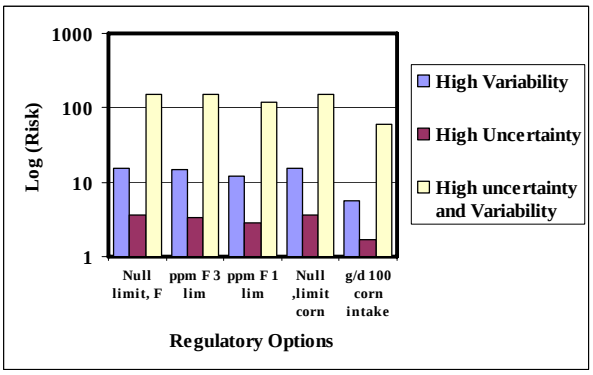
Research Synopsis

Project 2c: Risk Assessment and Analysis for Improved Planning for Foreign Animal and Zoonotic Disease Defense (Bier)

This work applies risk analysis, uncertainty analysis, and decision analysis to the intentional introduction of foot-and-mouth disease, as a basis for identifying the most desirable risk-management options, and key research and data needs.

Modeling Area: Risk Analysis
Case Studies Supported: Bioterrorism
Principal Investigator: Vicki Bier
Institution: University of Wisconsin-Madison
Other Investigators: Zach, Najmedin Meshkati, Michael Orosz, Terry Benzel



Even when variability is more important than uncertainty, neglecting uncertainty can understate risk

Brief Description:
This work uses risk analysis and uncertainty analysis to study intentional introduction of foot-and-mouth disease, in a case study involving feedlots in the Texas panhandle. In particular, we will apply two-dimensional Monte Carlo to epidemiologic, economic, and other models being developed at Texas A&M University, to quantify uncertainty (as well as the variability already addressed by the current models). We will also use decision analysis and decision support to present the results of this complicated analysis to decision makers.

Objectives:
The goal of this research is to develop a risk-based understanding of alternative risk-management options for controlling animal diseases that would lower the total long-run expected cost, as well as event-to-event costs.

Major Products and Customers:
- A user interface allowing decision makers to explore mitigation options for animal diseases, to be used by federal, state, and local agencies, as well as private firms
- A protocol and analytical tools to facilitate risk and uncertainty assessments based on linked systems of models for animal diseases

Interfaces to other CREATE Projects:
This project is closely related to the development of the Risk-Analysts' Workbench (RAW), and is also related to the case study on bioterrorism.

Interfaces to non-CREATE Projects:
Project personnel are working closely with the National Center for Foreign Animal and Zoonotic Disease Defense at Texas A&M University.

Technical Approach:
Traditional epidemiologic models typically consider only variability (the fact that a given outbreak of disease can either explode or die out, depending on what happens following the start of the outbreak). However, they often fail to give adequate consideration to the fact that there is substantial scientific uncertainty about many of the parameters of the models (e.g., measures of disease infectivity). By combining uncertainty analysis with more traditional simulation approaches using two-dimensional Monte Carlo, we hope to more accurately reflect the true extent of the uncertainty about disease risks.

Major Milestones and Dates:

1. Develop decision framework, software specification, and data needs -- March, 2006
2. Conduct in-house expert elicitation and uncertainty analysis -- March, 2006
3. Quantify impact of human actions and interventions -- April, 2007
4. Results and publications -- Mid 2007