What is Microphthalmia?
Ovine Microphthalmia is a genetic defect which causes lambs to be blind. It is present in Texel and Texel composite sheep only. When a lamb inherits damaged copies of the gene needed for eye development from both parents, the lamb will be blind. A lamb which inherits a damaged gene from only one parent is termed a carrier. Carrier animals have normal, functional eyes because they have also inherited a copy of the normal, functional gene from the other parent. When blind lambs are observed, there are likely to be multiple carrier animals in the flock and DNA testing may be required to remove the condition from the flock.

What is i-SCAN?
i-SCAN® is a predictive DNA test which identifies animals that carry the damaged gene causing the Microphthalmia disorder. i-SCAN allows sheep breeders to screen any or all animals in their flock to identify those that carry the Microphthalmia gene. With i-SCAN results, a breeder can plan matings to avoid breeding blind lambs and to progressively remove the Microphthalmia gene carriers from a flock.

How does i-SCAN work?
The i-SCAN test examines the DNA profile of each animal at a region known to have genes needed for eye development. It uses a specific DNA change at one region of DNA to determine whether an animal has nil or more copies of the damaged gene. i-SCAN can predict the status of an animal without reference to pedigree information, however, inclusion of pedigree and pedigree links to known blind lambs, in particular, can assist in interpretation of the results.

What type of DNA test is i-SCAN?
Over time, there have been a number of iterations of the I-SCAN test. Recently, Microphthalmia test technology has moved from an association (haplotype) test to a more definitive SNP test. The current SNP test is for the presence (reported as Carrier) or absence (reported as i-SCANCLR) of a mutation described by Becker et al. (2010; PLoS One, Jan 13;5(1):e8689) that is associated with Ovine Microphthalmia in Texel Sheep. This mutation is believed to be the causal mutation. While the results from the test are highly predictive, we cannot exclude the possibility that there are other mutations or factors that are responsible for this disease that this test will not resolve.

Interpreting i-SCAN results
The i-SCAN results simply report whether an animal is a carrier of the damaged gene responsible for Microphthalmia or whether they are clear of any copies of the damaged gene. An animal can carry two copies (termed double-copy) of the damaged gene responsible for Microphthalmia, having received one copy from each parent. In this case the animal will be blind.
Result | Explanation
--- | ---
i-SCAN<sup>CLR</sup> | The animal tested has a clear result and is free from any copies of the damaged gene.
Carrier | The animal tested has one copy of the damaged gene.

What do your results mean for breeding?

**i-SCAN<sup>CLR</sup>** – where an animal has been identified as i-SCAN<sup>CLR</sup>, it can be considered free of any copies of the Microphthalmia gene and can be selected for breeding.

**Carrier** – the animal carries one copy of the damaged gene responsible for Microphthalmia. If mated to other Microphthalmia Carriers, blind Microphthalmia lambs may result. If mated to i-SCAN<sup>CLR</sup> stock all progeny are expected to be normal in appearance but ½ will be Microphthalmia Carriers.

Mating a double-copy animal displaying the Microphthalmia blindness condition should be avoided in all situations.

**Summary of Inheritance**

<table>
<thead>
<tr>
<th>Sire</th>
<th>Dam</th>
<th>Progeny</th>
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</table>
| i-SCAN<sup>CLR</sup> | i-SCAN<sup>CLR</sup> | Physical appearance: Normal  
• All will be i-SCAN<sup>CLR</sup> |
| i-SCAN<sup>CLR</sup> | Microphthalmia Carrier | Physical appearance: Normal  
• 50% will be i-SCAN<sup>CLR</sup>  
• 50% will be Microphthalmia Carriers |
| Microphthalmia Carrier | i-SCAN<sup>CLR</sup> | Physical appearance: Normal  
• 50% will be i-SCAN<sup>CLR</sup>  
• 50% will be Microphthalmia Carriers |
| Microphthalmia Carrier | Microphthalmia Carrier | 75% of animals with normal appearance  
• 25% i-SCAN<sup>CLR</sup>  
• 50% will be Microphthalmia Carriers  
25% blind lambs displaying Microphthalmia |

**Further Information**
The i-SCAN test was developed for Ovita by AgResearch and is commercialised by Pfizer Animal Genetics. The New Zealand Texel Society and breeders, and the University of Utrecht have provided samples, pedigrees and financial input to i-SCAN developments over time.