

Single Nucleotide Polymorphism (SNP) in Prion Protein Alleles Renders Susceptibility or Resistance to Natural Scrapie in Sheep.

Phillip El-Hayek

Department of Science, Concordia University College of Alberta, Edmonton, Alberta, Canada

ABSTRACT: Sheep (*Ovis aries*) and goats (*Capra aegagrus hircus*) have been identified with a severe disease known as scrapie. Scrapie is one of the many types of diseases known as Transmissible spongiform encephalopathies (TSEs). These are a fatal and degenerative disease that affects the nervous system of sheep and goats. The disease appears to be caused by a polymorphism in the normal prion protein gene (PrP) that results in the formation of a mammalian prion precursor. More specifically there are three polymorphisms in sheep that are acutely linked to the occurrence of Scrapie: A136V, R154H and Q171R. Among these 3 codons there are 5 alleles generated that causes resistance and 3 alleles generated that causes susceptibility to the disease. Therefore, genotype of the breeds may dictate susceptibility or resistance to scrapie. Scrapie can be highly infectious and transmissible among similar species. But being a genetic disease, only individuals that are susceptible in the prion protein (PrP) gene could be infected, regardless of any environmental factors.

The objective of this research is to analyze each species genotype as to their genetic make up for alleles. Single nucleotide polymorphism (SNP) in the genotype of the three codons mentioned earlier, renders sheep susceptible or resistant to the disease. The research will involve the genotypic comparison of two breeds of sheep: The Awassi flock and The North Country Cheviot flock, to see which genotype of the two breeds resembles the disease allele the most. DNA extraction and amplification will be done through PCR amplification. Furthermore, identification of the nucleotide sequences that closely resemble those of the disease allele will be determined using methods of restriction enzymes and specific primer binding sites.