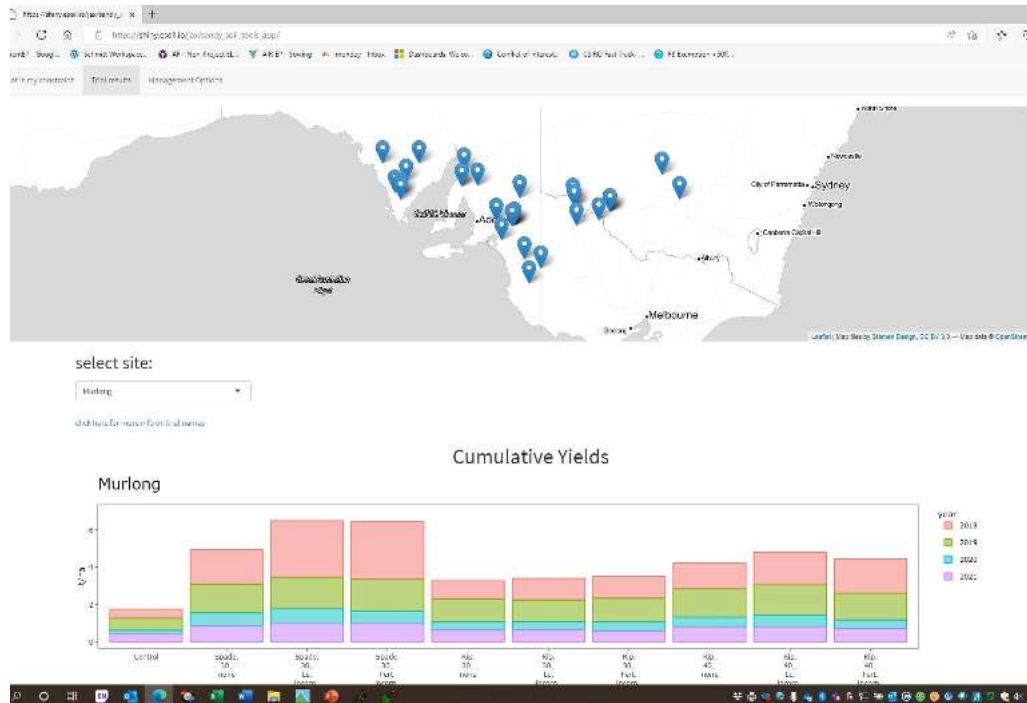


Further Information

- **SANDBOX APP** (<https://shiny.csiro.au/soil-sandbox/>)



- **FACTSHEETS (handouts)**
- <https://grdc.com.au/resources-and-publications/all-publications/factsheets/2022/seeding-sandy-soils-national>
- <https://grdc.com.au/resources-and-publications/all-publications/factsheets/2022/soil-wetter-national>
- <https://grdc.com.au/resources-and-publications/all-publications/factsheets/2022/ripping-technology-national-fact-sheet>
- **THE PROJECT TEAM**
- **YOUR ADVISERS AND PEERS**



WHAT ARE THE WHOLE FARM FACTORS TO CONSIDER AND HOW DOES IT WORK IN REALITY?

MASOOD AZEEM, ROYCE PITCHFORD, THERESE MCBEATH



BENEFIT:COST ANALYSIS

- **Do overall benefits exceed overall costs?**
- Most costs are usually born upfront at present, but benefits come later in the future

$$\begin{aligned} & \textit{Net Present Value(NPV)} \\ & = PV(\textit{Benefits}) - PV(\textit{Costs}) \end{aligned}$$

- **Rule for good project: $NPV > 0$**

Benefits = Yield gain × Grain Prices

Crop	Wheat	Barley	Canola	Lentil	Lupin	Vetch
Price (\$/t)	305	246	592	615	366	560

Source: Rural Solutions (2022).

TREATMENT COSTS

- **Rip30: \$90-109/ha.**
- **Rip40: \$98-124/ha.**

• **Spading: 180 \$/ha**

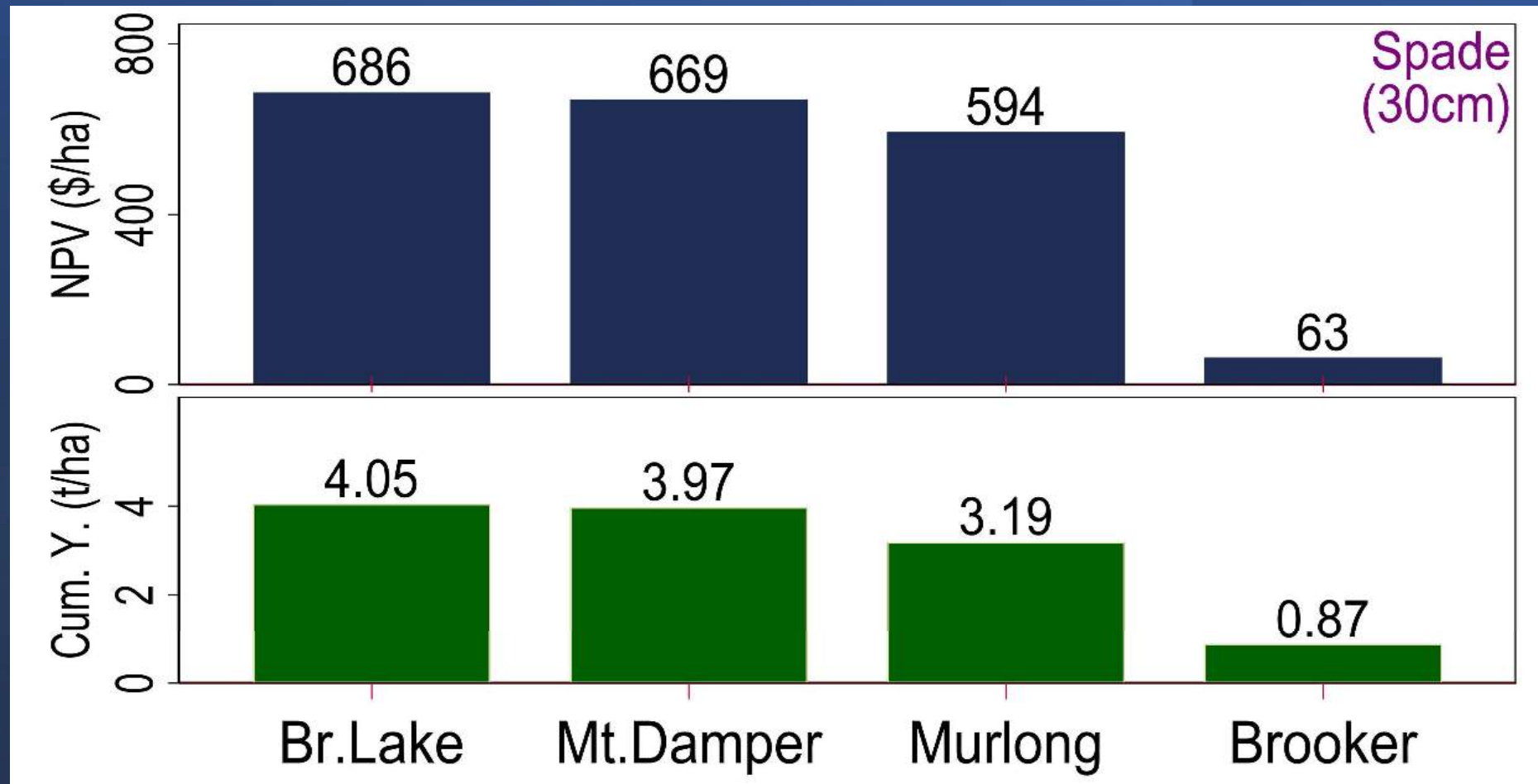
• **Lucerne: \$250/t**

• **Fertiliser: \$25-\$1000/ha**

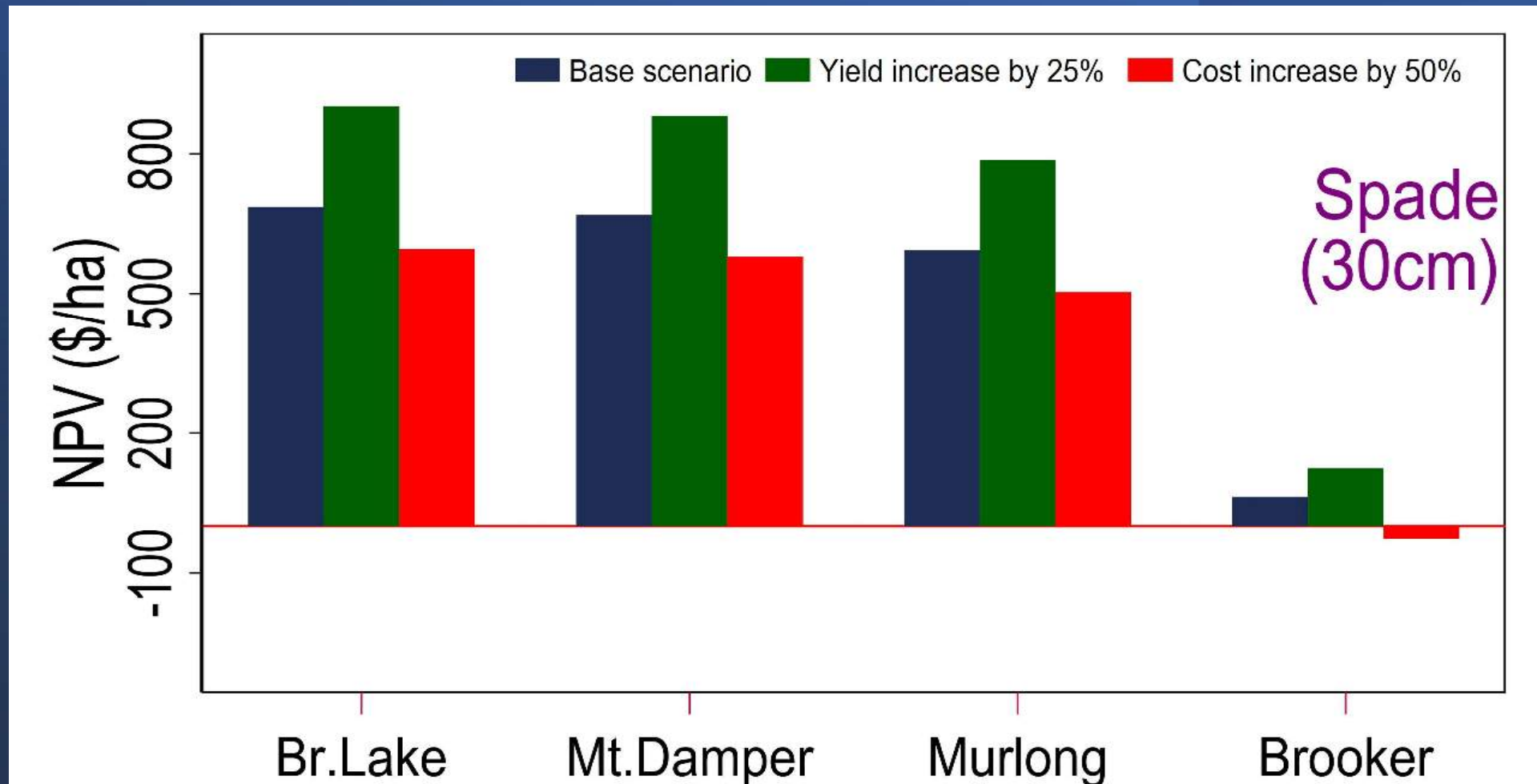
• **Clay: \$1000-\$1300/ha**

Source: various sources.

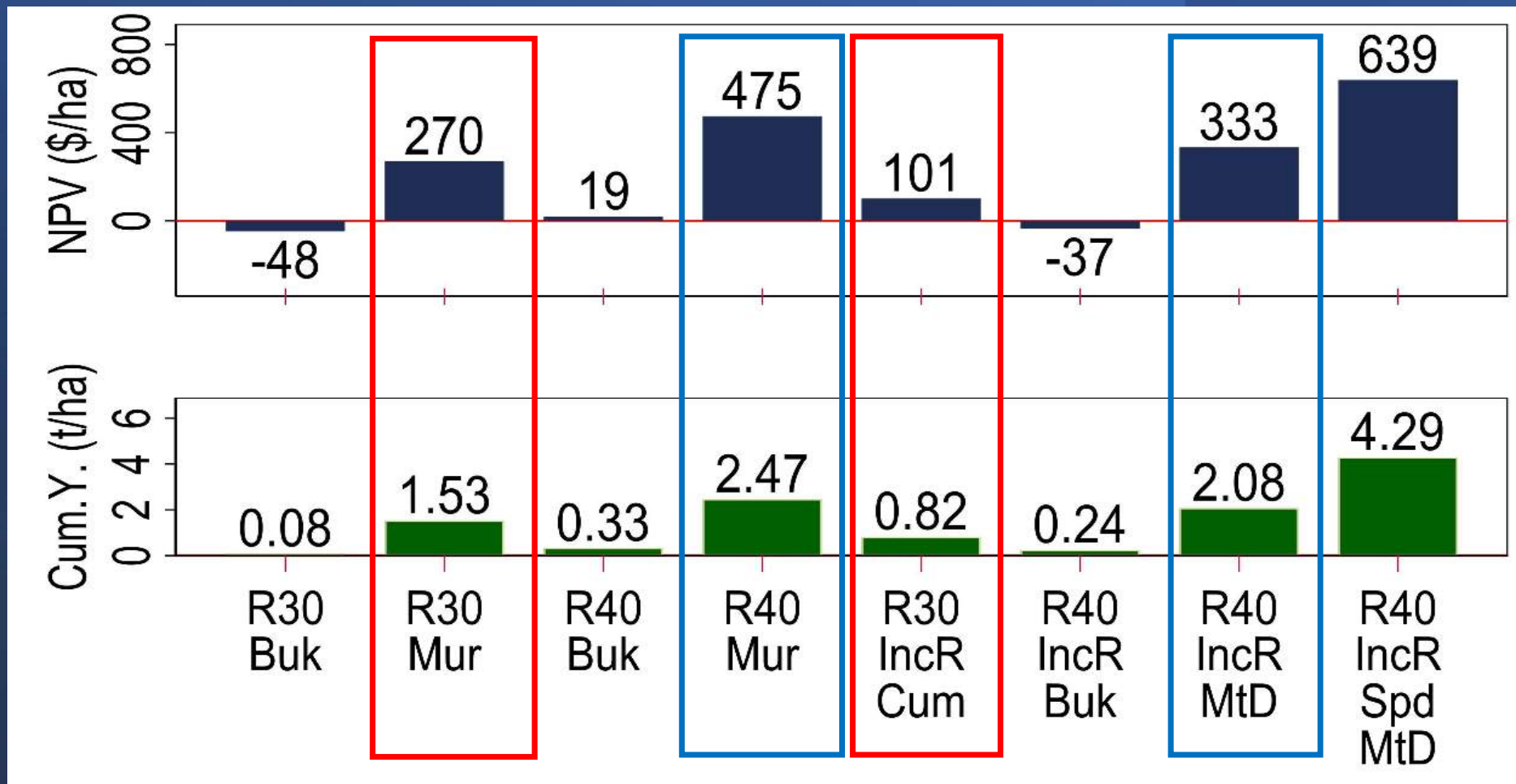
Spading is a profitable investment



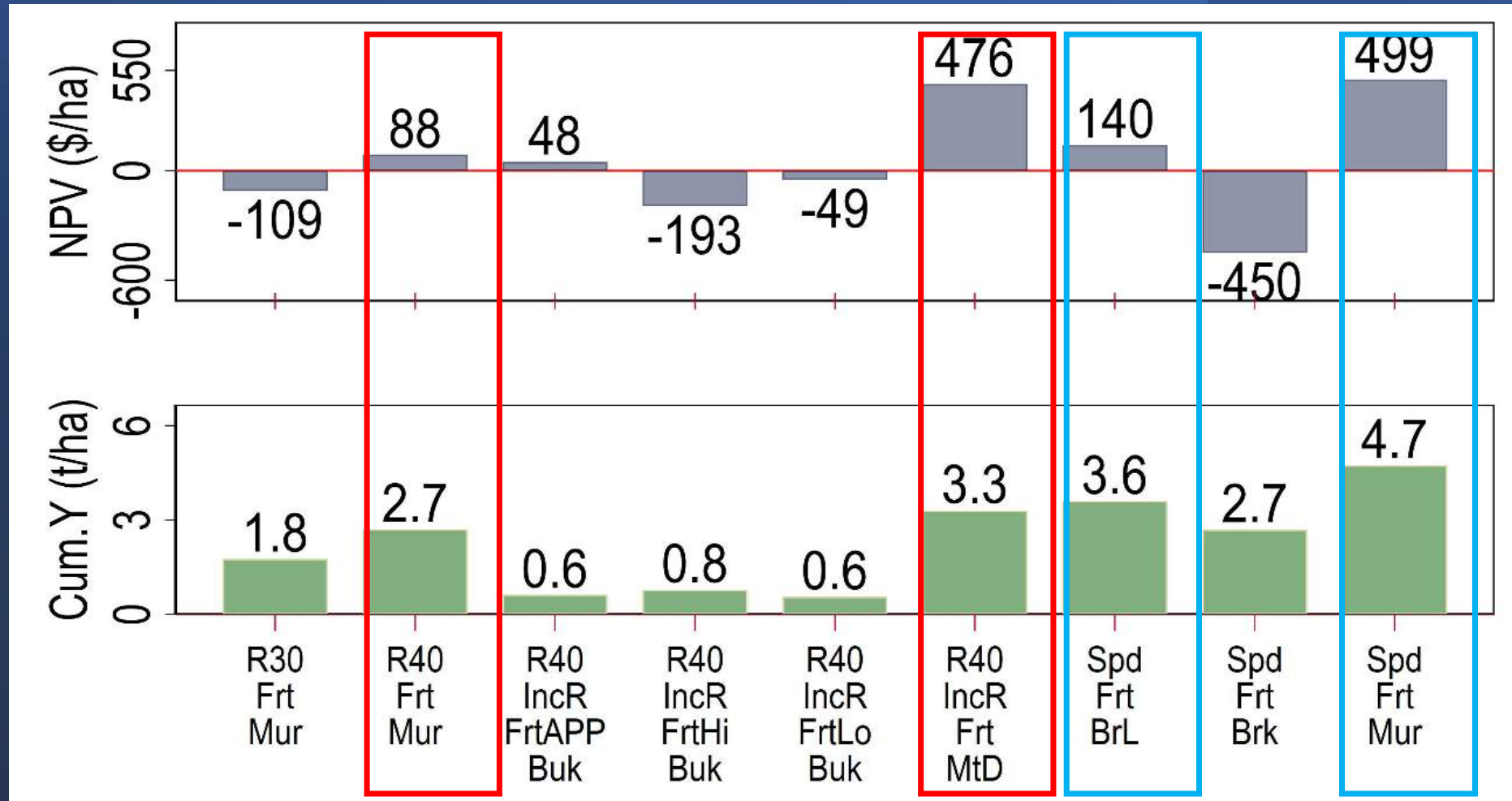
NPV is sensitive to yield and cost variations



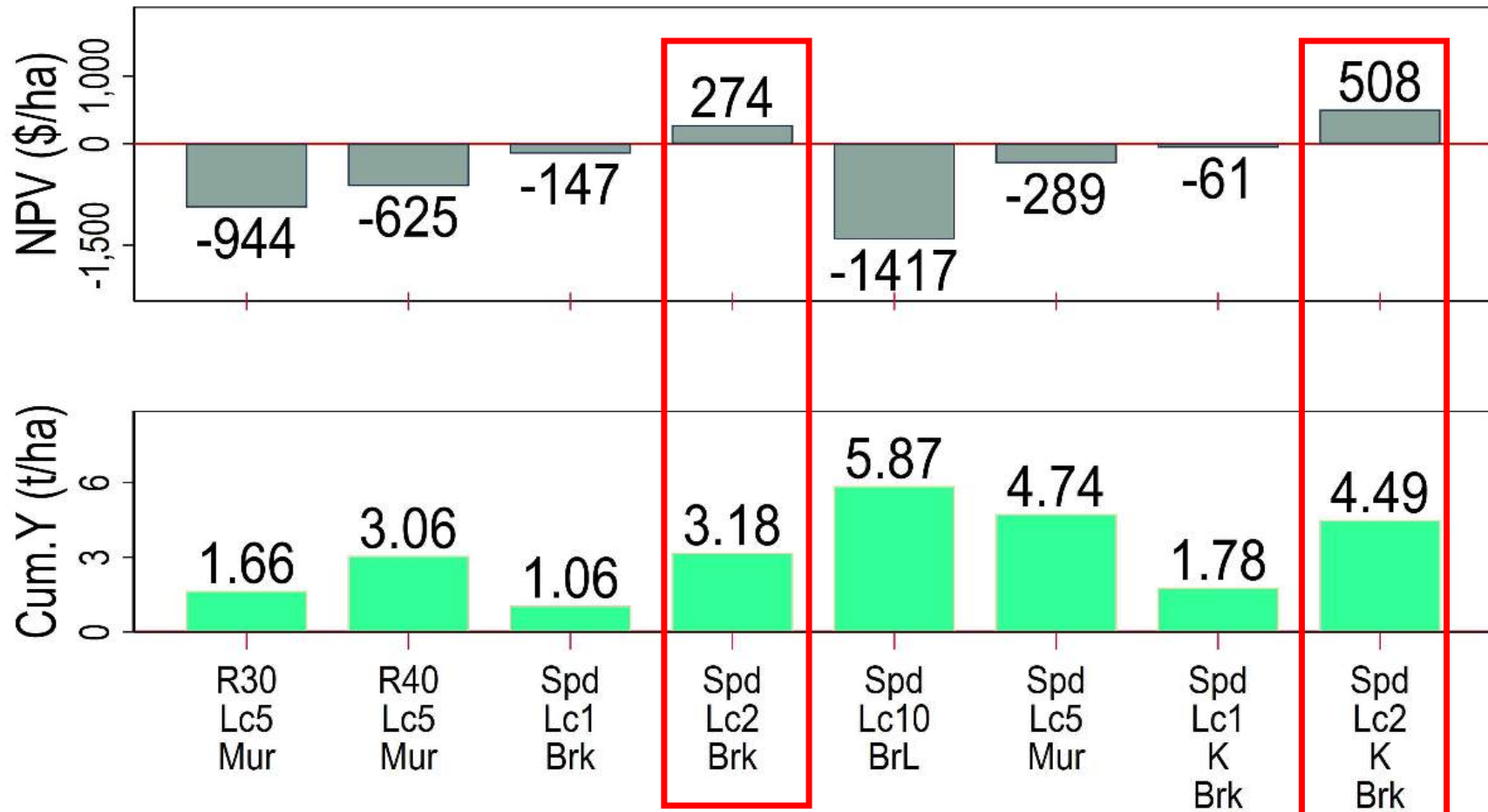
Rip 40cm is more profitable than Rip 30cm



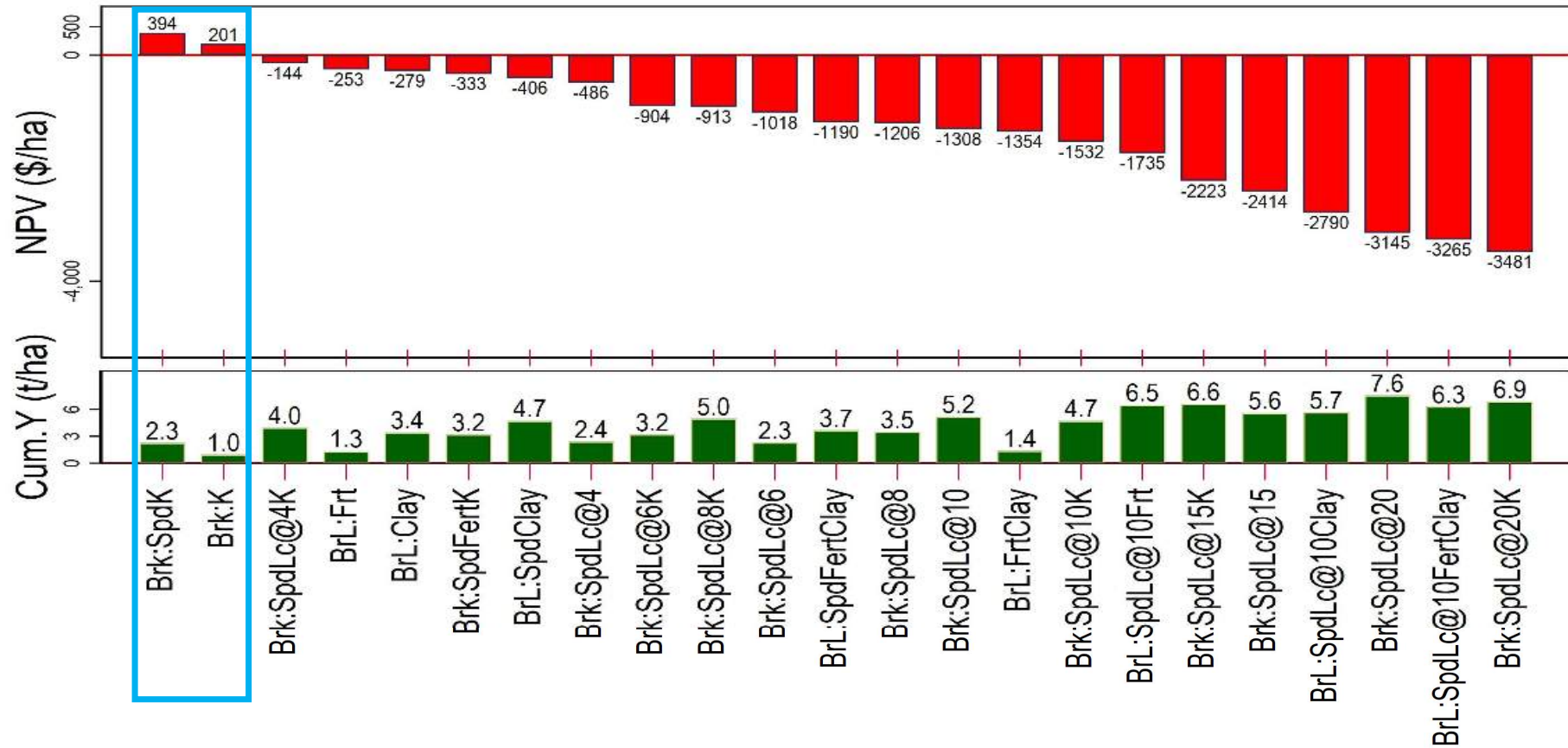
Variable returns with addition of fertiliser



High Lucerne rate reduces profitability



Spade, Lucerne, Clay: high yield but not economical!



- Profitable response at a farm level is a combination of benefit, cost, time, and risk
- Spading and Rip to 40 cm are profitable investments

Profitability on target area

- yield, price, treatment cost

Profitability at paddock scale

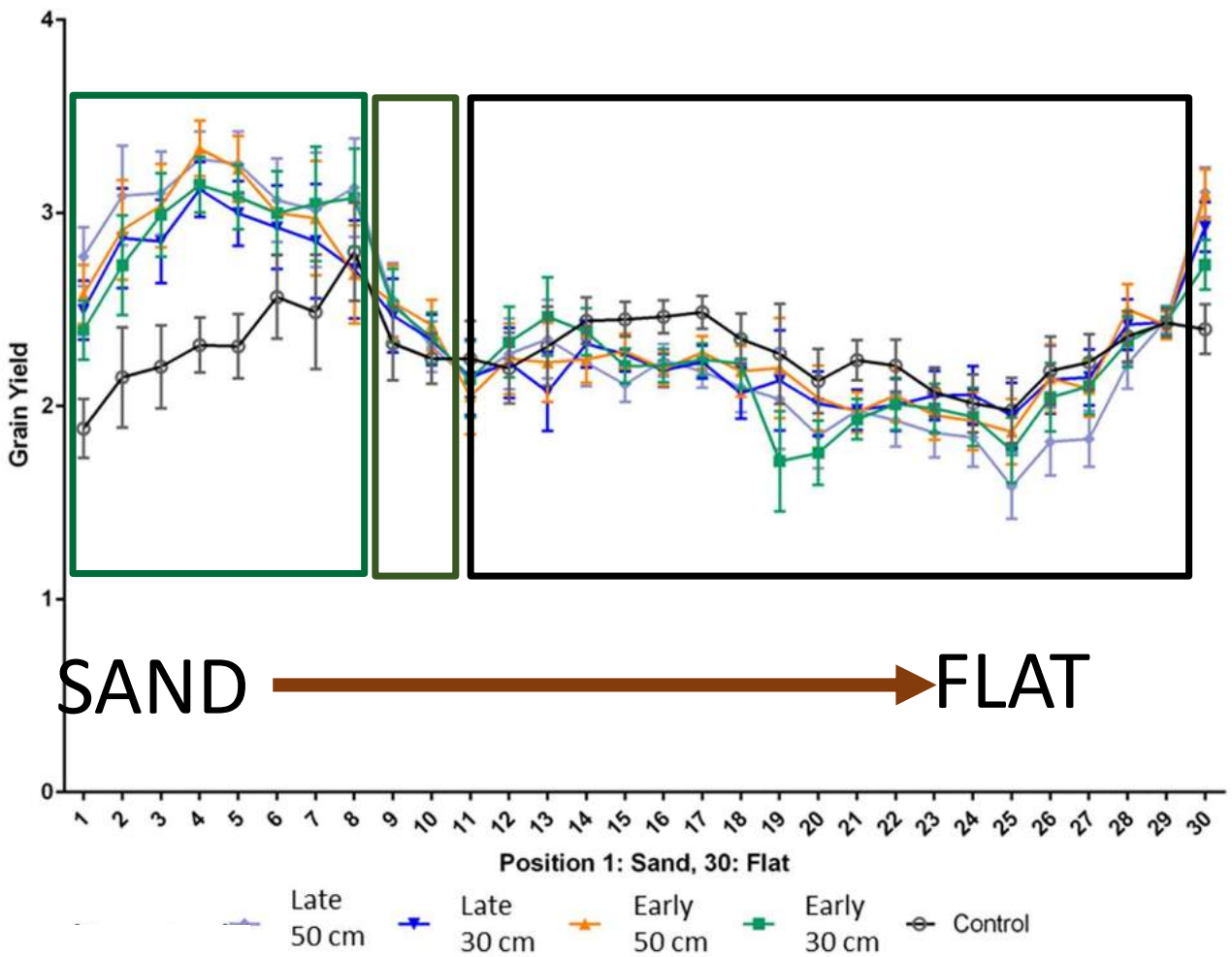
+ soil variability ; ability to only target responsive areas;
traffability/paddock workflow; erosion; crop choice

Profitability at whole-farm program scale

+ capital costs; total responsive areas; area treated per year;
whole-farm logistics

Responsiveness of zones in a paddock

Deep Ripping Landscape Trial: Kooloonong 2022



- **Class A: most responsive & most profitable sandy soils**
- **Class B: less responsive but still profitable**
- **Class C: Not profitable**



Profitable response at a farm level is a combination of:

- Benefit
- Cost
- Time
- Risk

Profitable response at a farm level is a combination of benefit, cost, time, and risk

Benefits

- Responsiveness – right treatment, right place.
- Amount of responsive land (Class A/B).
- Longevity of response.
- How much can you get done?
- Good season/pricing?
- Change in crop options (e.g. legumes)?

Profitable response at a farm level is a combination of benefit, cost, time, and risk

Costs

- Capital
- Treatment costs (depth, conditions, setup)
- Trade-offs on the farm (summer spray, seeding, recharge)
- Extra costs of establishment
- Making a paddock worse?
- Additional inputs

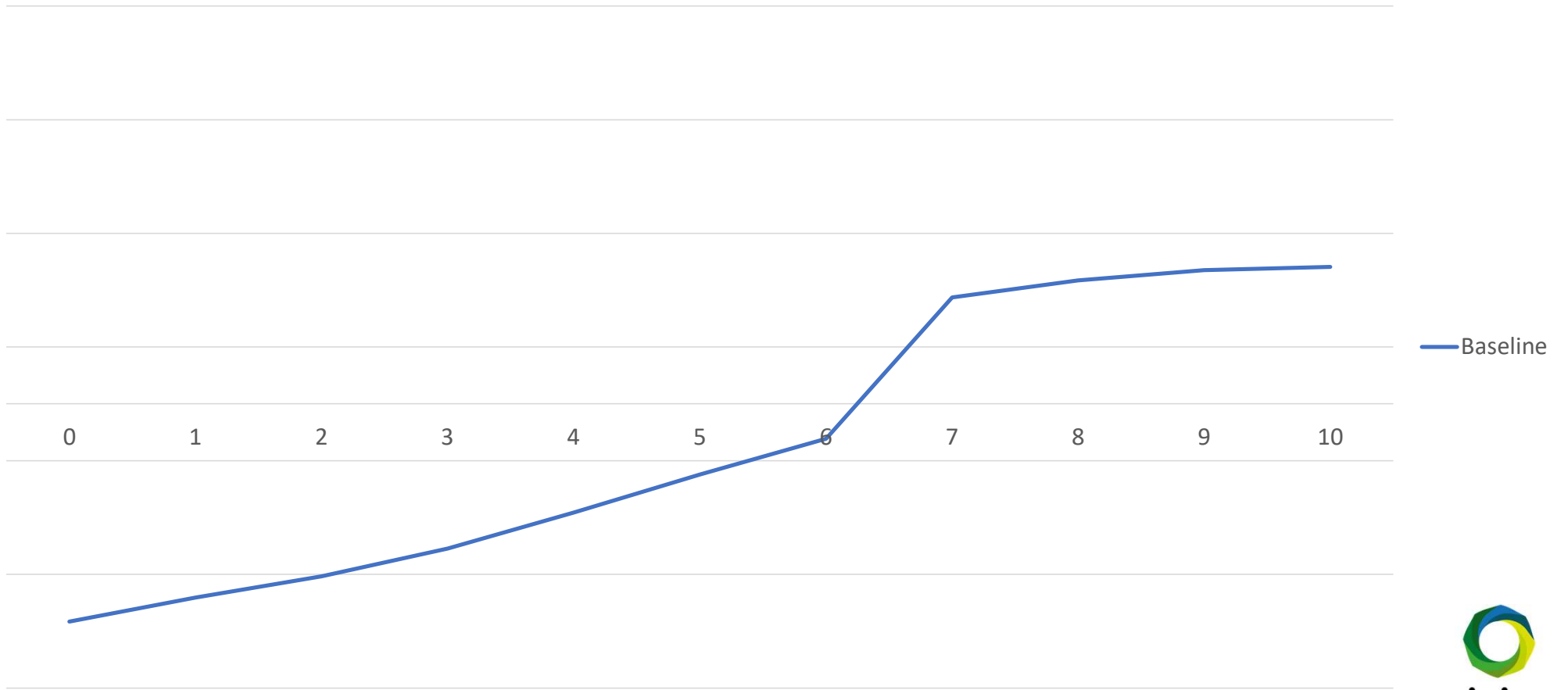
Profitable response at a farm level is a combination of benefit, cost, time, and risk

Time

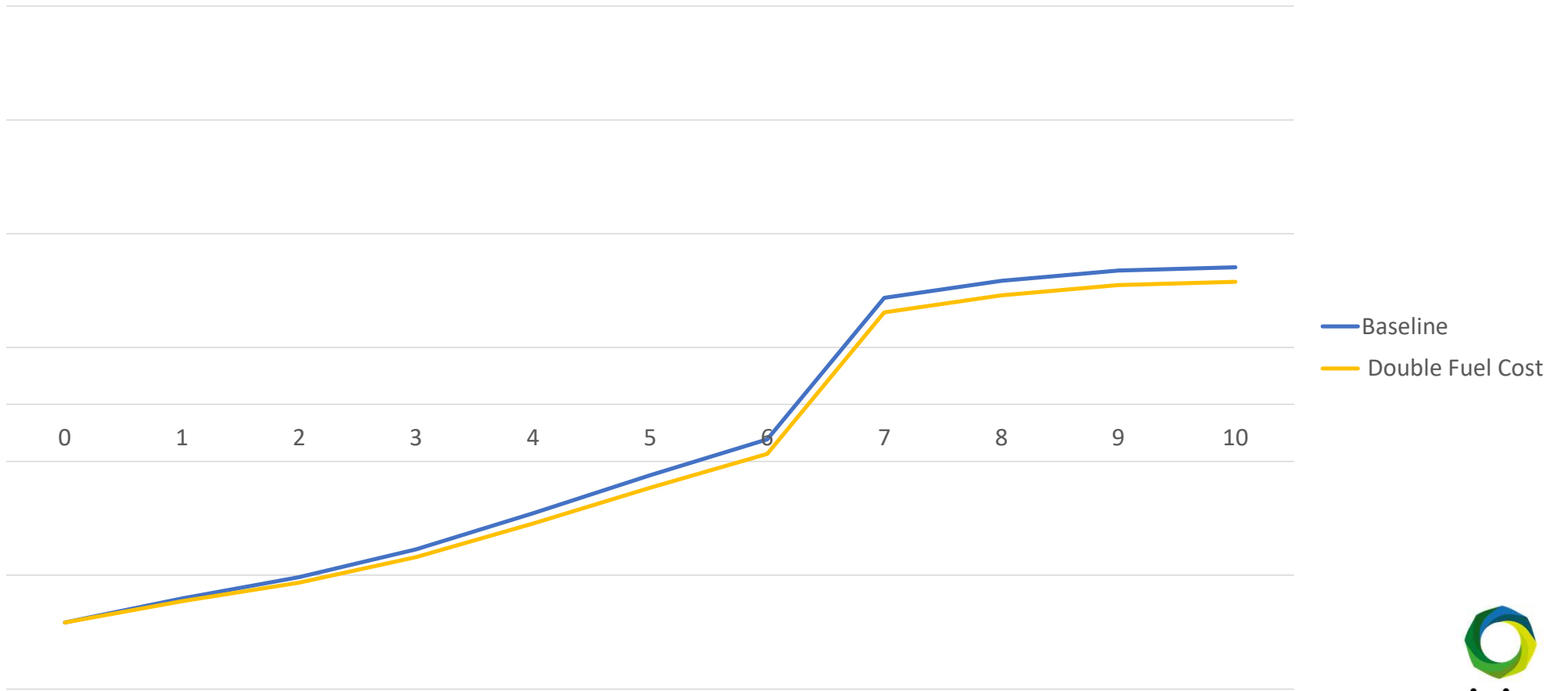
- Longevity of response is critical to overcome capital investment
- Is the treatment permanent or diminishing?
- Are you gaining productivity each year?

- Are there trade-offs in other parts of the farm whilst you are ameliorating...
Summer spraying.... Seeding prep..... Recharge time.....

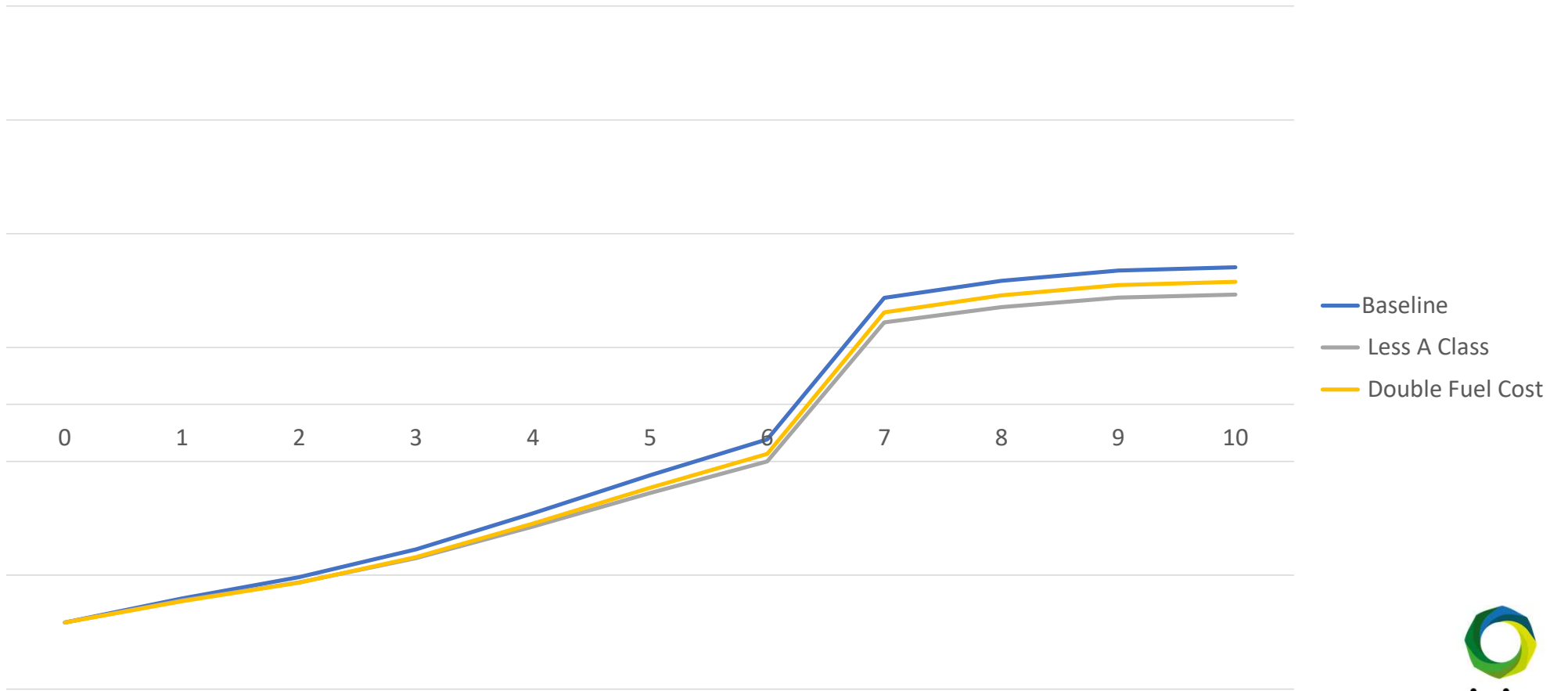
Example Cashflow



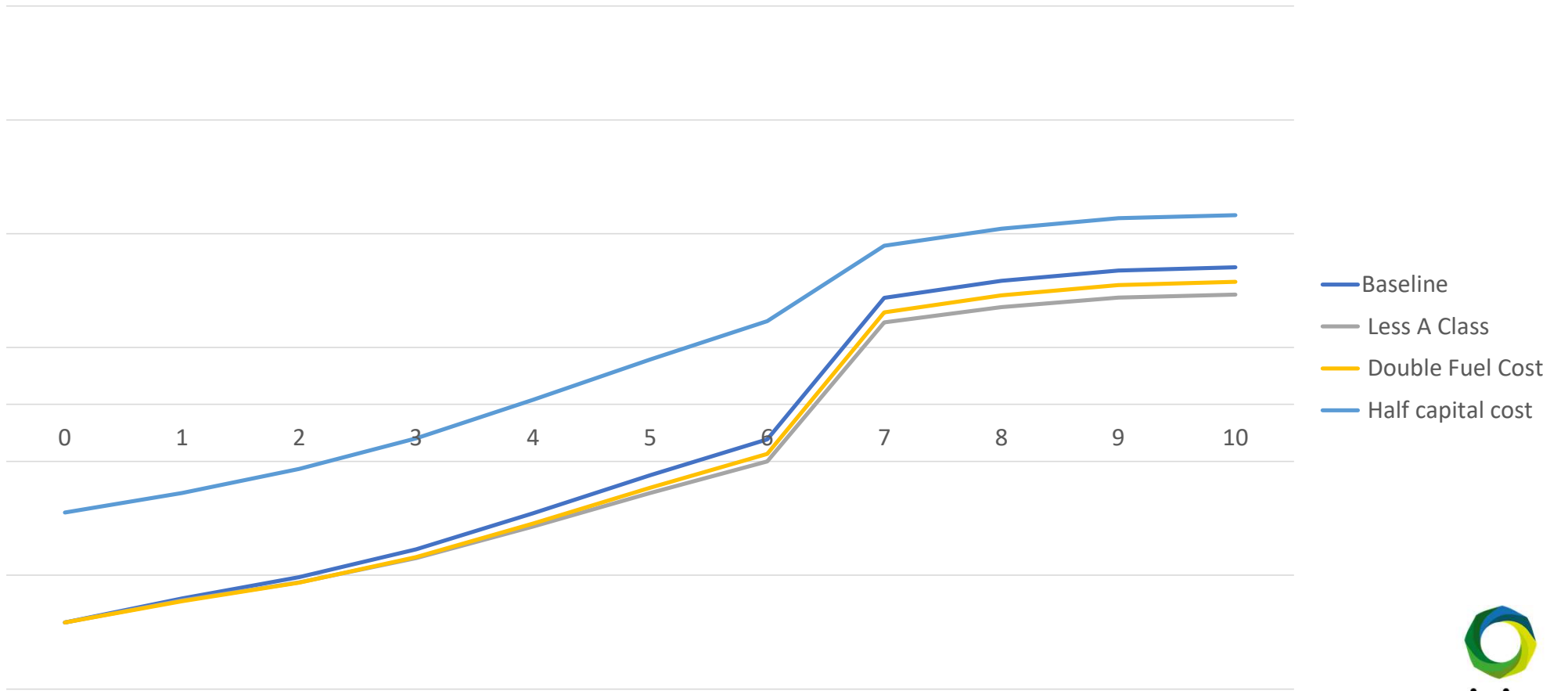
Example Cashflow



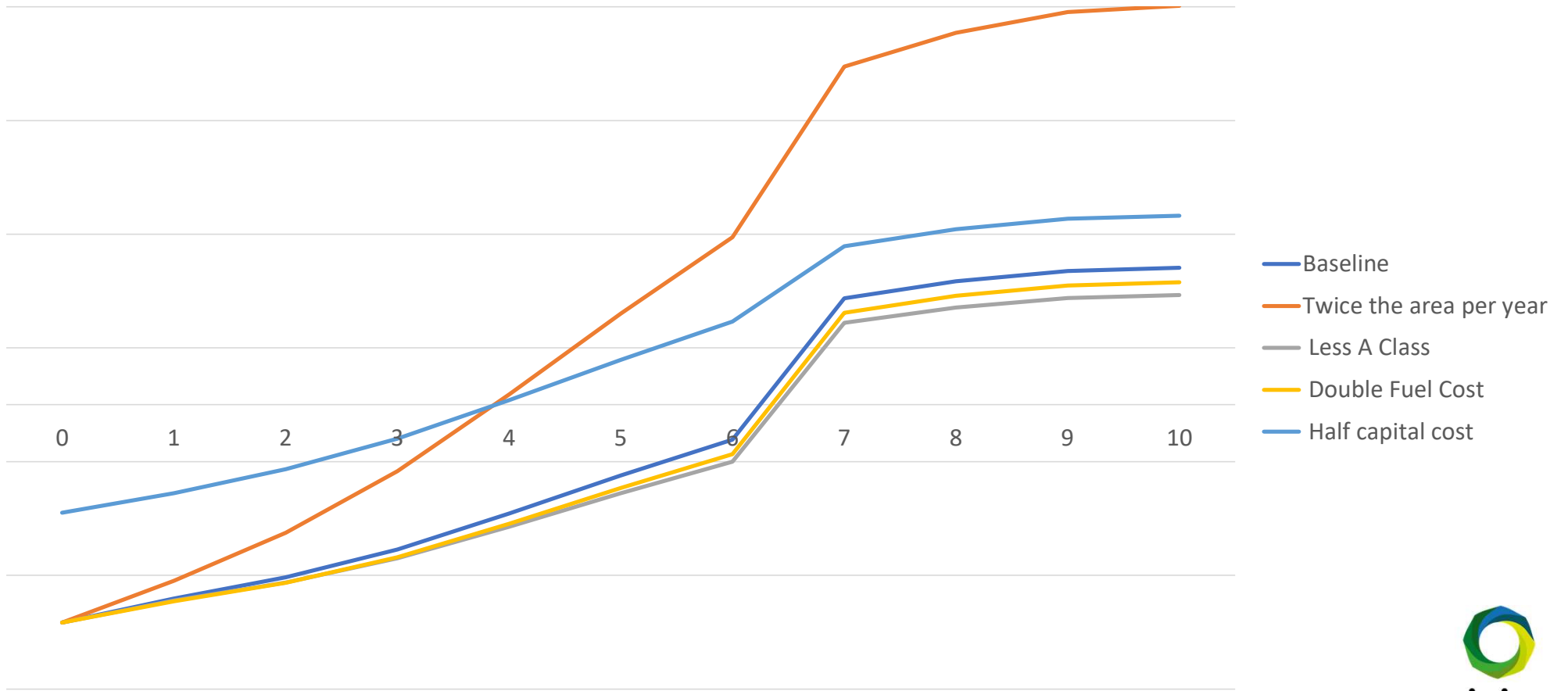
Example Cashflow



Example Cashflow



Example Cashflow

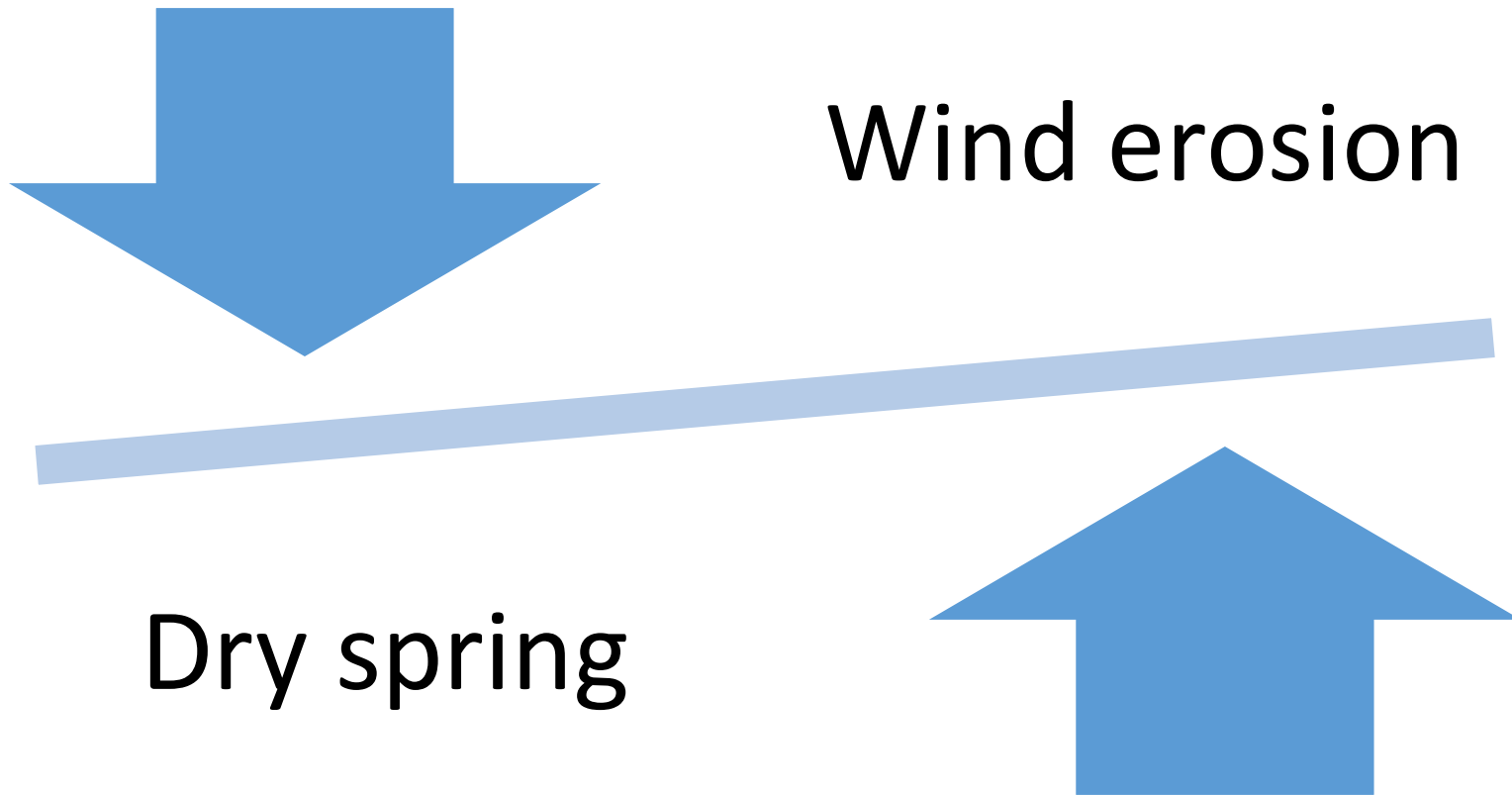


Post amelioration management

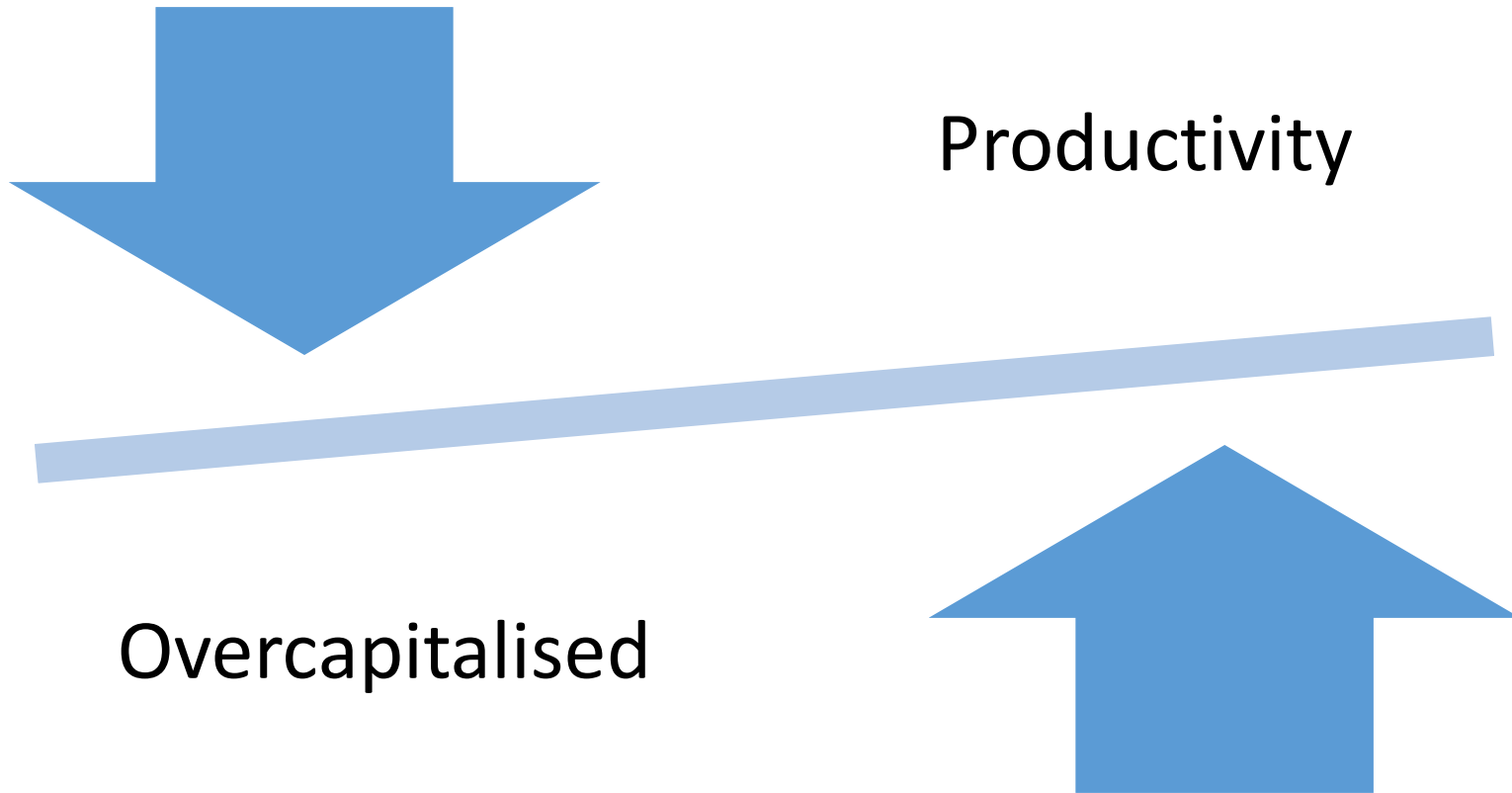
Key issues (not all researched)

- Trafficability and paddock workflows
- Seeding depth
- Erosion management
- Herbicide management
- Maintaining fertility – new yield potential

What about Risk?



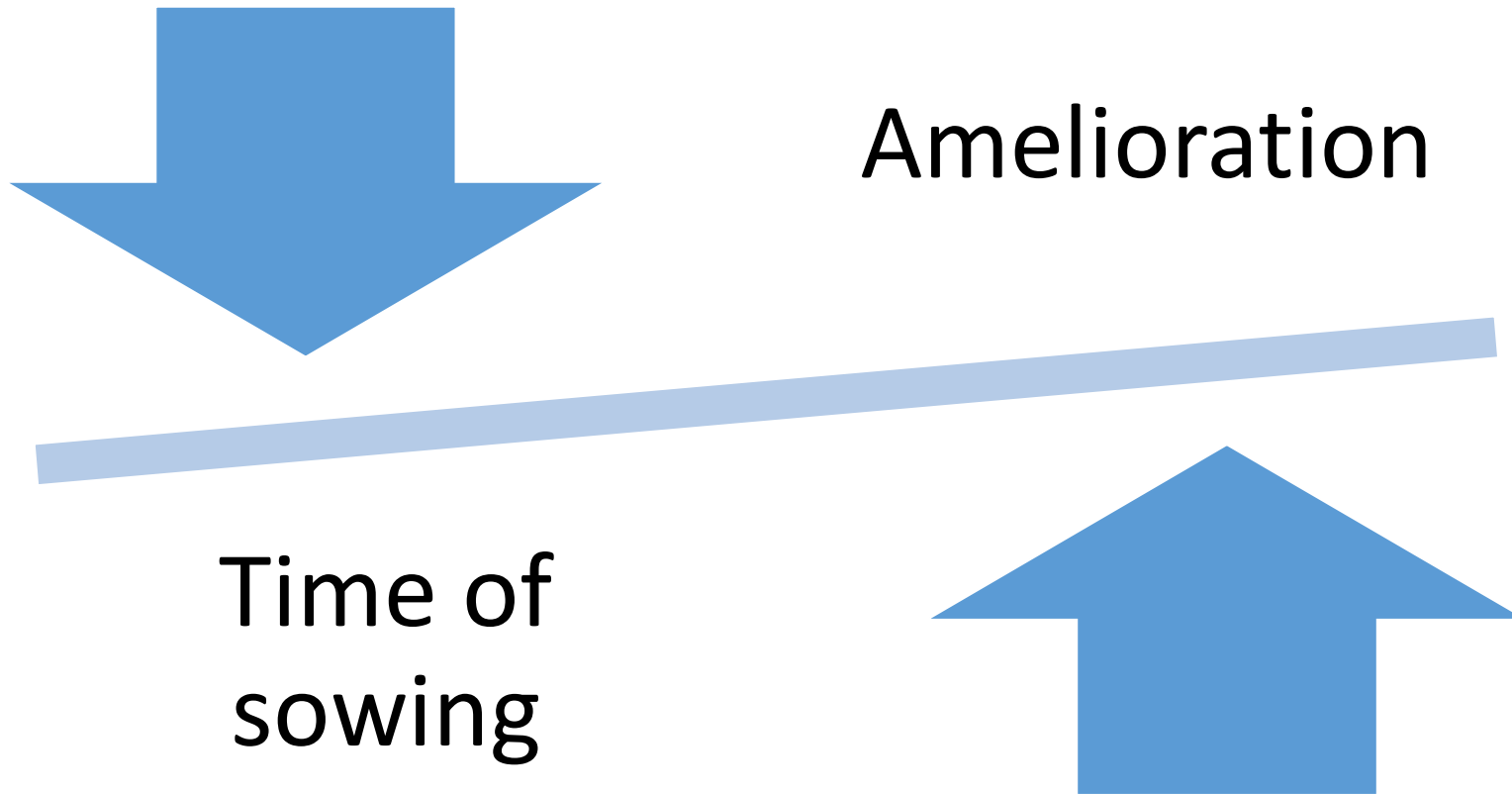
What about Risk?

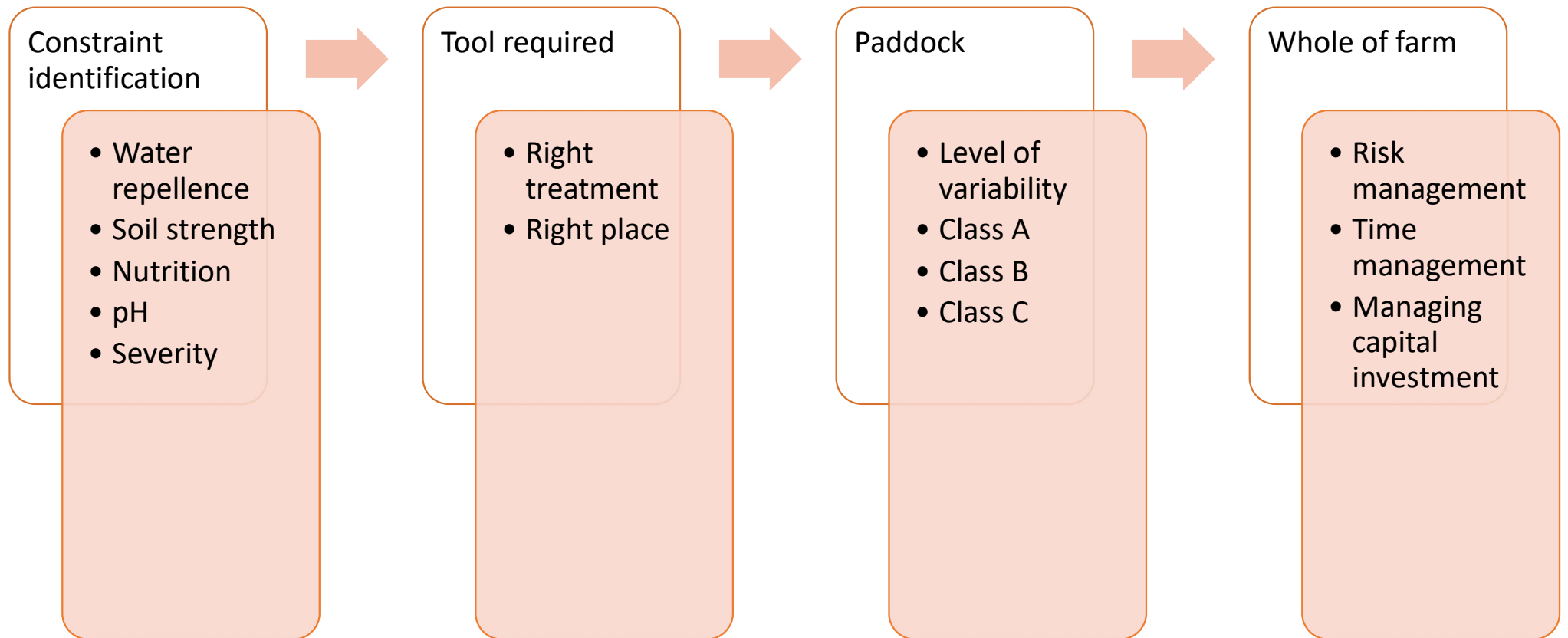


Productivity

Overcapitalised

What about Risk?





Site	Max_year	Year	Crop	Decile	Repellence	Acidity	Physical	Nutrient
Brimpton_Lake	5	2014	wheat	decile_7	1	1	2	1
Brimpton_Lake	5	2015	wheat	decile_4	1	1	2	1
Brimpton_Lake	5	2016	barley	decile_10	1	1	2	1
Brimpton_Lake	5	2017	lupin	decile_3	1	1	2	1
Brimpton_Lake	5	2018	wheat	decile_7	1	1	2	1
Mt_Damper	3	2019	wheat	decile_3	1	0	1	1
Mt_Damper	3	2020	wheat	decile_4	1	0	1	1
Mt_Damper	3	2021	barley	decile_4	1	0	1	1
Murlong	4	2018	wheat	decile_2	2	0	2	2
Murlong	4	2019	barley	decile_2	2	0	2	2
Murlong	4	2020	vetch	decile_5	2	0	2	2
Murlong	4	2021	wheat	decile_5	2	0	2	2
Brooker	3	2019	wheat	decile_6	2	0	1	2
Brooker	3	2020	canola	decile_6	2	0	1	2
Brooker	3	2021	wheat	decile_7	2	0	1	2
Buckleboo	3	2019	wheat	decile_1	0	0	2	1
Buckleboo	3	2020	barley	decile_6	0	0	2	1
Buckleboo	3	2021	lentil	decile_5	0	0	2	1
Cummins	3	2019	wheat	decile_4	0	1	2	1
Cummins	3	2020	canola	decile_5	0	1	2	1
Cummins	3	2021	wheat	decile_5	0	1	2	1

site	Descriptors	fert_cost_0	clay_cost_0	luc_cost_0
Brimpton_Lake	Spade.30_Clay.incorp_30	.	1227.836	.
Brimpton_Lake	Spade.30_Fert.incorp_30	445	.	.
Brimpton_Lake	Spade.30_Fert.incorp_30.Clay.incorp_30	445	1323.380	.
Brimpton_Lake	Spade.30_Lc.incorp_30	.	.	2500
Brimpton_Lake	Spade.30_Lc.incorp_30.Clay.incorp_30	.	1330.318	2500
Brimpton_Lake	Spade.30_Lc.incorp_30.Fert.incorp_30	445	.	2500
Brimpton_Lake	Spade.30_Lc.incorp_30.Fert.incorp_30.Clay.incorp_30	445	1483.310	2500
Brimpton_Lake	Unmodified_Clay.incorp_10	.	967.858	.
Brimpton_Lake	Unmodified_Fert.band_30	445	.	.
Brimpton_Lake	Unmodified_Fert.band_30.Clay.incorp_10	445	1063.280	.
Mt_Damper	Rip.45IncRip_Fert.incorp_45	115	.	.
Murlong	Rip.30_Fert.incorp_30	440.600	.	.
Murlong	Rip.30_Lc.incorp_30	.	.	1250
Murlong	Rip.40_Fert.incorp_40	440.600	.	.
Murlong	Rip.40_Lc.incorp_40	.	.	1250
Murlong	Spade.30_Fert.incorp_30	440.600	.	.
Murlong	Spade.30_Lc.incorp_30	.	.	1250
Brooker	Spade.30_Fert.incorp_30	1000	.	.
Brooker	Spade.30_Fert.incorp_30.K_added.incorp_30	1000	.	.
Brooker	Spade.30_K_added.surface	65.800	.	.
Brooker	Spade.30_Lc@1.incorp_30	.	.	250
Brooker	Spade.30_Lc@1.incorp_30.K_added.surface	65.800	.	250
Brooker	Spade.30_Lc@10.incorp_30	.	.	2500
Brooker	Spade.30_Lc@10.incorp_30.K_added.surface	65.800	.	2500
Brooker	Spade.30_Lc@15.incorp_30	.	.	3750
Brooker	Spade.30_Lc@15.incorp_30.K_added.surface	65.800	.	3750
Brooker	Spade.30_Lc@2.incorp_30	.	.	500
Brooker	Spade.30_Lc@2.incorp_30.K_added.surface	65.800	.	500
Brooker	Spade.30_Lc@20.incorp_30	.	.	5000
Brooker	Spade.30_Lc@20.incorp_30.K_added.surface	65.800	.	5000
Brooker	Spade.30_Lc@4.incorp_30	.	.	1000
Brooker	Spade.30_Lc@4.incorp_30.K_added.surface	65.800	.	1000
Brooker	Spade.30_Lc@6.incorp_30	.	.	1500
Brooker	Spade.30_Lc@6.incorp_30.K_added.surface	65.800	.	1500
Brooker	Spade.30_Lc@8.incorp_30	.	.	2000
Buckleboo	Rip.35_none	.	.	.
Buckleboo	Rip.45IncRip_Fert_APP.band_45	24.900	.	.
Buckleboo	Rip.45IncRip_Fert_High.band_45	295.800	.	.

NPV is sensitive to yield and cost variations

