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OPP CONCERNED SHEEP BREEDERS SOCIETY
Newsletter — March 2003

OPP Research at the
Texas Agricultural Experiment Station:
What we have learned in the last decade

Andres de la Concha-Bermejillo DVM, PhD, Texas A&M University

Abstract: Ovine progressive pneumonia (OPP) is a chronic disease of sheep caused by ovine lentivirus (OvLV), also called OPP virus. Economic losses that result from this disease include the cost of treatment of secondary infections, losses associated with reduced productivity of affected animals, animal deaths, and loss of marketing opportunities as a result of restrictions that countries impose on the importation of sheep from places where the infection exists. Ovine progressive pneumonia is considered one of the most important diseases of sheep in North America. For over a decade, a major effort of the Texas Agricultural Experiment Station-San Angelo (TAES-SA) has been the understanding of basic concepts on the epidemiology, transmission, diagnosis, treatment and prevention of this disease.

A major finding was that the prevalence of OPP in range sheep of western Texas was significantly lower than in sheep from other states. This divergence in infection rate may be the result of differences in flock management practices and climate. Because production objectives, sheep breeds and management are changing in Texas, producers in this state need to be aware of the potential risk of introducing this infection into their flocks.

We also determined that some of the commercially available ELISA tests used to identify infected sheep are unreliable. Although the agar gel immunodiffusion (AGID) test has high specificity, the test may be unable to detect sheep infected with slow replication OPP virus strains. Preliminary results indicate that a new commercially available "competitive" ELISA may be more sensitive than the AGID test and other ELISA formats.

... de la Concha-Bermejillo, continued on page 3

OPP Certification Program — to be or not to be?

Bob Leder, DVM, OPP Society Director

The question was raised at our annual meeting that we should consider developing an OPP free certification program. This is not a new question, as it was raised when we started our group in 1989. It seemed like a daunting task then. The initial goal of our group was to act as an educational resource for shepherds concerned about OPP. Secondly, we became a network system for producers to share experiences and ideas.

A certification program is just as daunting a task today as it would have been 13 years ago. We have however raised the level of awareness of OPP in the industry since our beginning. So, is it appropriate for us to tackle this today?

As producers have become aware of OPP, some have decided to either rid their flocks of OPP, or start over with OPP free stock. A certification program would provide for a standardized method of determining the status of a flock as a source of OPP free breeding stock. This would give the buyer a sense of confidence when buying sheep to add to their flocks or when starting over. Today there is no real standard by which to measure the confidence one has that a flock is truly free of OPP.

NAHMS 2001 Survey Report:
36.4 % of U.S. operations
seropositive for OPP

... more information on page 4

... Certification Program, continued on next page

OPP SOCIETY 2002 ANNUAL MEETING:

Recap provided by Bob Leder, DVM

A small group of members were present on September 8th for the annual meeting of the OPP Concerned Sheep Breeders Society at the first Wisconsin Sheep & Wool Festival near Milwaukee. Information packets and directories were made available for anyone interested. The treasurer's report was read and accepted. It was announced that we would be having our elections by mail ballot later in the year.

The only new business that was discussed was the possible development of a certification program for OPP free flocks. It was pointed out that the Ontario government has developed a program that could serve as a model. It was decided to include a ballot question regarding this issue to serve as a guide for the Society to move forward on this or not.

Certification Program, continued from cover . . .

The role of a certification program would be to establish criteria that would have to be met that would recognize that a flock is free of OPP. Ontario has established a program that could be used as a model from which to start. We as a group would have to seek outside advice from veterinary experts on what the guidelines would be. There would have to be provisions for flocks that have already done their own testing in the past. Monitoring of the flocks by continued testing would also have to be outlined.

Flocks that meet the requirements would be recognized in some manner or another. Flocks that did not pass the testing requirements would also be designated as such. While the idea seems easy, the devil is in the details.

First off, the party that oversees and designs such a program has to be deemed independent, and unbiased by everyone. The government is usually the independent group that does disease-free certification. Failing to get widespread agreement and acceptance of the program and its requirements is a recipe for failure. I am afraid that setting up such a program could become divisive within our industry and even within our group.

Designing and maintaining such a program may be more work than we have manpower. Just the program set-up will be a large task. I doubt that we would be able to get all volunteer help to set the program up. Then the on-going monitoring and re-certification process will be labor intensive and costly. How much will it cost our group to set up the program? I don't think we can do this on our current budget. I assume that we would have to charge a fee for a flock to be reviewed, to cover our costs. Would producers consider those fees worthy, and make that investment?

And then there are legal ramifications. If we certify a flock free of OPP, and a purchased animal is found later to have OPP and infects its new flock, are we in any way liable? What if we deny a certification to a producer that has already determined his/her flock free by some other method?

I do believe that there is a need to develop a standardized means to certify that a flock is free of OPP. I do not believe that we have the authority or jurisdiction to do so. It is also probably beyond our monetary and manpower resources. We have done

a good job of providing information about OPP to interested people. Education is our first mission, and hopefully we can encourage state governments to establish the OPP free certification programs.

OPP CONCERNED SHEEP BREEDERS SOCIETY GATHERING AT 2002 MARYLAND SHEEP & WOOL FESTIVAL

Report courtesy of Jean T. Walsh

The OPP Concerned Sheep Breeders Society hosted an informal gathering on Saturday, May 4th, at the Maryland Sheep & Wool Festival just outside of Baltimore. The event took place in the Shepherd's Tent, with Society members Kathy Maynard (Romneys) and Jean Walsh (Suffolks), both of New York, co-hosting. The Festival staff was very cooperative in announcing the time and place of the gathering, and Kathy and Jean hung signs provided by the Society in several key locations (including the ladies room) advertising the event.

The gathering was well attended, with about 15 persons signing in and a few more individuals showing up during the lively discussions who did not register. Those who came included "newbies" who did not have sheep but intended to purchase some, as well as experienced sheep producers. Flock sizes also varied considerably from those having only a few sheep to large operations. Interestingly, some of those who didn't have sheep came to the gathering specifically to meet prospective sellers in the hope of purchasing OPP free sheep. Many of those present were members of the Society, while others came for information on joining.

The meeting was very informal, with chairs grouped around tables which Kathy and Jean had bunched together. After introductions, there was a free and enthusiastic exchange of ideas and experiences with OPP and other sheep problems. The main emphasis of the meeting was on the producer setting his/her own standards on testing and eradication. Several of those present had experienced OPP in their flocks and these individuals were extremely helpful in talking about how they eliminated the virus. The consensus from those who had made the effort to rid their flocks of OPP was that they would definitely do so again, rather than "live with" the problem.

Besides OPP, Johnes and Scrapie were also discussed, with members of the group telling about their experiences with these problems. The Scrapie Flock Certification Program and the new mandatory Scrapie Identification Program were also topics of conversation.

Each person who came to the gathering was given an informational packet about the Society as well as OPP and OPP testing. The packets contained a membership application and each person was told that the membership directory would soon be on the Net, increasing visibility for the group and also its members.

The meeting was very informal, with everyone present seeming to have a good time as ideas and experiences were traded. The mood was friendly and upbeat, with those having extensive sheep experience giving advice and help to those who had not. The meeting achieved its purpose of dispensing information about the Society and ovine progressive pneumonia as well as touching on other common sheep problems.

SOCIETY THANKS RETIRING DIRECTORS:

Stefania Dignum — Brian Magee — Bets Reedy

We are about to elect three new directors (members will find a ballot with this newsletter). But first a note of sincere gratitude to Stefania, Brian, and Bets, all of whom are stepping down after more years of service than they'd care to count.

Long before the existence of the OPP Society, Stefania was writing about her experience with OPP in hopes of helping other flocks avoid having to deal with the virus. And Bets and Brian were key players when the OPP Society was organized more than a decade ago — both have served on the board since day one. All three are high profile, progressive breeders whose involvement has contributed much to the credibility of this organization, and we are honored that they remain active members.

de la Concha-Bermejillo, continued from cover . . .

Close contact transmission between infected and non-infected sheep under western Texas environmental conditions does not seem to occur, but semen of OPP-infected rams that have concurrent inflammatory lesions in the reproductive tract may be a source of virus for non-infected ewes. Recombinant ovine interferon-tau (roIFN-t), a new antiviral drug, has proven to be highly effective in reducing virus replication *in vitro* and *in vivo* and in preventing OPP virus-induced disease in lambs that are treated soon after infection. Due to its high cost, treatment of OPP with roIFN-t is not economically feasible at this point. The utilization of gene delivery vectors or slow-release drug delivery systems may help overcome this barrier.

Past attempts by other investigators to produce a vaccine for OPP have failed. Recently, we genetically engineered an OPP virus in which one viral gene (dUTPase) was replaced by the green fluorescent protein (GFP) gene (a gene from jelly fish). This recombinant OPP-GFP virus is attenuated for pathogenicity *in vitro* and *in vivo*. Because it contains the GFP gene, it can be easily differentiated from wild type OPP virus. For these reasons, the OPP-GFP virus could be used as a vaccine to protect sheep against OPP.

Sheep and Goat, Wool and Mohair CPR 2002. 129-138

SELECTED EXCERPTS FROM THE ABOVE PAPER:

Testing: While an ELISA test originally developed by Dr. J. Kwang from the U.S. Meat Animal Research Center in Clay Center, Nebraska had a specificity of more than 94% and a sensitivity of 86%, the results of an ELISA test performed by a private veterinary diagnostic laboratory were unreliable. The specificity and sensitivity of the AGID test were 100% and 91.5%, respectively. These results suggest that the AGID test may be a good screening test to identify OPP infected flocks (Juste et al., 1995). However, because the time of seroconversion may be as long as 12 weeks or more, repeated testing of sheep is recommended. In addition, a recent experiment by this research group using sheep experimentally infected with a slow replicating, genetically modified OPP virus showed that the AGID test was unable to detect infected sheep (author's unpublished observation). At the same time, antibodies against OPP were detected in the sera of four lambs by a new "competitive" ELISA that uses a monoclonal antibody against the surface envelope protein of CAEV, but that

crossreacts with OPP virus (Ozyoruk et al., 2001). Although this competitive ELISA seems to have high sensitivity to detect OPP serum antibodies, further testing using clinical samples will be necessary to confirm this observation.

Virus in Semen: Venereal transmission is the most common route of transmission for HIV, a human lentivirus similar to OPP virus (Levy, 1993). However, information about the potential transmission of OPP virus through contaminated semen was not existent. We were the first research group in the world to report that OPP-infected rams that have inflammatory lesions in the reproductive tract shed the virus in the semen (de la Concha-Bermejillo et al., 1996). In this study, OPP-infected rams co-infected with *Brucella ovis*, the cause of ram epididymitis, excreted large amounts of OPP virus in semen. On the other hand, OPP virus-infected rams without epididymitis did not shed the virus in semen. These results indicate that OPP virus-infected sheep with inflammatory lesions in the reproductive tract may be potential sources of OPP virus for non-infected sheep.

OPP replication starts soon after infection: 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. . . 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 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.

Note: The above paper by Andres de la Concha-Bermejillo can be found in its entirety at <http://sanangelo.tamu.edu/progressreports/R.pdf> or a hard copy may be requested from the OPP Society.

WORTH REPEATING . . .

The following URLs, which were included in our last newsletter, are even more timely now given the recent discussion re certification programs.

HEALTH CERTIFICATION IN ONTARIO & THE U.K.

<http://www.uoguelph.ca/~pmezies/mv> (excellent info on OPP/MV)

<http://www.sac.ac.uk/vet/external/SGHS/> (several programs)

NAHMS (National Animal Health Monitoring Survey) SHEEP 2001 STUDY:

Reported by Katherine Marshall to the Sheep & Goat Committee of the USAHA (United States Animal Health Association) 2002 Annual Meeting.

Scrapie Susceptibility Genotyping:

Overall, 16 percent of the 11,754 samples which were genotyped had the RR allele, 44 percent were QR, and 39 percent were QQ and 1 percent of the samples had the H allele. There was a difference in genotype distribution between the black-faced and white-faced breeds. The black-faced breeds had a greater percentage of animals with the QQ genotype than the white-faced breeds, 44 percent versus 36 percent respectively. All breeds tested had the R allele, and some of the non-British origin black-faced breeds had a much higher percentage of animals with the RR genotype than the general population.

OPP Seroprevalence:

Blood samples were collected from 682 operations for OPP testing. Overall, 36.4 percent of operations were seropositive for OPP, and 24.2 percent of animals were seropositive.

Johne's Seroprevalence:

A similar number of operations (682) and samples (21,357) were tested for ovine Johne's disease. The overall operation level seroprevalence for ovine Johne's was found to be between 4.7 and 10.9 percent depending on whether a positive flock was

defined as having at least one or at least two positive samples. The overall animal level seroprevalence for ovine Johne's was 0.8 percent.

Biosecurity:

With regard to biosecurity practices on U.S. sheep operations, 84 percent of sheep operations allowed visitors to have access to their sheep-grazing areas. Of these, only 22.6 percent had any biosecurity requirements for the visitors to their operations.

Summary:

Perhaps the low level of Johne's seroprevalence indicates a window of opportunity for Johne's control in the sheep industry. However, there is a need for a broad industry educational effort to control not only Johne's and OPP but also for general biosecurity issues on sheep operations. More importantly, there is a need for better tests, which can provide accurate detection of Johne's in sheep.

Editor's Note:

Data for the NAHMS report were collected from 3,210 operations in 22 participating states (California, Oregon, Washington, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Texas, Wyoming, Arkansas, Iowa, Illinois, Indiana, Kansas, Minnesota, South Dakota, Wisconsin, Ohio, Pennsylvania, and Virginia). These 22 states include the major sheep producing states, accounting for 87.4 percent of the January 1, 2001, U.S. sheep inventory and 72.3 percent of U.S. sheep producers.