Value of Animal Traceability Systems in Managing Contagious Animal Diseases

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Introduction

- Bioterrorism concerns
- Bovine Spongiform Encephalopathy (BSE)
  - WA – was 1 of 81 imported; only 29 were identified
  - TX – of 200 animals associated with index farm, 66 were never accounted for
  - AL – no identification, attempted DNA analysis from 37 different potential source herds
    - 8 – 12 yrs. old, 750 – 1150 lbs., & Red cow
- Increased globalization and world travel

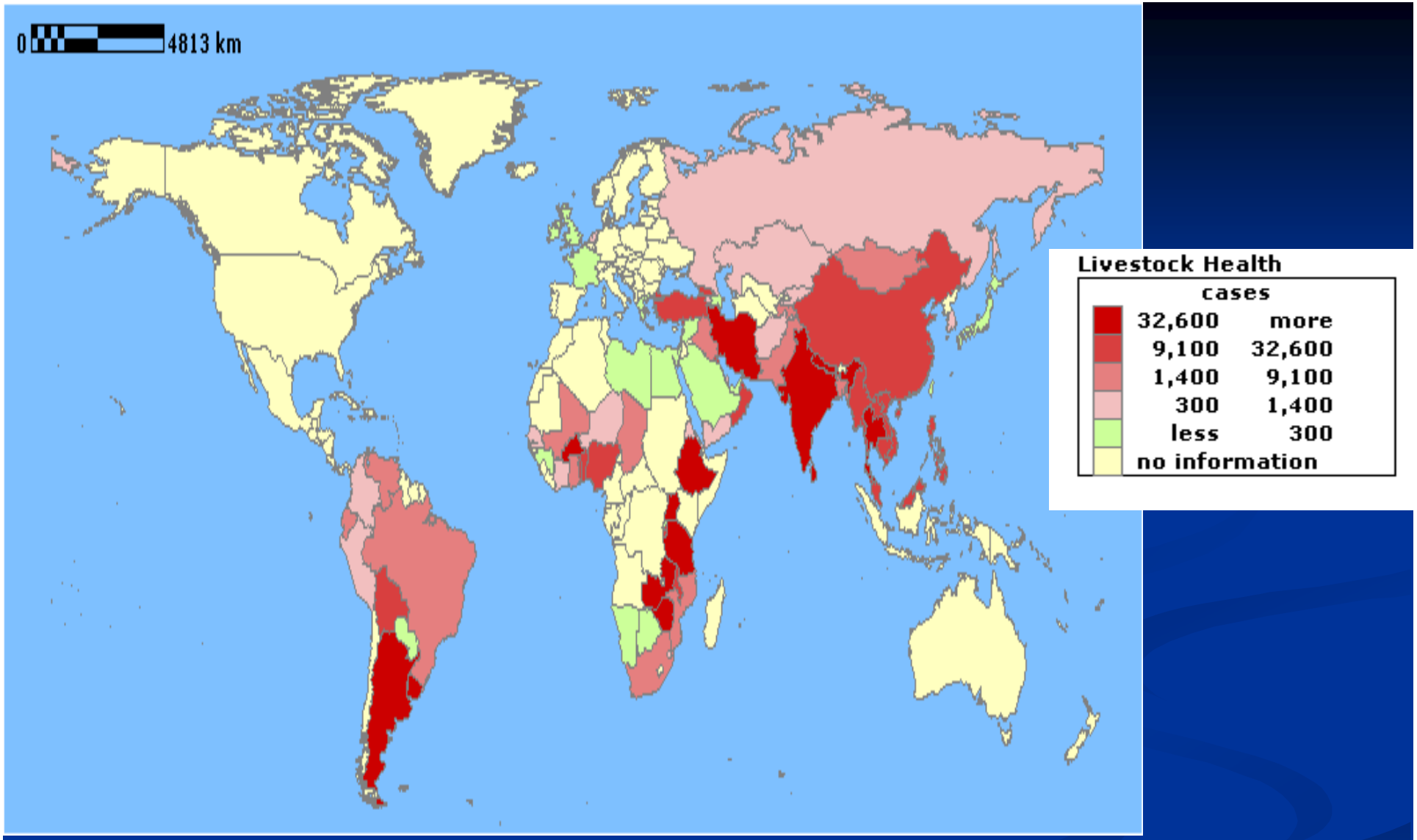


Figure 1. Total Reported Cases of Foot-and-Mouth Disease, 2000-2004

Source: Global livestock production and health atlas; http://www.fao.org/ag/aga/glipha/index.jsp

Objective

- Evaluate impacts of different depths of animal id in the event of a FMD outbreak
  - Use epidemiological disease spread model to evaluate the impact of a FMD outbreak in southwest KS
  - Integrate epidemiological disease spread model with economic model to capture welfare outcomes

Epidemiological Model

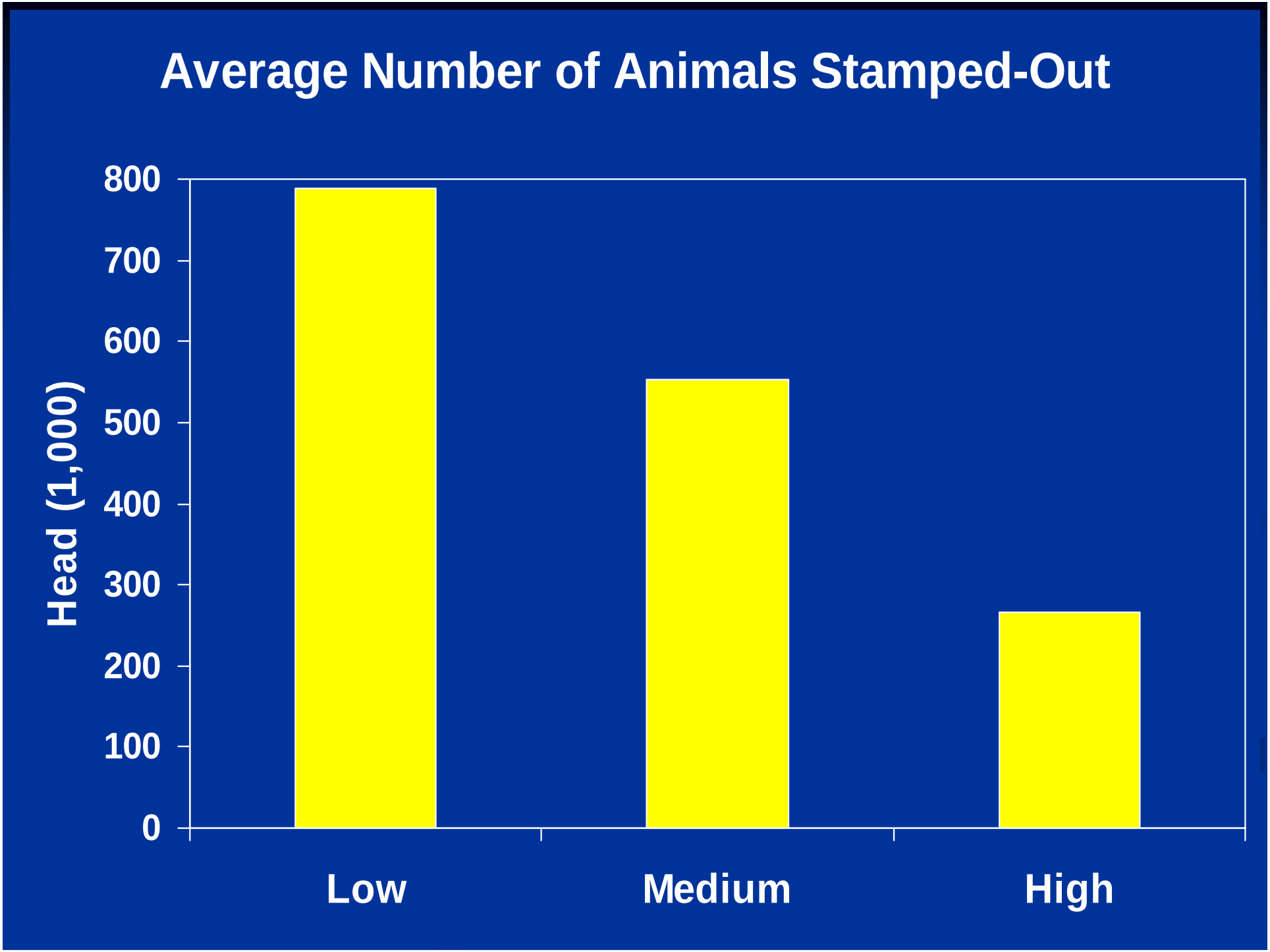
- North American Animal Disease Spread Model
- Stochastic, temporal, and spatial spread model that simulates FMD outbreak
- Input parameters
  - Published studies, experts' opinions, & KDHE

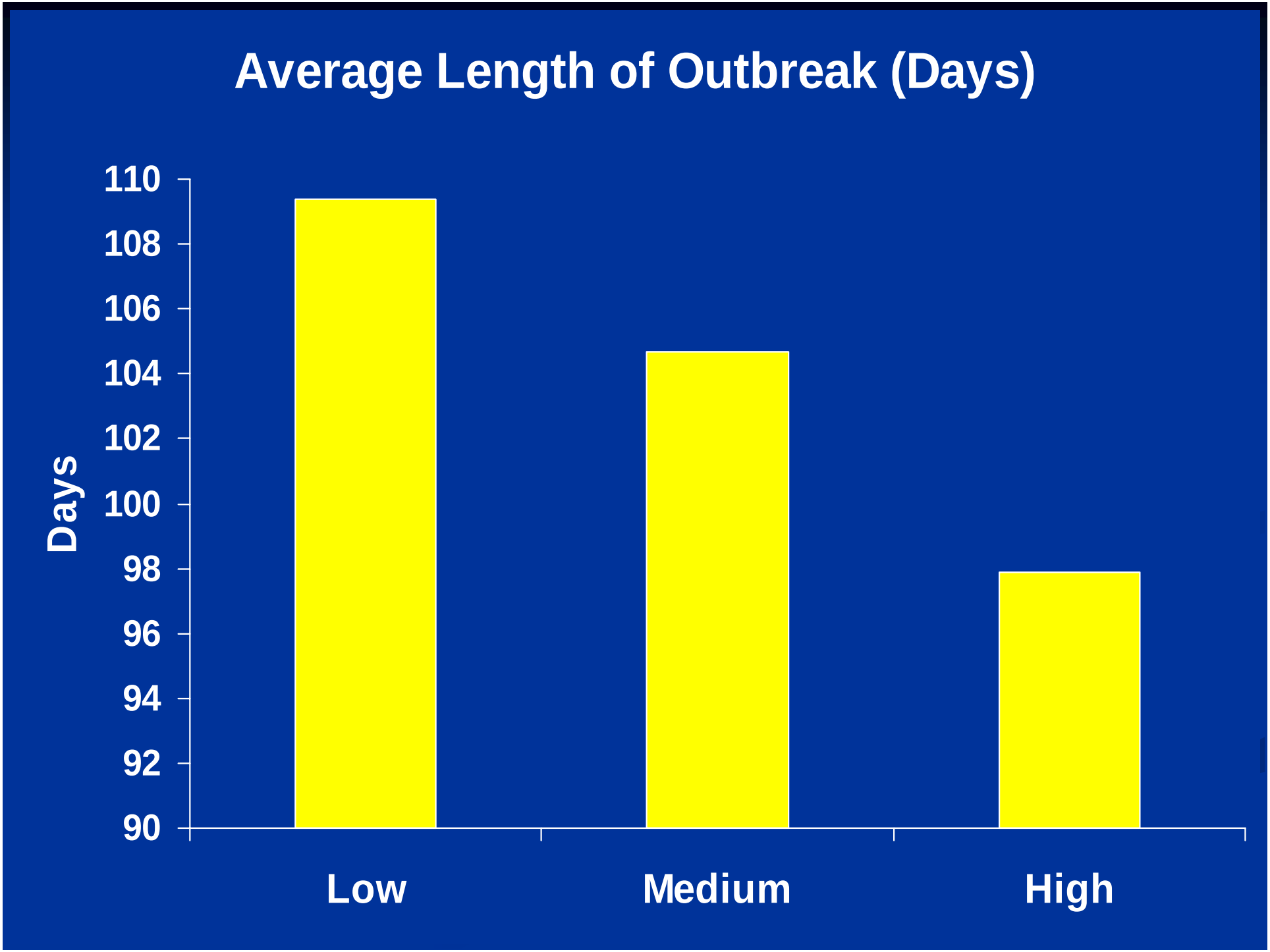
Identification Levels

- Low
  - Current U.S. animal ID system
- Medium
  - Potential voluntary U.S. animal ID system
- High
  - Potential mandatory U.S. animal ID system

Economic Model

- Equilibrium displacement model
  - Estimate welfare changes due to exogenous shock
  - Exogenous shift
    - Epidemiological model
  - Market parameters
    - Previous literature & estimation
    - Monte Carlo simulations
- System contains 44 equations
  - Consumer substitutability
  - Farm-Retail marketing chain
  - Kansas and Other States


Average Number of Animals Stamped-Out
Head (1,000)
800
700
600
500
400
300
200
100
0
Low
Medium
High


Average Length of Outbreak (Days)
Days
110
108
106
104
102
100
98
96
94
92
90
Low
Medium
High

Short-Run Welfare Changes with Change in Demand ($ million)

	Animal Identification Intensity		
Beef Producer Surplus	Low	Medium	High
Retail Level	-238.72	-228.29	-214.89
Wholesale Level	-144.76	-121.79	-92.18
OS Slaughter Level	-65.46	-57.69	-48.10
KS Slaughter Level	-69.27	-43.51	-22.21
OS Farm Level	-64.51	-48.51	-27.62
KS Farm Level	-1.18	-2.06	-1.16
Total Beef	-583.91	-501.85	-405.00
Total Meat Industry	-534.95	-471.83	-399.29
Total Consumer Surplus	-270.98	-219.80	-154.11

Summary & Implications

- FMD outbreak & increased animal ID levels
  - Reduced number of animals destroyed & length of outbreak → reduced costs → smaller losses in welfare changes

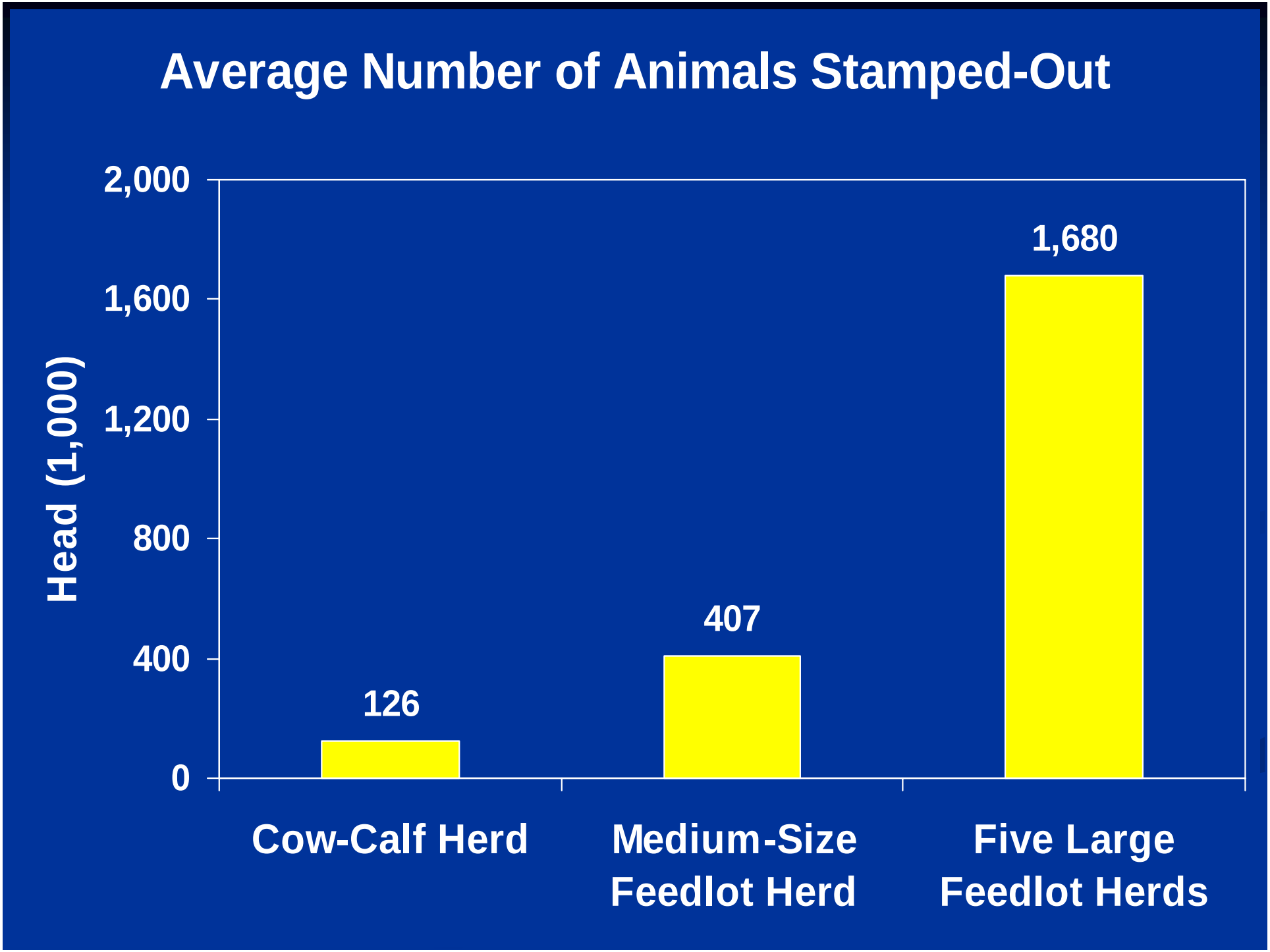
- Demonstrates value in animal id systems

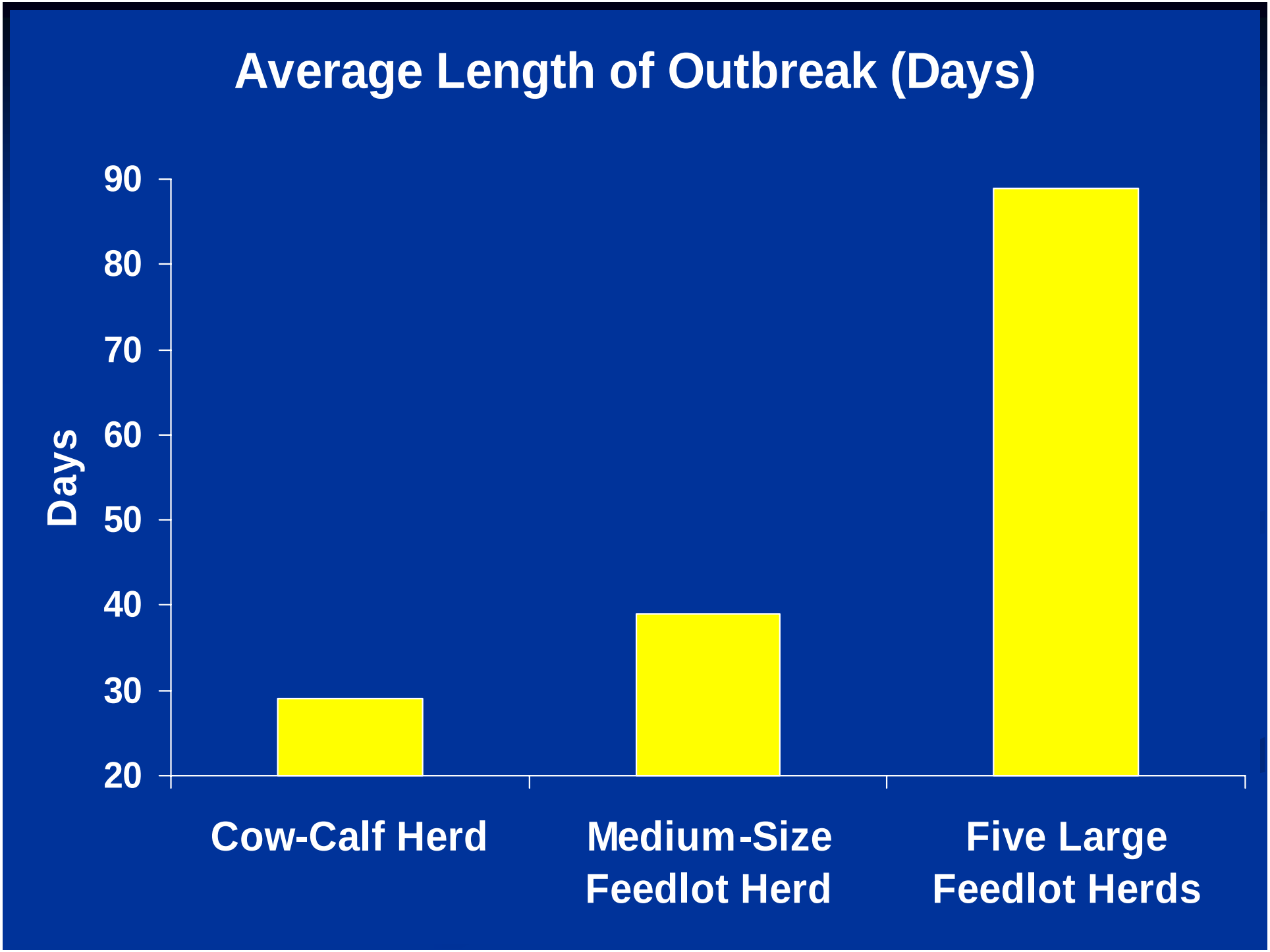
Objective

- Determine the regional economic implications of a FMD outbreak in a southwest Kansas under three different disease introduction scenarios

FMD Introduction Scenarios

- Single cow–calf operation
- Single medium sized feedlot
- Simultaneously at five large feedlots


Average Number of Animals Stamped-Out
Head (1,000)
2,000
1,600
1,200
800
400
0
126
407
1,680
Cow-Calf Herd
Medium-Size Feedlot Herd
Five Large Feedlot Herds


Average Length of Outbreak (Days)
Days
90
80
70
60
50
40
30
20
Cow-Calf Herd
Medium-Size Feedlot Herd
Five Large Feedlot Herds

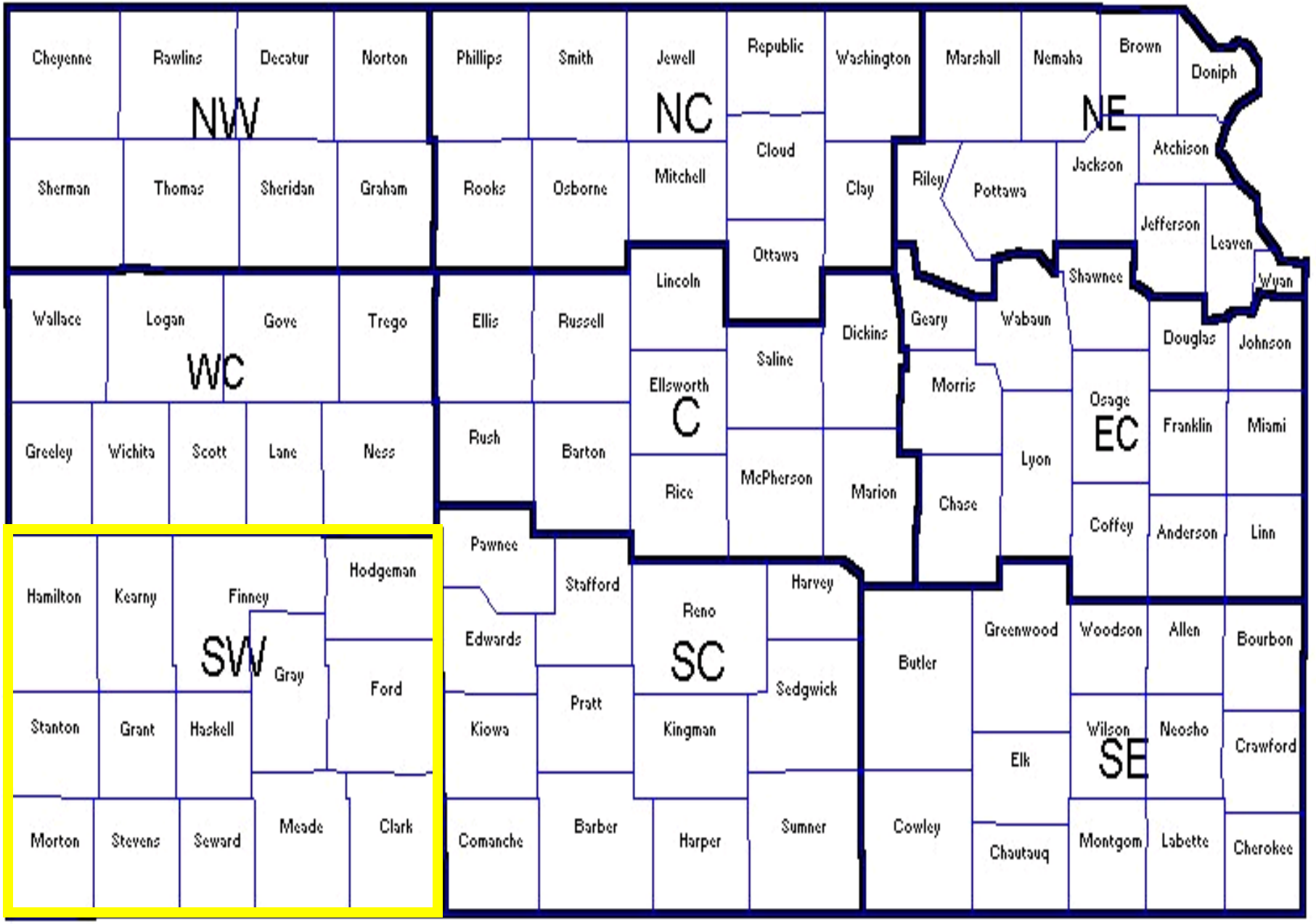
Summary & Implications

- Total impact for Kansas
  - Five large feedlot scenario ~ $1.3 billion loss
  - One medium feedlot scenario ~ $276 million loss
  - One cow-calf scenario ~ $51 million loss
- Demonstrates how incidence of FMD would have different epi and economic implications
  - Surveillance programs & policies, industry management strategies, & resources needed

What did we learn?

- Current infrastructure problems
  - Animals are hauled long distance
  - Cattle are moving further north and west
- Direct involvement by EU
  - How rapidly the Brazilian industry was adjusting to meet the diverse needs of the export markets
- Advice for a US FMD outbreak
  - Move quickly (speed of both detection & control is key)
  - Control the geographic area


Thank You


Cheyenne
Rawlins
Decatur
Norton
NW
Sherman
Thomas
Sheridan
Graham
Wallace
Logan
Gove
Trego
WC
Greeley
Wichita
Scott
Lane
Ness
Hamilton
Kearny
Finney
Hodgeman
SW
Gray
Ford
Stanton
Grant
Haskell
Morton
Stevens
Seward
Meade
Clark
Phillips
Smith
Jewell
Republic
NC
Cloud
Rooks
Osborne
Mitchell
Ottawa
Ellis
Russell
Lincoln
Ellsworth
C
Rush
Barton
Rice
Saline
McPherson
Pawnee
Stafford
Edwards
Pratt
Kiowa
Comanche
Barber
Reno
Harvey
SC
Sedgwick
Kingman
Harper
Sumner
Washington
Clay
Dickins
Marion
Marshall
Nemaha
Brown
Doniph
NE
Atchison
Riley
Pottawa
Jackson
Jefferson
Leaven
Wyan
Shawnee
Geary
Wabaun
Douglas
Johnson
Morris
Osage
EC
Franklin
Miami
Lyon
Chase
Coffey
Anderson
Linn
Butler
Greenwood
Woodson
Allen
Bourbon
Elk
Wilson
SE
Neosho
Crawford
Cowley
Chautauq
Montgom
Labette
Cherokee