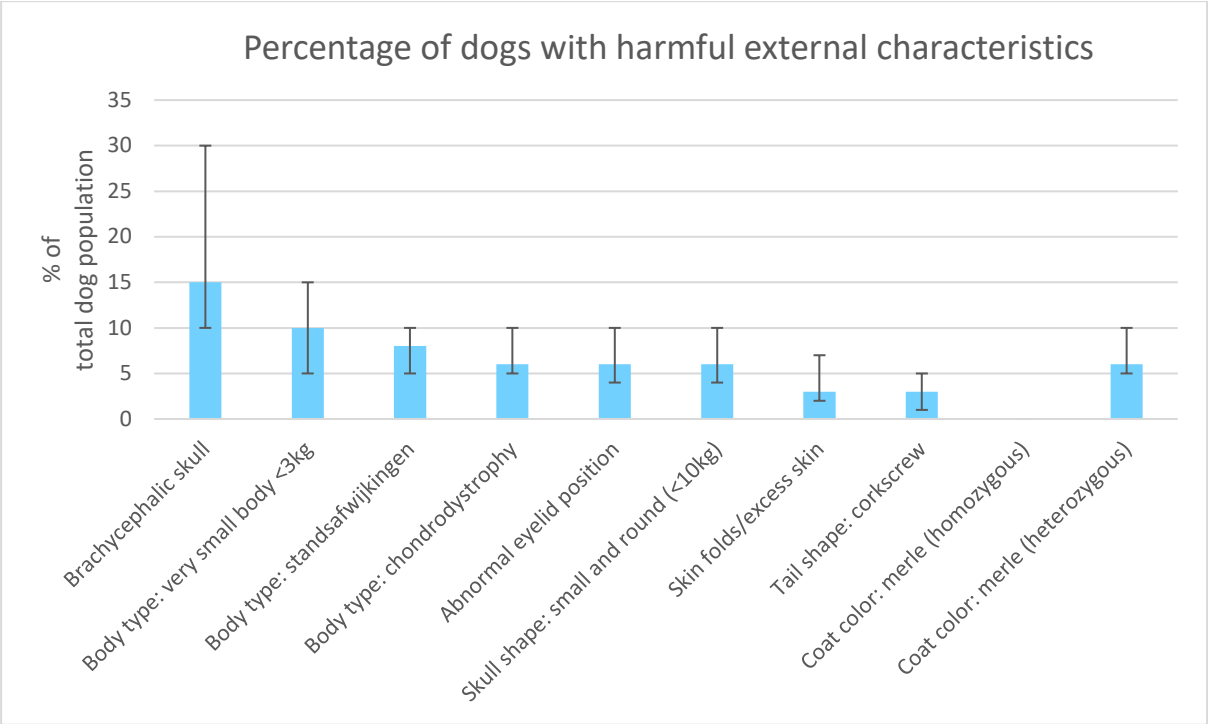

Figure 4. Estimated percentage of dogs with a harmful external characteristic in the total dog population in the Netherlands. The error bar represents the estimated distribution (/uncertainty). The coat colour merle (heterozygous) has been added for the sake of completeness, because this coat colour is the intended breeding outcome and the crossing of dogs with this coat colour may result in the harmful external characteristic of coat colour double merle (homozygous).

Assuming a total population of 1,9 million dogs, for each harmful external characteristic, it is shown in Table 8 whether the relative probability is (much) greater or (much) smaller in a given subpopulation. The current scientific knowledge on heritability is summarised by characteristic in this table.

Table 8. Estimate of the number of dogs per harmful external characteristic, assuming a population of 1,9 million dogs in the Netherlands, ranked from the most common to the least common. For each characteristic it is indicated whether the relative probability is (much) higher (shown as > > or >) or (much) lower (<< or <) in animals with pedigree, look-alikes, breeds (pedigree and look-alikes added together) or mixed breeds (including designer crosses). The genetic inheritance of the characteristic is briefly summarised.

External characteristic	Estimated number of animals (distribution)	Relative probability	Genetic inheritance
Brachycephalic skull shape ('short- snouted')	285,000 (190,000-570,000)	> > pedigree dogs > look-alikes < mixed breeds	Complex, multiple genes
Body type: very small < 3 kg	190,000 (95,000-285,000)	> purebred dogs < mixed breeds	Multiple genes
Body type: chondrodystrophy ('short legs')	152,000 (95,000-190,000)	> purebred dogs < mixed breeds	Two identified genes, dominant, both genes together make the characteristic clearer

Body type: angular forelimb deformities	114,000 (95,000-190,000)	> look-alikes < mixed breeds	1 gene mutation, incompletely dominant
Coat Colour Merle (heterozygous) *	114,000 (95,000-190,000)	> look-alikes	1 gene, incompletely dominant, variation in coat color intensity; in rare cases, not visible
Abnormal eyelid position	114,000 (76,000-190,000)	> purebred dogs < mixed breeds	Complex, multiple genes
Skull shape: small and round (< 10kg)	114,000 (76,000-190,000)	> purebred dogs < mixed breeds	Complex, multiple genes
Skin folds/ excess skin	57,000 (38,000-133,000)	> purebred dogs < mixed breeds	Multiple genes, including environmental factors and other external characteristics
Tail shape: corksc rew	57,000 (19,000-95,000)	> purebred dogs < mixed breeds	1 gene mutation, recessive
Coat colour Double merle (homozygous)	A few tens of animals * *	> look-alikes	1 gene, incompletely dominant

** The merle coat color (heterozygous) has been included for the sake of completeness, because breeding dogs with this coat color leads to the harmful welfare consequences associated with the double merle (homozygous) coat color, and breeders intentionally breed for heterozygous dogs with the desired merle phenotype.*

** * It is assumed that the number of animals ranges from 20 to 90 dogs.*

3.1.3 Risk characterisation dogs

The main welfare risks for the dog population in the Netherlands due to harmful external characteristics (Figure 5) are as follows, from the highest welfare risk to the relatively lower welfare risk based on the risk score:

1. brachycephalic skull shape ('short- snouted')
2. abnormal eyelid position
3. skull shape: small and round (< 10 kg)
4. body type: very small (< 3 kg)
5. body type: chondrodystrophy ('short-leggedness)
6. skin folds/ excess skin
7. tail shape: corkscrew
8. body type: angular forelimb deformities
9. coat colour: double merle (homozygous)

The risk score is a quantitative measure of the animal welfare risk at population level, obtained by multiplying the (combined) welfare effect of a harmful external characteristic by the percentage of dogs possessing the characteristic in the total population of dogs (the level of presence = exposure) (see Annex A for further explanation of the risk score). The characteristic brachycephalic skull shape has multiple (very) severe welfare consequences and there are relatively many dogs with a

brachycephalic skull shape. This characteristic is therefore the highest estimated welfare risk for dogs.

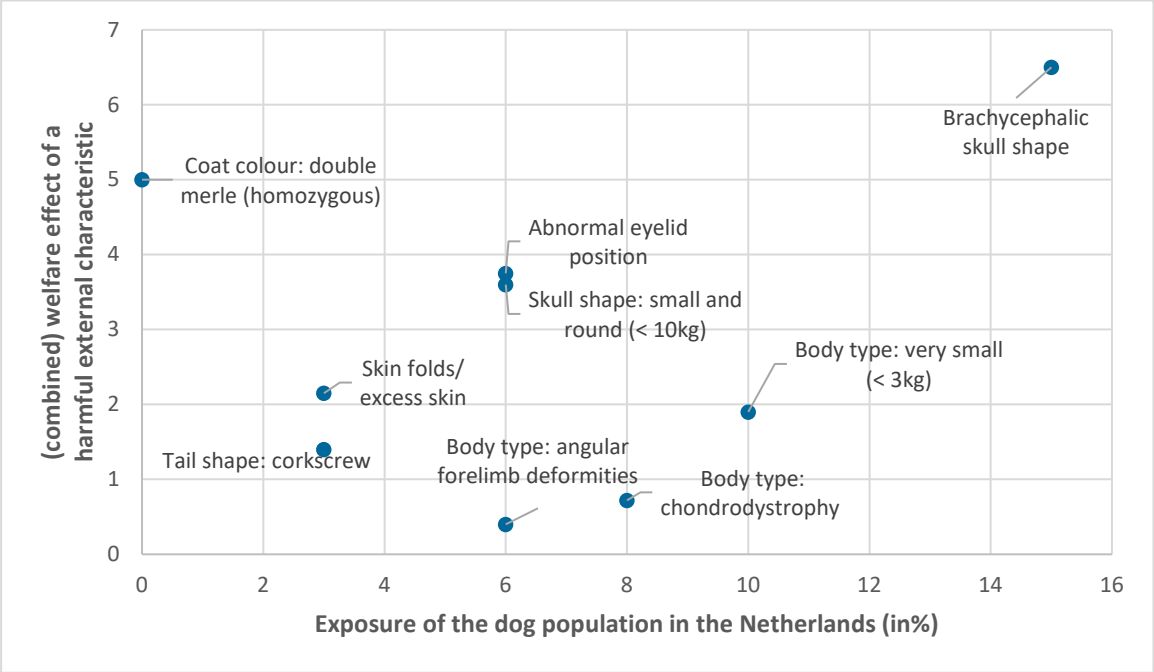

Figure 5. Risk matrix of the most relevant estimated harmful external characteristics in dogs. The y-axis shows the (combined) welfare effect. This indicates the extent to which welfare is reduced by a harmful external characteristic within the population of dogs exhibiting that characteristic. The x-axis shows the exposure (%) to the characteristic. This indicates the proportion of dogs with the harmful external characteristic within the total dog population in the Netherlands.

It is estimated that there are currently more purebreds (with and without pedigrees) in the Netherlands than mixed breeds. The prioritised harmful external characteristics appear to be particularly prevalent in the purebred dogs (both pedigree and look-alikes without pedigree, Figure 3).

3.2 Cats

3.2.1 Hazard identification and characterisation for cats: Harmful external characteristics and welfare consequences

Experts have identified different external characteristics of cats as harmful to welfare. From the longer list (16 characteristics), compiled from literature, nine external characteristics have been prioritised by the experts (see Annex D). These were considered by the experts to be the most relevant for the welfare of cats in the Netherlands. The prioritised characteristics are those that are expected to result in one or more welfare consequences with a high negative welfare impact (score of 5, 6 or 7 out of a maximum of 7) on an **individual** cat.

In cats, the external characteristics prioritised by experts relate to the limbs, the skull shape, the tail, the ears, and the coat (Table 9).

The **legs** are characterised by:

- dwarfism/ short-leggedness (front legs and hind legs),
- short and crooked front legs.

In the skull **shape**, the skull is:

- brachycephalic (short and wide).

The **tail** is different because it is:

- partly or completely missing.

Characteristics of **ears** are:

- forward-folded,
- backward-curled.

As regards **coat**, the characteristics are as follows:

- lack of coat,
- white coat (with 1 or 2 blue eyes),
- long (woolly) hair.

Table 9 provides an overview of the hazard inventory (the harmful external characteristics) and hazard characterisation (the welfare consequences that cats with the characteristic may experience). Of these welfare consequences, the impact (severity versus duration) on welfare and prevalence (the percentage of cats with the characteristic that suffer welfare impairment because of it) is shown. One impact score per welfare consequence was estimated by the experts. The prevalence shown refers to the occurrence of that welfare consequence with this specific impact score.

All nine prioritised characteristics have welfare consequences with a high welfare impact on individual animals. For **individual animals**, the highest welfare impact is caused by bone abnormalities due to short and crooked front legs, respiratory problems due to brachycephalic skull shape, physical problems due to abnormal tail, and osteochondrodysplasia related to forward-folded ears (Table 9). The welfare consequences of severe neck and back problems (due to dwarfism/ short-leggedness), reduced movement and behavioural limitations (due to short and crooked front legs) and eye and dental problems (due to brachycephalic skull shape) also score high (Table 9).

Table 9. Overview of the prioritised harmful external characteristics for cats with the associated welfare consequences, their estimated welfare impact and estimated prevalence and the resulting welfare effect when the cats have the characteristic. Ranked from highest to lowest (combined) welfare effect in the population of cats in the Netherlands by characteristic.

External characteristic	Welfare consequences	Welfare impact individual	Prevalence (%) in exposed population (distribution)	Welfare effect exposed population	Combined welfare effect exposed population
Short and crooked front legs	Bone abnormalities	7	100 (100-100)	7	
	Restricted locomotion	6	95 (90-100)	5.7	
	Behavioural limitations	6	95 (90-100)	5.7	
	Combined welfare effect				***18.4***
Brachycephalic skull shape ('short- snouted')	Dental problems	6	70 (35-80)	4.2	
	Eye problems	6	64 (50-78)	3.84	

	Breathing problems	7	50 (35-65)	3.5	
	Combined welfare effect				***11.54***
Backward-curled ears	Ear problems	5	55 (10-100)	2.75	
Dwarfism/ short-leggedness	Severe neck and back problems (clinical)	6	43 (20-80)	2.58	
Forward-folded ears	Osteochondrodysplasia (clinical)	7	30 (10-50)	2.1	
White coat (with 1 or 2 blue eyes)	Deafness	5	40 (20-60)	2	
Abnormal tails (partially or totally missing)	Physical problems	7	28 (13-50)	1.96	
Lack of coat	Skin problems	5	39 (28-50)	1.95	
Long (woolly) hair	Physical discomfort	5	20 (10-30)	1	

In order to compare in **the population of cats with the characteristic** the contribution of different welfare consequences due to harmful external characteristics, the impact of the welfare consequences has been multiplied by the prevalence (the share of cats with the characteristic that experiences the welfare impact). This is referred to as the welfare effect in this risk assessment. If more welfare consequences have been selected by the experts for a characteristic, the welfare effect of each individual welfare consequence has been added up (the combined welfare effect). The characteristics short and crooked front legs and a brachycephalic skull shape have the highest combined welfare effect. These characteristics can thus potentially contribute most to welfare reduction due to harmful external characteristics in the Dutch cat population. The top 5 individual welfare consequences with the highest welfare effect in the population are (Table 9):

- bone abnormalities, restricted locomotion and behavioural limitations due to shortened and crooked front legs
- dental problems and eye problems due to a brachycephalic skull shape

3.2.2 Exposure cats: the percentage of animals with harmful external characteristics

Reliable data on the actual numbers of cats in the Netherlands are hardly available. This risk assessment is based on an estimated population of 3 million cats in the Netherlands. Of the 3 million cats, eight out of ten are estimated to be random-bred cats (i.e. domestic shorthair/longhair cats) and two out of ten are selectively bred cats (i.e. non random-bred, or a combination of pedigree cats, look-alikes and their mixed breeds) (Figure 6). The exposure (the percentage of cats in the total cat population that have the characteristic) to the harmful external characteristics was estimated by the experts and is presented as percentages (Figure 7) and numbers of cats that have these characteristics (Table 10).

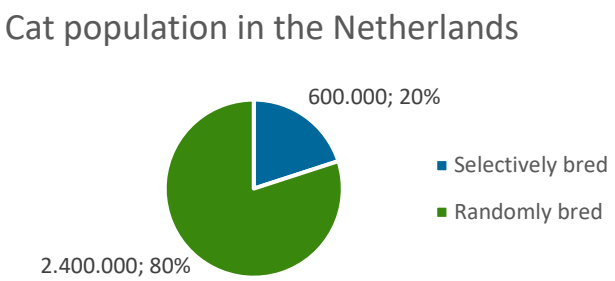

Figure 6 Estimated distribution of the cat population in the Netherlands in cats that are random-bred (house cat) or selectively bred (pedigree, look-alike or their cross breeds).

In cats, the most common harmful external characteristics are long (woolly) hair and a brachycephalic skull shape (Figure 7, Table 10). These are estimated to be 300,000 and 225,000 cats respectively. Harmful external characteristics prioritised by the experts, but currently absent or relatively limited in cats in the Netherlands, are a lack of coat, forward-folded ears, dwarfism/short-leggedness, abnormal tail shapes, backward-curled ears, and short and crooked front legs. Almost all prioritised characteristics are relatively more common in selectively bred cats (pedigree cats, look-alikes and their cross breeds), except for the white coat (with 1 or 2 blue eyes). This is unknown for the short and crooked front legs.

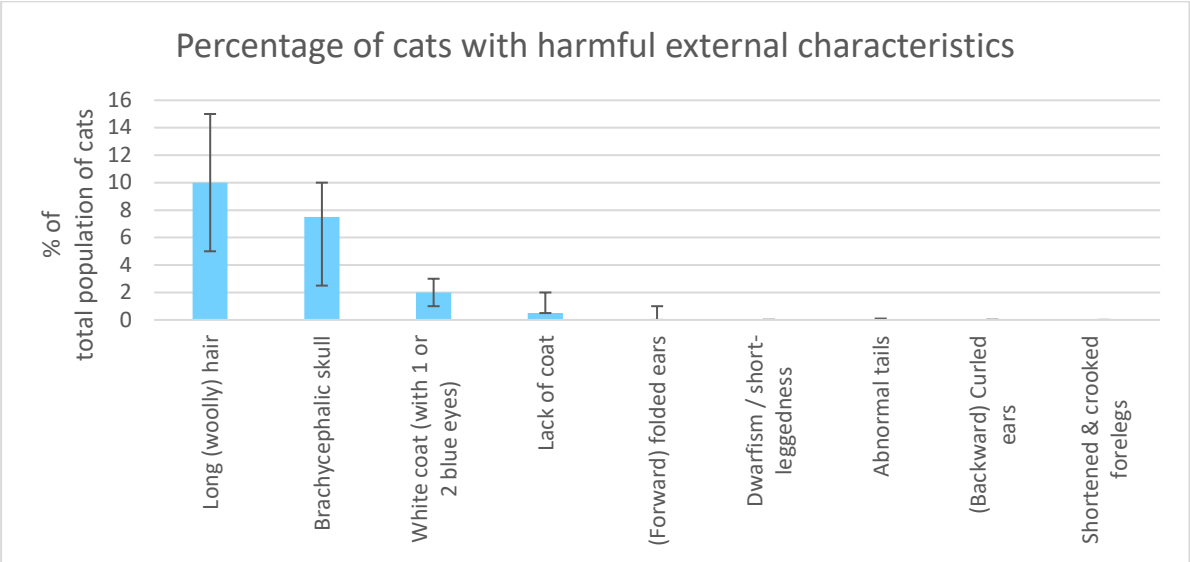

Figure 7. Estimated percentage of cats with a harmful external characteristic in the total cat population in the Netherlands. The error bar represents the distribution (/uncertainty).

In cats, the assessed external characteristics are not always caused by a single genetic variant. Some characteristics may arise from variation in multiple alleles within one gene, from variants in multiple genes, or from a combination of genetic factors. However, in the case of some harmful external characteristics in cats, one genetic variant makes an important contribution to the phenotype. This includes a white coat with one or two blue eyes, forward-folded ears and dwarfism/ short-leggedness. These characteristics can be inherited dominantly. This means that one copy of the genetic variant in question may already be sufficient for a characteristic to be expressed phenotypically and therefore become visible. The characteristic abnormal tails may also show dominant inheritance but can be caused by variants in different genes. There also appears to be dominant inheritance in backward-

curled ears, although the genetic background has been defined less unambiguously than in, for example, forward-folded ears.

For each harmful external characteristic, assuming a total population of 3 million cats, Table 10 shows whether the relative probability is (much) greater or (much) smaller in a given subpopulation. The current scientific knowledge on inheritance is summarised by characteristic in this table.

Table 10. Estimate of the number of cats per harmful external characteristic assuming a population of 3 million cats in the Netherlands, ranked from the most relevant to the least relevant. For each characteristic, it is indicated whether the relative probability is (much) greater (represented as > > or >) or (much) smaller (< or <) in animals that are random-bred (domestic cats) or selectively bred (pedigree, look-alikes or their cross breeds). The heritability of the characteristic is briefly summarised.

External characteristic	Number of animals (distribution)	Relative probability	Genetic inheritance
Long (woolly) hair	300,000 (150,000-450,000)	> selectively bred	Multiple variants of 1 gene, recessive (short hair is dominant), but this gene is not responsible for woolly hair, the genetic basis of which remains unclear
Brachycephalic skull shape ('short- snouted')	225,000 (75,000-300,000)	> selectively bred	Different candidate genes
White coat (with 1 or 2 blue eyes)	60,000 (30,000-90,000)	> random-bred	1 gene mutation, dominant
Lack of coat	15,000 (15,000-60,000)	> selectively bred	Multiple gene mutations are suspected, one of which has been confirmed
Forward-folded ears	1500 (0-30,000)	> selectively bred	1 dominant gene
Dwarfism/ short-leggedness	180 (0-300)	> selectively bred	1 gene mutation, dominant
Abnormal tails	30 (0-3000)	> selectively bred	Various gene mutations, of which 1 is fully dominant. The genetic cause is also unknown in some cases.
Backward-curled ears	9 (0-450)	> selectively bred	Multiple candidate genes, monogenic dominant
Short and crooked front legs	˜0	Not estimated	Possibly two gene mutations; recessive inheritance

3.2.3 Risk characterisation cats

The main welfare risks to the cat population in the Netherlands due to harmful external characteristics (Figure 8) are as follows, from the highest welfare risk to the relatively lower welfare risk based on the risk score:

1. brachycephalic skull shape ('short- snouted')

2. long (woolly) hair
3. white coat (with 1 or 2 blue eyes)
4. lack of coat
5. forward-folded ears
6. dwarfism/ short-leggedness
7. abnormal tails (partially or totally missing)
8. backward-curled ears
9. short and crooked front legs

The risk score is a quantitative measure of the animal welfare risk at population level, obtained by multiplying the (combined) welfare effect of a harmful external characteristic by the percentage of cats possessing the characteristic in the total population of cats (the level of presence = exposure) (see Annex B for further explanation of the risk score). There are relatively many cats with a brachycephalic skull shape, and they experience a high welfare burden because of it. Animals with this characteristic also experience multiple welfare consequences. Altogether, the brachycephalic skull shape is the highest estimated welfare risk in cats (Figure 8). There are also a relatively high number of cats with long (woolly) hair, but the welfare burden is relatively low. There are very few cats with short and crooked front legs, but the welfare burden of the animals that have this characteristic is very high.

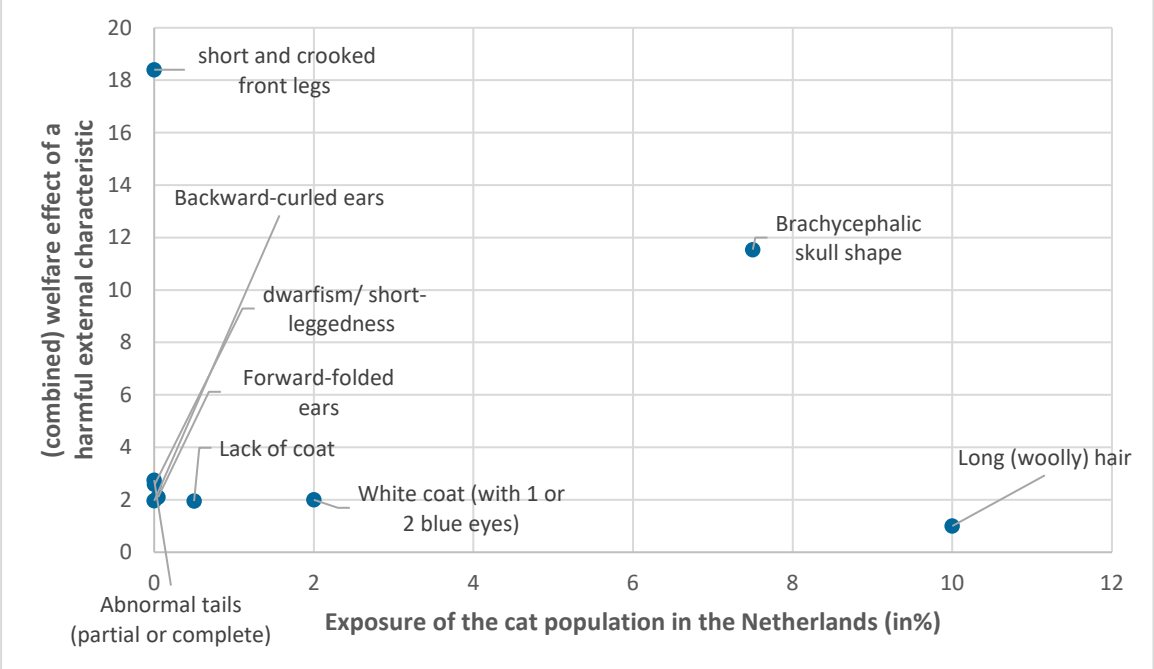

Figure 8. Risk matrix of the most relevant estimated harmful external characteristics in cats. The y-axis shows the (combined) welfare effect. This indicates the extent to which welfare is reduced by a harmful external characteristic within the population of cats exhibiting that characteristic. The x-axis shows the exposure (%) to the characteristic. This indicates the proportion of cats with the harmful external characteristic within the total cat population in the Netherlands.

It is estimated that there are currently more random-bred cats in the Netherlands than selectively bred cats (with pedigree, look-alike without pedigree and their cross breeds). The prioritised harmful external characteristics appear to be particularly prevalent in the selectively bred cats.

4 Welfare indicators

Animal-based indicators provide information on the state of the animal and can thus provide insight into the effects of circumstances, hazards or management factors on specific aspects of animal welfare. They provide insights into loss of function due to trauma or disease, into needs and affective states such as pain, and into physiological or behavioural responses to stressors (EFSA Panel on AHAW, 2012a). Harmful external characteristics in dogs and cats have an impact on the welfare of the animals concerned. This impact can be measured by indicators that reflect the burden of the welfare consequences resulting from the harmful external characteristics. Indicators for both dogs and cats have been found in the literature (see Annex A and Annex B). These indicators often lack validation, standardisation and established thresholds for identifying and quantifying welfare impacts due to harmful external characteristics. Some indicators, such as lameness or breathing sounds at rest, show a deviation from normal functioning. Not every animal with a particular external characteristic automatically experiences welfare consequences in the same way; there is individual variation. This variation is due to variation in the severity of the characteristic (for example, the degree of narrowing of the nostrils in a short- snouted dog or cat) and expression (for example, whether or not there are clinical signs due to abnormal spinal vertebrae in dogs with a corkscrew tail or cats with an abnormal tail). Moreover, the presence of any other characteristics plays a role and other factors, such as obesity, can amplify the impact on welfare. When assessing the welfare impact of harmful external characteristics on an individual animal, standardised and validated animal-based indicators can be valuable. They provide insight into the extent of deviation from normal behaviour and physiology of dogs and cats due to (breeding for) external characteristics, and can inform policy development and enforcement.

5 Uncertainty analysis

The risk assessments for both dogs and cats are methodologically and substantively grounded in science and provide sufficient information to estimate the welfare risks of the prioritised harmful external characteristics. The uncertainty of the welfare risks is mainly quantitative in nature, due to the lack of Dutch data on how often the external characteristics and welfare consequences occur and how severe the welfare consequences are. However, based on this risk assessment, it is highly certain that the assessed external characteristics have a negative impact on the welfare of both dogs and cats. Only external characteristics with a high estimated welfare impact have been prioritised for further risk assessment. Other external characteristics, not assessed here, may also be relevant for the welfare of dogs and cats, especially if there is a wide presence of such characteristics in the dog or cat population. Moreover, for each welfare consequence, only the most relevant impact score was taken into account in the risk assessment. This leads to an underestimation of the actual welfare burden, as some animals may also experience a lower or higher impact. These are then not included in the prevalence and exposure assessments, so the risk is underestimated.

Estimates are always subject to some degree of uncertainty. Currently, the animal welfare risk assessment relies on data and information from scientific literature that do not always reflect conditions in the Netherlands, as well as grey literature and expert estimates. The methods used to perform a risk assessment and include expert estimates are based on the practice of the European Food Safety Authority (EFSA). The experts are relatively certain that the prioritised external characteristics are associated with health and welfare problems in dogs and cats.

The uncertainty in the extent of the presence of the welfare consequences and the degree of exposure to the external characteristics is visible in the range of the expert estimates (see Annex C and Annex D for further information). For all these estimates, the experts were more certain than uncertain and even certain to very certain about the percentage of dogs and cats with the characteristic in the total population of animals in the Netherlands (exposure).

Uncertainties can be partially addressed by conducting robust research with systematically collected phenotypic and genotypic data from dogs and cats in the Netherlands, similar to the research of

Anderson et al. (2022). Such research would clarify the occurrence of external characteristics in dogs and cats in the Netherlands, including the actual size of and trends in the population at risk, as well as the extent to which these characteristics are associated with animal welfare and health. In particular, the relationship between external characteristics and behaviour is underexplored, while limiting behavioural manifestations by an external characteristic can make a substantial contribution to reduced animal welfare. It is also important to examine objectively scientifically validated limits in relation to welfare for external characteristics that may become increasingly extreme or are influenced by, for example, obesity.

6 Discussion and conclusion: dogs and cats

Harmful external characteristics arise when selective breeding of dogs or cats results in a phenotype that impedes physiology and/or behaviour. Currently, there is a broad consensus in scientific literature and among experts that harmful external characteristics significantly reduce the welfare of dogs and cats due to their high welfare impact. These risk assessments show that for both dogs and cats in the Netherlands, a brachycephalic skull shape causes the greatest welfare impairment. In addition, eight further harmful external characteristics with a high impact on the welfare of affected animals have been prioritised for each species. If characteristics are currently not common in dogs and cats in the Netherlands (low exposure), the welfare risk for the Dutch dog or cat population is low. Given the nature and presence of the prioritised harmful external characteristics in the dog and cat population, it is important to develop a more mitigating approach in dogs and a more preventive approach in cats. An assessment framework for external characteristics, including a reference framework for the physiology and behaviour of dogs and cats, is indispensable.

Accumulation of welfare risks by combining harmful external characteristics

Harmful external characteristics are diverse and the level of impairment of animal welfare is variable (for example, different during exertion and at rest). In addition, harmful external characteristics may be breed-dependent and breed-independent. Some dogs and cats will have multiple harmful external characteristics at the same time and will therefore experience multiple welfare consequences associated with those characteristics. For example, abnormal eyelid positions are common in short-snouted (brachycephalic) dogs, and a cat can have both a brachycephalic skull shape and long (woolly) hair. Risk accumulation is therefore plausible, but it is not clear how this translates into the level of welfare burden experienced by an individual animal or within a population of animals.

Intrinsic value, needs and integrity of dogs and cats

Animals have intrinsic value. This is laid down in Article 1.3 of the Animals[21] Act and means that the intrinsic value of the animal must be taken into account in any balancing of interests (Berkhout et al., 2020). Individual animals have interests primarily in their own welfare from the moment they come into existence. The conservation of breeds therefore appears to be based primarily on human values and preferences, rather than on the interests of the animals themselves (Sandøe et al., 2015). The fact that animals are valuable in their own right calls for respect for their integrity. This means respect for the animal's wholeness, its species-specific needs and characteristics, and its ability to function independently in a suitable environment. This responsibility goes beyond the prevention of discomfort: even physical characteristics that do not pose a direct risk to welfare require ethical justification if they are not in the animal's own best interests (Van Hagen & De Gier, 2018). BuRO's literature review, carried out as part of these risk assessments, revealed that scientific research into the relationship between external characteristics and the welfare and health of dogs and cats has focused primarily on health and less on the consequences for the expression of species-specific behaviour or integrity. Further research is needed in this area.

[21] Animal Act – Lawned on 27/08/2025

Market dynamics

Consumer demand for dogs with 'special' but harmful external characteristics seems to continue. Currently, harmful characteristics are already widely represented in the Dutch dog population, requiring a mitigating approach to reduce the existing welfare burden and to do justice to the intrinsic value of the animal. Besides this, preventive measures remain important in order to prevent a further increase in problems or the spread of new characteristics.

The Dutch cat population currently consists mainly of domestic cats (random-bred), but there are indications that demand for cats with specific external characteristics (selectively bred, not random-bred) is increasing, creating a chance that these or new harmful external characteristics will become more common in the cat population. By taking measures now, it is possible to prevent the increase of harmful characteristics within the cat population and to ensure that future generations of cats are protected from severe suffering. A more preventive approach is therefore appropriate for cats.

Inheritance of harmful external characteristics

The inheritance patterns of genetic variants involved in the assessed harmful external characteristics is often complex and not fully understood for all characteristics. For a number of assessed characteristics, one genetic variant with a dominant effect has been identified that makes a significant contribution to the phenotype (appearance/external characteristic). In such cases, depending on the penetrance and expressivity of the genetic variant, it may theoretically be easier to quantify the probability that offspring exhibit the harmful external characteristic, which is relevant for estimating population-level risks. This includes, in the case of dogs, the homozygous merle genotype (double merle coat colour) and a corkscrew tail, and in the case of cats, a white coat with one or two blue eyes, forward-folded ears and dwarfism/ short-leggedness. For these characteristics in cats, the presence of one copy (allele) of the respective gene variant may already result in the expression of the characteristic, although the severity and thus welfare impact of the welfare consequences may differ from one individual to another. For some of the characteristics, the genetic nature is known and in some cases valid genetic tests are available (Embark Veterinary Inc., 2024). For characteristics with a more complex genetic background, such as brachycephalic skull shapes in dogs and cats or a very small body (< 3 kg) in dogs, it is expected to be more difficult to target these characteristics through selection within the breed. This is because these characteristics may be influenced by multiple genetic factors and may moreover be part of the external phenotype selected. An appropriate selection strategy depends on the genetic background of the characteristic and should be population-specific, while preserving genetic diversity (Broeckx, 2020).

Welfare indicators of harmful external characteristics

All the harmful external characteristics assessed here are visible on the dog or cat (body shapes, colour, coat), but the resulting welfare consequences (harmfulness) are not always visible at a glance. For each harmful external characteristic, various animal-based welfare indicators have been identified that can provide information on the harm to animal welfare (see Annex A and Annex B). These can contribute to the further development of possible criteria for supervision to be developed. In the context of policy development, it is also essential to establish clear definitions and verifiable limits for each characteristic. Binary characteristics are relatively easy to delineate, continuous characteristics such as skin folds/excess skin in dogs require additional studies to establish a substantiated limit value. Also, the relationship between an external characteristic and the welfare effect on the animal is not always linear or direct. This calls for an explicit consideration of what degree and probability of welfare impairment is still considered acceptable and from what point the risk to animal welfare of a characteristic as such is considered to be so high that it should no longer be permissible. The Council for Animal Affairs (RDA) balancing framework for breeding may provide guidance (RDA, 2016).

Monitoring of (external) characteristics in dogs and cats

Up-to-date population data on dogs and cats can provide insights into the composition of the population and the welfare problems associated with harmful external characteristics and body type. If data such as weight, hair length, leg length, and presence and impact of welfare problems are recorded, trend analyses can predict the impact on future generations. This allows for a proactive rather than reactive approach to population composition shifts, such as the emergence of (new) designer mixed breeds (O'Neill et al., 2023) or a population shift to selectively bred cats (purebred)(Cats Protection, 2025). There is a need for large-scale studies that systematically collect both phenotypic and genotypic data from dogs and cats in the Netherlands, similar to the investigation of Anderson et al. (2022) ideally combined with systems such as VetCompass (pet health surveillance in the United Kingdom) (RVC, 2026) and PETscan (Utrecht University's diagnostic recording system) (Expertisecentrum Genetica, 2026). Population data, registration and an up-to-date welfare monitoring system are essential for effective monitoring and risk-based policy development.

The added value of an assessment framework for reducing welfare risks

Despite broad public attention, objective criteria to properly identify, define and determine the impact on animal welfare are often lacking. The exception to this is the established criteria for brachycephaly in (short- snouted) dogs for the purposes of a breeding ban. Similarly, the recently adopted ban on keeping cats with folded-forward ears and hairless cats concerns two characteristics that can be defined relatively easily. However, most of the harmful external characteristics are continuous (vary in degree of presence) and therefore cannot be unambiguously identified as binary (present or absent). The degree of extremeness of a characteristic, as assessed under the policy rule for brachycephalic dogs[9] (including substantiation from Utrecht University), will have to be combined with the severity of the welfare impairment. The extremeness of a characteristic becomes meaningful only in relation to the welfare impairment it causes. Developing an assessment framework is essential to establish the link between external characteristics, the degree of extremeness of the characteristic and the impact on animal welfare, to ensure that breeding takes place within the legal frameworks. This is also essential in the development of the ban on keeping and displaying. Such a framework can be used to systematically assess whether each characteristic, considered individually or in combination with other characteristics, results in an unacceptable risk to the animal's welfare, health or integrity. The assessment framework should be based on a reference framework defining, for each animal species, the anatomical structures, physical functions and behavioural manifestations that are necessary to ensure optimal physiological and behavioural functioning and good welfare. Research and development of validated and animal-based welfare indicators, aiming at optimal physiological and behavioural performance for specific harmful external characteristics, are indispensable for this purpose. In particular, the relationship between external characteristics and the possible consequences for showing species-specific behaviour is currently underexplored. This appears to be reflected in the prioritisation of the welfare consequences, most of which concern physical or health problems. Although external characteristics that restrict the expression of behaviour, such as reducing activity or play, can substantially impair animal welfare, scientific research on the relationship between behaviour and harmful external characteristics is very limited.

It is appropriate to prioritise the development of assessment frameworks based on the risks identified in this risk assessment. Finally, an assessment framework should ideally take into account the presence of multiple harmful external characteristics at the same time and the resulting cumulative harm to welfare.

Research Agenda

This report is limited to assessing the risks associated with harmful external characteristics in dogs and cats. Breeding for external characteristics also increases the prevalence of non-visible hereditary diseases (diseases or internal anatomical abnormalities) in dogs and cats that also significantly affect animal welfare. Genetically inherited diseases related to external characteristics with possible

negative welfare effects also occur in other animals such as rabbits and rodents, fish, birds and reptiles (LICG, 2026). The systematic approach to risk assessment used in this report a framework for identifying and prioritising these welfare risks and supporting well-founded, targeted policy choices.

7 References

Ackerman LJ, 2021. Pet-specific care for the veterinary team. John Wiley & Sons, Inc., Hoboken, NJ. Available online: https://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=2878821

Addley E, 2024. Taylor Swift's cats have condition that causes constant pain, say experts. The Guardian.

All-Party Parliamentary Group for Animal Welfare (APGAW), 2026a. APGAW Innate Health Assessment (IHA) [Web page]. Available online: https://www.innatehealthassessment.org/ [Accessed: 2026-02-03].

All-Party Parliamentary Group for Animal Welfare (APGAW), 2026b. Which IHA do you need? [Web page]. Available online: https://www.innatehealthassessment.org/take-the-iha [Accessed: 2026-06-26].

Anderson H, Davison S, Lytle KM, Honkanen L, Freyer J, Mathlin J, Kyöstilä K, Inman L, Louviere A, Chodroff Foran R, Forman OP, Lohi H & Donner J, 2022. Genetic epidemiology of blood type, disease and trait variants, and genome-wide genetic diversity in over 11,000 domestic cats. PLoS Genet, 18 (6), e1009804. Available online: https://doi.org/10.1371/journal.pgen.1009804

Asher L, Diesel G, Summers JF, McGreevy PD & Collins LM, 2009. Inherited defects in pedigree dogs. Part 1: Disorders related to breed standards. Veterinary Journal, 182 (3), 402-411. Available online: https://doi.org/10.1016/j.tvjl.2009.08.033

Bannasch DL, Baes CF & Leeb T, 2020. Genetic Variants Affecting Skeletal Morphology in Domestic Dogs. 36 (8), 598-609. Available online: https://utrechtuniversity.on.worldcat.org:443/atoztitles/link?sid=google

Batcher K, Dickinson P, Giuffrida M, Sturges B, Vernau K, Knipe M, Rasouliha SH, Drögemüller C, Leeb T, Maciejczyk K, Jenkins CA, Mellersh C & Bannasch D, 2019. Phenotypic Effects of FGF4 Retrogenes on Intervertebral Disc Disease in Dogs. Genes (Basel), 10 (6). Available online: https://doi.org/10.3390/genes10060435

Bellamy KKL & Lingaas F, 2020. Short and sweet: foreleg abnormalities in Havanese and the role of the FGF4 retrogene. Canine Med Genet, 7 (1), 19. Available online: https://doi.org/10.1186/s40575-020-00097-5

Berkhout B, Sloover IS, Wierenga W, Starmans E, van Baardewijk S & van Dam F, 2020. Evaluatie van de Wet dieren. Berenschot. Available online: https://zoek.officielebekendmakingen.nl/blg-956539.pdf

Blokhuis H, Miele M, Veissier I & Jones B, 2023. Improving farm animal welfare: Science and society working together: the Welfare Quality approach. Wageningen Academic. Available online: https://brill.com/view/title/68852

Bognár Z & Kubinyi E, 2023. The brachycephalic paradox: The relationship between attitudes, demography, personality, health awareness, and dog-human eye contact. Applied Animal Behaviour Science, 264. Available online: https://doi.org/10.1016/j.applanim.2023.105948

Bongers K & Ruitenburg K, 2024. Hé, is deze hond wel oké? Gedragsonderzoek naar het aanschaffen, houden en fokken van kortsnuitige honden. Inspire to act.

Broeckx BJG, 2020. The dog 2.0: Lessons learned from the past. Theriogenology, 150, 20-26. Available online: https://doi.org/https://doi.org/10.1016/j.theriogenology.2020.01.043

Bryson GT, O'Neill DG, Brand CL, Belshaw Z & Packer RMA, 2024. The doodle dilemma: How the physical health of 'Designer-crossbreed' Cockapoo, Labradoodle and Cavapoo dogs' compares to their purebred progenitor breeds. PLoS ONE, 19 (8). Available online: https://doi.org/10.1371/journal.pone.0306350

Buckland EL, Corr SA, Abeyesinghe SM & Wathes CM, 2014. Prioritisation of companion dog welfare issues using expert consensus. Animal Welfare, 23 (1), 39-46. Available online: https://doi.org/10.7120/09627286.23.1.039

BuRO, 2024. Onderbouwing risicobeoordeling roodvleesketen hoofdstuk 11 Diergezondheid. Available online: https://www.nvwa.nl/site/binaries/site-content/collections/documents/dierenwelzijn/welzijn/publicaties/onderbouwing-risicobeoordeling-roodvlees--en-grofwildketen/onderbouwing-hoofdstuk-11-diergezondheid.pdf

Cats Protection, 2025. Cats Report: Cats and Their Stats UK 2025. Available online: https://www.cats.org.uk/media/onnnmi1h/cats-report-uk-2025_digital.pdf

Collins LM, Asher L, Summers J & McGreevy P, 2011. Getting priorities straight: Risk assessment and decision-making in the improvement of inherited disorders in pedigree dogs. Veterinary Journal, 189 (2), 147-154. Available online: https://doi.org/10.1016/j.tvjl.2011.06.012

EFSA, 2014. Guidance on Expert Knowledge Elicitation in Food and Feed Safety Risk Assessment. EFSA Journal, 12 (6), 3734. Available online: https://doi.org/https://doi.org/10.2903/j.efsa.2014.3734
EFSA Network on Risk Assessment in Animal Health and Welfare, 2024. Minutes of the 23rd meeting of the AHAW Network (AW topic) [Web page]. Available online: https://www.efsa.europa.eu/en/events/23rd-meeting-scientific-network-risk-assessment-animal-health-and-welfare-aw-topic [Accessed: 2026-03-02].
EFSA Panel on AHAW, 2007. Animal health and welfare aspects of different housing and husbandry systems for adult breeding boars, pregnant, farrowing sows and unweaned piglets - Scientific Opinion of the Panel on Animal Health and Welfare. EFSA Journal. 1831-4732. 572 pp. Available online: https://doi.org/https://doi.org/10.2903/j.efsa.2007.572
EFSA Panel on AHAW, 2012a. Guidance on Risk Assessment for Animal Welfare. EFSA Journal, 10 (1). Available online: https://doi.org/10.2903/j.efsa.2012.2513
EFSA Panel on AHAW, 2012b. Scientific Opinion on the welfare of cattle kept for beef production and the welfare in intensive calf farming systems. EFSA Journal. 18314732. 2669 pp. Available online: https://doi.org/10.2903/j.efsa.2012.2669
EFSA Scientific Committee, 2018a. The principles and methods behind EFSA's Guidance on Uncertainty Analysis in Scientific Assessment. EFSA Journal, 16 (1), e05122. Available online: https://doi.org/https://doi.org/10.2903/j.efsa.2018.5122
EFSA Scientific Committee, 2018b. Guidance on Uncertainty Analysis in Scientific Assessments. EFSA Journal, 16 (1), e05123. Available online: https://doi.org/https://doi.org/10.2903/j.efsa.2018.5123
Embark Veterinary Inc., 2024.]. Available online: https://embarkvet.com/physical-traits-list/ [Accessed: 23-09-2024].
Eurogroup for Animals, 2023. Extreme breeding in Europe - Mapping of legislation.
Expertisecentrum Genetica, 2026. Petscan [Web page]. Available online: https://www.uu.nl/onderzoek/expertisecentrum-genetica-diergeneeskunde/diensten/petscan [Accessed: 2026-02-02].
Expertisecentrum Genetica Diergeneeskunde, 2025. Rapportage Nederlandse honden- en kattenrassen in de PetScan database. Universiteit Utrecht, Utrecht.
FCI, 2025. Website van de Fédération Cynologique Internationale (FCI) [Web page]. Available online: https://www.fci.be/en [Accessed: 29-08-2025].
FIFe, 2025. Website van de Fédération Internationale Féline (FIFe) [Web page]. Available online: https://fifeweb.org [Accessed: 29-08-2025].
FNK, 2025. Over de FNK Federatie Nederlandse Katten verenigingen [Web page]. Available online: http://www.f-n-k.nl/nl/fnk_nl_index.html [Accessed: 29-08-2025].
Gardeweg SMA, van Herwijnen IR, Vinke CM & Hartman D, 2025. Designer breed dogs (canis lupus familiaris) with aggression and hyperactivity. Veterinary Record Case Reports, 13 (2), e70048. Available online: https://doi.org/https://doi.org/10.1002/vrc2.70048
Gough A, Thomas A & O'Neill D, 2018. Breed predispositions to disease in dogs and cats. John Wiley & Sons. Available online: https://dlib.scu.ac.ir/bitstream/Hannan/236053/1/9781119225546.pdf
LICG, 2026. Erfelijke aandoeningen [Web page]. Available online: https://www.licg.nl/erfelijke-aandoeningen/ [Accessed: 2026-02-02].
Lyons LA, 2012. Chapter 43 - The Feline Genome and Clinical Implications. In: Little SE (ed.), The Cat. W.B. Saunders, Saint Louis, pp. 1263-1269.
Lyons LA & Kurushima JD, 2012. Chapter 42 - A Short Natural History of the Cat and Its Relationship with Humans. In: Little SE (ed.), The Cat. W.B. Saunders, Saint Louis, pp. 1254-1262.
Morel E, Malineau L, Venet C, Gaillard V & Péron F, 2024. Prioritization of Appearance over Health and Temperament Is Detrimental to the Welfare of Purebred Dogs and Cats. Animals, 14 (7). Available online: https://doi.org/10.3390/ani14071003
Nicholas FW, Tammen I & Sydney Informatics Hub, 2013. OMIA:000975-9685 : Tail, short in Felis catus (domestic cat). Available online: https://omia.org/OMIA000975/9685/
Nicholas FW, Tammen I & Sydney Informatics Hub, 2024. OMIA:001551-9615 : Brachycephaly in Canis lupus familiaris (dog). Available online: https://omia.org/OMIA001551/9615/
Nicholas FW, Tammen I & Sydney Informatics Hub, 2025. Online Mendelian Inheritance in Animals (OMIA). Available online: https://omia.org/
NVWA, 2024a. Specifiek interventiebeleid NVWA Dierenwelzijn. Available online: https://www.nvwa.nl/ondernemers/toezicht-maatregelen-en-boetes/interventiebeleid
NVWA, 2024b. Inspectieresultaten dierenwelzijn [Web page]. Available online: https://www.nvwa.nl/onderwerpen/dier/dieren-houden-en-verzorgen/inspectieresultaten/2024/honden-en-katten [Accessed: 09-03-2026].

O'Neill DG, McMillan KM, Church DB & Brodbelt DC, 2023. Dog breeds and conformations in the UK in 2019: VetCompass canine demography and some consequent welfare implications. PLoS ONE, 18 (7), e0288081. Available online: https://doi.org/10.1371/journal.pone.0288081
Packer RMA, O'Neill DG, Fletcher F & Farnworth MJ, 2019. Great expectations, inconvenient truths, and the paradoxes of the dog-owner relationship for owners of brachycephalic dogs. PLoS ONE, 14 (7). Available online: https://doi.org/10.1371/journal.pone.0219918
Packer RMA, Wade A & Neufuss J, 2024. Nothing Could Put Me Off: Assessing the Prevalence and Risk Factors for Perceptual Barriers to Improving the Welfare of Brachycephalic Dogs. pets, 1 (3), 458-484. Available online: https://www.mdpi.com/2813-9372/1/3/32
Proschowsky HF, Arendt ML, Bonnett BN, Bruun CS, Czycholl I, Fredholm M, O'Neill D, Serpell JA & Sandøe P, 2025. A new future for dog breeding. Anim Welf, 34, e1. Available online: https://doi.org/10.1017/awf.2024.66
Puppyplaats, 2024. Brancherapport Honden 2023. https://www.puppyplaats.nl/huisdier-advies/brancherapport-honden-2023.html pp.
Raad van Beheer, 2025a. Over de Raad van Beheer [Web page]. Available online: https://www.houdenvanhonden.nl/over-ons/over-de-raad-van-beheer/ [Accessed: 27-08-2025].
Raad van Beheer, 2025b. De Raad van Beheer [Web page]. Available online: https://www.houdenvanhonden.nl/ [Accessed: 29-08-2025].
Raad van Beheer, 2026. Alle hondenrassen op een rij [Web page]. Available online: https://www.houdenvanhonden.nl/hondenrassen/ [Accessed: 2026-02-02].
RDA, 2016. Zienswijze 'Fokkerij en voortplantingstechnieken. Available online: https://www.rda.nl/documenten/2016/02/29/zienswijze-fokkerij-en-voortplantingstechnieken-uitgebreid-verslag-pdf
RDA, 2026. Denkkader RDA: Centrale begrippen rond dierenwelzijn. Available online: https://www.rda.nl/documenten/2026/02/09/denkkader-rda
Rioja-Lang F, Bacon H, Connor M & Dwyer CM, 2019. Determining priority welfare issues for cats in the United Kingdom using expert consensus. Veterinary Record Open, 6 (1), e000365. Available online: https://doi.org/https://doi.org/10.1136/vetreco-2019-000365
Rioja-Lang F, Bacon H, Connor M & Dwyer CM, 2020. Prioritisation of animal welfare issues in the UK using expert consensus. Veterinary Record, 187 (12), 490. Available online: https://doi.org/10.1136/vr.105964
Roberts C, Foreman-Worsley R, O'Neill DG & McDonald JL, 2025. A framework to refocus the conversation around the welfare of UK purebred cats. Animal Welfare, 34, e76. Available online: https://doi.org/10.1017/awf.2025.10051
RVC, 2026. Overview of Veterinary Companion Animal Surveillance System (VetCompass™) [Web page]. [Accessed: 2026-02-02].
Sandøe P, Corr S & Palmer C, 2015. Companion animal ethics. John Wiley & Sons.
Silversides DW, 2025. The brave new world of clinical veterinary genetics. Canadian Veterinary Journal, 66 (2), 210-212.
TICA, 2025. Website van de International Cat Association (TICA) [Web page]. Available online: https://tica.org/ [Accessed: 29-08-2025].
Van Hagen MAE & De Gier J, 2018. Deskundigenverklaring: Fokken van designerkatten als de Bambino Sphynx. Faculteit Diergeneeskunde, Universiteit Utrecht. Available online: https://www.uu.nl/sites/default/files/deskundigenverklaring_bambino_sphynx_nvwa_de_gier_en_van_hagen_2018.pdf
Voogt AM, Ursinus WW, Sijm DTHM & Bongers JH, 2023. From the Five Freedoms to a more holistic perspective on animal welfare in the Dutch Animals Act. Frontiers in Animal Science, Volume 4 - 2023. Available online: https://doi.org/10.3389/fanim.2023.1026224
Weir S & Kessler SE, 2022. The making of a (dog) movie star: The effect of the portrayal of dogs in movies on breed registrations in the United States. PLoS ONE, 17 (1), e0261916. Available online: https://doi.org/10.1371/journal.pone.0261916

8 Annexes

Annex A. Risk assessment of harmful external characteristics in dogs
Annex B. Risk assessment of harmful external characteristics in cats
Annex C. Technical report expert session dogs
Annex D. Technical report expert session cats
Annex E. Glossary