衞生防護中心
Centre for Health Protection

Scientific Committee on Vector-borne Diseases

Recommendations on the Proximity of Pig Farms to Human Residence in Hong Kong

There were 5 cases of local Japanese encephalitis (JE) in Hong Kong in 2004. This is the highest number of local cases recorded in a single year since 1967. The Scientific Committee on Vector-borne Diseases (SCVBD) has considered certain control measures to reduce the number of human cases, including human vaccination, pig vaccination and mosquito control. Restricting the proximity of pig farms to human residence is another possible control measure.

2. Pigs are of prime importance in the epidemiology of JE. They amplify the virus resulting in a huge viral reservoir. Mosquitoes feed on pigs, acquire the virus and transmit it to humans.

3. JE is transmitted mainly by mosquitoes of the *Culex* genus. The only **significant** vector in Hong Kong is ***Culex tritaeniorhynchus***, which has a maximal flight range of 3 km. Important vectors in other countries have a flight range of 2 km to 3 km.

4. Outbreaks of JE occurred in Badu Island, Australia, in 1995 and again in 1998. In 1995 there were 3 human cases and there was one further human case in 1998. It was postulated that proximity of pig farms and mosquito breeding sites to human communities facilitated the outbreak[1]. After 1998 all pig farms were relocated at least 3 km away from human communities. Subsequently, in 2000, sero-conversion was noted among sentinel pigs but there were no further human cases. The number of virus isolates from mosquitoes near human residence was much reduced, compared with 1998 [2]. The Department of Agriculture, Fisheries & Forestry of Australia, in an effort directed to reduce JE transmission, subsequently recommended 3 km as the

minimal distance between pig farms and human residence.

5. In Singapore, pig farming was banned in the 1980's. Although this measure led to a marked decrease in human JE cases, there were 2 human cases of JE in Singapore in 2001. Studies showed that 50% of chickens and dogs were seropositive, showing that JE continued to circulate probably due to migratory wild birds[3]. Similarly in Hong Kong banning pig farms would be expected to reduce the number of cases of JE but not to completely eliminate it.

6. In the USA and in Canada a distance of 3 km is recommended as the minimal distance between pig farms and human residence. Such biosecurity measures are only guidelines and are not mandatory. Moreover they are not aimed at controlling vector-borne diseases in humans.

7. All pig farms in Hong Kong are within 3 km of human residence, although not all are located near major towns. Due to a lack of land, it is difficult to find land for relocating pig farms to more than 3 km from human residence. Therefore, to solve this dilemma, total cessation of pig farming in Hong Kong should be considered.

8. Seroprevalence for Japanese Encephalitis amongst Hong Kong population below age of 40 is 0.3%. Seroprevalence for those 40 years old and above is 2.4%.

9. In 2004, 3 out of the 5 JE human cases occurred in areas NOT in the proximity of pig farms (Kwai Chung, Shum Shui Po and Ap Lei Chau). These cases can possibly be explained by:

(a) Mosquitoes can be carried long distances by wind. For example, with the "funnel effect", air currents are strengthened by valleys and mosquitoes from pig farms in a valley could be blown by such currents to places more than 3 km away.

(b) Wild birds carry the JE virus. Surveillance up to March 2005 showed that 40% of wild birds in Hong Kong and 70% of wild birds in Kowloon Park had JE antibodies. It is thus feasible that a mosquito could pick up JE virus from a wild bird and thereafter transmit it to a human. However, it is noted that wild birds pose much less danger to humans in the transmission of JE because the total viral mass in birds is far less than in pigs.

10. The SCVBD therefore recommends that:

(a) There should be no pig farms within 3 km of human residence; and that

(b) Total cessation of pig farming in Hong Kong should be considered to reduce the risk of JE.

Such recommendations are expected to reduce risk but cannot guarantee total elimination of JE from Hong Kong.

Centre for Health Protection
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References

[1] An Outbreak of Japanese encephalitis in the Torres Strait, Australia, 1995. Hanna JN et al. MJA 1996; 165:256-260

[2] Emerging Viral Diseases of Southeast Asia and the Western Pacific. Mackenzie JS et al. Emerging Infectious Diseases. Vol.7, No.3 Supplement. June 2001

[3] Seroepidemiology of neutralizing antibodies to Japanese encephalitis virus: continued transmission despite abolishment of pig farming? Ting SHL et al. Acta Tropica 92 (2004) 187-191.