OPP: The Silent Scourge

By Joan E. Mueller
Part I

Ovine Progressive Pneumonia (OPP), as my *Merck Veterinary Manual* (Fourth edition, 1973) told me when first I reached for it to find out what it was I suspected I had in my flock, is "primarily a disease of range sheep." By the next edition (in 1979) that statement had been removed since it had long since been untrue. The basic and inescapable facts of the disease, however, have remained the same:

As described by the foremost authority on OPP in this country, Dr. Randall C. Cutlip of the USDA's National Animal Disease Center, Progressive Pneumonia of sheep is "a chronic disease of sheep caused by a nononcogenic retrovirus that is similar in most physical and immunochemical characteristics to maedi/visna and caprine arthritis-encephalitis (CAE) viruses. The viruses differ in their nucleic acids as shown by hybridization tests. The disease is characterized by persistence of the virus, prolonged incubation period of 2 to 10 years, and insidious onset of progressive emaciation and dyspnea (hypoventilation) resulting in death. A neurologic disorder and lameness are sometimes seen. The lesions are lymphocytic interstitial pneumonitis, nonsupperative arthritis, and leukoencephalitis" (Cutlip *et al., American Journal of Veterinary Research* [Vol. 46, No. 2, pp. 326-28], Feb. 1985).

In lay language, as this viral infection progresses, the lungs become heavy with lesions, lung function is inhibited, and difficulty with breathing becomes noticeable. Clinical signs, as your *Merck* will inform you, rarely occur in sheep under two years of age and are usually first seen in sheep of four years or older. The disease may last from two to eighteen months before it kills the infected animal. There is no effective treatment and death is inevitable.

In December 1977 *The Shepherd* published a press release from the USDA's Research Service in Ames, Iowa, announcing the results of a survey of tested flocks which indicated that 1-68 percent of older sheep from a western and midwestern flocks were infected with OPP. The announcement went on to describe briefly the work of the researchers as well as the clinical signs of OPP and its inevitable effect—the death of the diseased animal.

The research itself was the work of Dr. Cutlip and fellow researchers and was summarized and described in detail in a paper entitled "Prevalence of Ovine Progressive Pneumonia in a Sampling of Cull Sheep from Western and Midwestern United States" which appeared in *The American Journal of Veterinary Research* (Vol. 38, No. 12), Dec. 1977. Dr. Cutlip and his colleagues had standardized the Agar Gel Immunodiffusion test for OPP first developed in Holland by G. F. De Boer and were using that test to identify OPP-seropositive animals.

Also appearing at the same time in the *Journal of Veterinary Medical Associations (Vol. 171, No. 12),* the research of N. L. Gates, D. O. Everson, and C. V. Hulet linked OPP with Thin Ewe Syndrome (TES).

Before, during, and after that fateful year of 1977, I was buying purebred sheep which came complete with health papers signed by veterinarians. Certainly I had not seen the writing on the wall in *The Shepherd* announcement of the OPP research, and evidently few if any veterinarians were warning their clients to test for the disease. In the years following, a series of articles reporting ongoing OPP research appeared in the professional veterinary journals, yet little or nothing was passed along to sheep producers.

It is true that Thin Ewe Syndrome was getting some limited space in the popular sheep press. Readers will undoubtedly recall reading about this "mystery disease" for which there seemed to be no ready answers. Certainly no heavy warnings were being issued, no alarms were raised. Yet behind TES has lurked the hard reality of OPP, and since 1977 that connection has been known in the world of veterinary research. Gates, Everson, and Hulet had found OPP to have been the villain behind 50 percent of cases of emaciation examined at the US Sheep Experiment Station, Dubois, Idaho. The other diseases related to TES were reported to be visceral caseous lymphadenitis (caused by *Corynebacterium pseudotuberculosis)* and infections caused by *Corynebacterium pyogenes.*

Gates *et al.* reported "highly significant" differences in reproductive efficiency between affected and normal ewes of three important range breeds. These differences were seen in kilograms of lamb weaned per ewe bred and in percentage of lambs born alive, and were attributed to "prolonged disease-induced stress and associated catabolism," although "the exact reason for lowered reproductive efficiency in the affected ewes is unknown." The authors concluded: Because TES is associated with diseases for which diagnostic technology has not been developed or for which effective therapeutic measures are unavailable, affected ewes should be culled from the breeding flock. Retention of such ewes would undoubtedly serve as a reservoir of disease from which other sheep could become infected.

While it is still true that effective therapeutic measures are unavailable for OPP, diagnostic technology *has been developed* and indeed was being announced in the same month in which the TES link was being reported. Yet in the years since both of these important advances in the knowledge about OPP were made public, evidently little awareness has developed in the world of veterinary practice or the sheep industry.

Because many local veterinarians are unaware of OPP, they are equally unaware of the testing which has been available to all breeders. The National Veterinary Services in Ames, Iowa, will do serological tests of blood serum appropriately drawn. With the approval and assistance of the Federal Veterinarian-in-Charge in your state, samples will be analyzed for the presence of the OPP antibody (or in the case of the related goat disease, Caprine Arthritis Encephalitis [CAE], the CAE antibody).

Meanwhile, at the National Animal Disease Center, USDA Agricultural Research Service, in Ames, Dr. Cutlip, one of the researchers responsible for much of the significant work done with OPP and a co-developer of the standardized test (see above), has been directing the OPP-CAE experimental control program at the Ames facility. For approximately two years, sheep breeders interested in eradicating OPP from their flocks have participated in Dr. Cutlip's program by drawing blood

samples from all sheep and goats on their farms and sending him the blood serum for serological testing. At the onset of the program Dr. Cutlip suggested two eradication methods to participants but left the actual management practices up to the individual participants. However, preliminary findings now indicate that, in order to increase probabilities of effectiveness, breeders must be willing to use one or the other of the two management methods if they wish to participate in the eradication program.

OPP-CAE Eradication: Method I—The test and remove method—follows testing with the removal from the flock of seropositive animals and their progeny of less than 1 year of age. Animals removed from the flock can either be sold or isolated in separate facilities. Sale is recommended because of the danger of cross contamination. The clean flock must be kept isolated from infected sheep and goats and from people and equipment in contact with an infected flock. Additions to the flock must be seronegative animals from other seronegative flocks or from seronegative parents in an infected flock following one year of isolation with a negative test reading. Testing must be done annually until there are at least two consecutive negative flock tests in order to be reasonably sure that the flock is free of OPP or CAE viruses. To maintain a clean flock, testing must continue on an annual basis.

Eradication Method II—Isolate and artificially rear progeny—requires the removal of progeny from their dams before nursing and their subsequent strict isolation. Then, as with Method I, only seronegative animals should be added to the flock, either from other seronegative flocks or from seronegative parents following one year of isolation with a negative test reading. Again, testing must be done annually until there are at least two consecutive annual negative flock tests, and maintenance of a clean flock requires that testing must continue on an annual basis.

A decision to eradicate OPP clearly requires, on the part of breeders, a desire to be on top of their flocks' health status and a willingness to bite the bullet if testing reveals seropositive animals. Losses through culling may be heavy and the near-term cost high. Moreover, both of these regimes are, to say the least, difficult under normal farming conditions. As regards the second method, a British Ministry of Agriculture veterinarian wrote in a review of the research into Maedi/Visna and Maedi/Visna-related diseases, of which OPP is one: Lambing would have to be supervised on a 24 hour basis. There would have to be staff and facilities to rear the lamb crop away from the infected flock. The feeding of bovine colostrum. . .would help to reduce the risk of neonatal disease. (M. Dawson, in *The Veterinary Record,* March 8, 1980.)

When Maedi was first reported in Iceland in 1939, the disease spread rapidly, as Dawson reports in the review just quoted, with annual losses on some farms of twenty to thirty percent until a slaughter policy was introduced in 1944. By 1965, after the loss of approximately 105,000 sheep to the disease and another 650,000 to slaughter, Maedi was eradicated in Iceland, but surveillance and experimental work continue.

Dawson comments: When the epidemics occurred in Iceland, serological tests had not been developed. The slaughter policy was a drastic measure but it proved to be effective. Alternative schemes now appear to be feasible. The method of rearing the lamb crop in isolation (see Cutlip Method II above), while demanding in terms of labour and facilities, provides the means of establishing a non-infected flock. . . . An added benefit of this system however may be that the derived flock may have a degree of genetic resistance to infection.

As sheep breeders can easily imagine, both methods are demanding and require a drastic, if not desperate, choice, and may in fact need to be used in conjunction if the ewe flock is heavily infected; that is, Method II is used to save as many lambs as possible for restocking, and then Method I—removing all remaining seropositive sheep from the farm—will best reduce the chances of cross contamination.

When I first suspected that OPP was present in my two purebred flocks and expressed a determination to confirm my suspicion, a Canadian breeder warned me that I might be sorry that I had. Three years later and after the loss of 99 percent of my adult flock, with the obvious accompanying financial losses, I am older and wiser but not sorry. What I deeply regret is the widespread ignorance of OPP in the sheep industry which, shared by me, led me to ask no questions about the disease and subsequently to introduce into my flock at least one carrier which eventually led to the infection of both of my purebred flocks.

The only comparable sheep scourge occasionally dealt with in the popular sheep press in the past decade is Scrapie, and there has been little enough written about it. The eradication method mandated for Scrapie has been whole-flock slaughter as well as slaughter of all exposed animals moved from the flock and their immediate progeny. Chiefly because of Scrapie, importation of sheep into the U.S. from Great Britain and Europe has been impossible, so lethal is its potential judged to be by those officials in charge of permitting or prohibiting importation.

Yet OPP, in many ways a comparably disastrous disease of sheep, is much more widely occurring in the sheep industry and little or nothing is known of it among people in the business of raising and treating sheep. The consequences of this ignorance are obvious. The disease continues to spread silently, with widespread hidden costs.

The most insidious aspect of OPP would seem to be the perpetuated ignorance about it shared by breeders and veterinarians alike. I have come to believe that at least some of this ignorance is deliberate, if perhaps at some suppressed level. When I am told by a very successful breeder/veterinarian, who incidentally sells his purebred sheep at very heady prices, that OPP is a fantasy of bureaucrats trying to maintain their empires, I wonder, to say the least, at just which level he has rationalized his view. That other breeders who know about the availability of the serological test do not avail themselves of it is cause for wonder as well.

However, the mass of sheepmen east of the Rockies simply do not know about OPP as such, although they might have seen popular articles about Thin Ewe Syndrome. And veterinarians east of the Rockies, with almost no sheep experience in veterinary school and few sheep in most of their practices, might understandably be ignorant of the existence of a sheep disease which is probably often wrongly diagnosed as bacterial pneumonia, if diagnosed at all.

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Part II

While emaciation (with continued good appetite) and difficulty with breathing *are* symptoms of OPP, runny nose and coughing are not, but can be symptoms of secondary bacterial infections to which the ravages of OPP expose the animal. Death from the OPP effects alone is inevitable, but often the reduced condition of the animal will lead to earlier death from opportunistic diseases, such as bacterial pneumonia, which will then, on posting, be credited with the death by the breeder or his vet. The prolonged stress to which the OPP-infected animal is subjected appears to make it a ready victim of other, more easily diagnosed, immediate causes of death. But the primary cause remains OPP, and while the sheep industry remains cloaked in ignorance, the ravages spread from animal to animal, flock to flock, and state to state, province to province.

My costly ignorance ended when I asked my vet to draw blood from a few suspect animals. His ignorance ended when he called the state animal disease department and was referred to the National Veterinary Services in Ames, Iowa, to which he sent our samples. When the results came back seropositive, I called the virologist whose name appeared on the Veterinary Services' report. I was then referred to Dr. Cutlip who, I was told, was the resident authority there on OPP.

With Dr. Cutlip's cooperation, first in accepting my flock into his program, and then in sharing with me the current research as he knew it, my unwanted enlightenment proceeded apace. With the exception of selected areas in the southwestern U.S., I learned that all states had OPP-infected flocks, that few if any major and minor breeds had been unaffected, and that some samplings had found the incidence as high as 100 percent of flocks sampled.

Information in the popular sheep press was harder to find. In the back pages of *Sheep Production* (Sp. 1983) but not listed in the table of contents (although a short piece on footrot was), Dr. I. A. Schipper of the Veterinary Science Dept. at North Dakota State University, reported on OPP: In testing complete flocks in North Dakota, Minnesota, Montana, South Dakota, and Michigan, we have found all flocks tested to be positive with infection rates of 3-71 percent. Compilation of flock records indicate that there are breed differences in susceptibility as well as by age, with older animals having the highest incidence of infection.

Schipper's research found that sheep placed in an air-tight room supplied with air from an adjacent room housing OPP-infected sheep became infected within three months of the initiation of this test. Additional studies indicate: If infected sheep are removed from a flock and retesting is done at six month intervals, most flocks have been free of OPP within a year with all flocks free within 18 months. Infected animals may be removed by sale or by placement on a different premise. Separating flocks on the same premise has been less successful.

Had I read the piece in *Sheep Production* knowing nothing of OPP, I would not have found in it anything to become alarmed about. It says nothing about the inevitability of death; it suggests no urgency to the reader to have his flock tested. Moreover, while it indicates that "Departments of Animal Science and Veterinary Medicine" (who, what, when, where, how?) have ongoing research programs, we are left with the vague impression that somebody somewhere is doing something about this viral infection about which there is really no need to get excited.

If you search the popular sheep magazines, you will find virtually nothing to inform sheep breeders about the disease that even now is undoubtedly in their states, on the nearest sheep farms, or perhaps even within their flocks. A noted veterinarian writing in answer to a question about OPP said, yes, there was such a disease, usually known as Lungers' disease, and that there was a test for it. Then, on the same page, he chastised himself for not having taken footrot more seriously in the early days of his practice. He would, he said, have ridden like Paul Revere, shouting "Footrot is coming! Footrot is coming!" But he drew no parallels between that problem and OPP which, in the slightness of his answer, he seemed to find much less significant.

When I shouted, "OPP is coming! OPP is coming!" to some of my sheep associates, I was told, in no uncertain terms, that I was "overreacting." They thought it best not to discuss OPP—they didn't want to hear about it, they were sure they didn't have it, nobody they knew had it, no vet they knew had ever seen a case, and the very mention of it in relation to any breeds would surely condemn those breeds in the public mind!

And yet, within a few months, I began to hear: "We decided to test and found OPP. And our vet now says he's heard of another case!" There were also those who said they would test but were not going to tell anyone if the tests proved seropositive. And still others who while ridiculing the whole idea of OPP as a problem or testing as a means to important information, proceeded to sell their flocks to buyers whose ignorance of OPP they did not disturb.

The concern of breeders that association with any disease is the kiss of death is not unwarranted. Clearly there are those potential buyers who do not distinguish between fact and fancy, or who leap to unsubstantiated conclusions. A Canadian breeder who talked with his customers about the existence of OPP watched them drive away from his cleaned flock, only to purchase animals from a breeder who, because he had not tested, said nothing of OPP and sold the unsuspecting buyer sheep of ambiguous health which, in the light of statistical probability, might well have been infected with OPP. No matter how often a breeder might assure a customer that research has shown that *all* breeds are affected by OPP, there is certainly the possibility that particularly the inexperienced buyer will not understand. It is quite possible, it seems to me, that there may be many a breeder out there who knows about OPP but, fearing the reaction of the unthinking, unlistening customer, just keeps his knowledge to himself.

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Two years ago, in the midst of what was apparently widespread unawareness of OPP, I asked the sheep specialist for another popular sheep publication to write or get someone else to write a plain-language no-holds-barred article on OPP. My request produced neither an answer to my letter or the article I had suggested. I wondered again what the sheep-breeding public was taken for: A creature too ignorant to be able to understand a fundamental epidemic? One to be fed the pap of "cheer up" articles or perhaps one seen to be so essentially greedy and unconcerned about the industry's future that he would *not want to be disturbed* as he read about such amiable topics as trefoil pastures, preparations for lambing, high-tensile wire, etc.

Perhaps those editors and sheep specialists and veterinarians have insights of their own into the minds of their audiences, but surely they do a disservice to sheep breeders and the industry at large when they remain as good as silent about an incurable but not unstoppable viral pneumonia quietly ravaging flocks, bloodlines, and pocketbooks throughout the sheep world.

PLAIN FACTS: *All breeds are affected by OPP. The most recently published research suggests that some breeds are more susceptible and some are more resistant (see *Acres USA*, Dec. 1985 issue).

*Once brought into a flock (almost without exception because of ignorance on the part of seller and buyer), OPP is readily passed through common bunkers and waterers, as well as through air in poorly ventilated loafing barns when animals stand or sleep nose to nose.

*Infected ewes inevitably infect their offspring through colostrum and early mothering. Lambs infected in this fashion, it appears, will be affected by the age of 2-3 years.

*Sheep which are apparently healthy when purchased may be in the early stages of the disease when brought into a clean flock.

*Some adult sheep which carry the antibody may never go down to the disease but be carriers and, like Typhoid Mary, wreak havoc wherever they go.

*Although OPP is untreatable, it can be eradicated.

*OPP is no longer a disease primarily of range sheep!

When it was, it was not devastating purebred sheep which were expected to lead long and productive lives and provide the commercial industry with genetic strengths for flock improvement. Expecting heavy replacement demands for many reasons, ranchers have simply lived with OPP and apparently been more excited about coyotes than Lungers' disease, although the effective predation by OPP of their flocks might well represent a greater loss of income than all other kinds of predation. Since the occurrence of OPP has become so widespread, chiefly through the bringing east of hundreds of western ewes beginning about 10 years ago in highly touted sheep expansion programs, OPP has also been introduced into both purebred and commercial sheep operations by rams or ewes brought in for new blood. In ignorance, both seller and buyer become unwitting catalysts to the spread of OPP.

Realistically, what can be done?

Eradication is tough and costly. As the infected animals are hauled off your farm, you may be watching, as I did, thousands of dollars' worth of adult breeding stock alone—to say nothing of irreplaceable bloodlines, top producing ewes and rams, uncounted years of potential production that will never be realized—hauled off as though they were "only sheep!"

But the hidden costs of silent depredation will in the long run be higher, and the bloodlines and top producers will be lost in any event if the disease is present in your flock and left unchecked. Weaning weights will be lower, live lamb births fewer. Infected dams will infect their progeny so that those animals you planned to keep for replacement will die, probably within two years. The most recent work of Dr. Cutlip and his colleagues shows that other problems, from arthritis and encephalitis to vasculitis, may appear. Inevitably, valuable producers, both ewes and rams, will mysteriously weaken and die. And once OPP is present in you flock, it will not just go away, but will spread from infected to uninfected animal with few exceptions.

For breeders who are determined to eradicate OPP from their flocks there is the consolation that they will make up with healthy animals more than they are silently losing with carriers of a dread and costly disease. And in these days when peace of mind is a rare commodity, they will have it in the knowledge that, as sellers, they are not infecting other flocks with their sheep, and that, as buyers, they will never again in ignorance introduce an untested animal from an untested flock onto their farms. And perhaps most importantly, they will be contributing to, rather than endangering, the genetic future of their chosen breeds.

Perhaps, in an industry which winks at the introduction of out-breed genes to "upscale" smaller sized breeds, putting at risk the long-term contributions of the specialized breeds in favor of quick competition gains, perhaps in such an industry one should simply choose to be cynical and let the bell toll where it may! "The industry," together with the large breed associations, is the emperor, and it is best, according to the folk tale, not to point out that the emperor wears no clothes. That would seem to be the prudent way to proceed in the U.S.

But other agricultural establishments are taking a range of measures to stop OPP. Great Britain, Norway, Iceland, Australia, New Zealand, and Canada are among countries where governments or the industry itself is taking measures of varying kinds.

In England, for example, where selling is inseparable from showing, separate housing and showing areas are provided for the disease-free flocks. It is believed that the disease was brought into the country with an importation of Texels, and the English Texel association became the first to make testing mandatory, followed by the Hampshire association, with others leaving it up to individual breeders for the time being. A Ministry of Agriculture representative told me in 1984 that he believes it will eventually become a reportable disease, like Foot-and-Mouth Disease or Scrapie. Recently I was told that in New Zealand, goat breeders are testing for the related goat disease (C.A.E.) and purebreed associations are refusing to register unclean goats.

In Canada testing is being done on a small scale because of limited testing facilities, although all purebred breeders are encouraged to test. *Farm and Country*, a popular agricultural publication in Canada, carried an extensive article on OPP in October, 1983.

In spite of the excellent testing opportunities available to all sheep and goat breeders in the U.S., perhaps the American sheep industry would simply prefer the heads-in-the-sand game to the hardball reality of the silent scourge of OPP. In this, as in all things, time will tell. But how much more time can we waste before we deal seriously with the extraordinary seriousness of OPP?