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The Consequences of Fire Blight in Australian Pome Fruit Industries

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Outline

- Background
  - Consequence assessment and prioritisation
  - The SPS Agreement
  - Appropriate Level of Protection
- Assessing the implications of trade
  - Net social welfare change
  - The Snape and Orden approach
- Case study
  - New Zealand apple imports
  - Partial equilibrium trade model and impact simulation model
- Results
  - Consumer gains vs. expected production loss
- Discussion and Conclusions

Consequence Assessment & Pest Prioritization

Cooperative Research Centre for National Plant Biosecurity

Enhanced Risk Analysis Tools

Objectives

- Develop a rigorous methodology for identifying and prioritising threats
- Communicate priorities and sensitivities to stakeholders
- Extend applications to other national biosecurity issues

Stakeholders

Horticulture Australia Ltd.

Rural Industries Research and Development Corporation

Beale Review 2008

Balancing risk and return

The SPS Agreement

Strong focus on production effects

Article 5 (Para. 3) stipulates that any welfare effects resulting from trade in potentially-contaminated goods be measured in terms of producer welfare

Members can restrict trade up to the point where the risk posed is 'acceptable' (i.e. < ALOP) and remain compliant

An ALOP is a locus of arrival probabilities and incursion impacts with a unique product representing the maximum tolerable level of contamination risk

Memorandum of Understanding between the Commonwealth and States, 21st December 1995

Beale *et al.* (2008) called for a *National Agreement on Biosecurity*

Economics and Risk Analyses

Lack of consensus

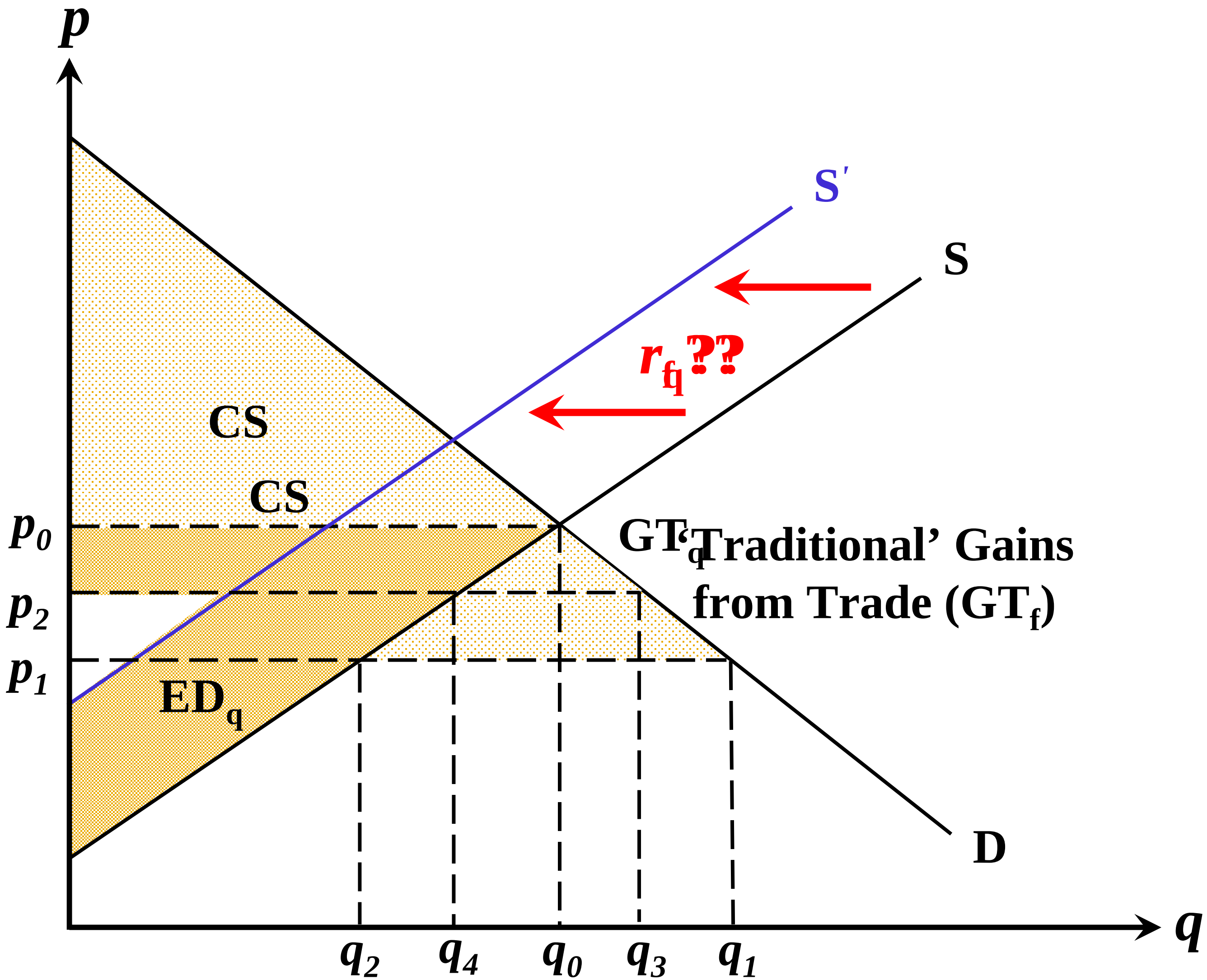
Past economic analyses have tended to focus on long standing, high profile market access requests:

- Hinchy and Low (1990), Bhati and Rees (1996): New Zealand apples, fire blight
- McKelvie (1991): New Zealand salmon, whirling disease
- McKelvie *et al.* (1994): Canadian salmon, Furunculosis and Infectious Haematopoietic Necrosis
- Hafi *et al.* (1994): chicken from the USA, Thailand, Malaysia and New Zealand, Newcastle Disease

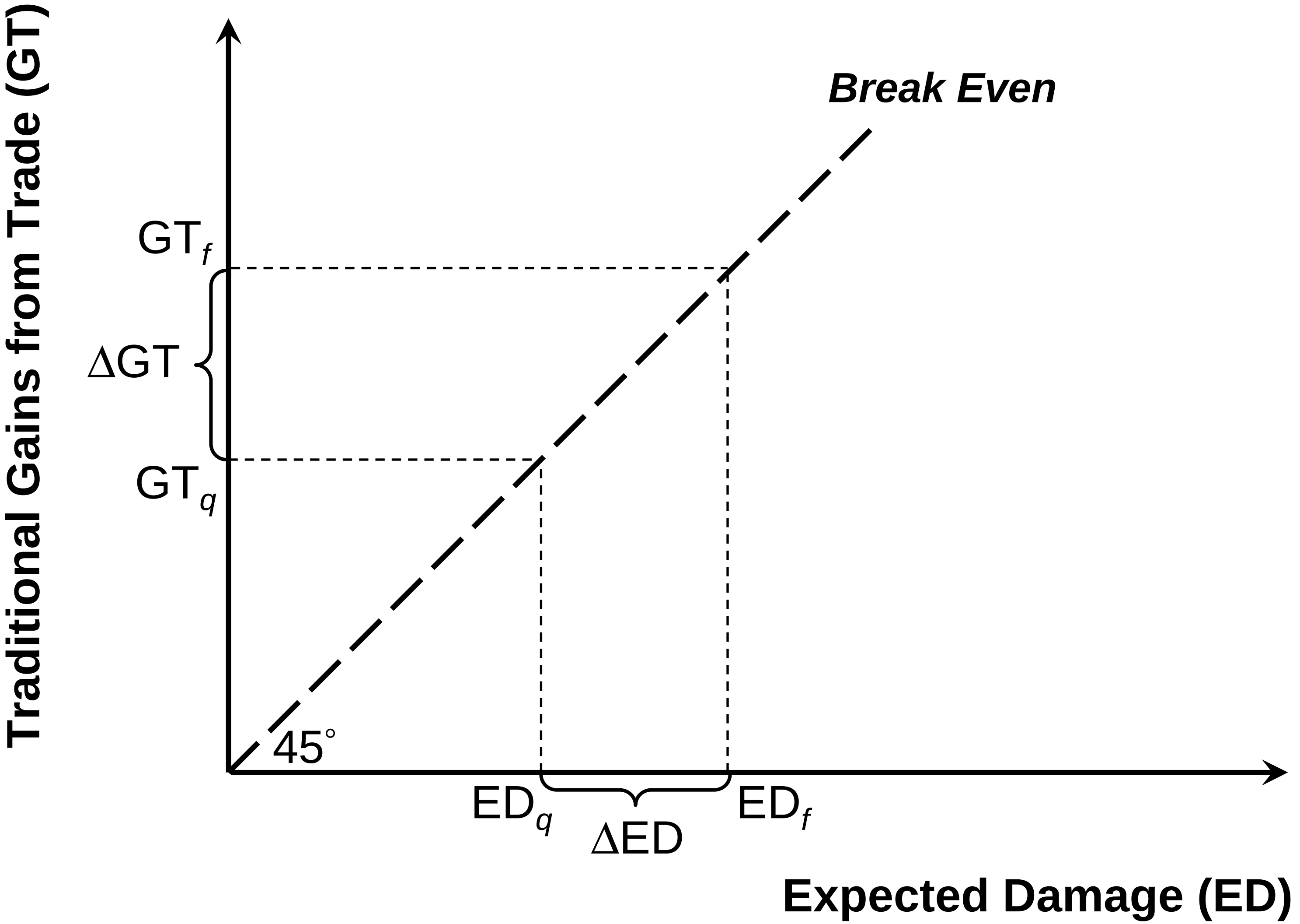
James and Anderson (1998)

Cook and Fraser (2007) and Cook (2008)

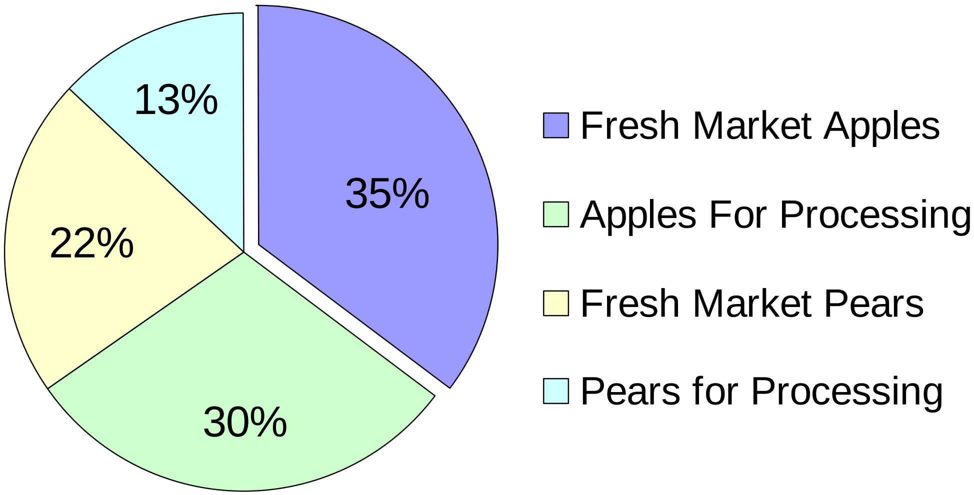
Social Welfare:
Free & Quarantine-Restricted Trade



Net Social Welfare Assessment



Case Study – Apples from New Zealand



Key Figures (2008)

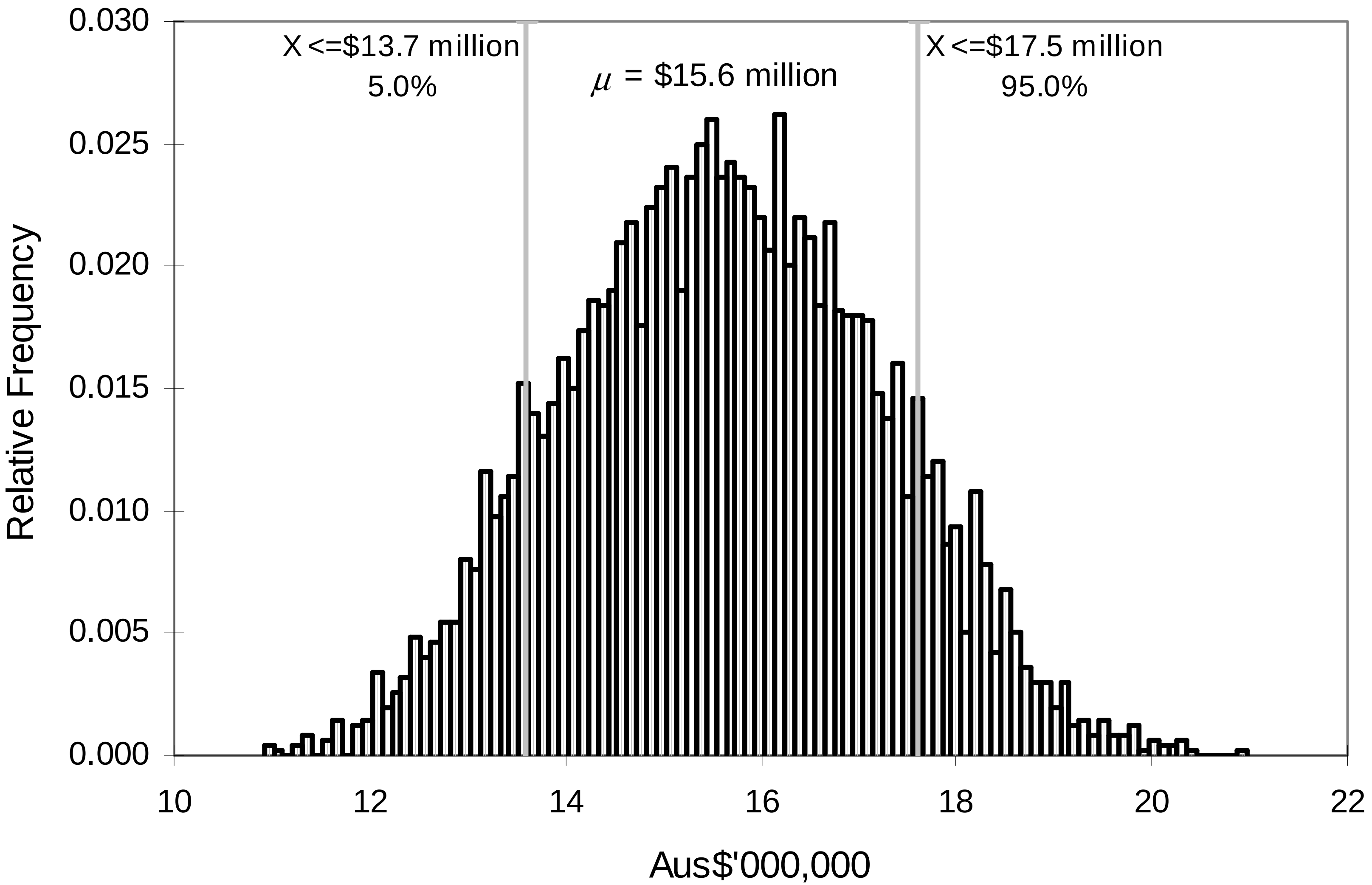
Industry Revenue	707.3 $ million
Revenue Growth	11.7 %
Gross Value of Production	341.1 $ million
Employment	2,353
Exports	16.5 $ million
Imports (Processed)	4.3 $ million

Fireblight (*Erwinia amylovora*)

Traditional Gains from Trade

	5% Confidence Interval	Mean	95% Confidence Interval
Autarchy			
Change in Consumer Surplus	-$47,693,100	-$50,488,650	-$53,322,170
Change in Producer Surplus	$32,955,340	$33,618,690	$34,264,710
Forfeited Net Gains to Trade	$14,737,760	$16,869,970	$19,057,460
Quarantine Restricted Trade			
Change in Consumer Surplus	-$3,917,790	-$4,145,580	-$4,374,810
Change in Producer Surplus	$2,882,300	$2,887,020	$2,891,610
Forfeited Net Gains to Trade	$1,035,490	$1,258,560	$1,483,200
Net Welfare Gain Resulting from Quarantine-Restricted Trade	$13,702,270	$15,611,410	$17,574,260

Net Gains from Trade



Generic Impact Simulation Models

Capture the principle ecological processes

Arrival, population growth and spatial spread

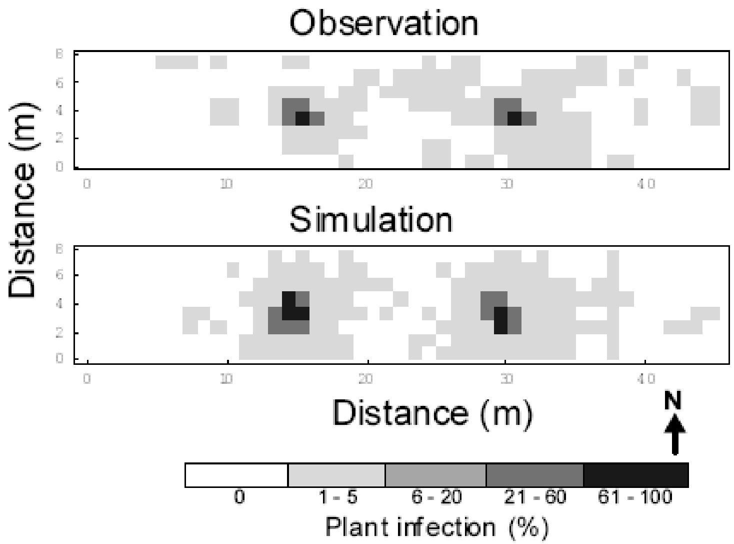
Applicable to a range of taxa

Invertebrates, pathogens and fungi

Facilitate multidisciplinary interactions

Marry biological and ecological information with economic risk assessment approach

Integrating Two Risk Models



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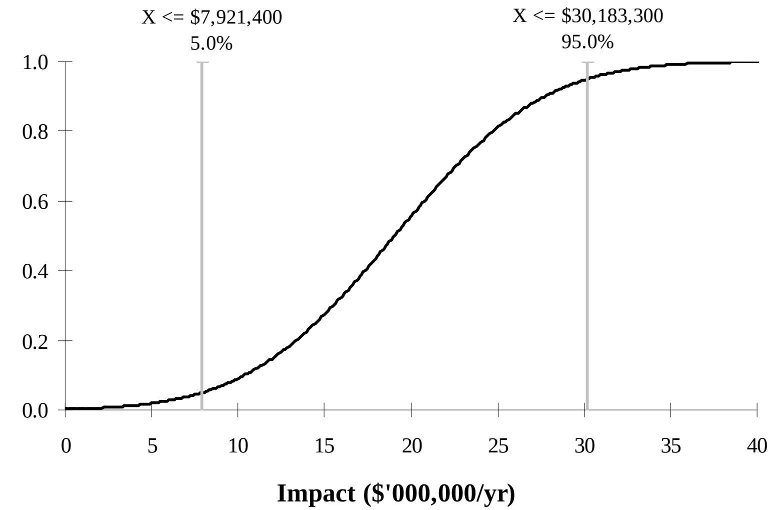
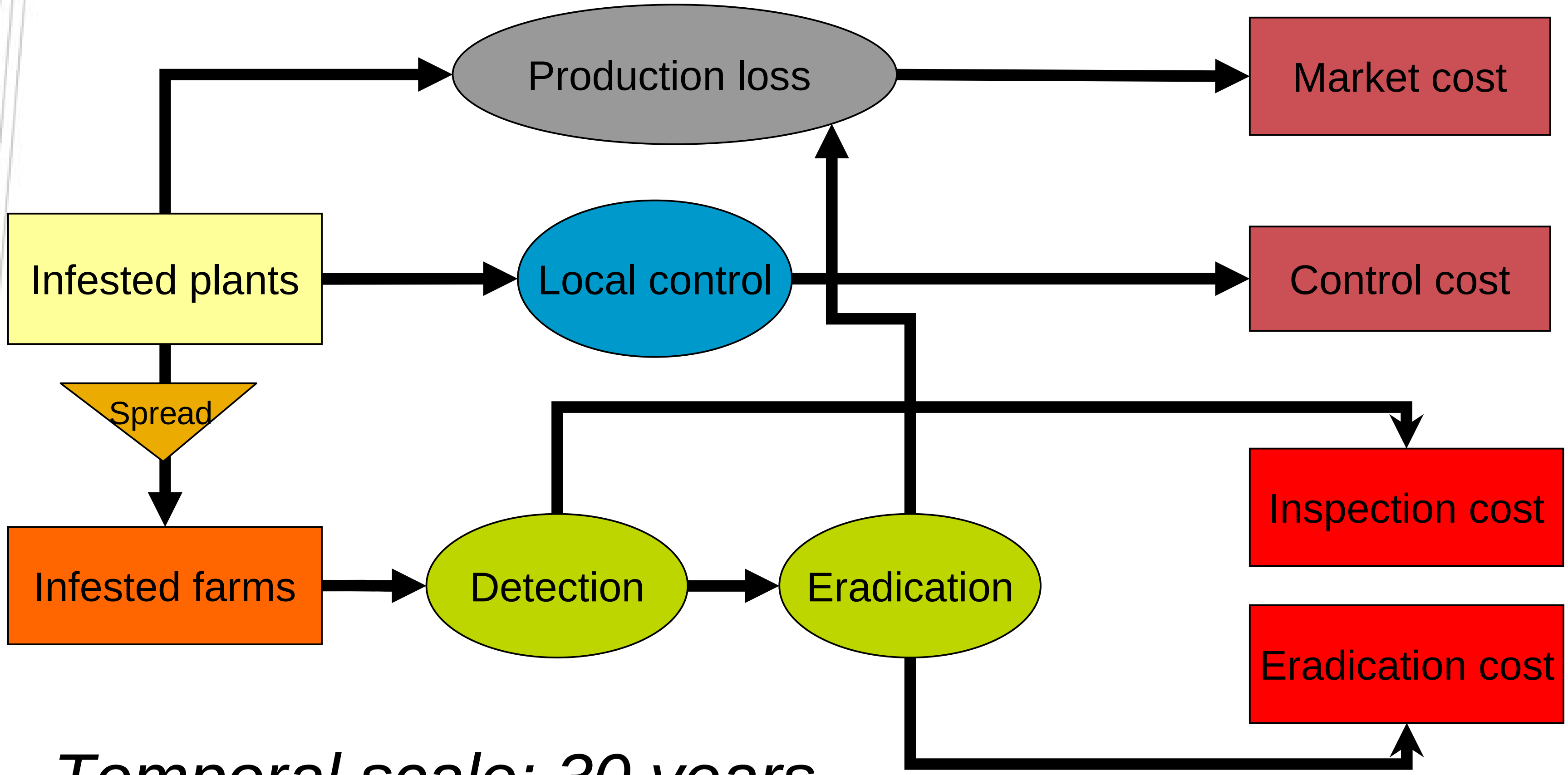


Diggle, AJ et al (2002), Phytopathology
AnthracnoseTracer: A spatiotemporal model for simulating the spread of anthracnose in a lupin field

Cook et al (2007), Ecological application
Predicting the economic impact of an invasive species on an ecosystem service

Model Structure



Temporal scale: 30 years
Spatial scale: Australia

Major Model Outputs

Total C = yield/market C + control C+ inspection C + eradication C

Farmers → **Governments**

What will be the economic costs and how will they change over time?

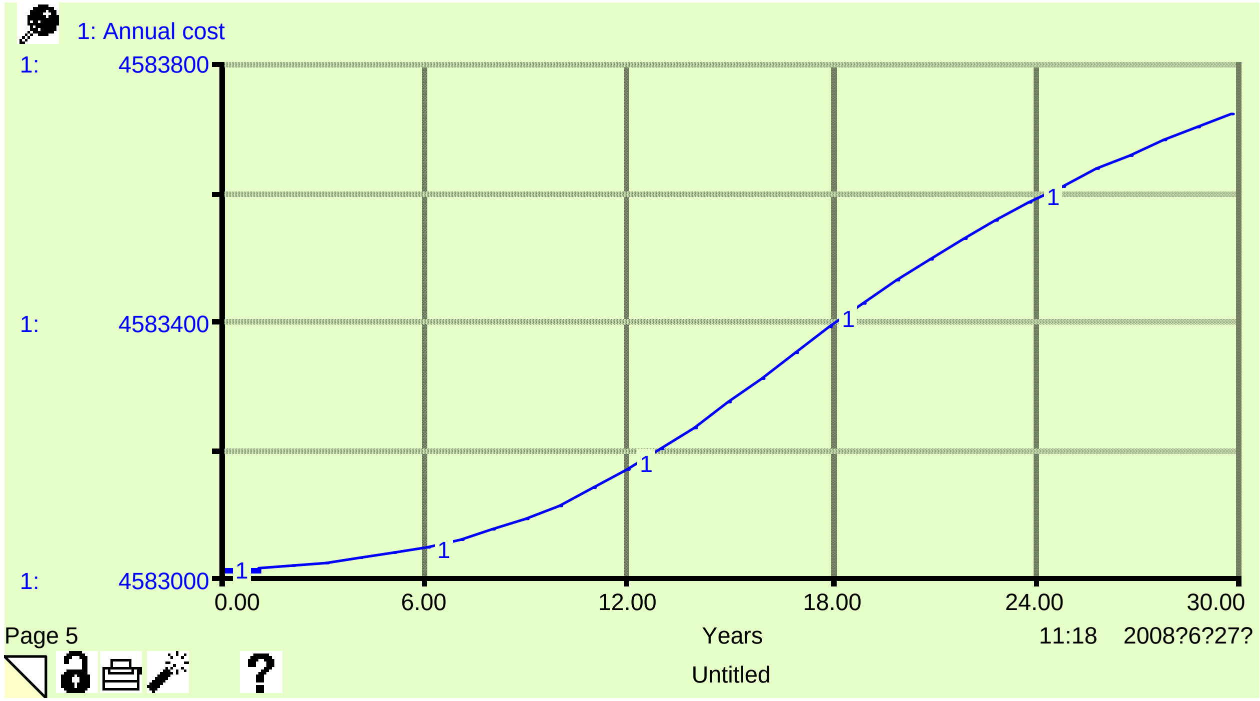
What is an optimal way to allocate our funding in controlling pests?

Who are the winner/losers for each policy option?

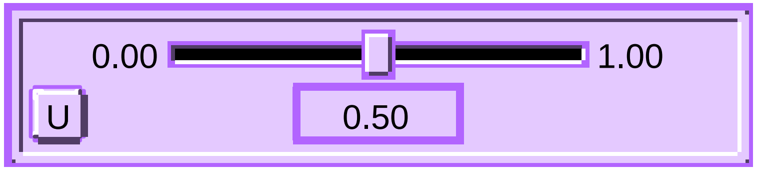
Core Economic Assumptions

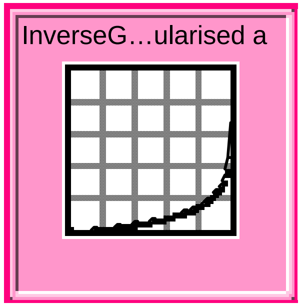
1. Australian producers are price-takers on global markets;
2. Perfect competition among domestic apple producers, implying product homogeneity;
3. Constant elasticities and non-linear demand;
4. Constant discount rate;
5. Market value without infestation remains constant over the simulation time of 30 years (can be easily updated).

Stella: Built to Communicate



Percentage yeild loss despite management activities



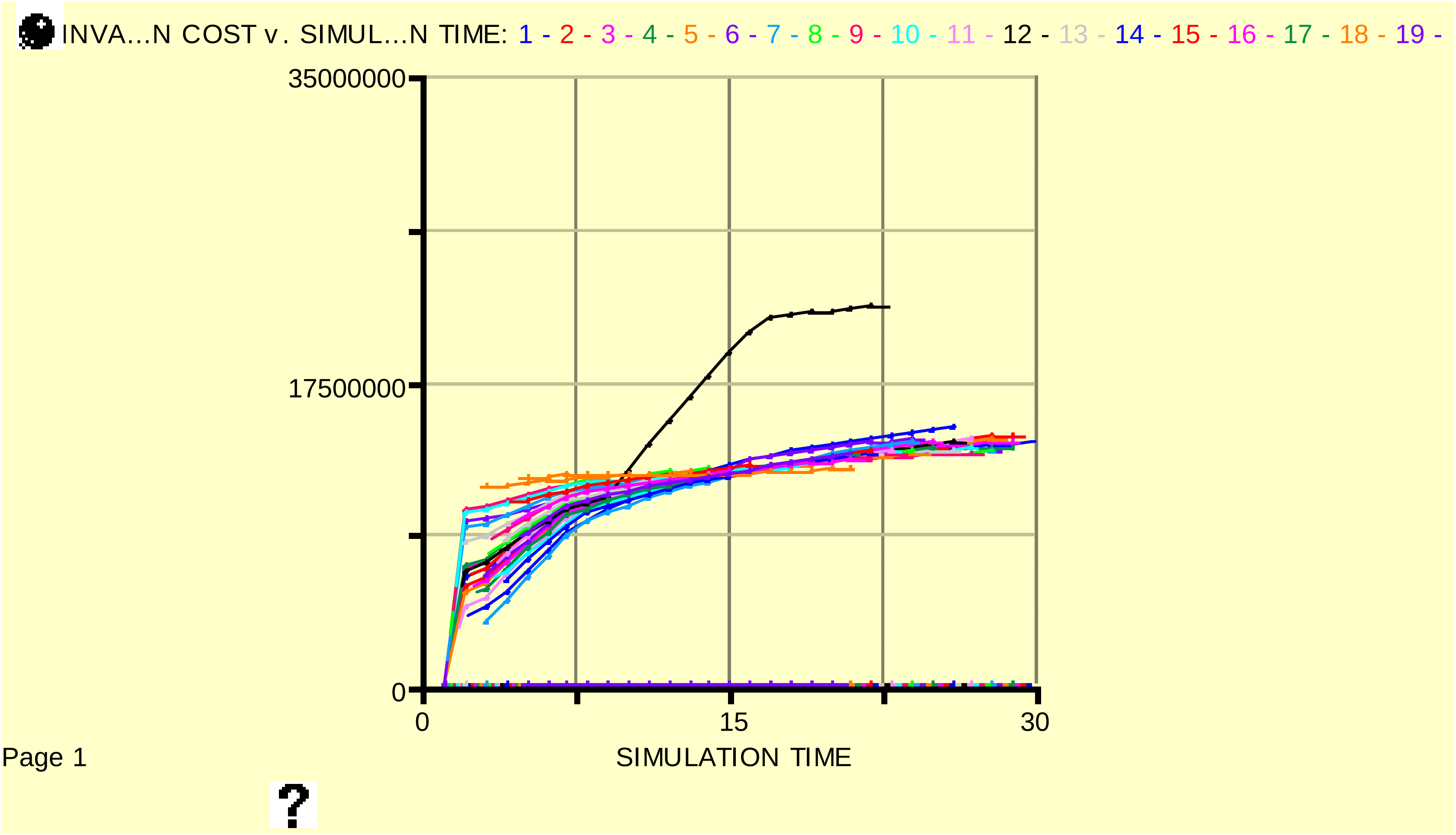


Expected Damage from Fireblight

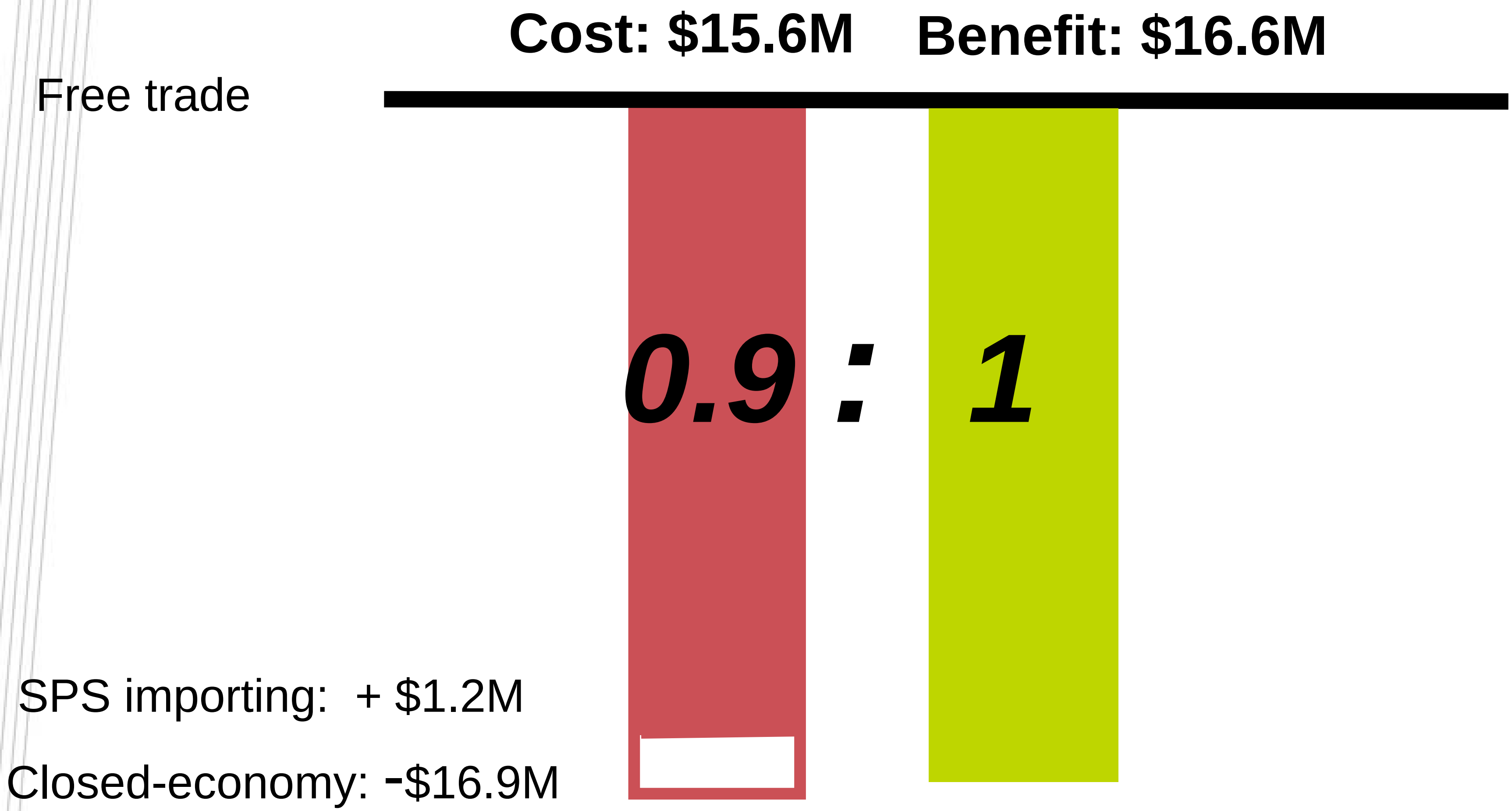
Benefit from Quarantine Restricted Trade：

Saving in Market Cost: $16.6 M/year
Saving in Invasion Cost: $17.6M/year

Average of 1,000 Stochastic Runs



Returns for Australia from Importing NZ Apples subject to SPS Measures



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Thank you

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