Linking
Epidemic & Economic Modeling
An Economic Perspective

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Forest and Agricultural Sector Model (FASOM / ASM)

• The Agricultural Sector Model (ASM), which is part of the Forestry and Agricultural Sector Optimization Model (FASOM)

• Contains budgets for
  
  Beef  Dairy  Hogs
  Sheep  Broilers  Turkeys
  Egg layers  Horses

  Within the beef and hog operations a number of intermediate budgets are represented separating out important stages of production.
Commodity Budgets

• Budgets are defined on a per unit of output basis
  – i.e. output of eggs per laying hen per year, feed input requirement per feeder pig per year

• Budgets are individual to production stages

• Define final products
  – i.e. lamb/mutton, wool, replacement lambs, cull ewes for the sheep category

• Define inputs for production
  – i.e. feed, pasture, labor
Forest and Agricultural Sector Model (FASOM / ASM) Beef

Cow/Calf
- Beef Steer Calves
- Beef Heifer Calves

Replacement Breeding Stock

Steer Calves

Cull Cows

Heifer Calves

Replacement Breeding Stock

Heifer Calves

Non-Fed Beef Slaughter

Steer Yearling Stockers

Heifer Yearling Stockers

First Grazing Program

Second Grazing Program

Steer Calf Stockers

Feedlot Beef Yearlings

Feedlot Beef Calves

Feedlot Beef Slaughter

First Grazing Program

Second Grazing Program
Forest and Agricultural Sector Model (FASOM / ASM) Beef

- Cow/calf operations,
- Steer and heifer calves in stocker operations,
- Steer and heifer yearlings in stocker operations,
- Beef yearlings in feedlots, and
- Beef calves in feedlots.

The budgets for this portrayal depict several major categories of items:
- production of beef or intermediate animals in cwt – net of usage of animals for replacements
- use of intermediate animals (negative sign in table) in cwt
- use of feed in cwt
- use of pasture in acres
- use of aum grazing in animal unit months
- use of other inputs in $
- use of cost in $
- greenhouse gas emissions in metric tonnes
Dairy Steer Calves* merge in with the Steer Calves in the Beef Cattle Flow
Forest and Agricultural Sector Model (FASOM / ASM) Dairy

- Dairy operations,

The budgets for this portrayal depict several major categories of items:
  - production of milk or intermediate animals in cwt – net of usage of animals for replacements
  - use of feed in cwt
  - use of pasture in acres
  - use of aum grazing in animal unit months
  - use of other inputs in $
  - use of cost in $
  - greenhouse gas emissions in metric tonnes
Forest and Agricultural Sector Model (FASOM / ASM) **Hogs**

- Hog Farrowing
  - Pigs
  - Cull Sows

- Cull Sows

- Feeder Pigs

- Hog Finishing

- Hogs for Slaughter

- Replacement Breeding Stock

Farrow to Finish
Forest and Agricultural Sector Model (FASOM / ASM) Hogs

• farrowing
• finishing and
• farrow to finish

The budgets for this portrayal depict several major categories of items

• production of fed hogs or intermediate animals in cwt – net of usage of animals for replacements
• use of intermediate animals (negative sign in table) in cwt
• use of feed in cwt
• use of pasture in acres
• use of aum grazing in animal unit months
• use of other inputs in $
• use of cost in $
• greenhouse gas emissions in metric tonnes
Forest and Agricultural Sector Model (FASOM / ASM) Sheep

Sheep
- Lambs
- Wool

Replacement
Breeding Stock

Wool

Cull Ewes

Lambs

Sheep Slaughter
Forest and Agricultural Sector Model (FASOM / ASM)

- 11 Regions, 63 Sub-regions
- 70-100 year time period
International Trade

- **Imports**
  - Eggs
  - Wool
  - Non-fed beef
  - Fed beef
  - Pork
  - Secondary dairy
  - Live cattle

- **Exports**
  - Eggs
  - Fed beef
  - Wool
  - Pork
  - Secondary Dairy Products
  - Chicken
  - Turkey
International Trade Regions

- 37 International Trade Regions
Modeling Disease Outbreak in ASM

1. Define Common Scenarios
2. Epidemic Model
3. Adjust Affected Commodity Budgets
4. Fix some animal and other numbers
5. Economic Model Output
Epidemic Model

Provides Inputs for the Economic Model
- Animal Mortality
- Infected Animals or Herds
- Treatment Activity levels

Rift Valley Example
- Young-Infected
- Young-Dead
- Abortions
- Pregnant-Dead
- Pregnant-Infected
- Adult-Infected
- Adult-Dead
Adjust Affected Commodity Budgets

• Define Scenarios
• Define per herd/animal costs
• Split epidemic model results into herd types
  – i.e. backyard, large feedlots, small dairies, etc.
• Split epidemic model into herd components
  – i.e. number of infected cattle into number of infected calves, cows, stocker steers, stocker heifers, etc.
Adjust Affected Commodity Budgets

• Identify what happens to each of the herd components
  – i.e. for quarantined cows what percentage are slaughtered for welfare reasons, what percentage are culled, etc.

• Calculate economic model outputs

• Run a scenario loop to generate impacts for each scenario
Economic Model Output

• Direct Cost of Lost Animals
• Direct Cost of Treatment and Response Activities
• Value of Lost Production Revenue
• Forgone Income from Shutdown
• Welfare Effects
High Plains Study

• Phase 1
  – Done
  – Report to Cattle feeders
  – Draft professional report(s)

• Extensions
  – More approaches
  – Balance and robustness
  – Java Epidemic model
  – ASM
  – National unification
DADS Study

• Memos set to Tim in November and December and yesterday
• Awaiting response

• National study idea
RVF Study

• Extension?
• Treatment methods
• Writing?
Other activities

- Robustness
- BSE and trade
- AI and trade
- Carcass disposal costing
- RAW/DSS interface