Potential Economic Impacts of a Highly Pathogenic Avian Influenza Outbreak on Upper Midwestern United States Table-Egg Laying Operations

Jada Thompson¹, Dustin Pendell¹, Todd Weaver², Kelly Patyk², and Sasidhar Malladi²;

¹ Department of Agricultural and Resource Economics, Colorado State University, Fort Collins, CO.; ² USDA: APHIS: VS, Fort Collins, CO.


Copyright 2015 by [authors]. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.
Potential Economic Impacts of a Highly Pathogenic Avian Influenza Outbreak on Upper Midwestern United States Table-Egg Laying Operations

By J. Thompson, D.L. Pendell, J.T. Weaver, K. Patyk, S. Malladi, and T. Boyer

Colorado State University *Kansas State University *USDA: Animal and Plant Health Inspection Service *University of Minnesota

INTRODUCTION

- Outbreak of highly pathogenic avian influenza (HPAI) first reported in the United States December 19, 2014.
- Two virus strains have been found in U.S. commercial poultry flocks: H5N2 HPAI & H5N8 HPAI.
- As of July 2015 roughly 48 million birds were affected by the outbreak.
- There have been some permits issued for movement of product from uninfected premises within control areas during the current outbreak.

DATA

- Published budget information, supplemented with approximations and industry expertise.
- Epidemiological disease spread data through the North American Animal Disease Spread Model (NAADSM).
- Egg Industry Center
- United States Department of Agriculture’s: World Agricultural Supply and Demand Estimates (WASDE), National Agricultural Statistics Service (NASS), Economic Research Service (ERS), and Agricultural Marketing Service (AMS).

ANALYSIS

A partial equilibrium model of the U.S. Egg Industry was used to estimate the economic consequences of allowing permitted movement of egg products during a modeled outbreak using the most likely disease spread scenario.

Key Behavioral Equations

1. Global Market Clearing
   \[ q_i \tilde{P}_i + l_{i2-1} \tilde{r}_{i2-1} = (X_i - M_j)(X_i - M_i) + b_i \tilde{r}_i + l_{i2} \tilde{r}_{i2} \]

2. Market Price
   \[ \tilde{P}_i = \tilde{r}_i \tilde{P}_i + \theta_{x,i} \tilde{P}_x + \theta_{x,i} \tilde{P}_x \]

3. Production Diversion to Table or Processed Eggs
   \[ \tilde{E} = \lambda_{e,x} q_{e,x} + \lambda_{e,x} q_{p,x} + \lambda_{e,x} q_{i,x} + \lambda_{e,x} \tilde{q}_{x,pe} \]

4. Capacity Constraint
   \[ \tilde{k}_i = \tilde{a}_{x,i} + \tilde{q}_i \]

5. Final Demand
   \[ \tilde{d}_i = \tilde{p}_i + \epsilon_{x,i} \tilde{P}_x + \epsilon_{x,i} \tilde{P}_x \]

Where:
- \( i = \text{Table Eggs, Processed Eggs} \)
- \( k = \text{Capital} \)
- \( e = \text{Shell Eggs} \)
- \( l = \text{Production Inputs} \)

RESULTS

- Stop movement orders have serious daily adverse consequences for average sized egg producers located within a control area, $6.05/100 hen housed or $5,500 for a 110,000 bird layer house.
- Minnesota table egg price estimated to rise by 1.6% (3¢/dozen) more without business continuity.
- Table egg retail price in the first quarter estimated to be $2.09/dozen for rest of U.S. (1.88 ¢/ dozen difference from actual January-March 2015 U.S. average retail price.)
- Business continuity allows non-infected premises to move products which reduces the impact of an HPAI outbreak to consumers by mitigating price increases and affected producers by reducing the loss of potential revenue.

Acknowledgements

This material is based upon work supported by the U.S. Department of Homeland Security under Cooperative Agreement Number HSHQDC-07-C-00062 and U.S. Department of Agricultural under Cooperative Agreement Number 74000-027-1-A000.

The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Department of Homeland Security or U.S. Department of Agriculture.