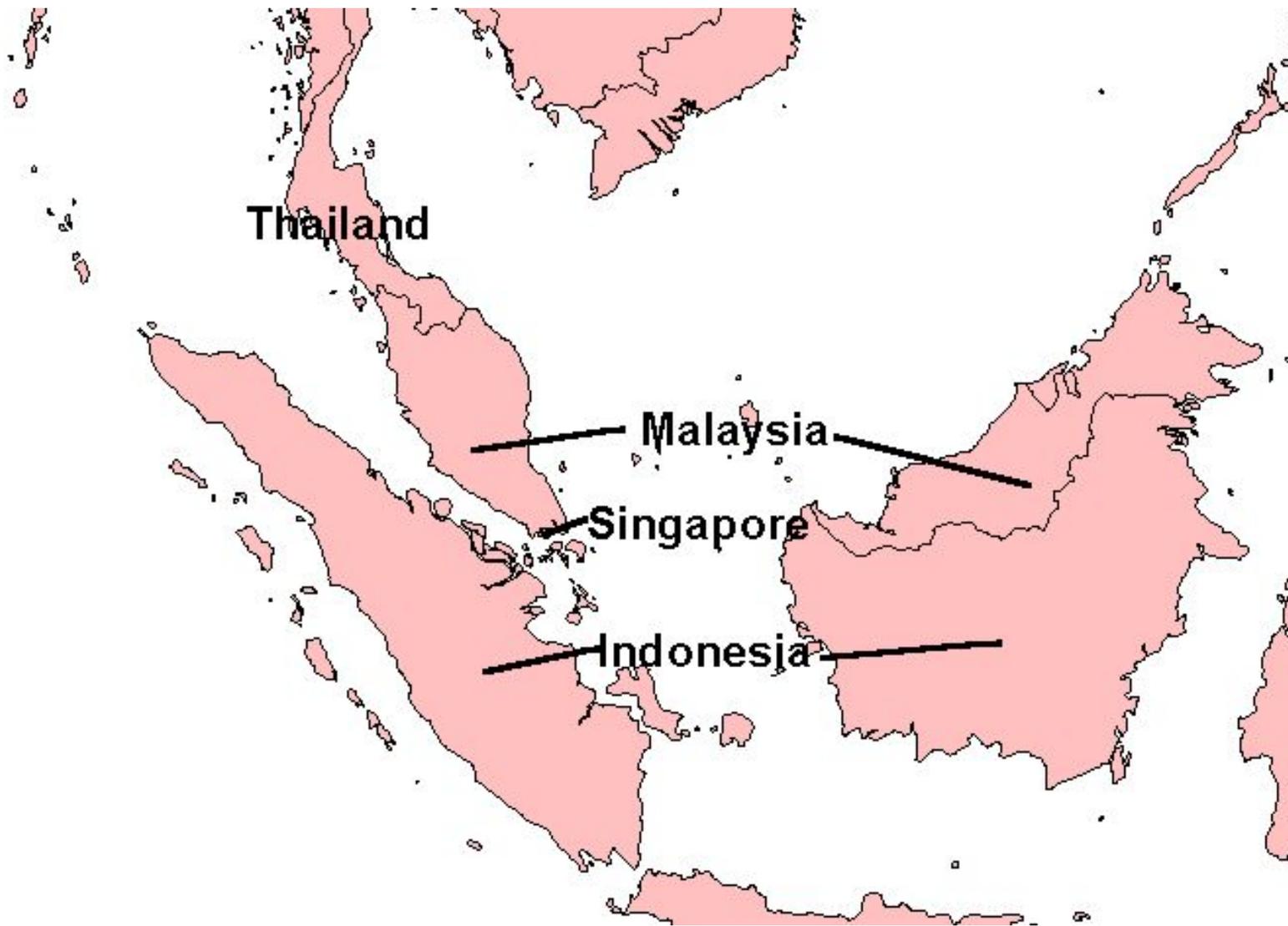




Nipah Virus, Malaysia, May 1999 Emerging Disease Notice

Summary

- Nipah virus is a previously unknown virus of the family Paramyxoviridae that has been identified in the northern peninsula of Malaysia. The virus has caused illness and death in humans and pigs.
 - The apparent source of infection for humans is direct contact with pigs. Transmission of virus is thought to be from body fluids of infected pigs. Human-to-human transmission has not been documented.
 - In pigs, the disease is not well documented. Clinical signs in pigs appear to include rapid and labored breathing; an explosive and nonproductive cough; and neurologic changes, including lethargy or aggressive behavior.
 - The natural reservoir of the virus is not yet unknown. Virus has been isolated from humans, pigs, and one dog. Bats, two horses, dogs, and at least one cat have reportedly shown serologic evidence of Nipah virus infection.
 - Malaysia exported over one million live pigs in 1997, mostly if not entirely to Singapore.
 - The U.S. imported no live pigs from Malaysia or Singapore in 1998 or 1999, but did import some swine leather and other products that may have come from pigs. In 1997, the U.S. imported some mammalian wildlife from both Malaysia and Singapore.
 - About 330 thousand airline passengers arrived in the U.S. on direct flights from Malaysia and Singapore in 1997.
 - It seems prudent for U.S. pork producers to stay aware of the situation and to maintain adequate biosecurity.
-



Thailand

Malaysia

Singapore

Indonesia

Background

Nipah virus is a previously unknown virus of the family Paramyxoviridae that has been identified primarily in humans and pigs in Malaysia. In humans, the virus causes fever, severe headache, myalgia, and signs of encephalitis or meningitis. The case fatality rate has been about 40%.

The first human cases of disease attributed to Nipah virus occurred in late September 1998 in the northern city of Ipoh. The cases were first attributed to the Japanese encephalitis (JE) virus; however, the epidemiology of the disease was not consistent with JE. Most of the cases were in adult males who had direct contact with pigs. In March 1999, Malaysian researchers identified the virus as a previously unknown paramyxovirus. This was confirmed by the CDC. The virus was first called Hendra-like virus because it is similar to the Hendra virus, first identified in horses in Australia in 1994. The virus is now named after the village near Kuala Lumpur from where it was first isolated.

As of late April 1999, 257 cases of febrile encephalitis had been reported in Malaysia, including 100 deaths. Malaysian states in which these cases have occurred are Perak, Negri Sembilan, and Selangor (map not to scale). Nipah virus was also confirmed in abattoir workers in Singapore, where many hogs from Malaysia are slaughtered.



The degree of involvement of the Nipah virus and the JE virus in causing human disease was initially in question. However, scientists now conclude that the role of JE in the outbreak was insignificant, and that most of the cases were due to Nipah virus. According to Malaysian authorities, of the 146 cases where tests were available, 116 tested positive for Nipah virus, 18 tested positive for both Nipah and JE virus, and 12 tested positive for JE.

In pigs, the Nipah virus is associated with clinical signs and death, although the morbidity and mortality rates are not yet known. Clinical signs in pigs appear to include rapid and labored breathing; an explosive and nonproductive cough; and neurologic changes, including lethargy or aggressive behavior.

Source: Promed; NY Times, May 4, 1999; Science Apr 16, 1999; MMWR, Apr 30, 1999; MMWR, Apr 9, 1999

Transmission and reservoir of the Nipah virus

The apparent source of infection for humans is close contact with pigs. The specific routes of infection have yet to be determined, however the prevailing thought is that transmission of the virus is through direct contact with body fluids. Another theory is that humans may become infected via aerosol transmission from respiratory or urinary secretions.

There appear to have been no cases of human-to-human transmission of the virus. Family members of case patients have remained uninfected. Further, a survey of physicians, nurses, and pathologists who had direct contact with infected persons found none with encephalitic illness or with serologic evidence of Nipah virus infection.

The natural reservoir of the virus is unknown at this time. Virus has been isolated from humans, pigs, and one dog. Nucleotide sequence studies of the virus isolates from the dog, pigs, and humans suggest all three isolates are identical. Reportedly, serologic evidence of Nipah virus infection has been found in bats, two horses, dogs, and at least one cat. Studies of wildlife are currently ongoing in an attempt to identify the natural reservoir.

With Hendra virus, it is thought that the 3 humans were infected through exposure to blood or other body fluids or excretions from infected horses. Evidence suggests that fruit bats are the natural host of the Hendra virus. It has been shown that both bat urine and part of the bat placenta can contain the virus. In the case of Hendra virus, one of the human victims died 14 months after he was infected. (A factsheet on Hendra virus, previously called equine morbillivirus, is available on the APHIS web site. For a brief review of other paramyxoviruses and details of the Menangle virus, identified in pigs in Australia in 1997, see Emerging disease notice - New virus of animals and humans emerges in Australia , CEI, November 1998.)

Source: Promed; NY Times, May 4, 1999; Science, Apr 16, 1999; MMWR, Apr 30, 1999; MMWR, Apr 9, 1999.

Control measures in Malaysia

The primary control measure has been culling of pigs. In the 3 affected states, almost 900,000 pigs have been killed. Transport of pigs within the country has been banned. Other control measures include educational efforts and national surveillance to detect any additional infected herds.

Source: MMWR, Apr 30, 1999

What is the country's production and trade in affected animals and animal products?

Malaysia

Pigs are the primary livestock industry in Malaysia. In 1998, estimated inventories of pigs were 3.3 million head, representing 0.34% of world stocks. Also in 1998, Malaysia produced an estimated 241,124 metric tons of pig meat.

The two Malaysian states in which most of the human deaths have occurred (Negri Sembilan and Perak) together account for half the swine population in Malaysia. Inventories in Negri Sembilan, the largest swine-producing state, are normally about 620,000 pigs.

Self-sufficient in the swine industry, Malaysia also exports to other countries in the region. In 1997, Malaysia was the principal source of swine imports to Singapore. Malaysia exported 1,046,000 live pigs in 1997, as well as 2,760 metric tons of pig meat.

Malaysia imported 440 live swine and 3,863 metric tons of pig meat in 1997.

Singapore

The swine herd in Singapore totals only 190,000 animals. This herd is supplemented with the importation of live pigs, principally from Malaysia. In 1997, a total of 1,046,648 pigs were imported into Singapore, making Singapore the 4th largest importer of live pigs in the world.

Singapore produced a total of 83,900 metric tons of pig meat in 1998. Singapore's production accounted for less than 1 percent of worldwide production. Domestic pig meat production is supplemented with imports. In 1997, pig meat imports totaled 23,006 metric tons (less than 1 percent of worldwide imports).

In 1997, Singapore exported only 348 live pigs and 2,328 metric tons of pig meat. Exports go principally to other southeastern Asian countries.

Source: United Nations FAO; USDA Foreign Agricultural Service

What are the U.S. imports of affected animals or animal products from the country?

The U.S. imported no live pigs from Malaysia or Singapore in 1998 or in January-February 1999. The only potentially relevant products that the U.S. imported from Malaysia in 1998 were 56,441 kg of soups, broths, and preparations thereof. From Singapore, the U.S. imported 7,323 square meters of swine leather, 28,605 kg of soups, broths, and preparations thereof, and an unknown amount of preparations used in animal feed (valued at \$739 thousand). In January-February 1999, the U.S. imported 9,746 kg and 1,050 kg of soups, broths, and preparations thereof from Malaysia and Singapore, respectively.

Because of the potential connection between Nipah virus and wildlife, wildlife import statistics were checked. According to data from the US Fish and Wildlife Service, 8 unspecified mammals were imported into the US from Malaysia in 1997. From Singapore, 2 leopards, 50 mongooses, and 2 tigers were imported. These numbers do not represent all mammals imported from Malaysia or Singapore, as CEI does not have access to the complete wildlife import database.

Source: World Trade Atlas; LEMIS database, US FWS

What is the level of passenger traffic arriving in the United States from the affected country?

There are 5 daily direct flights from Singapore to the U.S. west coast, and 1 daily direct flight from Kuala Lumpur to the west coast. U.S. Department of Transportation data show that, in 1997, 52,375 passengers arrived in the US on direct flights from Malaysia, and 282,375 arrived on direct flights from Singapore. In addition, there are numerous other routes from Malaysia to the U.S., including via cities in the far east or in Europe. The World Tourism Organization reports that 80,066 tourists from Malaysia and 114,713 tourists from Singapore arrived in the U.S. in 1996.

Of the 240 passengers from Malaysia that were sampled as part of PPQ's agricultural quarantine inspections in fiscal 1998, 73 reported California as the final destination in the U.S. Other frequent destinations included PA

(16), TX (15), WA (15), MA (12), and VA (12). In all, 33 states were reported as destinations. Only 1 passenger, whose destination was MN, reported going to visit or work on a farm or ranch while in the U.S. Eight of the passengers were carrying relevant products, including pork, salami, and unspecified meat. These numbers are an indication of the amount of animal product illegally entering the U.S. via airline passengers.

From the same data, 692 passengers from Singapore reported a total of 41 states as final destinations in the U.S. California again was the top destination, with 242 passengers. Other main destinations were NY (98), WA (28), NJ (28), MA (26), TX (23), and FL (23). One passenger with destination TX reported going to visit or work on a farm or ranch in the U.S. Six passengers were carrying meat products, including pork, sausage, and soup mixes with meat.

Source: www.flifo.com; World Tourism Organization; PPQ - Agricultural Quarantine Inspections database

CEI's interpretation:

Direct contact with infected pigs is thought to be the most likely route of virus transmission to humans. However, routes of transmission between pigs or from humans to pigs are not known. Given that human-to-human transmission does not appear to occur, it is unlikely, though possible, that humans can transmit the virus to pigs. The survival of the virus outside of the host is unknown; therefore, the role that mechanical transmission might play in spread of the disease is also unknown. It seems prudent for U.S. pork producers to stay aware of the situation and to maintain adequate biosecurity.

The amount of live pigs and pig products imported into the U.S. from Malaysia and Singapore since 1998 has been minimal. However, until more information is available regarding what animal products may play a role in disease transmission, the risk these products present is unknown.

If you seek more information or wish to comment on this notice, please contact Judy Akkina at (970) 490-7852 or by e-mail at Judy.E.Akkina@usda.gov.

Prepared by: Center for Emerging Issues, Centers for Epidemiology and Animal Health