

Avian Influenza in Mexican Poultry: Wildlife Implications

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The diagnosis of a highly pathogenic strain of avian influenza (AI) in commercial poultry in Central Mexico has created a status of "red alert" among the U.S. poultry industry. The last major episode of this disease in 1983-84 resulted in the destruction of more than 17 million birds at a cost to the U.S. taxpayer of nearly \$65 million! Because aquatic birds represent an important natural reservoir for the AI viruses, there is concern that they will bring the "high-path" AI virus from Mexico to the U.S. during migration.

AI viruses have been isolated from at least 88 avian species representing 12 orders. However, AI viruses represent a genetically diverse group, and very few are highly pathogenic for domestic poultry. The virulence of AI viruses in poultry is primarily determined by differences in a surface protein called hemagglutinin. Viruses of only 2 of the 14 hemagglutinin serotypes, H5 and H7, have been associated with high pathogenicity in poultry. However, not all H5 or H7 viruses are "high-path."

The best information on AI virus diversity in wild birds comes from extensive surveys of wild ducks. Past research has revealed an interesting fact...the H5 and H7 AI viruses represent an extremely small proportion of the AI viruses circulating in wild duck populations. This is especially true with the H5 AI serotype. Of 3,109 viruses isolated by researchers in North America and Europe during the 1980s, only 8 were H5 viruses. The H5 serotype also has not been a dominant serotype in shore birds and gulls. Only one "high-path" H5 AI virus has been recovered from *bona fide* wild birds, and this was in 1961 from terns in South Africa.

In contrast, H5 AI viruses, with a neuraminidase type N2 (designated H5N2), have been the predominant serotype found in truly confined poultry in the U.S., and now, in Mexico. A question posed by these data is: if AI viruses are entering confined poultry directly from wild birds, why is the H5N2 serotype, which is relatively rare in wild birds, over-represented? One would think that the wide variety of AI serotypes found in wild birds would be reflected in the viruses found in confined poultry. For example, domestic turkeys raised on range in Minnesota have direct contact with waterfowl, and turkeys have become infected with many different AI viruses...not just H5N2. This point in the epizootiology of AI viruses in confined poultry is not completely understood, and it is possible that there are other undefined sources for the H5N2 virus.

Surveys of wild birds for avian influenza during the 1983-84 H5N2 AI outbreak in Pennsylvania yielded some important points that can be applied to the current problem.

- Of wild birds examined in the quarantined area, only waterbirds (ducks, geese, and gulls) had serological evidence of infection. Sparrows, pigeons, crows, starlings, and other upland birds had no evidence of exposure.
- Very few ducks, geese, and gulls were shedding AI virus during the poultry outbreak. One H5N2 virus was isolated after the poultry outbreak was over. It was a "low-path" strain that was different from the poultry virus.
- After the H5N2 outbreak had subsided in poultry, isolations of multiple serotypes of AI viruses were made from approximately 200 wild ducks and geese (mostly juveniles) in the quarantine zone. These viruses did not enter the commercial poultry in the outbreak area because the poultry industry was practicing excellent biosecurity.
- Both "low-path" and "high-path" H5N2 Pennsylvania AI viruses from chickens replicated poorly in

experimentally infected ducks. This suggested that the risk of these "poultry adapted" viruses moving from chickens to free-flying ducks back to chickens was low.

From these observations and many other studies, it appears that wild waterfowl *might* have been the source of the H5N2 Pennsylvania AI virus but that *they did not maintain or spread* this virus once it got started in poultry. Furthermore, good biosecurity was most effective in preventing AI infection. From our perspective, the risk of migratory birds bringing highly pathogenic H5N2 AI virus from Mexico is low. This assessment agrees with the Risk Assessment prepared by the USDA. However, there will be continued opportunities for introduction of other AI viruses from wild birds into poultry, and this is likely to occur whenever proper biosecurity practices are not followed to segregate wild birds from commercial poultry.