

Equine Health April 2017

Hoof wall separation disease.

Sarah Logie A.W.C.F

The Connemara Pony is athletic, versatile equine with a kind and willing temperament. The breed is elegant, hardy, and intelligent. A good example should show great agility and superb jumping scope. These attributes have made it one of the most popular UK native breeds. However, there is a serious genetic condition that can present in the breed. Hoof Wall Separation Disease (HWSD) affects the bond within the hoof wall and affected animals present with broken and delaminated feet, which struggle to hold shoes or maintain soundness. It is a serious issue within the breed and steps are now being taken to screen breeding animals so that the disease does not become more widespread.

Hoof Wall Separation Disease (HWSD) is an autosomal recessive genetic disorder resulting from a single gene mutation. This means that there is a permanent alteration in the DNA sequence of the animal (Finno, 2015). This mutated gene can be passed onto the offspring regardless of the gender of the parent or offspring (Autosomal). The fact it is a recessive gene means that symptoms will only present, if, the offspring inherits the mutated gene from both parents. A pony may be a carrier, with only one copy of the mutated gene. A carrier may be completely sound and will not show any signs of the disease. It is not an acquired condition, and it is incurable.

HWSD is characterized by the delamination and separation of the dorsal hoof wall. (Figure 1.) The bond between the *stratum externum* and *stratum medium* fails, causing it to crack and break away easily. The failure in the bond is caused by a malfunction in the lipid metabolism in the extracellular matrix of the hoof wall. In simple terms, there is a lack of 'waterproof glue' holding the hoof wall tubules together. Remaining wall may have a 'stringy' appearance, where the intertubular horn has disintegrated leaving the tubular horn visible.



Figure 1: Hoof showing separation of the *stratum externum* from the *stratum medium*.

The signs of deterioration begin to show in young animals - generally between 1 and 6 months of age (Figure 2). The condition affects all 4 feet. In severe cases the wall disintegrates to the extent that the

ponies' weight is entirely on the sole of the foot. This can lead to severe lameness, abscesses and laminitis. Shoe loss is a problem with nails tearing out of the poor horn. Some animals may develop large solar callouses which allow them to cope as grazing animals barefoot but are unlikely to stay sound with use.

If a Connemara is showing the signs of HWSD then genetic testing can confirm whether it has the genetic problem, or if there is another cause for poor horn quality. Common misdiagnosis is Type 2, (systemic) Seedy toe but this is a bacterial and fungal infection and not a genetic problem. Good hoof hygiene, diet and management will improve seedy toe, it will not resolve HWSD.



Figure 2: Signs of separation start to show in young animals.

Management of affected ponies involves controlling their living conditions, as extremes of environment or sudden changes can cause rapid deterioration. Dietary supplementation, can ensure that no deficiency is present to worsen the horn quality.

Skilled farriery can help manage animals with milder symptoms. The use of glue on shoes and modern materials can be used to reduce the load on the hoof wall, and spread the load on the solar surface of the sole and frog (Figure 3).



Figure 3: Glue on shoes can be used to redistribute load on the solar surface and to lessen the pull on the wall.

Careful trimming and the use of boots may suit some affected individuals and allow them to work.

Any form of permanently fixed shoe will rely on the hoof wall to some extent, and success of any fixing will depend on the extent of the condition.

None of this can cure HWSD but it might lessen the symptoms and keep the affected pony in comfortable condition.

HWSD has varying degrees of severity, with some ponies being able to stay in work whilst others due to continuous lameness require euthanasia.

Since 2014 the genetic test for HWSD has been available commercially. It is important that carriers are not excluded from breeding, with a wide spread of the mutated gene within a relatively limited gene pool, exclusion will only further contract the gene pool and potentially cause appearance of other damaging traits. The sole purpose of testing is only to avoid crossing carriers that could result in affected foals being born (Figure 4).

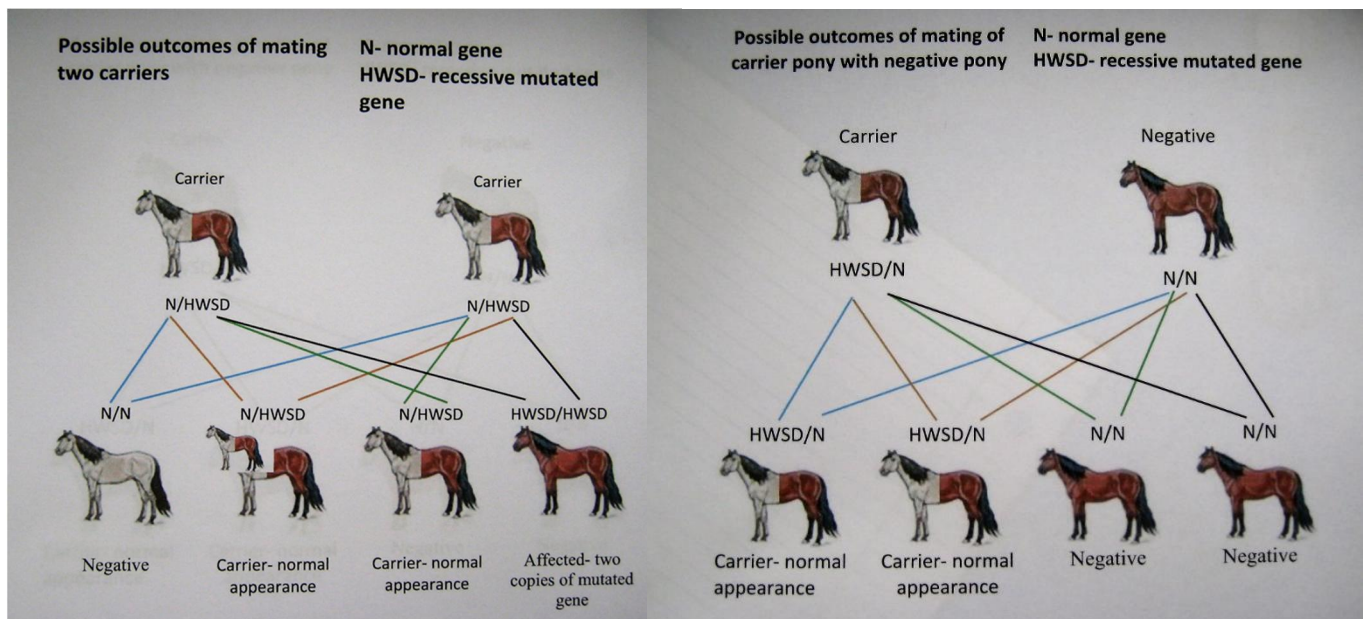


Figure 4: careful breeding can maintain genetic diversity whilst avoiding producing affected animals. With kind permission from Kate Murray DVM MRCVS.

The Connemara Pony Breeders' Society strongly encourages breeders to undertake voluntary testing of mares and stallions not included in the compulsory testing.

From 2016 CPBS has implemented compulsory testing of colts presented for inspections and all registered foals with the results of the test stamped in their passports. (CBPS, 2016)

The genetic research that led to discovery of the mutation was initiated by the Connemara Pony Research Group and carried out at the Bannasch Laboratory of University of California, Davis. (Finno, et al.)

Although this is not a commonly known about disease, education should be encouraged, to ensure careful breeding and appropriate management reduce the spread of the disease.

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