Vaccinating Birds May Help to Curtail Virus’s Spread

As avian influenza continues to ravage Asian poultry, countries are experimenting with a novel control strategy.

Fearful that a deadly flu epidemic could be brewing in Asia, some countries are stockpiling drugs, preparing pandemic flu plans, and ratcheting up vaccine production (see p. 394). As these efforts kick into overdrive, animal experts are grappling with the other half of the bird flu equation: the birds. Specifically, they are debating whether a relatively untested strategy of mass vaccination of chickens and other poultry against avian flu will do more harm than good in warding off a human pandemic.

Since its appearance in 1997, global health experts have worried that H5N1 will combine, or reassort, with a human flu virus to produce an easily transmissible strain with H5N1’s lethality. To avert such a disaster, last winter and spring seven Asian countries slaughtered more than 100 million birds, decimating the poultry industry. But the virus has resurfaced and appears to be endemic in the region. And the more virus in circulation, the greater the chance that a deadly reassortment.

Animal health officials agree that the best ways to curtail H5N1 are increasing surveillance and improving biosecurity, which includes a host of measures intended to prevent diseases from spreading among flocks and to the public. But now, after years of debate, consensus is building that vaccination of at-risk poultry could also be a critical tool in averting a human pandemic. Indeed, in September, alarmed at the spread of H5N1, the Paris-based World Organization for Animal Health (OIE) and the United Nations Food and Agriculture Organization (FAO) strengthened a previous recommendation encouraging consideration of vaccination in conjunction with other control methods.

But there’s a catch, explains Alex Thierman, a veterinarian at OIE: “If improperly done, vaccination could be dangerous.” It could enable the virus to circulate undetected among birds, perhaps spurring its evolution. And no matter how helpful poultry vaccination might be, some countries may decide against it for fear that it would jeopardize their export market.

So far, Hong Kong requires vaccination of all poultry. Thailand forbids it. China and Indonesia are selectively vaccinating in regions where the virus has appeared.

**Risks and benefits**
The clear benefit of vaccination is its ability to reduce the amount of wild virus in circulating. Although vaccination does not always prevent infection—just disease—it takes a much higher dose of virus to cause infection, and vaccinated birds that do become infected shed far less virus than unvaccinated birds. As an added precaution, animal health experts agree that vaccinated birds that become infected should be culled. “By reducing the amount of virus in the environment, you reduce the possibility of the virus spreading to a new flock, and you reduce the risk to humans,” says David Suarez of the U.S. Department of Agriculture’s (USDA’s) Southeast Poultry Research Laboratory in Athens, Georgia.

For a country to undertake vaccination safely, it first must ensure the quality and efficacy of the vaccine. It must be targeted to the virus in circulation, properly inactivated, and tested to determine the adequate dosage. Then there’s the problem of distinguish-

With the increased scale of modern poultry farms, culling in a buffer zone around an infected flock was killing enormous numbers of healthy birds. Some farmers and animal health officials began arguing that vaccination in a buffer zone, instead of slaughter, might be more humane and cost effective.

In addition, studies done at the USDA lab in Georgia and reported in *Avian Pathology* in 1999 and in *Vaccine* in 2000 showed that a vaccine based on one H5 virus subtype might provide cross-protection against several others. If so, vaccinating with a strain that differs from the circulating strain could solve the problem of differentiating vaccinated-but-uninfected birds from infected birds. More recently, researchers at the Tai Lung Veterinary Laboratory of Hong Kong’s Agriculture, Fisheries, and Conservation Department tested a vaccine based on an H5N2 strain against the H5N1 strains...
Asia Struggles to Keep Humans and Chickens Apart

SONG PHINONG, SUKHABURI PROVINCE, THAILAND—After having 30,000 chickens culled when H5N1 turned up on a farm 2 kilometers away, Boonchu Taeng-orn got serious about biosecurity. When permitted to restock his farm here in the central lowlands 2 hours north of Bangkok, he followed recommendations of Thailand’s Department of Livestock Development to the letter. He strung netting from the shed roofs to the tilapia ponds beneath to keep wild birds out. (Biosecurity experts discourage locating chicken coops near open water, but raising tilapia on bird droppings is key to the economics of chicken farming here.) As few workers as necessary go into the sheds, changing first into work clothes kept at the site, walking through a disinfecting mist, and stepping in pails of disinfectant on the way in. The egg crates are disinfected before use, as are vehicles at the gates to each compound. And Taeng-orn follows the all-in, all-out practice: When he fills a shed with new chicks, he keeps them until egg production drops and then sells the entire batch. Sheds and cages are washed and repaired before the next batch arrives. “The emphasis on cleanliness is definitely good. It is more humane for the animals and safer for the workers,” Taeng-orn says.

It is also safer for the world. Infectious disease experts agree that keeping zoonotic diseases like H5N1 and severe acute respiratory syndrome from crossing the species barrier into humans will partly depend on the efforts of millions of farmers like Taeng-orn. A greater challenge is to extend such practices to the numerous households that keep backyard chickens. Alex Thiermann, an official with the World Organization for Animal Health, says that large poultry operations in Asia have biosecurity practices on par with farms in the United States or Europe. But in the backyards, there is “no biosecurity at all.”

A key element of Thailand’s push to stamp out H5N1 is to educate small holders and require that even backyard chickens be kept in coops to minimize contact with wild birds and family members. Vietnam, too, has launched an education campaign targeting small chicken operations. But no one expects sudden changes in such an age-old practice.

Hong Kong is taking aim at another entrenched custom: It is considering closing its live animal markets. Currently, buyers pick a live chicken at one of more than 800 live animal shops and have it slaughtered on the spot. K.Y. Yuen, a microbiologist at the University of Hong Kong, favors a central slaughtering facility, both to reduce the chances of exposing the general public to avian influenza and to cut the incidence of other infections. “Other advanced countries adopted central slaughter long ago,” he says. The government asked for public comment this summer and is now deciding how to proceed.

—D.N.

In Thailand, which has reported more than 250 outbreaks in 45 of the country’s 76 provinces in the last 3 months, authorities have rejected vaccination, at least for the moment. Yukol Limlamthong, director-general of Thailand’s Department of Livestock Development, says they are worried that vaccination might enable the virus to circulate silently among vaccinated birds, exposing farm hands and families to infection. “We don’t want to put them at risk,” he says. But flu experts elsewhere suspect that commercial concerns factored heavily in the decision.

The OIE Terrestrial Animal Health Code, which governs international trade in animals and animal products, says a country can be considered free of avian influenza if specified levels of surveillance do not turn up the virus—regardless of whether it is vaccinating. But the code is vague and places the burden of proof on the exporting country. Johan Reyniers, a press spokesperson for the European Commission in Brussels, says, “It would ultimately be up to Thai authorities to demonstrate that vaccination is properly implemented.”

For now, Thai officials believe it will be easier to convince trading partners that its poultry products are safe if the country can control the disease without vaccination. But whether it can remains to be seen.

—DENNIS NORMILE

With reporting by Xiong Lei in Beijing.