FACT SHEET:
Swine Flu

Evolution of a Pandemic:
From Factory Farm to
Hospital Ward

Evolution of the Influenza Virus

Influenza is a zoonotic disease – one humans can catch from animals. Its history parallels the rise of domestication of livestock and increase in trade. As poultry and pig production has intensified, increased in scale and become an international trade commodity, the frequency and severity of influenza outbreaks in birds and pigs have also increased. Now, we have a full-fledged human disease pandemic caused by a virus derived from hybrid swine flu virus that originated on a North Carolina factory pig farm in 1998.

Yes, "Swine flu" does come from intensive hog farms

On May 22, 2009 the US Centers for Disease Control and Prevention (CDC) announced that the pandemic H1N1 influenza virus genetic fingerprint had been analyzed (Garten et al). Six of the eight genetic components of the virus match the triple pig/human/bird hybrid flu virus which is widespread in North American pig herds. Nancy Cox, MD, director of the CDC's influenza division, said "The study reinforces that swine are an important reservoir. The result shows the global need for more systematic surveillance in pigs."

A June 2009 study by Nava et al. revealed that this H1N1 virus may have been circulating in pig herds for years, but without proper surveillance it went undetected. They traced the evolution of the virus, and conclude that virus components from bird, human and pigs were reassorted in pigs, and that the strain may have been circulating in humans at least since January 2009, and perhaps as early as August 2008.

A third study that found remarkable similarities between pandemic H1N1 and flu strains found in North American hog herds also noted "these findings indicate that domestic pigs in North America may have a central role in the generation and maintenance of this virus ... a common element of these swine influenza zoonotic transmissions was that humans (mostly swine farm workers) were in direct contact with infected pigs" (Vijaykrishna et al).

About the influenza virus

Viruses cause illness by "unlocking" a cell's doorway, entering and taking over the cell's machinery in order to reproduce copies of itself, disrupting the cell's normal functioning. The new viruses enter the world propelled by coughing, sneezing, and in some cases, diarrhoea and vomiting. If the virus can survive long enough another host will pick it up, become infected and allow the virus to reproduce and spread.

When a flu virus makes copies of itself it makes a lot of mistakes, called mutations. These variations alter its ability to infect and/or cause illness. Thousands of years ago the influenza virus that caused mild intestinal illness in ducks mutated to a form that could enter respiratory cells of chickens. This mutation would have died out if no chickens had been there to catch the new disease. Thus the ability of virus mutations to survive is limited by the environment. If there are few susceptible hosts, and those hosts are not in close contact, a new virus type will not spread. However if there are many hosts in close proximity (such as in a factory farm), the flu virus will easily survive, reproduce and mutate into new forms.

Hogs are susceptible to both avian and human forms of influenza. If a pig catches the flu from a human and a bird at the same time, individual cells may harbour both types of flu. While reproducing in the same cell, genetic material from each strain combine, generating a novel virus with characteristics derived from both older types. This process is known as "reassortment". Pandemic H1N1 is a reassortment of avian, human and swine origin viruses. This first hybrid mutant detected in North America was in a hog factory in Newton Grove, North Carolina in August 1998.

Contact between hog barn workers and pigs provides a route for human flu viruses to meet up with pig viruses. In 2007 researchers in Alberta warned of swine-based flu risk due to workers catching flu from pigs in intensive hog barns.

Vaccination making things worse?

When an animal or human is infected it develops antibodies to protect against future infections by the same virus. However immunity also puts evolutionary pressure on the virus. While the old strain can no longer effectively infect its host, its mutated progeny is successful because the host's immune system does not yet recognize the new strain as a threat.

Influenza in hogs may slow weight-gain and reduce survival rates of piglets. In 1995 a vaccine for swine flu in hogs was introduced and was widely adopted. By 2003 half of the sows in the USA were being vaccinated against H1N1 and H3N2. This was another evolutionary pressure on the virus. After 1998 the rate of mutation of swine flu viruses increased, leading to a wider variation and increasing virulence of new flu strains.

Factory hog farm conditions increase the risk of animals becoming ill. Crowding means respiratory disease will spread quickly from animal to animal. Pigs' airways are more vulnerable when exposed to high concentrations of ammonia in the barn's air from the manure stored in pits below the slatted floor. Virus shed in feces can remain viable in the liquid manure storage pits. Flies landing on the manure may spread the virus to nearby hogs and people.

People in the village of La Gloria, Mexico located near a Smithfield-owned intensive hog operation suffered unusually high levels of respiratory disease in the spring of 2009. The farm produces nearly a million hogs per year in close confinement. Open air liquid manure pits are mmediately adjacent to the hog barns, near the village residences. At least one child is confirmed to have had the pandemic swine flu. Smithfield denies any connection although evidence for its position is absent to date. However it does admit to vaccinating its pigs for influenza.

Frequently Asked Questions

Q. Did it come from Mexico?

A. It is not known exactly who was the first person to become infected, but research to date indicates that the virus had begun circulating among humans by January 2009. The first severe cases identified were in people who were in, or had travelled to Mexico. Canadians may have had early cases of H1N1 swine flu but were unaware of it, as the illness was mild and it coincided with seasonal flu.

Q. What does H1N1 mean?

A. Hemagglutin (H) and Neuraminidase N are two specially shaped proteins on the surface of influenza viruses that open and close the "doorway" into host cells by fitting into receptors on the host's cell. The specific shapes of these proteins vary and are classified using a numerical system (H1-H16 and N1-N9). H1N1 means that the virus has H1 and N1 proteins in its structure.

Q. Can swine flu pass from people to pigs?

A. Yes. There are documented cases from Canada, USA and China where pigs were found to be infected with flu virus that had a wholly human origin. In April 2009 a pig herd in Alberta was thought to have been infected by a worker who had recently returned from Mexico. Tests showed that he had not had the H1N1 flu strain, so could not have infected the pigs. The source of the flu in that case is still unknown.

Q. Why do Aboriginal people who catch H1N1 swine flu seem to be so severely affected?

A. It could be due to lack of historical exposure to influenza, as this disease only came to North America after colonization by Europeans. More likely, the higher incidence of severe cases is due to health disparities, including diabetes and over-crowded housing conditions, too common in First Nations communites.

Prevention

To prevent future influenza pandemics it is essential to stop providing an environment for quickly evolving and spreading new virus strains. Beyond Factory Farming recommends the following:

- Improve public health conditions in all communities. When everyone has clean water, good food and adequate housing there will be less ill health of all kinds, and people who do get sick will have a better chance of experiencing less intense symptoms, and of recovering more quickly.
- Quickly phase out the intensive confined animal production model by reducing scale of hog barns and reducing crowding within barns. Too many animals in too close proximity is a recipe for infectious disaster.
- Switch to dry composting of manure. Proper manure composting destroys influenza viruses, reducing the risk of spread through fecal contamination.
- Produce pork for domestic consumption only. Trade in live animals spreads influenza between hog herds in different countries and regions.
- Raise a wider range of heritage breeds. Increased genetic diversity will reduce the likelihood that any one virus will infect all pigs in a region.
- Monitor for emerging viruses. Existing intensive hog operations should be required to have their herds regularly tested for influenza by independent third parties, with the results made public. Commercial hog workers should be monitored in order to detect emerging new strains of influenza so that protective measures can be taken.
- Quarantine and/or culling herds that become infected with novel influenza may be a more effective as a public health measure than widespread herd vaccination. If culling is necessary, hogs could be safely slaughtered and processed on or near the farm of origin, provided workers were protected and appropriate facilities were available.
- Agriculture policies should promote health in Canada and around the world. Governments must stop making export and international "competitiveness" their over-riding objectives, and stop subsidizing intensive hog operations.
- Know where your pork comes from – buy only pork raised on dispersed, small scale independent farms. BFF

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For more information:

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