

Getting to Know the Elitest ELISA

We've joked that working with Elitest is somewhat like piloting a Ferrari after having learned to drive in grandpa's trusted Jeep. So as an addendum to the management guidelines, available at www.OPPsociety.org, here are some things we've learned along the way.

- The Elitest ELISA is read by a machine which discovers the optical density (OD) of each serum sample. The ODs are then divided by the cutoff to report a signal/noise (s/n) ratio for each animal. Since Elitest cutoffs vary each time the test is run, these s/n ratios are the best way to track results over time.
- To interpret: An s/n ratio above 1.0 is positive; above 3.5 is positive with greater specificity; those between 0.8 and 1.2 are considered borderline (near the cutoff).
- According to the test's developers, the best "true negatives" are those with s/n ratios of 0.0 or 0.1 and these should be everyone's goal.
- We've learned to watch for high negatives as well as the positives, and begin to pay attention when s/n ratios exceed 0.5. Some elect to segregate these individuals for retesting, and our experience has been that most, *but not all*, will convert to strongly negative following sequential testing over 2 to 4 months.
- Note that fluctuating values are often observed in early infection while the immune system battles the virus (*the excerpt at bottom of page explains this in detail*). We've also seen *temporarily* elevated Elitest results in young ewes and rams during the breeding season, but only rarely have these been higher than a 1.0 s/n ratio.

| ANIMAL ID | AGE | BREED | SEX | OPP(MVV)/CAE ELISA Elitest s/n ratio | Notes below, and cell colors, do not appear on test reports. Included here for illustration. |
|-----------|------|-----------|-----|--------------------------------------|--|
| 1634 | 1 yr | Crossbred | F | 0.543 Neg | |
| 1635 RD | 1 yr | Crossbred | F | 0.103 Neg | |
| 1637 RD | 1 yr | Crossbred | F | 1.108 POSITIVE | Borderline positive / remove |
| 1638 RD | 1 yr | Crossbred | F | 10.608 POSITIVE | Positive / remove |
| 1639 | 1 yr | Crossbred | F | 0.017 Neg | |
| 1640 RD | 2 yr | Crossbred | F | 0.091 Neg | |
| 5006 RD | 2 yr | Crossbred | F | 0.953 Neg | Borderline negative / watch |
| 5029 | 2 yr | Crossbred | F | 0.241 Neg | |
| 5030 | 2 yr | Crossbred | F | 5.940 POSITIVE | Positive / remove |
| 5032 | 2 yr | Crossbred | F | 7.737 POSITIVE | Positive / remove |
| 5035 | 2 yr | Crossbred | F | 0.697 Neg | High negative / watch |
| 6056 RD | 1 yr | Crossbred | F | 0.030 Neg | |
| 6057 | 1 yr | Crossbred | F | 4.677 POSITIVE | Positive / remove |
| 6058 | 1 yr | Crossbred | M | 12.142 POSITIVE | Positive / remove |
| 6059 | 1 yr | Crossbred | M | 1.767 POSITIVE | Positive / remove |

Understanding How the Virus Does its Dirty Work

NOTE: While the excerpt below describes the actual measurement of viral titers in blood, it's important to remember that all ELISAs for OPP/CAE, including Elitest, recognize infection via antibodies which are triggered by the animal's immune response. And these antibodies aren't detectable until at least 2 weeks following infection.

Text excerpted from:

Ovine progressive pneumonia research at the Texas Agricultural Experiment Station: What we have learned in the last decade

Andres de la Concha-Bermejillo, Sheep and Goat, Wool and Mohair CPR 2002. 129-138

OPP VIRUS REPLICATES RAPIDLY SOON AFTER INFECTION. REPLACEMENT SHEEP MUST BE QUARANTINED AND TESTED FOR OPP SEVERAL TIMES BEFORE MIXING THEM WITH OTHER SHEEP.

As mentioned previously, OPP virus is a lentivirus. The name lentivirus was given to this group of viruses because they were thought to replicate slowly (lenti means slow). Previously, it was believed that after initial infection, OPP virus would hide in tissues of infected sheep (remain latent), and that several years later, for unknown reasons, the virus would start multiplying; only then inducing clinical disease (Bulgin, 1990). We were the first research team to demonstrate that this theory was incorrect. To prove this, we inoculated 16 lambs with OPP virus. Every other week after infection the amount of OPP virus in blood was measured. What we found was that OPP virus replicated to high titers soon after infection. In most sheep, the maximum virus titer in blood was reached between 4 and 6 weeks. Then, a strong immune response by the infected animal partially controlled virus replication causing a decline in virus titer by 8 weeks after infection. From then on, there is a constant battle between the sheep's immune system and the OPP virus. In this battle, the virus first replicates rapidly; then, the immune system partially controls the virus. A small amount of remaining virus in the infected sheep mutates; thus escaping the initial immune response and producing a new spike in blood virus titer. This is followed by a secondary immune response against the new mutated virus. Eventually, the constant fight between new virus mutants and the immune system leads to tissue damage and the development of clinical disease. A major finding of this project was that because during the first few weeks after infection infected sheep have high titers of virus in blood but lack antibodies against the virus, shedding and transmission of the virus are more likely to occur during this period (Juste et al., 1998). For this reason, sheep producers obtaining replacement sheep from flocks where the infection exists should quarantine new sheep for several weeks and test them several times before mixing them with other sheep.