

Ask A Vet: Genetics and DNA Testing Can Be Key to Success

Sunday, April 24, 2016

Dear Dr. Weldy's,

I was visiting with a friend of mine that raises sheep and he was buying a ram that was a QR ram. What does that mean and why is this important?

-Curious

Dear Curious,

In recent years it has become exceedingly important to select replacement animals for your flock that are genetically superior whether for carcass traits seen in muscling and tenderness, feed efficiency, being able to breed out of season, resistance to parasites and diseases detrimental to the industry. Through DNA testing (which stands for deoxyribonucleic acid) the industry can control and eliminate two disorders that have been very detrimental over past two decades to the sheep industry, Scrapie and Spider Syndrome.

Scrapie is a degenerative disease affecting the central nervous system in sheep that is fatal and can be passed between sheep. If there are positive sheep for scrapie found, the flock will be quarantined and animals destroyed. Luckily we know sheep can have genetic resistance to scrapie and this can be detected with a very inexpensive DNA test. By doing DNA testing, one can provide a way for a breeder to select for and breed resistant animals. It also gives buyers assurance they too are buying resistant sheep. Spider syndrome is a disorder causing bent legs, twisted spines, nose and rib cage. These animals are economic disasters for a producer. DNA testing is also available to see if sheep are carriers of this genetic disorder.

Here comes the boring part. DNA is a self-replicating material found in most all living organisms and the main part of chromosomes. It is the carrier of genetic information and acts like a blueprint for making an animal and is made of long subunits linked together much like beads on a wire. These beads are nucleotides (building blocks for DNA) and are organized into chromosomes. There are 54 chromosomes in sheep (humans have 46). There are actually 27 pairs in sheep with one pair coming from the mother (ewe) and the other from the father (ram). Sequences of nucleotide comprise genes. A codon is a subunit of a gene which codes for certain proteins which are made up of amino acids. Amino acid glutamine is abbreviated "Q", and arginine "R"

Resistance is a dominant trait. We know that changes in genes can make an animal susceptible to scrapie (the prion protein gene) and in spider syndrome (the fibroblast growth factor receptor gene). This is where DNA testing comes in to detect these. QQ, QR, or RR may be how results are reported for scrapie. QQ and RR mean they are resistant. Think of "R" standing for resistant if you will. An RR ram or ewe will only produce resistant offspring (QR, RR). Mated to an RR all will be RR; mated to a QQ all will be QR; mated to a QR, half will be RR and half will be QR. Testing is either done with blood, hair or ear punch. Mistakes are rare with DNA testing but worth the investment. Hope this clarifies that it is simply another tool used to manage your flock.

-Dr. Wanda Schmeltz

