

Genetics of Scrapie

Research has shown that sheep have a gene that determines if they are resistant or susceptible to becoming infected with Scrapie. The primary gene that determines whether sheep are *resistant* to Scrapie (almost never become infected with Scrapie) or whether they are *susceptible* (can easily get Scrapie) is a gene that consists of a pair of alleles at Codon 171. These alleles are usually designated as “R” and “Q”. R is the gene most resistant to Scrapie, and Q is most susceptible. Each sheep has two of these alleles and sheep that have two alleles that are “RR” are very resistant and there have been no known cases of Scrapie in RR sheep in the United States. Sheep that are “QQ” are the most susceptible to Scrapie, and almost all known cases of Scrapie in the U.S. have been in QQ sheep. Sheep that are “QR” are almost always resistant to Scrapie. The combinations of RR, QQ, or QR are known as the sheep’s genotype.



Genetic Flock Plans: Normally if Scrapie is detected in a sheep flock a quarantine is issued and a Genetic Flock Plan is employed. The Genetic Flock Plan involves State or Federal veterinarians drawing blood on all breeding sheep in the flock and having the blood tested to detect the genotype at Codon 171 for each sheep. Then all QQ sheep, the genotype most susceptible to Scrapie, may be purchased by USDA (if funds are available), and the QQ sheep are euthanized and sampled for the presence of Prions (the Scrapie

Genetic resistance to Scrapie has not been proven in goats, and at this time all goats are thought to be susceptible.



infectious agent). Following the completion of cleaning and disinfecting the lambing and post-parturient areas, the flock is placed on a Post- Exposure Monitoring and Management Plan for five years and the quarantine is released. During this time, animals exhibiting clinical signs will be sampled for Scrapie. In some flocks, all “found deads” may also be sampled. Since all QQ ewes have been removed from the flock, the remaining ewes are QR and RR, which are resistant to Scrapie. The use of RR rams is strongly encouraged, since exclusive use of RR rams for breeding prevents the production of QQ sheep. This makes a Scrapie recurrence in a flock nearly impossible (See [How to “Scrapie-Proof” Your Flock & The Importance of Using RR Rams](#)).

