Transmission Of Pathogens: We Veterinarians Should Change Our Tune!
By Robert Desrosiers

While at the veterinary college, 25 years ago, I was told and taught that direct pig contact, or introduction of infected animals, was by far the most important means by which swine herds were getting infected with pathogens. Since then, most presentations, books, documents on the epidemiology of swine diseases that I have attended or read have suggested the same thing. But is this really so, or always so? My opinion is that under contemporary conditions, introduction of infected pigs is evidently important in the transmission of swine pathogens, but by no means as much as it may have been in the past, or as we seem to be told everywhere. Following are the findings of some studies that evaluated the causes of herd infection for various conditions of importance in swine veterinary medicine.

Foot and mouth disease
The epidemic of foot and mouth disease (FMD) that struck UK in 2001 mainly occurred in an area where there were few pigs, and pigs were involved in a minority of cases, but it is still of interest to see how this important pathogen appeared to spread between farms. Researchers have reported the most likely method of spread for the first 1847 cases of FMD during this epidemic. Less than 5% of the cases were categorized as caused by introduction of infected animals. Seventy nine percent (79%) of the cases were thought to have been caused by local spread, defined in the document as infected premises that were located within 3 km of another infected premises and with more than one possible conveyor identified.

Hog cholera
In 1997 hog cholera was reported from the Netherlands and caused the local industry over two billion dollars in losses. Of the 429 herds included in an epidemiological study of this epizootic, the introduction of infected animals was, overall, after putting together cases before and after implementation of measures, responsible for only about 3% of the farms that became infected, while neighborhood infection was responsible for 12 times more.

Porcine reproductive and respiratory syndrome
Porcine reproductive and respiratory syndrome (PRRS) is also among the most important swine diseases worldwide, and is likely the most important at this time in North America. From 1999 to 2002, 44 cases of PRRS were diagnosed in sow herds of a Quebec integration company (Menard J, personal communication, 2003). Most of these herds are located in pig dense areas. Since the multipliers of this company have remained PRRS negative over these four years, this means that none of the 44 cases is thought to have been caused by the introduction of infected animals. The boar studs of the company also have remained negative during this period, so introduction of infected semen was not
involved either. Although the role of trucks was not believed to be very significant, they were still considered as one of the possible indirect transmission means for herds of that company, along with contaminated material or equipment, and area spread, which was thought to be among the most important factors (Menard J, personal communication, 2003).

**Enzootic pneumonia**

Enzootic pneumonia caused by *Mycoplasma hyopneumoniae* (MH) is again one of the most common and important swine diseases worldwide. In an investigation conducted in Quebec (see Pigletter, February 2002) 37 farms that were all populated from the same MH-negative supplier herds were investigated. Of these, 18 became infected over the years, and 19 are believed to have remained negative. Of the 18 herds that became infected, none was determined to have been infected by the introduction of infected animals. It is believed that all these farms likely got contaminated because of area spread, or neighborhood infection.

These data suggest that as veterinarians, we should change our tune. Although introduction of infected pigs should evidently be considered as a significant means by which herds can become infected, it is presently, for many diseases and situations, overemphasized. At the same time farm location, pig density and indirect transmission means by which herds become infected with pathogens have been largely underestimated. This should be recognized so that resources can be allocated to determine what really are the causes of herd infection with every significant pathogen, and what relative weight or importance each of these causes actually has. Only then will it be possible to know if investments made to address this or that particular transmission means are worth it or not. We seem to have a long way to go in that respect. In fact, at this time, not only are we far from solutions to cope with transmission means that would have been both identified and at least partly quantified, we are not even agreeing on what these transmission means are. Hopefully, this will soon be realized, and addressed.

**Morgan Morrow responds**

As Robert has well demonstrated pig pathogens can certainly travel by aerosol. However, the problem in protecting against aerosol transmission is the cost of either filtering the incoming air, controlling enough land around the pig farm so as to keep neighboring pig farms well away or installing wind breaks. If we really knew how many outbreaks were caused by aerosol transmission then we could allocate resources based on the risk. But, determining that risk is enormously difficult and costly.

How would you determine the likelihood of an aerosol introduction of a variety of pathogens into your farms? Some answers may be forthcoming from the interest the Department of Homeland Security in showing in the threat of aerosol transmission for bioterrorism agents but until that time you should do more than just cross your fingers and hope.