

Advice of the Brussels Animal Welfare Council (21/06/2018)

Concerning a ban on the breeding of Fold cats due to congenital osteochondrodysplasia

The increasingly popular cat breed "Scottish Fold", has a characteristic appearance with slightly short and forward folded ears, flattened against the round head. This appearance is caused by a genetic mutation that affects the development of the cartilage. Unfortunately, this genetic defect does not only cause abnormality in the ear cartilage, but also serious cartilage abnormalities in the rest of the skeleton, which in many cases leads to pain and chronic joint inflammation (arthritis). The scientific name for this hereditary (congenital) abnormality is osteochondrodysplasia.

The Brussels Animal Welfare Council studied this issue in detail at the beginning of 2018, in order to assess whether Scottish Fold cats should be considered as animals with an inherited disorder whose breeding should therefore be prohibited, in accordance with Art. 19 paragraph 2 of the Royal Decree (RD) of 27 April 2007¹.

Content of discussions:

The Scottish Fold (and the long-haired variant called Highland Fold) originated in Scotland around 1961 and was further developed in the United States in the 1970s. Early scientific research into the genetic basis of the typical breed traits identified the genetic anomaly - a naturally occurring mutant variant of the Fold gene - as dominant. The genetic sequence of the Fold gene was not identified until 2016 (Gandolphi et al. 2016²) and therefore a genetic test has only very recently become available. The initial assumption was that the mutation had full penetrance; meaning that it was previously thought that all individuals in which one of the two copies (alleles) of the Fold gene was mutant (heterozygotes), would develop folded ears and osteochondrodysplasia. However, the ears are not yet folded at birth. They usually start folding at the age of three to four weeks, but sometimes the fold disappears again. In the latter case, the result is a cat with upright ears, which is then called Scottish Straight.

This is due to the incomplete penetrance of the mutation, which was demonstrated in later research (Malik et al. 1999³ and Takanosu et al., 2008⁴). This means that (a) the offspring of a cross of a Scottish Fold with one mutant copy of the Fold gene (heterozygous carrier) with a cat having upright ears (of another breed) are heterozygous in 50% of the cases and (b) these heterozygotes may or may not develop osteochondrodysplasia to varying degrees.

Given the incomplete penetrance of the mutation, some of these heterozygous offspring may have upright ears (and thus be called Scottish Straight), but they can pass on the mutation responsible for the folded ears, as well as the risk of osteochondrodysplasia, to the next generation.

¹ Royal Decree of 27 April 2007 on licencing conditions for establishments for animals and the conditions for the trade of animals.

² Gandolphi, B., Alamri, S., Darby, W.G., Adhikari, B., Lattimer, J.C., Malik, R., Wade, C.M., Lyons, L.A., Cheng, J., Bateman, J.F., McIntyre, P., Lamandé, S.R., Haase, B. (2016). A dominant TRPV4 variant underlies osteochondrodysplasia in Scottish Fold cats. *Osteoarthritis Cartilage* 24 (8), 1441-1450.

³ Malik, R., Allan, G.S., Howlett, C.R., Thompson, D.E., James, G., Mc Whirter, C. Kendall, K. (1999) Osteochondrodysplasia in Scottish Fold cats. *Australian Veterinary Journal* 77 (2), 85-92.

⁴ Takanosu, M., Takanosu, T., Suzuki, H., Suzuki, K. (2008) Incomplete dominant osteochondrodysplasia in heterozygous Scottish Fold cats. *Journal of Small Animal Practice* 49(4),197-199.

In osteochondrodysplasia, cartilage develops abnormally as the cat grows. As a result, the tail vertebrae can visibly thicken and become stiff, the front and hind legs can become bent (twisted) and thicken, and the joints can develop abnormally (Aydin et al. 2015⁵, Langley-Hobbs 2012⁶, Vella et al. 1999⁷, and Chang et al. 2007⁸ and Matthews et al. 1995⁹ in UFAW 2011¹⁰). The symptoms associated with this osteochondrodysplasia are similar to those of arthritis, where the joints are chronically inflamed. Moving becomes difficult and painful and in severe cases the cats are crippled. The condition is progressive and incurable (UFAW 2011).

Due to the above mentioned health problems, the affected cats are not free of discomfort, not free of pain and disease and not free to display their natural behaviour. This violates the five freedoms formulated by the Brambell Committee (Brambell 1965¹¹), that define animal welfare. Skeletal abnormalities can also be considered as an infringement on the integrity of the animal, and thus as a lack of respect for the intrinsic value of the animal. This is also a factor leading to questions about the ethics or morality of the "use" (including breeding) of animals with abnormalities (RDA 2015¹², Verhoog 1992¹³).

From the 1970s the Scottish Fold was recognised as a breed by some breed cat associations in the United States, such as the "Cat Fanciers Association"¹⁴ and thereafter "The International Cat Association"¹⁵. Later, due to health problems, more and more (international) cat associations stood against the breeding of the Scottish Fold. This was done by welfare associations such as "International Cat Care"¹⁶ but also by breeding associations, such as the "Fédération Internationale Féline" (FIFe, a worldwide umbrella organisation of local breeding associations). FIFe¹⁷'s regulations governing the breeding and registration of cats state that no cat breed suffering from osteochondrodysplasia (such as the Scottish Fold) will be recognised, and that no cat with osteochondrodysplasia, or with a pedigree containing osteochondrodysplasia, is permitted in breeding.

⁵ Aydin, D., Altunatmaz, K., Olgün Erdikmen, D., Özer, K., Durmus, D., Avanus, K. (2015). Hereditary Osteochondrodysplasia in Scottish Fold Cats. *Kafkas Universitesi Veteriner Fakültesi Dergisi* 21 (4), 463-469.

⁶ Langley-Hobbs, S. (2012). Musculoskeletal oddities in the cat: overview of some curious causes of lameness. *Journal of Feline Medicine and Surgery* 14,31-42.

⁷ Vella, C.M., Shelton, L.M., McGonagle, J.J., Stanglein, T.W. (1999). *Robinson's Genetics for Cat Breeders & Veterinarians* (4th edition).

⁸ Chang, J., Jung, J., Oh, S., Lee, S., Kim, G., Kim, H., Kweon, O., Yoon, J., Choi, M. (2007). Osteochondrodysplasia in three Scottish Fold cats. *Journal of Veterinary Science* 8, 307-309.

⁹ Mathews, K.G., Koblik, P.D., Knoeckel, M.J., Pool, R.R., Fyfe J.C. . (1995). Resolution of lameness associated with Scottish Fold osteodystrophy following bilateral ostectomies and pantarsal arthrodeses: a case report. *Journal of the American Animal Hospital Association* 31, 280-288.

¹⁰ UFAW (Universities Federation for Animal Welfare). (2011). <https://www.ufaw.org.uk/cats/scottish-fold-osteochondrodysplasia#clinical>. Consulted 25/04/2018.

¹¹ Brambell, F.W.R. (1965). Report of the Technical Committee to Enquire into the Welfare of Animals kept under Intensive Livestock Husbandry Systems. Her Majesty's Stationery Office, London, UK.

¹² RDA (Dutch Council on Animal Affairs). (2015). Viewpoint 'Visibly Changed - Biotechnology and Exhibiting Animals': Consulted 25/04/2018.

¹³ Verhoog, H. (1992). The concept of intrinsic value and transgenic animals. *Journal of Agricultural and Environmental Ethics* 5 (2),147-160.

¹⁴ <http://www.cfa.org/Breeds/BreedsSthruT/ScottishFold.aspx>. Consulted on 25/04/2018.

¹⁵ <https://www.tica.org/en/cat-breeds/item/262-scottish-fold-introduction>. Consulted on 25/04/2018.

¹⁶ <https://icatcare.org/advice/cat-breeds/scottish-fold>. Consulted on 25/04/2018.

¹⁷ http://fifeweb.org/wp/lib/lib_current.php. Consulted on 25/04/2018.

In addition, these cats cannot be registered, exhibited, promoted or advertised via FIFe. Certain local breeding associations in Belgium recognise the Scottish Fold or Highland Fold as a breed, others do not. The studbook regulations of Felis Belgica¹⁸ state that the aforementioned FIFe regulations apply in full. A number of other Belgian cat societies prohibit crossbreeding between Fold cats with folded ears, and only allow crossbreeding with cats with straight ears - such as the British or American Shorthair or Longhair.

Although the health problems specific to the Scottish Fold have become more well known in recent years due to media attention in the United Kingdom¹⁹, the Netherlands²⁰ and Belgium²¹, there is as yet no legal ban on breeding the Scottish Fold or Highland Fold in any of these countries. In Belgium, Article 19 paragraph 2 of the Royal Decree (RD) of 27 April 2007 sets out the basis for a possible ban on the breeding of breeds with congenital abnormalities. This article of the law allows the Minister responsible for animal welfare (since 2015 a regional responsibility) to draw up a list of animals (breeds) that present a genetic disorder, and with which breeding is therefore prohibited. To date, however, no such list has been included in any legislation in any of the Belgian regions.

Conclusion and advice:

During its meeting of 20/04/2018, the Brussels Animal Welfare Council discussed the above information regarding the Scottish Fold, and debated the impact of genetic disorders on animal welfare. The desirability of a legal, complete ban versus an authorisation subject to conditions (such as a legal obligation to perform genetic tests and/or radiographic controls on osteochondrodysplasia) was discussed.

In the case of conditional authorisation, the following bottlenecks were identified:

- Diagnosis of osteochondrodysplasia on the basis of morphological abnormalities in the skeleton (by radiographs or CT/MRI scans) does not give a 100% conclusive answer
 - as to whether the cat being examined is a carrier of one or two copies of the mutant Fold gene,
 - about the severity of the defect and the pain or discomfort it causes the cat, nor does it provide a prognosis for this.

It is also noted that pain in cats is difficult to detect in any case, and that its severity is difficult to assess for both owners and veterinarians, because cats often show only subtle changes in behaviour, posture and facial expressions when in pain (Taylor & Robinson 2004²², Robertson 2015²³).

¹⁸ <http://www.felisbelgica.be/doc/nederlands/stamboek.pdf>. Consulted on 25/04/2018.

¹⁹ <http://www.bbc.com/news/uk-scotland-39717634>. Consulted on 25/04/2018.

²⁰ <https://www.nrc.nl/nieuws/2017/08/13/niet-echt-schattig-12511437-a1569776>. Consulted on 25/04/2018.

²¹ http://www.standaard.be/cnt/dmf20170815_03018313. Consulted on 25/04/2018.

²² Taylor, P.M., Robertson, S.A. (2004). Pain management in cats — past, present and future. Part 1. The cat is unique. 6 (5), 313-320

²³ Robertson, S.A. Acute pain and behaviour. (2015). In: Feline behavioural health and welfare. Rodan, I., Heath, S. (eds.) Elsevier Health Sciences, St Louis, US.

- A DNA test has recently become commercially available abroad^{24,25}, but it remains relatively expensive (for the time being).
- Only allowing crosses of heterozygous Fold's without (detectable) osteochondrodysplasia x cats with upright ears (non-Folds)
 - will still result in 50% of the offspring (heterozygous carriers of the mutation) having a chance of developing a certain degree of osteochondrodysplasia.
 - would mean that the Fold could no longer be considered a breed, because a breed is not a breed if the cats cannot be crossed within the breed.

For these reasons, the Brussels Animal Welfare Council advocates a complete ban on the breeding of the Scottish Fold and Highland Fold, and advises the Brussels Secretary of State for Animal Welfare to implement this ban quickly, given the increasing popularity of these breeds.

If any subsequent discussions of the Brussels Animal Welfare Council suggest that other breeds of animals should also be banned due to similar problems, the Scottish Fold and Highland Fold may be included with these other breeds on a list of animals (breeds) displaying a genetic disorder, and with which breeding is therefore prohibited, in accordance with Article 19 paragraph 2 of the Royal Decree (RD) of 27 April 2007.

Furthermore, an extinction policy should be provided for the keeping of Scottish and Highland Fold, with an obligation to neuter the already existing cats of these breeds. In support of the breeding ban, the Brussels Animal Welfare Council also advises a ban on exhibiting and advertising in the context of the trade of these breeds.

²⁴ <http://www.animalabs.com/shop/cats/scottish-fold-osteochondrodysplasia/>. Consulted on 25/04/2018.

²⁵ <https://www.vgl.ucdavis.edu/services/ScottishFold.php>. Consulted on 25/04/2018.