

Testing and Control of Ovine Progressive Pneumonia

by Cindy Wolf, DVM, University of Minnesota

(From proceedings of the 2000 annual meeting of the Minnesota Veterinary Medical Association)

The small ruminant retroviruses, Ovine Progressive Pneumonia virus (OPPV) and Caprine Arthritis Encephalitis virus (CAEV), have confused producers and practitioners for many years. The nature of these viruses has been the source of this confusion. While these viral infections persist for life, few animals in a flock or herd actually show clinical problems. The subclinical manifestations probably occur with a higher frequency, but in a practical farm setting their effects are difficult to quantify. Literature references exist that document the economic relevance of OPPV infection in flocks.^{2,4} Most producers who seek veterinary assistance in controlling and even eradicating these viruses do so because they either raise a breed of sheep that has more documented clinical problems with OPPV, or they recognize that both viruses can have significant effects on productivity through reduced levels of milk production or longevity. In both control and eradication programs, producers must be seriously committed to the longterm effort, understand how the virus is spread, and use the test results correctly. These viruses can be costly to control because of semi-annual test related fees, the lost opportunity cost related to premature culling, reduced productivity, and increased cost of replacement breeding stock which includes the cost of artificial rearing. The cost of milk replacer alone to rear a lamb to twenty-five pounds body weight is a minimum of twenty-five dollars. An estimate of all other costs such as creep feed, Clostridial vaccines, labor, and facilities is ten dollars assuming less than 2% mortality.

Presently, veterinary diagnostic laboratories use the agar gel immunodiffusion test (AGID) for OPPV testing. Its sensitivity and specificity have been reported to be 91.5% and 100% respectively.³ Based on these parameters, this test can best be used in control programs if the sheep are tested every 6-12 months. While the test only requires 0.1 ml of serum, it is advisable to send 1 ml of serum. The cost ranges from \$3.50/sample on up depending on the lab. The test takes 48 hours from the time that it is set up to a final reading. For unknown reasons some samples may be difficult to interpret so these are generally set up and read a second time. No major sheep diseases are recognized to cause false positives or negatives. My experience has been that when the same individual in the same lab runs the same samples repeatedly, the repeatability of the results is 100%. We have also found at the University of Minnesota Diagnostic Lab that seroconversion is permanent. In other words repeatedly drawn blood samples on a seropositive ewe reliably test positive when run in the same lab.

It is difficult to recommend an optimal control program to a flock owner until the seropositive rate in the flock is determined. Most flocks can be rearranged into two groups on a farm, an infected group and a test-negative group. These groups or sub-flocks are maintained for a finite period of time. This arrangement is generally not workable nor advisable for the long term unless the flock owner already has access to two farms. Several scenarios should be considered with no one approach to control being the only appropriate one without the owner embracing the proposed plan.

Purebred flocks and those flocks where the sheep have emotional value are the more difficult ones to set up short-term eradication programs. The flock owners will invariably want to salvage genetics from some of their seropositive sheep. These select sheep need to be placed in the infected flock and kept isolated from the seronegative sheep as soon as possible. The sheep should either be synchro-

nized for natural or artificial breeding purposes or breeding dates should be recorded on a daily basis based on breeding marks that result from the ram's marking harness. Because parturition in ewes is more difficult to induce compared to goats, lambing must be closely monitored and lambs snatched at birth to be reared artificially. If there is any suspicion as to whether or not the lambs have nursed, then they should be left on the ewes and considered infected. However, DNA from ovine lentivirus was found by PCR in 11% of 117 neonatal lambs tested prior to colostrum ingestion. 1 Seropositive sheep that do not carry an elite genetics designation can either be sold for slaughter, sold as breeding stock with their OPP status disclosed, or managed in the infected group and their progeny sold as feeder or slaughter lambs.

Heavily infected purebred flocks are faced with a tremendous challenge as to how to stay financially solvent while trying to change the percentage of the flock that is infected. With aggressive marketing, breeding stock from uninfected flocks can be worth more than the same genetics derived from infected sheep. Several years ago, a producer group formed named the OPP Concerned Sheep Breeders Society. 5 This group provides educational material upon request and also publishes an annual directory of members stating member flocks' OPP status, flock numbers and breed(s). This group is a valuable resource for any flock owner that is trying to purchase OPP-free breeding stock. Potential buyers should review the OPP test results from flocks in which they are considering purchasing sheep. The tests should have been conducted within the past 6 months and within the past 30 days preceding purchase is ideal. The tests should have been run at a lab that the veterinary community trusts regarding OPP test validity.

Commercial flocks that have a low seropositive rate, arbitrarily defined here as <25%, may consider immediate separation of the test-positive sheep, followed by culling when cull prices are at a reasonable level. Again sound sheep from this group could be offered for sale as long as their OPP status is transparent even to potential buyers who are unaware of the potential impact of OPPV. When commercial flocks have a seropositive rate that exceeds 30% the owner may decide that it is not economically feasible to cull all of the sound, seropositive sheep at one time. Remember that the flock owner ought to be culling between 10-15% of his/her flock each year for reasons relating to poor production that might include the availability of genetically improved replacements, mastitis, bad mothering traits, poor weaning weights, unsoundness due to chronic disease or age. Again these seropositive sheep must be managed as a separate group from the time that they test positive to the point that they are culled.

For any of the above scenarios, the test-negative sheep should be retested every 6-12 months depending on the owner's wishes and financial situation. If only testing every 12 months, then the sheep should be tested 4 weeks prior to lambing. Test-positive sheep should be identified and removed prior to lambing. If any sheep are lacking individual identification at the time of blood sampling, these sheep should be ear-tagged so that they can be found later when the test results are available. Once the flock is found to be less than 5% seropositive, the flock can be tested on an annual basis. Once the rate is less than 1%, the flock could be tested every two years unless the seropositive rate starts increasing again. Flocks that have had no test-positive sheep in a three year time period have usually declared themselves OPP-free and stopped testing.

Management of two groups on the same farm can be practical because of the labile nature of the OPP virus in the environment. This characteristic of the virus is advantageous regarding OPP control. It means that the infected and test-negative sheep do not have to be kept on two different farms

in order to manage a two-flock system. They cannot share a building, fence line, waterer, or feed space that has nose to nose contact between the two groups. But they can use these same areas if a time gap exists in between usage. For example, a barn can be used for lambing the test-negative sheep first followed by lambing the seropositive sheep 34 days later. There is nothing scientific about 34 days regarding the OPP virus except that is a reasonable target length for a breeding and subsequent lambing season. The same rotation could be used for pastures. The virus has been shown to die within minutes after being discharged from an infected sheep. Equipment such as automatic syringes, drench guns, ear taggers, tattoo pliers and water buckets can be used in between the two groups if cleaned and disinfected first.

Not testing means the status of those sheep or that flock is unknown. The statement that producers have not noticed clinical signs is meaningless to producers and veterinarians versed in the nature of how this virus naturally behaves. Serologic testing or histologic examination of biopsies or tissues collected at necropsy is the only means commercially available to confirm the presence of OPPV infection.

References

1. Brodie SJ, de la Concha-Bermejillo A, Koenig G, et al: Maternal factors associated with prenatal transmission of ovine lentivirus. *J Infect Dis*: 169:653-657, 1994.
2. A de la Concha-Bermejillo: Maedi-Visna and Ovine Progressive Pneumonia. In *Vet Clin of North Am Food Anim Pract* 13:13-33, 1997.
3. Juste RA, Kwang J, de la Concha-Bermejillo A: Comparative evaluation of the agar gel immunodiffusion test and recombinant ELISA for the diagnosis of ovine progressive pneumonia. In *Proceedings of the 99th Annual Meeting of the U. S. Animal Health Association*, 1995, pp. 536-545.
4. Pekelder JJ, Veenink GJ, Akkermans JP, et al: Ovine lentivirus indurative lymphocytic mastitis and its effect on the growth of lambs. *Vet Rec*, 134: 348-350, 1994.
5. OPP Concerned Sheep Breeders Society (updated info)
Holly Neaton, DVM, Secretary
11549 Highway 25 SW
Watertown, MN 55388