

## Emerging Disease Notice

### Porcine Reproductive and Respiratory Syndrome (PRRS) in Vietnam and China

#### Outbreak Status in Vietnam

Reported outbreaks of porcine reproductive and respiratory syndrome (PRRS) continue to occur in Vietnam. In the northern province of Hai Duong, PRRS was initially detected on March 12, 2007. The disease was later confirmed using polymerase chain reaction (PCR) on March 26. Vietnamese veterinary authorities sent an immediate notification to the OIE on April 11 reporting six outbreaks within northern Vietnam, specifically the Hai Duong and Thanh Hoa provinces as well as Ha Noi City. A total of 372 susceptible animals were recorded, of which 133 pigs were clinically affected with the PRRS virus, 87 died, and 105 were destroyed. (The fate of the remaining pigs is unclear). Two days after this initial report, the Minister of Agriculture and Rural Development issued a notice requesting provinces to stop the sale of ill pigs as a means to prevent further spread of the disease (ProMED, May 12, 2007).

A follow-up report, submitted to the OIE on April 19, identified seven additional PRRS outbreaks in five other northern provinces. Of the 2,452 susceptible pigs, there were 1,140 pigs with clinical signs, 580 deaths, and 184 pigs destroyed. The source of infection for all outbreaks was determined to be introduction and legal transport of live animals. Control measures were immediately applied, including quarantine of animals, disinfection of infected areas, movement control of animals within Vietnam, modified stamping out, no treatment of affected animals, and vaccination (OIE, April 19, 2007). The deputy director of the Central Veterinary Diagnosis Centre stated in May that PRRS in Vietnam had been successfully treated (ProMED, May 12, 2007).

PRRS is a viral disease which causes a variety of clinical signs including reproductive problems (abortions, premature delivery, and infertility), inappetence, coughing, high fever, respiratory distress, and death in severe cases. The illness has also been referred to as 'blue ear disease' because some pigs develop a transient cyanosis of the ears. Due to the potential for rapid spread among herds and the debilitating nature of the disease, PRRS can be very damaging for swine farmers and producers causing huge production and

economic losses. Likewise, since PRRS has immunosuppressive effects in pigs, it may increase their susceptibility to bacterial infection, including *Streptococcus suis* (Thanawongnuwech, et al. 2000). Recently an outbreak of *S. suis* infection in humans has been reported in Vietnam. Officials are investigating whether there is a link between PRRS outbreaks and *S. suis* infection in pigs that could explain the increased incidence of *S. suis* infection in people working around pigs (ProMED, July 26, 2007). There is no evidence that PRRS virus is zoonotic, despite extensive research since it was first discovered in the United States in 1987.

More recently, the PRRS virus has been detected in the Quang Nam province of central Vietnam. In early July 2007, the local animal health center suggested that the cause of approximately 1500 dead pigs could be a new disease with symptoms similar to 'plasmodium congestion' (ProMED, July 7, 2007). Only ten days later, ProMED (July 17, 2007) described an outbreak, confirming the etiologic agent to be the PRRS virus, in the central province. The disease had already accounted for 20,000 pig deaths in fewer than two weeks. Vietnamese officials assigned eighteen task forces to Quang Nam to monitor the slaughter and transport of all pigs in the area since the sale of infected pigs is prohibited. Likewise, the provincial People's Committee gave orders for a mass cull of ill pigs in epidemic zones as emphasis is being placed on preventing any further spread of the disease to other provinces. Breeders will receive some government reimbursement for their losses, but the head of Quang Nam's Department of Agriculture and Rural Development acknowledged that the province desperately needs about VND 10 billion (US \$626,000) for this compensation.

Further reports indicate a lack of compliance with the ban of pig sales by local breeders. Reporters state that pig farmers within epidemic areas have been rushing to slaughterhouses to sell as many pigs as they can. Markets in the Da Nang city area, just north of Quang Nam, are freely selling pork to customers, even though new reports have shown PRRS cases emerging there. Within the Thang Binh district, there are reports of people digging up the remains of dead pigs to sell the meat and bones to restaurants. Health officials are facing many obstacles while trying to eliminate and prevent the spread of PRRS, including lack of personnel to monitor the prohibited movement and slaughter of infected pigs, and insufficient funds to compensate breeders for any pigs lost in a mass cull. Officials have acknowledged that breeders will continue to sell their pigs regardless of disease because of the need for money. Meanwhile, Vietnamese officials have allocated about 250,000 doses of PRRS vaccine to Quang Nam

province for the week of July 16 through July 22. Sterilization equipment and techniques are being improved and reinforced. (ProMED, July 17, 2007). In addition, veterinary officials recently traveled to Quang Nam to help directly guide efforts to combat the blue-ear virus epidemic, as well as foot-and-mouth disease and classical swine fever, two other diseases currently damaging Vietnam's porcine population.

Even with the existing control measures in place, ProMED has received new reports on the spread of PRRS in Vietnam. On July 27, the Animal Health Department reported an outbreak in the central province of Thua Thien-Hue, where more than 1,400 sick pigs tested positive for PRRS in the Phu Vang and Huong Thuy districts. Three days later (July 30), a local newspaper stated that dozens of pigs in Vietnam's southern province of Long An had tested positive for the virus. Thus, the current PRRS epizootic has infected thousands of pigs in the central provinces of Quang Nam, Quang Ngai, Da Nang and Thua Thien-Hue plus the southern Long An province. Local veterinary agencies are strengthening their control strategies by establishing checkpoints along the main roads to monitor and prevent animal transport, along with continued culling of infected pigs (ProMED, July 30, 2007).

### **Outbreak Status in China**

A similar situation of multiple outbreaks involving the PRRS virus has been documented in China since the summer of 2006. Originally classified as "high fever disease," an atypical form of PRRS sickened approximately 2,120,000 pigs with deaths of at least 400,000 from June to September in at least ten provinces. Unlike typical cases of PRRS, which kills mostly young pigs, many adult sows died during these outbreaks. Necropsy findings and immunohistochemical analyses revealed a highly pathogenic PRRS virus infecting multiple organs. Collaborative efforts involving containment, slaughter, and vaccination helped control the outbreak (Tian, et al. 2007). However, following a hiatus of several months, another widespread outbreak of swine disease occurred in China, also apparently caused by highly pathogenic PRRS virus. On May 9, 2007, Chinese authorities notified the OIE that they were waiting for further laboratory confirmation of the causal agent, although RT-PCR and virus isolation test results were positive for the PRRS virus (ProMED, May 12, 2007). On July 25, the Chinese Ministry of Agriculture reported that pig blue-ear disease had killed more than 45,000 pigs and that more than 42,000 pigs had been culled in 2007. The PRRS outbreak in China has caused extensive economic losses and an enormous rise in pork prices in multiple eastern provinces. Chinese veterinary officials are working to prevent the illegal sale of diseased pork products, strengthen inspections at slaughterhouses and production sites, and dispense millions of doses of the PRRS vaccine. The OIE has yet to receive an official report on current laboratory data.

### **PRRS Genotypes**

PRRS is a highly contagious global disease affecting pigs of all ages; however, different strains of the virus vary widely in pathogenicity. The FAO determined that the existing outbreak in Quang Nam is from a more virulent strain of the PRRS virus than the one detected during the March epidemic in Vietnam's northern provinces. Also called 'green-ear virus,' (probably a subjective color difference from 'blue-ear') the PRRS virus currently in Quang Nam also differs from the PRRS types found in the Americas and Europe (VietNamNet Bridge, July 19, 2007). Presently, two major genotypes (Type I and Type II) of the PRRS virus have been clearly identified using phylogenetic analyses of samples taken from different geographic regions worldwide. Yet it is important to note that there is extensive genetic variability between and within the two genotypes. Virus isolates from the highly pathogenic PRRS 2006 pandemic in China were grouped into Type II using whole-genome analysis (Tian, et al. 2007). Samples of the virus from the current PRRS outbreak in Vietnam are being sent to an international laboratory for further testing and characterization. The fact that PRRS viruses continuously evolve within infected pigs has important implications for disease transmission, viral virulence, and host immunity (Chang, et al. 2002). The high degree of genetic and antigenic diversity also adds to the complexity of controlling and eliminating this disease.

### **Potential Pathways for PRRS to Spread**

PRRS viruses can potentially spread through a variety of routes, resulting in the transmission of the disease among pig herds. Some of the common methods of spread are direct contact between pigs, droplet contact through nasal secretions, saliva, feces, and urine, indirect contact via contaminated housing areas, and even airborne transmission of up to two miles. Experimental studies have shown that PRRS virus also can be transmitted on contaminated objects (e.g. boots, clothing, instruments, containers, and transport vehicles) as well as by mosquitoes and houseflies (Cho and Dee 2006). More studies are needed to determine the importance of vector and airborne transmission of PRRS viruses among swine producing areas (Otake, et al. 2003; Cho, et al. 2007).

Highly pathogenic strains of PRRS virus circulating in Asia could reach the United States by several potential pathways. These pathways include legal and illegal trade of live pigs and pig products, shipment of contaminated parcels, and unintended transport of insects that could transmit the virus (Dee, et al. 2004). China has by far the world's largest inventory of live pigs, totaling 488 million animals, and produces 51 million metric tons of pig meat annually (FAO 2007). Vietnam produces 26 million live pigs and over 2 million metric tons of pig meat annually. The United States currently does not import live pigs or pig products from either China or Vietnam due to the presence of foot-and-mouth disease in these countries. Quantities of

smuggled pork products reaching U.S. destinations from Vietnam and China are unknown.

Although the risk of transmitting highly pathogenic PRRS virus to the United States through international travel is undetermined, airline passengers could carry viruses on their clothing, shoes or equipment while traveling. According to U.S. Bureau of Transportation Statistics in 2006, more than 928,000 air passengers arrived in the United States on direct flights from China and more than 13,000 passengers arrived in the United States on direct flights from Vietnam. Some passengers carry potentially contaminated illegal food products on international flights. For example, U.S. Customs officials have seized small quantities of pork products from airline passengers arriving on direct flights from both China and Vietnam.

## Conclusion

The Center for Emerging Issues will continue to monitor the status of the PRRS epizootic in Vietnam and China, as well current and future outbreaks in other parts of the world. The Foreign Animal Disease Diagnostic Laboratory (FADDL) on Plum Island, New York, is receiving samples from Vietnam for PRRS testing. Since PRRS virus is capable of infecting pigs of all ages, has immunosuppressive effects, causes reproductive loss, and can rapidly spread through herds, an outbreak of PRRS can lead to large production and economic losses for swine farmers and producers. Vietnam authorities continue to apply control measures (movement control, disinfection, spraying, quarantine, and vaccination) to prevent further spread of PRRS virus and eliminate the disease in affected populations. In the United States, producers, scientists, and veterinarians are researching methods to solve the PRRS problem. The PRRS-CAP (Coordinated Agricultural Program) website discusses two such efforts, the National Pork Board Initiative and the North-Central 229 Multi-state PRRS Integrated Project, both of which started in 2003 to develop control and elimination methods in U.S. swine populations.

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