

## 2004 Undergraduate Student Project Description

### Department of Bioresources Engineering

**Project Title:** Interactive Prediction Model for Airborne Disease Dispersion

**Faculty/Staff Sponsor:** Eric Benson and Nick Gedamu

**Area of Study:** Poultry/Geographic Information Systems

#### **Project Description:**

Background: The long term goal of this project is to develop a producer accessible tool for real-time infectious poultry disease risk assessment and outbreak response for use in both naturally occurring or agro-terrorism associated disease events. Poultry production, especially broiler production, is an important agricultural commodity in the Southeastern and Mid-Atlantic regions of the United States. Broiler chickens are raised at high densities, with approximately 20,000 to 30,000 birds per house. With chickens housed in such large numbers and at high densities, infectious diseases can travel rapidly through a broiler house. In many poultry producing regions, the farms are tightly packed; making farm-to-farm infectious disease spread a serious threat. For this reason, poultry production is particularly sensitive to bioterrorism or other intentional disease epidemics.

The project would develop a GIS database of commercial broiler housing and to produce a public accessible website that incorporates house locations, weather data, vegetative index and dispersion modeling to identify routes of airborne disease transfer.

Proposed Research: A georeferenced database of poultry houses has been developed for the Delmarva Peninsula. A total of 2176 farms are currently included in the database (1131 in Maryland and 1045 in Delaware and Virginia). An AI outbreak can be modeled as a spatial diffusion process with directionality primarily influenced by relative proximity of poultry houses, local meteorology (primarily wind direction) and landscape. This project will use ArcGIS 8.3 and ERDAS Imagine already in use at the University of Delaware to combine and analyze various spatial data layers.

- Identification and incorporation of a dispersion model that will accurately project the path of infectious material and vectors between farms within the study region
- Incorporate satellite imagery to determine a vegetative index influencing airborne disease transfer
- Produce a public accessible website that incorporates house locations, weather data, vegetative index and dispersion modeling to identify routes of airborne disease transfer

Students can work for credit or pay.

**Student Qualifications:** completion of EGTE115