A broader view of extinction risk of dog breeds in the UK

http://www.instituteofcaninebiology.org/blog/a-broader-view-of-extinction-risk-of-dog-breeds-in-the-uk

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Synopsis

Of 173 breeds in the UK for which there are data, the status of 66% (115 breeds) is "critical", the FAO's highest risk category for domestic animal breeds. Another 27% (47 breeds) are "endangered", and 2% (4 breeds) are "vulnerable". Only 7 breeds (4%) could be classified as "not at risk". The reasons for the high proportion of breeds at risk are low numbers of breeding animals and an inadequate number of sires used for breeding. Comparable information is desperately needed for breed populations in other countries as well as the overall size and status of the global population.

The risk status of dog breeds in the UK

When the UK Kennel published their list of native breeds at risk of extinction, it made the headlines.

"***The disappearing dogs: Ex-popular pedigrees face extinction as fashionable pets take over***", announced one news source, and from the BBC it was "***UK native dog breeds 'at risk of extinction***'".

On the list were both well-known breeds like the English Setter, Bloodhound, and Mastiff, and less familiar breeds such as the Dandie Dinmont Terrier, Otterhound, and Skye Terrier. The most recent list includes 29 breeds described as "vulnerable" and another 11 that are "at watch".

The KC list was the result of an evaluation of the recent trends in population size, which for these and many other breeds in both the UK and elsewhere have been falling. They only evaluated the native breeds of England and Ireland, but the data are available to do similar assessments of other breed populations in the UK.

Pharaoh Hound. (Photo copyright Beuchat)

The Pharaoh Hound is one of the most critically endangered dog breeds in the UK, with only 13 offspring produced from 3 breeding pairs in 2014.

Lewis et al (2015) summarize information on population status, genetic diversity, and levels of inbreeding of more than 200 breeds in the UK based on the Kennel Club stud book records. This information can be used to assess vulnerability using some simple guidelines developed by the FAO for domestic mammals and birds.

This FAO table for risk assessment is designed to be used for species with "high reproductive capacity" such as rabbits, dogs, and poultry. It bases risk status of a population in a particular country on the number of breeding females and males, with 7 size categories for females (from less than 100 to greater than 6,000) and four for males (from less than 5 to more than 35).

TABLE 3

Risk categories according to species' reproductive capacity

Reproductive capacity	Males (n)	Breeding females (n) ≤100	101 - 300	301 - 1 000	1 001 - 2 000	2 001 - 3 000	3 001 - 6 000	>6 000
High*	≤5							
	6 - 20							
	21 - 35							
	>35							

= critical, = endangered, = vulnerable and = not at risk.

*High reproductive capacity species = pigs, rabbits, guinea pigs, dogs and all poultry species.

I pulled the data for number of sires, number of dams, and number born in 2014 from the breed summaries in Lewis et al (2015). I used these data to classify the risk status for all breeds with sufficient data according to the FAO chart above. These data are summarized in the table available for download at the bottom of the page. (Note that I didn't include all of the size and coat varieties of some breeds.)

Of the 173 breeds for which I tabulated data, only seven were classed as "not at risk", and these included the six breeds with the highest number of offspring born in 2014 (English Cocker, English Springer, French Bulldog, German Shepherd, Labrador Retriever, and Pug) plus the Chihuahua. Four breeds were classed as "vulnerable" (Border Terrier, Bulldog, Cavalier King Charles Spaniel, and Miniature Schnauzer). Of the remaining breeds, 47 were designated as "endangered", and 115 as "critical".

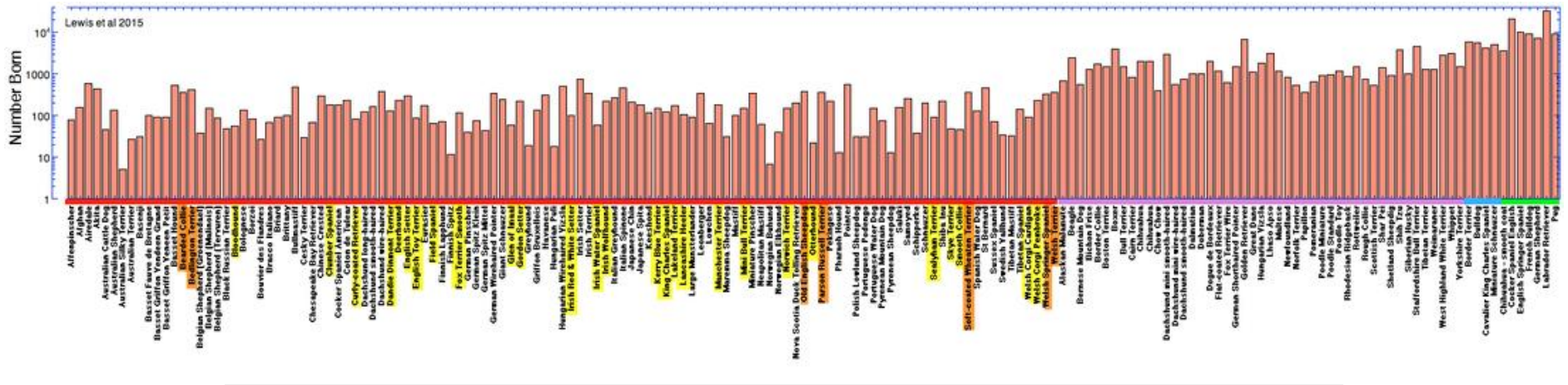
	# of Breeds
Critical (red)	115
Endangered (purple)	47
Vulnerable (blue)	4
Not at risk (green)	7

In the graphs below, I have separated the data into the four FAO risk categories and plotted them in alphabetical order with a colored bar along the x-axis (horizontal) to indicate each group (critical = red; endangered = purple; vulnerable = blue; not at risk = green). Note that the y-axis (vertical) is a log scale to accommodate values that range from 5 (Australian Silky Terrier) to 33,157 (Labrador Retriever).

I have also indicated the native breeds designated by the UK Kennel Club as either "vulnerable" (yellow highlight) or "at watch" (orange highlight). All of the latter fell within the "critical" risk group.

You can download a larger version of this graph here:

Download File



I have also graphed the same data ordered by the number of dogs born in 2014 and with the same colored bars indicating the risk groups. Note again that the y-axis is a log scale. The breeds with the lowest number of offspring fell exclusively into the "critical" category. To give you a sense for the magnitude of the difference in offspring production between critical breeds and those not at risk, I also include the same graph displayed on linear axes.

You can download larger copies of both of these graphs here:

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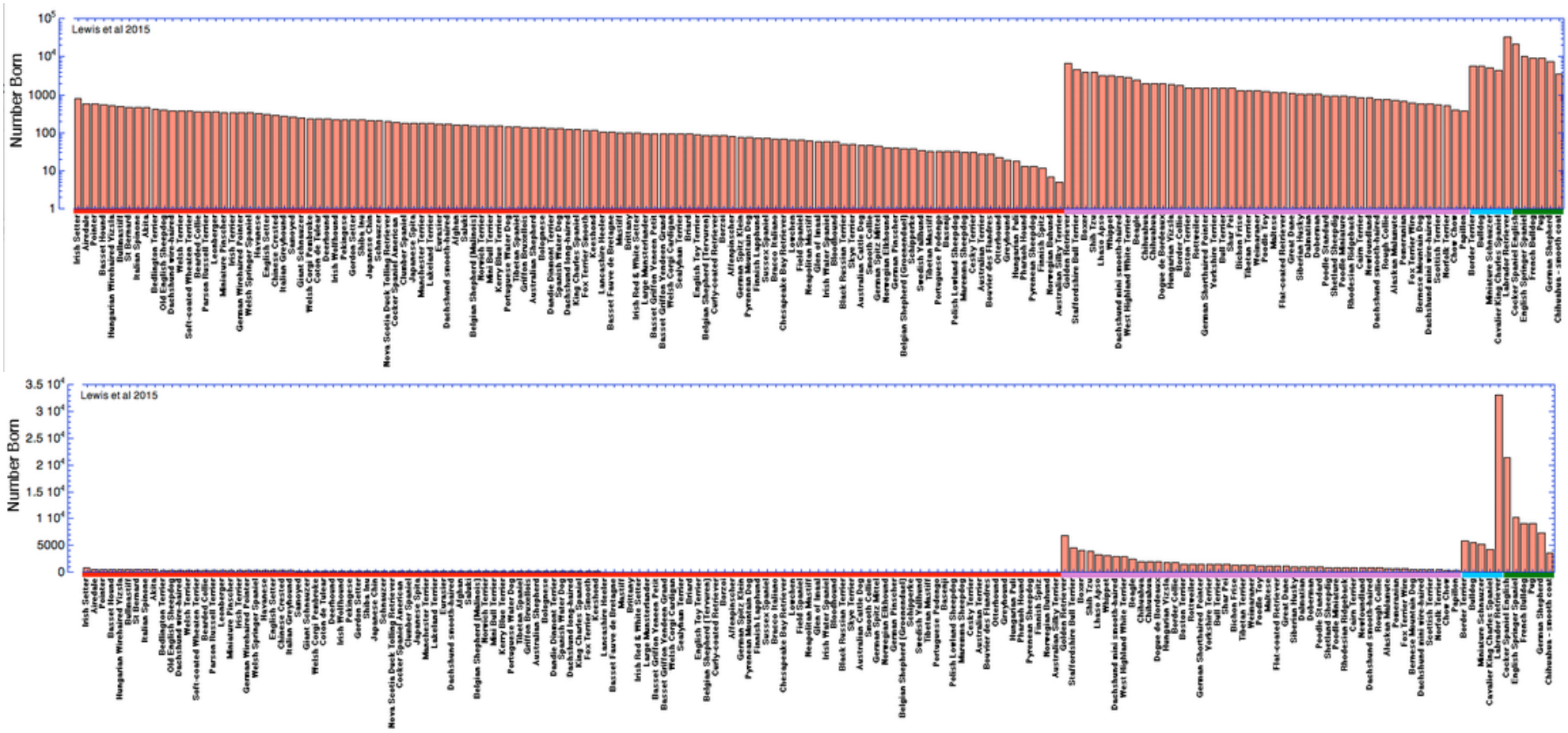

By the FAO criteria, any population with fewer than 100 breeding females is classed as "critical". For the other risk categories, classification depends on the number of sires relative to the number of dams in the seven size classes.

Here I have graphed the breeds by number of dams and also as the ratio of the number of sires to number of dams.

You can download larger versions of these graph here:

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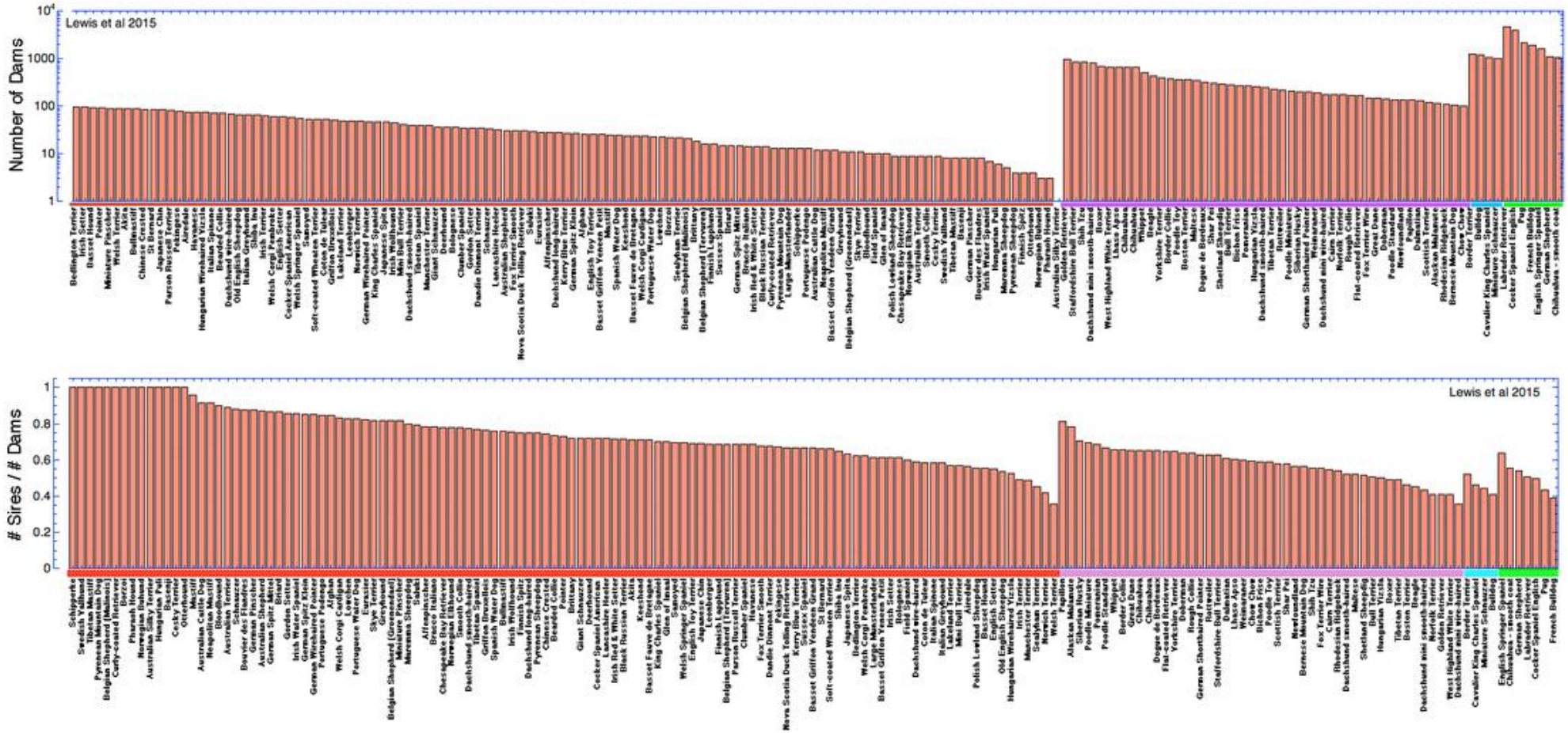

How can we reduce the risk of a breed's extinction?

Using the classification system developed by FAO for domestic animal breeds with high reproductive potential, 96% (166) of the breeds in England and Ireland are at risk of extinction. Some breeds might have larger populations in other countries, and that information would be critical to assessing the global status of a breed. However, there is no central source for this information and it will need to be compiled by breed and by country.

What is the most effective way for breeders to reduce the vulnerability of a breed? Small populations, regardless of the number of males, are at the highest risk of extinction. Increasing the number of breeding females to greater than 100 in a population that has at least 6 males will reduce risk from critical to endangered. To downgrade to "vulnerable" status, a population needs at least 1,000 dams and more than 20 sires; to be classed as "not at risk", the population must have > 2,000 dams and more than 35 sires. It will be difficult for all but the most popular breeds to achieve the status of "not at risk" using these criteria. Only the Pug, English Cocker Spaniel, and Labrador Retriever recorded more than 2000 dams in 2014.

For most of the breeds classed as "critical" in the UK, moving to "endangered" status will require at least doubling the number of females being bred; there are more than 40 breeds for which the number of breeding females is fewer than 20. For most breeds, it will be easier to increase the number of males used for breeding, and this is an important strategy in any case because it will increase the effective population size and reduce the rate of increase in the level of inbreeding.

The numbers of some breeds in the UK have skyrocketed in the last decade. These include multiple breeds in the Utility (non-Sporting) group (the French Bulldog, Bulldog, Boston Terrier, Tibetan Terrier, Miniature Schnauzer, Shih Tzu, Lhasa Apso) the Dogue de Bordeaux, several Toy breeds (Pug, Chinese Crested, Chihuahua), the Belgian Malinois, a few hounds (Whippet, Beagle, Rhodesian Ridgeback), and three sporting breeds (English Cocker, Vizsla, and Labrador. (Numbers of some of these breeds have begun to fall off in the last few years, perhaps reflecting the end of a fad.)

Overall, however, the annual registrations of purebred dogs have been falling over the last decade in both the UK and US. For breeds that already fall in one of the FAO risk categories, this will only make matters worse. Again, the status of breed populations in other countries is essential to understanding the global risk to a breed, and compiling this information should be a priority.

It is important for breeders to know the risk status of their breed and take appropriate measures to stabilize population sizes by including more animals in the breeding program. Breeders also need access to the information and expertise necessary to develop strategies for sustainable breeding of both local and global breed populations. Protecting the size and quality of the gene pool will be an essential component of genetic management. Fortunately, breeders have become increasingly aware of the importance of managing inbreeding and the incidence of genetic disorders, and developing breed-wide strategies for genetic management will make both of these things easier.

As I have argued elsewhere, dogs need to be added to the list of domestic animal species that are monitored and protected as a valuable genetic resource. From the analysis here that shows most purebred breeds in the UK are at risk of extinction under the FAO criteria, it is evident that this needs to be done very soon. Declining populations, loss of genetic diversity, and the rising incidence of genetic disorders will make genetic management increasingly more difficult. The time to act is now.

You can download a copy of the data used in this analysis here:

Download File

Data from -

- *Lewis TW, BM Abhayaratne, and SC Blott. 2015. Trends in genetic diversity for all Kennel Club registered pedigree dog breeds. Canine Genetics and Epidemiology 2:13 (DOI 10.1186/s40575-015-0027-4)*

FAO risk status of breeds in the UK

FAO risk status of breeds in the UKRisk status of breeds based on population statistics of dogs from the registry of the UK Kennel Club (Lewis et al 2015).

Critical (n = 115)
Affenpinscher
Afghan
Airedale
Akita
Australian Cattle Dog
Australian Shepherd
Australian Silky Terrier
Australian Terrier
Basenji
Basset Fauve de Bretagne
Basset Griffon Vendeen Grand
Basset Griffon Veneen Petit
Basset Hound
Bearded Collie

Endangered (n = 47)
Alaskan Malamute
Beagle
Bernese Mountain Dog
Bichon Frise
Border Collie
Boston Terrier
Boxer
Bull Terrier
Cairn Terrier
Chihuahua
Chihuahua
Chow Chow
Dachshund mini smooth-haired
Dachshund mini wire-haired

Vulnerable (n = 4)
Border Terrier
Bulldog
Cavalier King Charles Spaniel
Miniature Schnauzer

Not At Risk (n = 7)
Chihuahua - smooth coat
Cocker Spaniel English
English Springer Spaniel
French Bulldog
German Shepherd
Labrador Retriever

Bedlington Terrier
Belgian Shepherd (Groenendael)
Belgian Shepherd (Malinois)
Belgian Shepherd (Tervuren)
Black Russian Terrier
Bloodhound
Bolognese
Borzoi
Bouvier des Flandres
Bracco Italiano
Briard
Brittany
Bullmastiff
Cesky Terrier
Chesapeake Bay Retriever
Chinese Crested
Clumber Spaniel
Cocker Spaniel American
Coton de Tulear
Curly-coated Retriever
Dachshund long-haired
Dachshund smooth-haired
Dachshund wire-haired
Dandie Dinmont Terrier
Deerhound
English Setter
English Toy Terrier
Eurasier
Field Spaniel
Finnish Lapphund
Finnish Spitz
Fox Terrier Smooth
German Pinscher
German Spitz Klein
German Spitz Mittel
German Wirehaired Pointer
Giant Schnauzer
Glen of Imaal
Gordon Setter
Greyhound
Griffon Bruxellois
Havanese
Hungarian Puli
Hungarian Wirehaired Vizsla
Irish Red & White Setter
Irish Setter
Irish Terrier
Irish Water Spaniel
Irish Wolfhound
Italian Greyhound
Italian Spinone
Japanese Chin
Dachshund smooth-haired
Dalmatian
Doberman
Dogue de Bordeaux
Flat-coated Retriever
Fox Terrier Wire
German Shorthaired Pointer
Golden Retriever
Great Dane
Hungarian Vizsla
Lhaso Apso
Maltese
Newfoundland
Norfolk Terrier
Papillon
Pomeranian
Poodle Miniature
Poodle Standard
Poodle Toy
Rhodesian Ridgeback
Rottweiler
Rough Collie
Scottish Terrier
Shar Pei
Shetland Sheepdig
Shih Tzu
Siberian Husky
Staffordshire Bull Terrier
Tibetan Terrier
Weimaraner
West Highland White Terrier
Whippet
Yorkshire Terrier
Pug

Japanese Spita
Keeshond
Kerry Blue Terrier
King Charles Spaniel
Lakeland Terrier
Lancashire Heeler
Large Munsterlander
Leonberger
Lowchen
Manchester Terrier
Maremma Sheepdog
Mastiff
Mini Bull Terrier
Miniature Pinscher
Neapolitan Mastiff
Norwegian Buhund
Norwegian Elkhound
Norwich Terrier
Nova Scotia Duck Tolling Retriever
Old English Sheepdog
Otterhound
Parson Russell Terrier
Pekingese
Pharaoh Hound
Pointer
Polish Lowland Sheepdog
Portuguese Podengo
Portuguese Water Dog
Pyrenean Mountain Dog
Pyrenean Sheepdog
Saluki
Samoyed
Schipperke
Schnauzer
Sealyham Terrier
Shiba Inu
Skye Terrier
Smooth Collie
Soft-coated Wheaten Terrier
Spanish Water Dog
St Bernard
Sussex Spaniel
Swedish Vallhund
Tibetan Mastiff
Tibetan Spaniel
Welsh Corgi Cardigan
Welsh Corgi Pembroke
Welsh Springer Spaniel
Welsh Terrier