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Valuing potential benefits of weed biocontrol research

A study of Californian thistle on New Zealand lowland intensive sheep farms

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1 The Problem

Biological control can be successful, but requires investment of research money. For public agencies to invest in this research, they need to know the size of the potential economic benefit. Generating such an estimate was the focus of this research.

Californian thistle reduces the productivity of sheep farming in New Zealand, an industry worth over NZ\$2 billion per year.

2 Bioeconomic model

- Spreadsheet model (Excel) with Visual Basic macros, solved with Premium Solver Platform.
- Chemical and biological weed control.
- Economics from farm production budgets.
- Biological module, based on research by Bourdôt, et al., accounted for distinctive features of Californian thistle reproduction.
- Module linkages from bioeconomic literature.

3 Model parameters

Biological

- Root bud population size
- Root bud production
- Root bud dormancy
- Weight per aerial shoot
- Shoot mortality
- Clover N fixation rate
- Pasture area of impact
- Shoot size

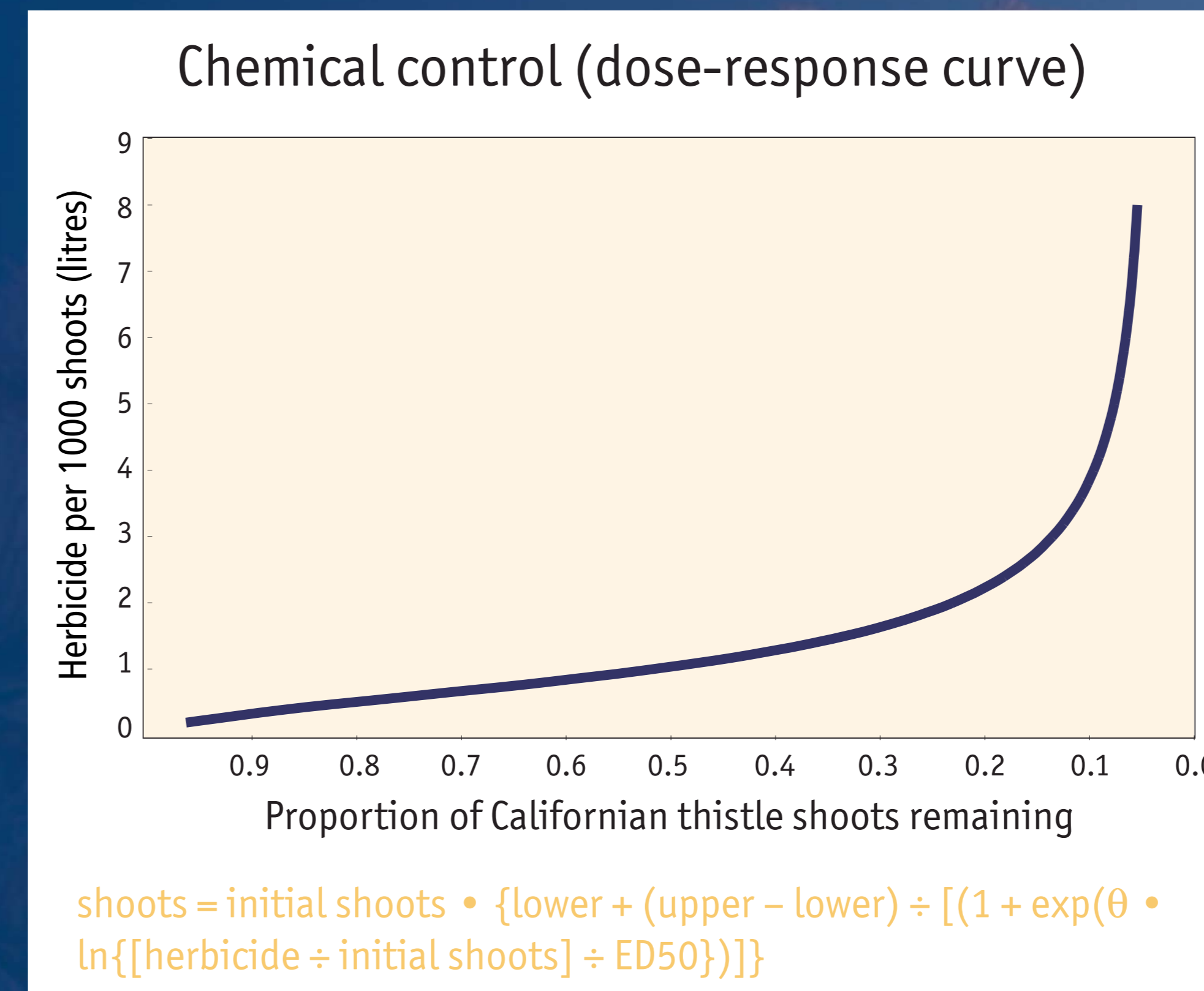
Economic

- Wool clip per ewe
- Pasture dry matter per ha
- Ewe feed requirement
- Farm size
- Gross margin
- Discount rate
- Lamb feed requirement
- Lambing rate
- Lamb sales price
- Ewe maintenance feed
- Price of N
- Wool price

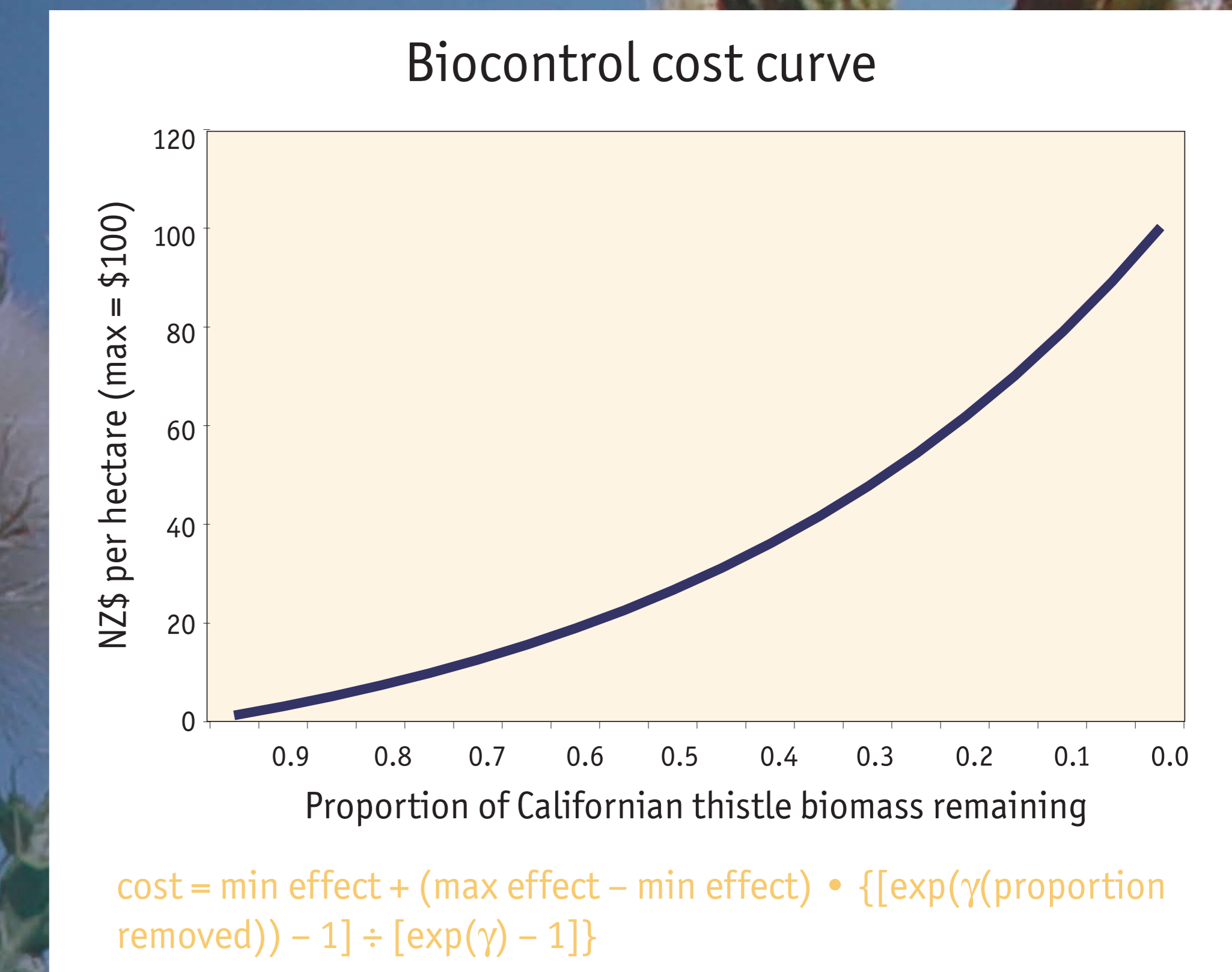


Pasture infested with Californian thistle.

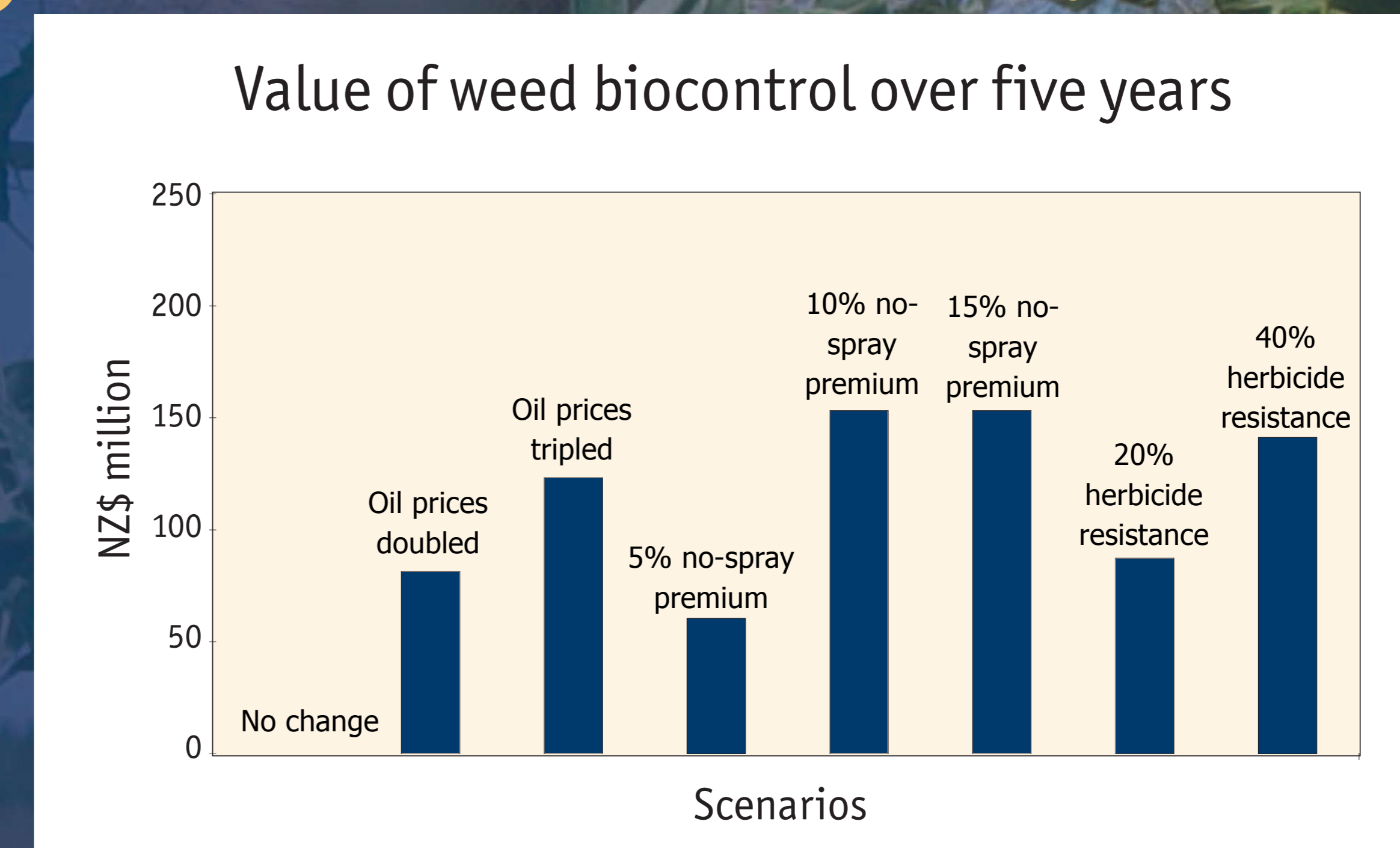
4a Chemical control cost



4b Biocontrol cost



5 Value of biocontrol over 5 years



6 Findings

- Biocontrol of Californian thistle in lowland sheep farming in NZ worth from NZ\$0 to NZ\$153 million over five years.
- Biocontrol useful strategy for reducing economic risk.
- Key variables: petroleum prices, herbicide resistance, consumer demand.

Key References

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intensive sheep farms**

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