# A simplified approach to assessing the economics of alternative PD control policies

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# Economics for helping decision making

PD can cause substantial losses via mortality and reduced production

These losses can be reduced by interventions:

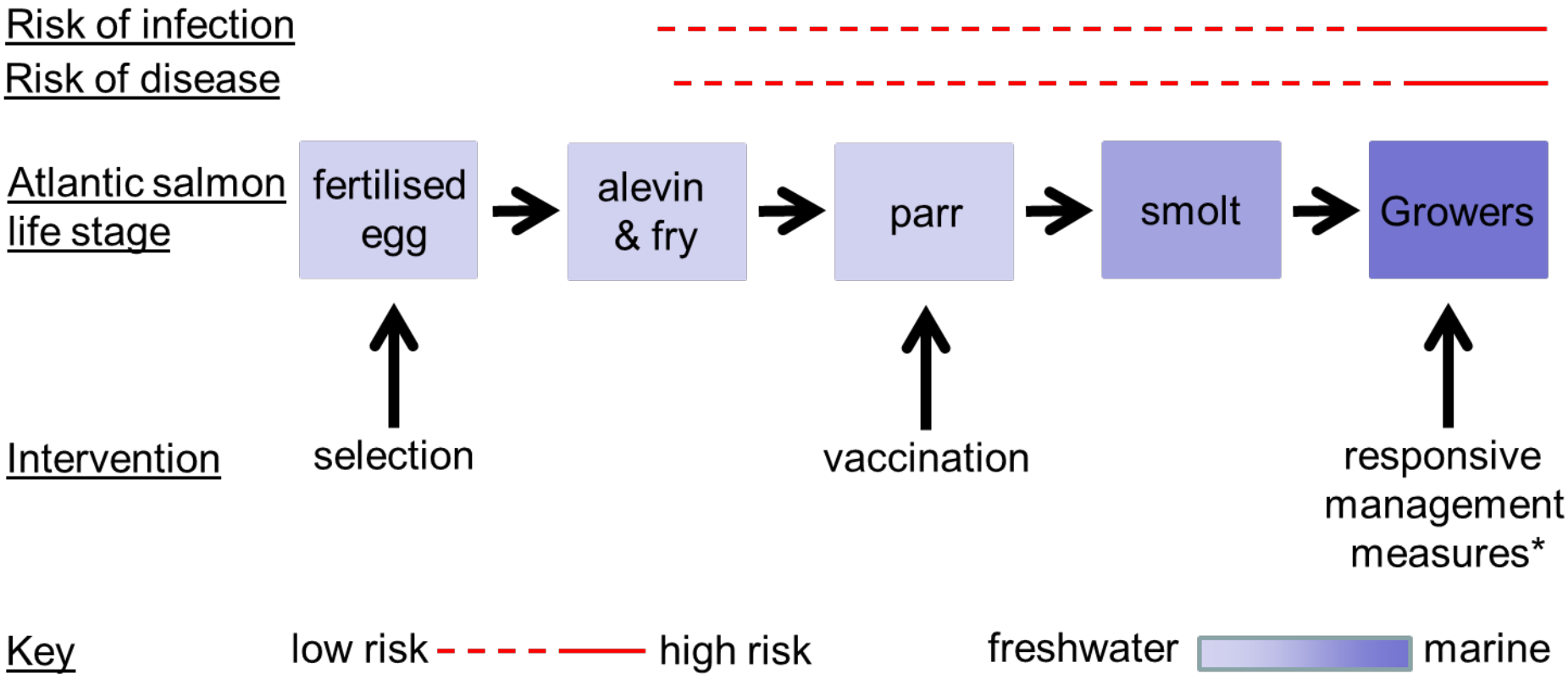
Prior interventions: using resistant stock, vaccination
Intervention on infection: functional feeds, husbandry measures

These interventions cost money

Balance reduced losses from PD against costs of intervention

Depends on how likely and how severe PD outbreaks are

# Outline of intervention timing




* responsive management measures: include inclusion of functional feed, cessation of handling, and/or increased removal of dead and moribund fish as a consequence of disease signs.

# Economic modelling

Benefits – reduced losses to disease

- Mortality
- Discards
- Growth rate reduction
- Flesh quality reduction

Costs- costs of interventions, losses due to interventions

Benefit:cost ratio, must be > 1 (in fact larger than alternative investment BCR)

Complication of insurance

Avoid double counting

# Detailed model for loss of value of a production cycle due to PD

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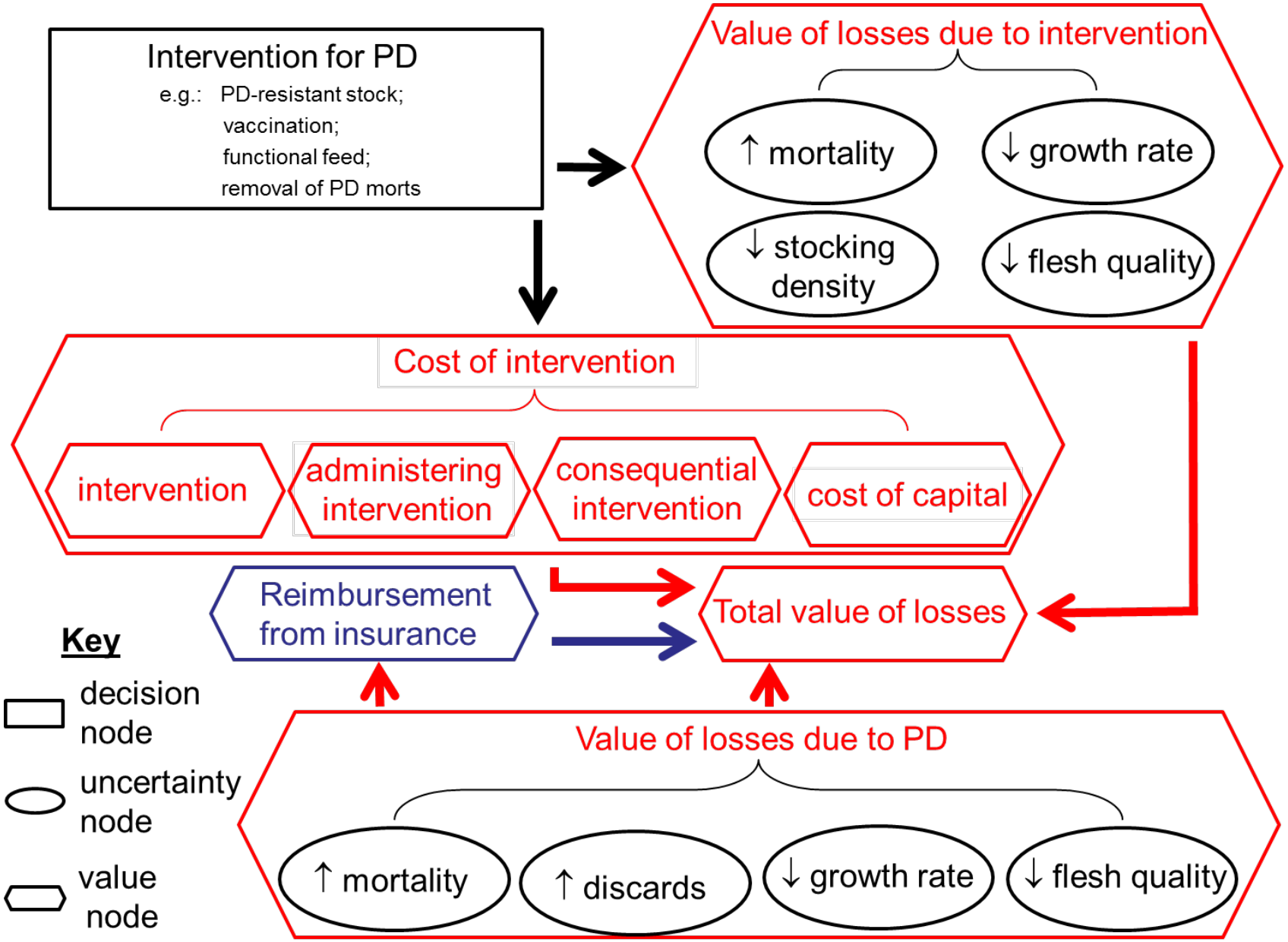


## Simplifying the model

We don’t have the data for much of this

Even if we did, parameter uncertainty would not remove uncertainty from model outputs

We simplify the intervention costs into a simple constant

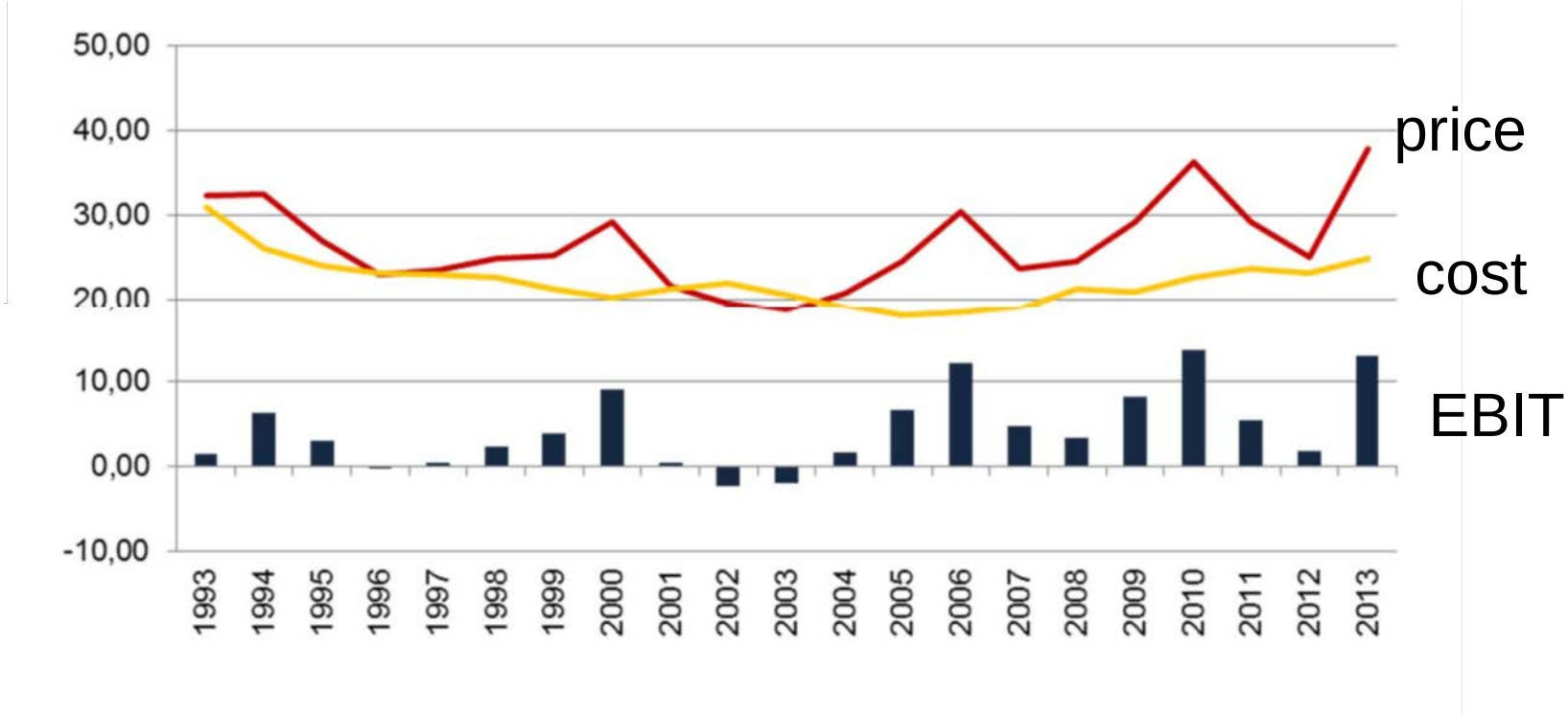
In this case we are assuming 1% of production cost (can be varied)

Production costs have been fairly constant in recent years

However, price is not, and variation in price is included

Also insurance impacts costs, so remains

# Cost relatively stable, price very variable



# Simplified model for loss-of-value of a production cycle due to PD

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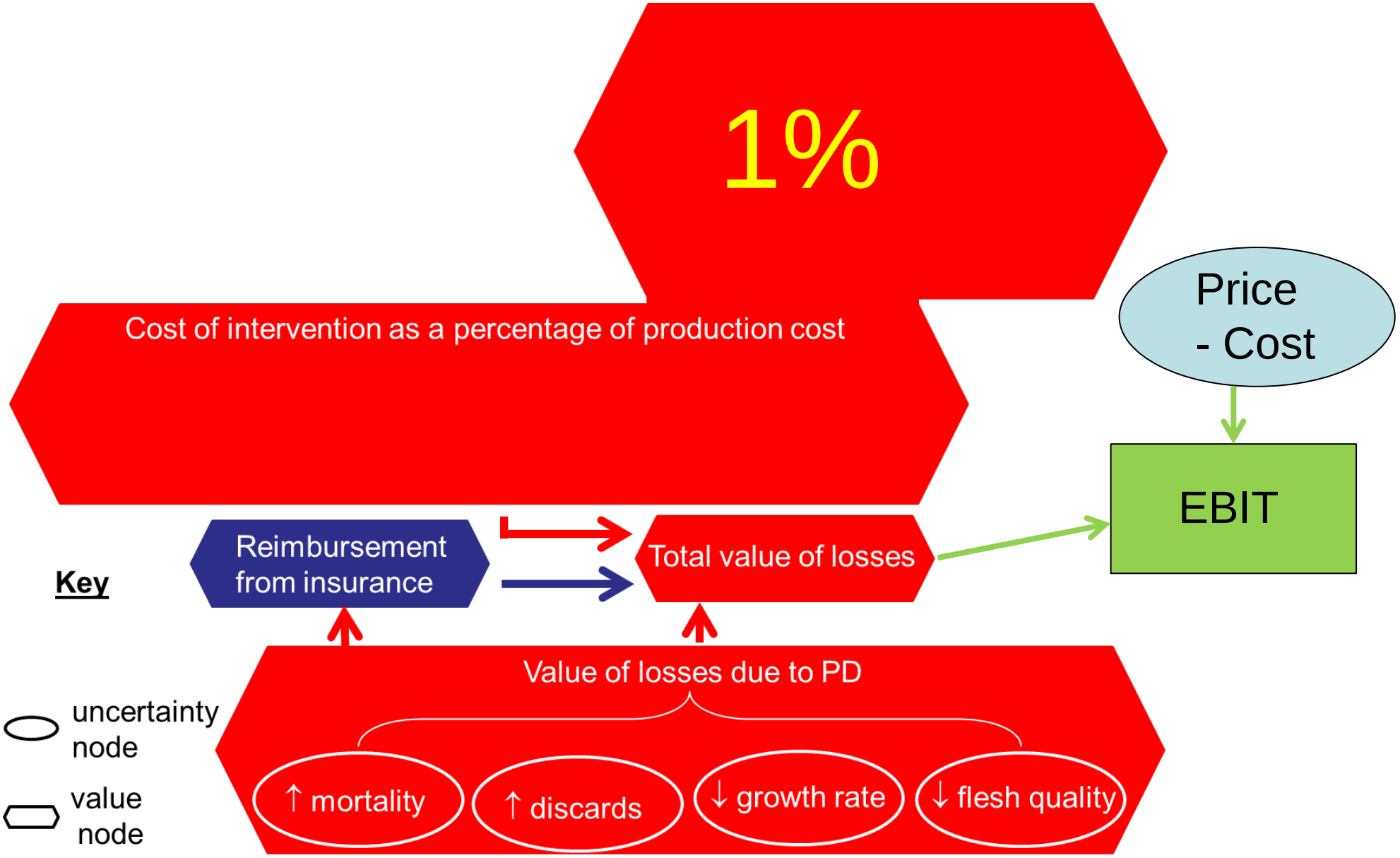

# Sources of data and analysis

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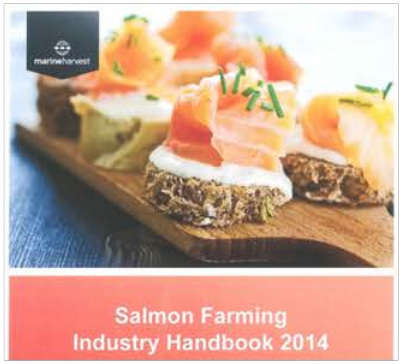
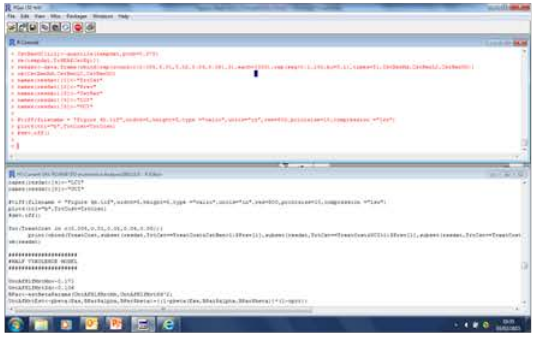
Veterinary parameters


Economic parameters



**Additional model features**

- Mean annual price over 10 years modelled as continuous unif(a,b) and cost as median.
- Effective mortality μ & σ following insurance re-imbursement re-estimated from truncated Beta(α,β) pdf derived from original published mortality μ & σ.
- Prophylactic intervention cost modelled for probability of PD without intervention

Estimate median benefit-cost ratio, based on loss-of-value to PD, for interventions of fixed cost and variable PD-occurrence risk.

## Parameters

Values and variation taken from review of literature

Flesh quality price of 97.5% of PD free farms (derived from Aunsumo 2010)

Mortality from Bang Jensen et al. (2012)

Mean and standard deviation used to derive beta distribution
Mortality >15% intervention for insurance (from industry)
75% of cases mortality caped at this level
Truncated beta distribution converted back to new mean and SD

Reduced growth to 74.5% of PD free

Discards of 2%

## Parameters

Price varies on 10 year's data

- The higher the price the bigger the benefits of intervention
- Prices can be fixed in the model

Insurance included

Intervention costs multiplied by inverse probability site will be uninfected

In this case protective effect on other farms not included, this is an individual farm version. However this effect can be included an is similar to reducing the relative number of uninfected farms

## Illustrative Model Scenarios

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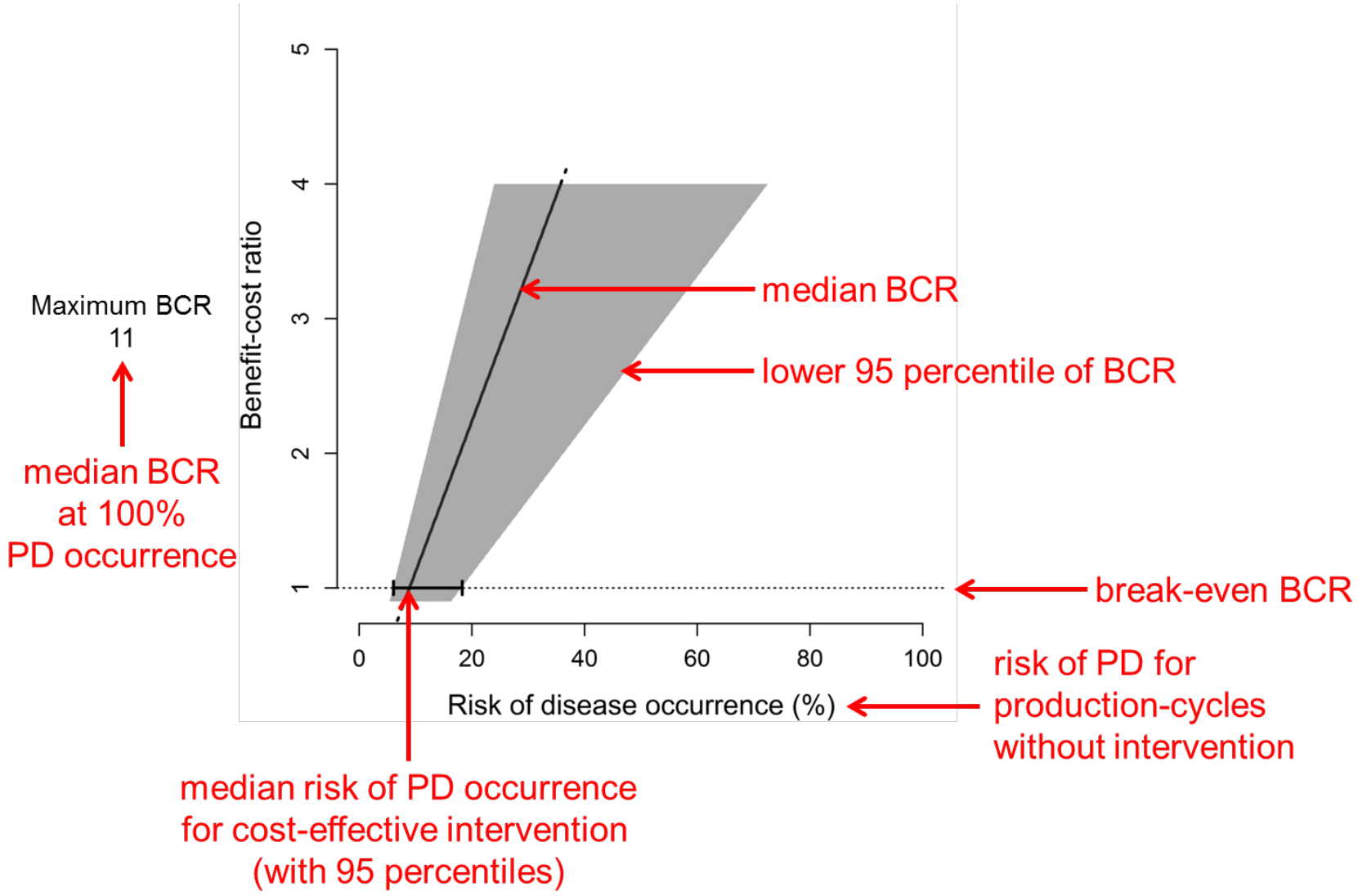
Illustrative model scenarios for generalised interventions:

- Intervention equivalent to effectiveness of vaccination on a strain similar to SAV III as reported by Bang Jensen et al. (2012)
- Intervention equivalent to effectiveness of vaccination on a strain with half the virulence of SAV III
- Intervention equivalent to half the effectiveness of vaccination on a strain similar to SAV III
- Intervention for equivalent to reduced effectiveness of vaccination on a strain with half the virulence of SAV III

All presented scenarios assume a total intervention cost of 1% of cost of production

# Model output structure



# Illustrative model output results

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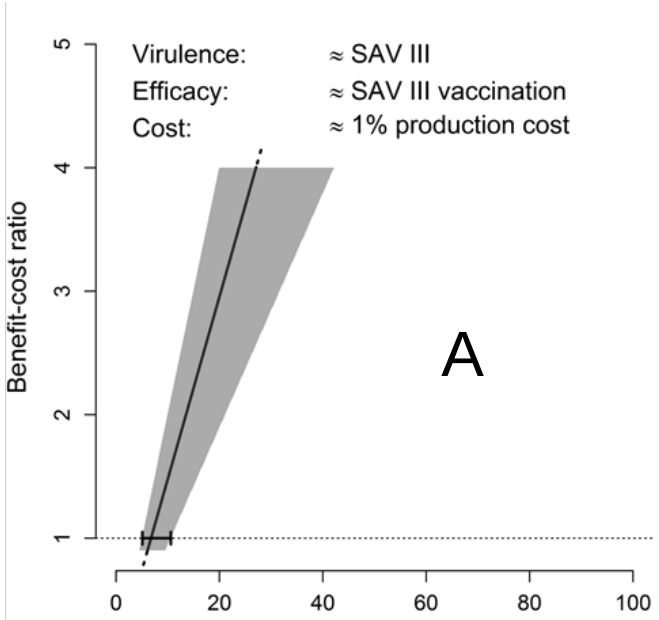
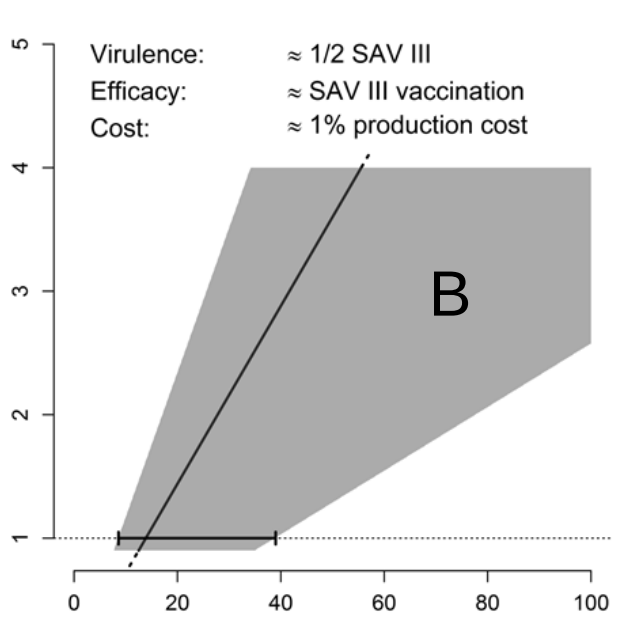
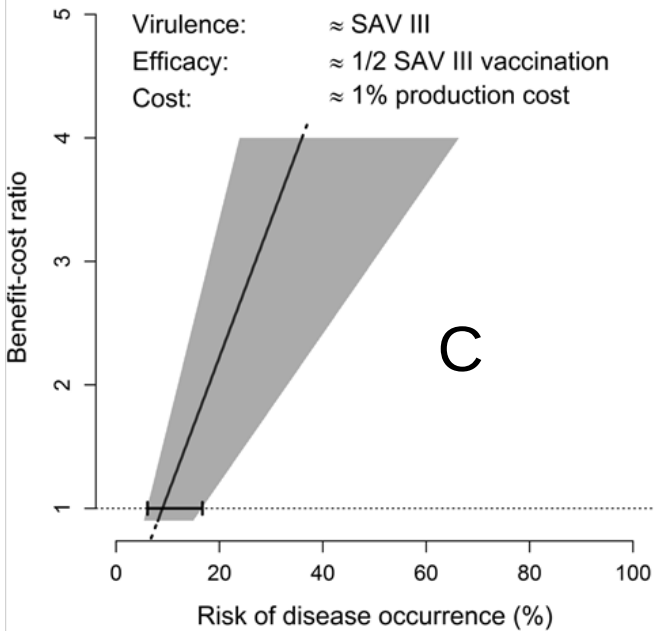
Maximum BCR 15

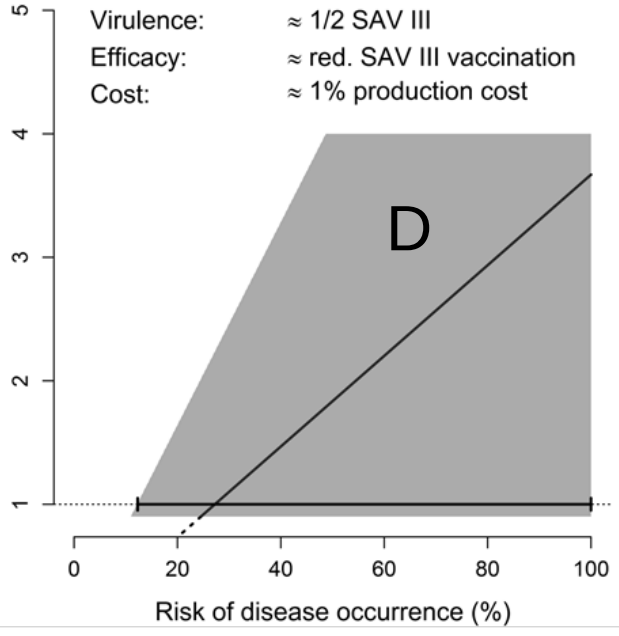



Maximum BCR 7

Maximum BCR 11




Maximum BCR 4

## Summary and (unsurprising) conclusions

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A simple generalised intervention-model providing indicative (rather than definitive) results.

Results though ‘seeded’ with published vaccination trial data can be applied to other interventions and are intended as an example

<u>Conclude</u>

- Cost-effectiveness of intervention dependent on virulence of strain & efficacy of intervention;
- Cost-effectiveness of prophylactic intervention dependent on underlying risk of PD to production-cycle;
- Cost-effectiveness of intervention positively associated with current prices

## And questions

Is the model too simple?

Are the results realistic?

Happy to work with colleagues to develop model and validate outputs