

## Bobtail Gene - Health issues

Natural bobbed tails (a natural shortening of the coccyx or tail bone) occurs in several species and is seen in many different breeds of dogs, with our Swedish Vallhund being one. While it may well known that some short tail genes in dogs, cats, and laboratory mice etc have associated undesirable consequences, no indication of this have been reported with the bobtail condition in the Swedish Vallhund. It is therefore imperative that breeders keep track of this natural occurrence.

Studies conducted in other dog breeds indicate that the gene causing brachury generally produces no obvious effects other than the shortened tail, when seen as a single recessive gene in the heterozygous (Tt/tt) condition. When this gene for bobtails (brachury) appears in its dominant homozygous (T/T) form, it then becomes a lethal! Homozygous (T/T) embryos usually die in utero at between ten to eleven days after coitus. Some breeds have reported concerns with the homozygous (T/T) when [inter]breeding two heterozygotes.

Other studies indicate that the homozygous (T/T) gene appears to be pleiotropic. Pleiotropic means a gene can also cause an array of complex and interrelated abnormal developmental changes in organ systems, and/or defects to both cartilage and structural developments. Most often these [T/T] pleiotropic effects are seen as: missing appendages (metacarpal/metatarsals) or situations where the ribs, vertebrae (including spinal bifida and scoliosis), and/or sternum are defective and are associated with secondary notochord failures; resulting in the whole hindquarters being malformed and/or frequently causing failure of the bones to knit properly together, and which effectively can cause organs to be malformation.

The following examples show the breeding possibilities Tt (bobtail) tt(full tail):

### Bobtail to Tail mating

Tt x tt	t	t
T	tt	tt
t	Tt	Tt

### Tail to Tail Mating

tt x tt	t	t
t	tt	tt
t	tt	tt

### Bobtail to Bobtail mating

Tt x Tt	T	t
T	TT	Tt
t	Tt	tt

## Swedish Vallhund Tail set and carriage



**Ideal tail set and croup angle**



**Full Tails**



**Bob Tails**



**No discernible tail**

## About Bob-tails .... midline and other defects

### VERTEBRAL COLUMN DEFECTS

Selection for any tail, back or head abnormality (from the average normal) is simultaneously a selection for a "midline defect". The dorsal midline of a developing foetus is where the subsequent head, brain, spinal cord and vertebral column arise.

#### Short/Screw/Stumpy Tails

The selection for a shortening of the tail, whether straight or screw tail, is selection for a spinal defect as opposed to a straight, normal length tail. (Example, Manx Cat.) Selection for sacro-caudal agenesis (short-tail/no-tail) is associated with an increased incidence of spinal dysraphism.

**Spinal dysraphism** refers collectively to a group of abnormalities involving the spinal cord, vertebral column, and the skin subsequent to faulty closure of the neural tube (developing spinal cord). This results in a group of 5-6 different conditions of varying severity, of which spina bifida and hemi-vertebrae are the most commonly seen defects.

**Spina bifida** is a condition where the neural tube (spinal cord) has not fully closed over so that the spinal cord is exposed along a section of the back. In these puppies, the vertebral column arch has not closed and neither has the skin. These puppies are euthanased at birth.

**Hemi-vertebrae** are very short or malformed vertebrae that can, by their abnormality of shape, severely distort the spinal cord in affected individuals causing hindquarter paresis or abnormal gait. Severely affected puppies are usually diagnosed by six months of age due to increasing pressure on the spinal cord. With the screw tail breeds this can be seen, particularly with the very short backed individuals, with an increased incidence of hemi-vertebrae. This defect is usually associated with the brachycephalic (short headed) breeds. (English and French Bulldogs.)

#### Brachycephalic (short-headed) Breeds

The selection for a shorter head, particularly a shorter muzzle, increases the incidence of another midline defect, namely, cleft palate (and the associated hare lip). Cleft palates also occur occasionally in any "normal" headed breed with the incidence in long-headed breeds (dolicocephalic breeds) being extremely low.

**Cleft palate** is where the two sides of the roof of the mouth have failed to join during development. It is noticed either at birth or within 2-3 days as the puppy cannot suckle (no pressure platter as the mouth is open to the nasal cavity) and milk comes out the nose. Similarly, failure of the lips to close results in "hare lip".

#### Dolicocephalic (long-headed) Breeds

The long head is associated with a shorter, flatter skull and this usually results in a higher incidence of eye defects and "small eye" (microphthalmia). Also seen in cats.

#### Walrus Puppies

Although this is not itself a vertebral column defect, it is most commonly seen associated with a combination of vertebral column defects. It appears that various combinations of two or more of the following - brachycephalic head, short body length and/or abnormal tail length - leads to a higher than normal incidence of walrus "fluid" (anasarca) puppies in breeds so affected.

Walrus puppies are nearly twice the size of a normal puppy due to enormous fluid retention under the skin. Often these puppies have further abnormalities, particularly cleft palates. Invariably, these puppies result in caesarian births because of their size. Breeds more commonly affected include British and French Bulldogs, and Pekingese.

In breeds where there is high incidence of walrus puppies, a simple recessive pattern has been postulated. Walrus puppies can still appear in more "normal shaped" breeds but the incidence is usually extremely low.

### **Short/Screw Tail Genetics**

Sailer (1954) considered that there were five different inherited tail abnormalities. As many breeds are differentiated by their tail length and carriage, speculation as to the finer points of the genetics of inheritance of many of the aspects including length, carriage, etc., is still very open. The inheritance of the stumpy/short tail is considered to be caused by an autosomal dominant gene with incomplete penetrance. Selection for this gene pattern, when it occurred in a group of Beagles lead to fewer caudal (that is, shorter tails) and line breeding on these dogs produced cases of spina bifida.

Stumpy/short tails (as opposed to screw tails) were divided by Pulling (1957) into two groups.

1. Tail-less (anury), and,
2. Short stub tail (brachyury).

Selection for excessive shortness of tail would be expected eventually to increase the incidence seen of anal intresia (no anus). This is a separate condition from spinal abnormalities.

Screw tails (Stockard 1941) as seen in English and French Bulldogs was also divided into two possible components.

1. Screw tail gene, which is the dominant, and,
2. Length of tail, with long screw being dominant to short.

This is still not fully determined but seems likely.

### **Dermoid Cyst/Sinuses**

As a point of interest, while not a vertebral column defect or a midline defect, the selection for an abnormal pattern of skin lay along the back, as seen in the Rhodesian Ridgeback, increases the incidence of dermoid sinuses/cysts. Dermoid sinuses are a neural tube defect resulting from incomplete separation of the skin and neural tube during development. The sinus of skin tissue attaches on to the tip of the vertebrae and in some cases, especially posterior locations (pelvic regions) may attach directly to neural tissue. This is considered to be inherited in an autosomal recessive mode.

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