



Carbon Positive

Applying Regenerative Principles to
Intensive Process Vegetable Production





MicroFarm 2018

- Onion research
- Process crops



2022 Fence Line



2022 Adjacent Plot

Regenerating soil carbon in intensive field cropping

Can soil health and quality can be improved by adopting methods used to sequester carbon through sustainable and regenerative practices?

While maintaining or increasing crop quality and profitability





McCain Foods Regen Principles



**Ensure
farm
resilience**



**Enhance
crop &
ecosystem
diversity**



**Armour
soil,
preferably
with living
plants**



**Minimize
soil
disturbance**



**Reduce
agro-
chemical
impacts &
optimize
water use**



**Integrate
organic &
livestock
elements**



| Conventional | Hybrid | Regenerative |
|--|---|---|
| Current industry practice | 'Cherry-picking' management | 5 core principles adapted to vegetable production |
| Full input - full output | Conventional + regen practices | Reduced synthetic input? (AgChem/fertiliser) |
| Crop management by processor agronomists | Intuitive agronomy | Reimagining the status quo |
| Aim to make high profit margin | Reduce environmental impact, keep profit margin | Long-term soil & plant health, profit, enviro, crop |

Key measurements



- Soil Organic Carbon (90 cm every 3 years)
- Soil Labile Carbon (60 cm twice per year)
- Aggregate stability (slaking)
- Bulk density
- Visual Soil Assessment (VSA)
- Nutrient fertility



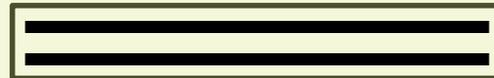
- Inputs
- Environmental Impact Quotient (EIQ)



- Crop yield
- Crop quality



- Gross margin



Operations Advisory Group

Processors, regen advisors, contractors, growers, researchers, technical field staff etc.





Management Decisions

Scaleable

Can we apply at 0.1 ha and 10 or 100ha?



Practical/Sensible

Is it practical for a grower to do?

Profitable

Will the benefit out weigh the cost?



Defensible

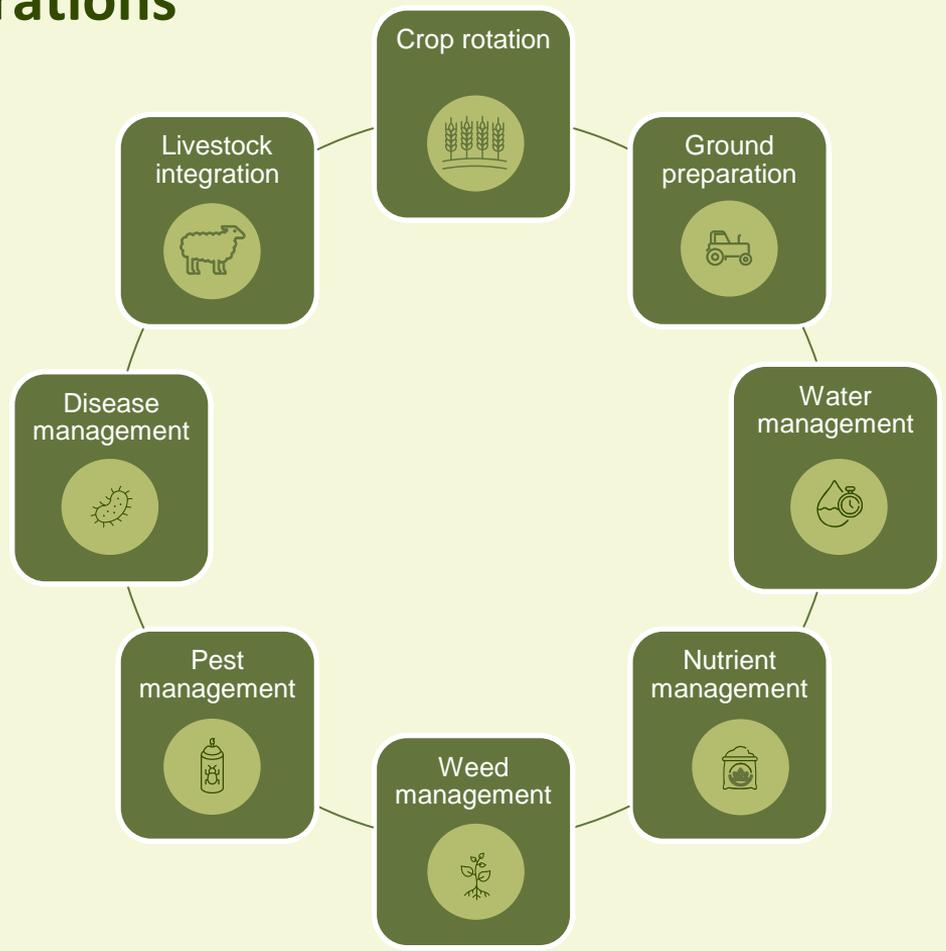
Is there some evidence to support doing it?

Factors/Considerations

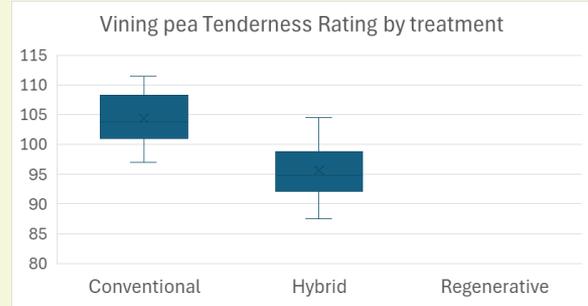
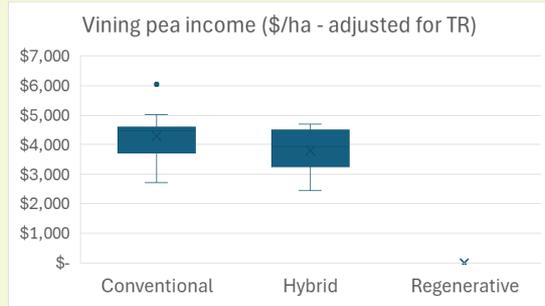
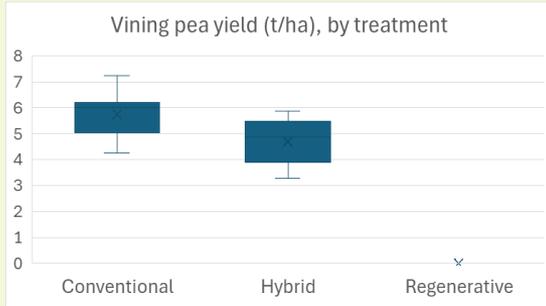
How do we apply the 6 principles to these factors?

What are the flow on effects of each decision?

How do we adapt crop-to-crop and season-to-season?



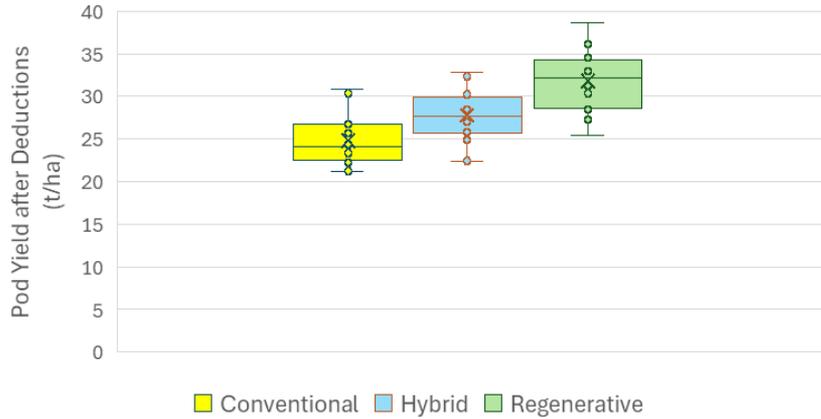
2024-2025 Peas



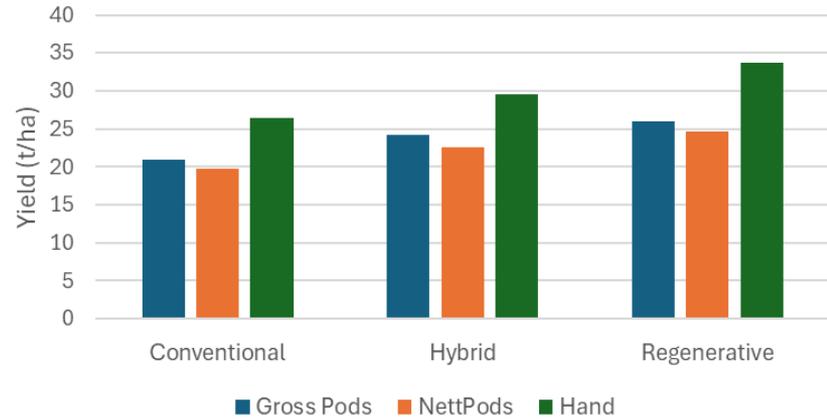
- Hybrid slower to emerge after planting
Low TR at harvest
Delayed harvest was indicated

2024-2025 Beans

Bean Yield after Deductions (t/ha)



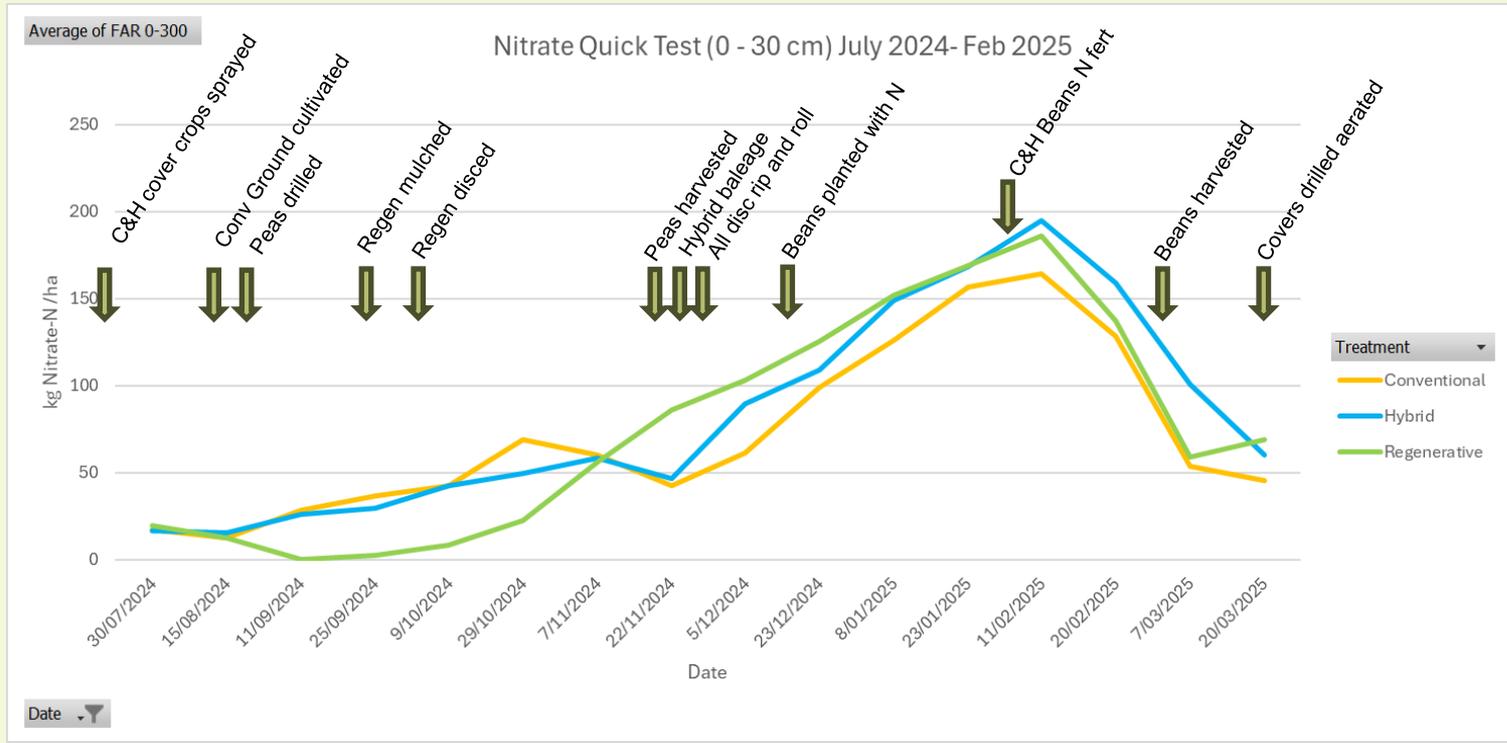
Machine versus hand harvest yields



- Regenerative plots significantly highest yield
- Conventional plots significantly lowest yield
- Machine (factory) versus hand (plot) harvests - different yields but same pattern



2024-2025 Peas and Beans



No real difference in soil N between treatments

2024-2025 Lessons

- Our soil doesn't like being worked when wet and cold!
- Beans after peas had lower yields - but we can't say why
- We didn't see nitrogen being supplied by the pea crop

What about our footprints?

Do the treatments have the same CO₂^{-e} emissions?

Emissions



LandWISE Cropping Carbon Accounting

Summary by Date

PROPERTY / FIELD DETAILS

Farm: LandWISE

Crop: Cover Crop 2024

Area Cropped (ha): 1

Start Date: 23/12/2022

End Date: 7/04/2025

ALTERNATIVE SCENARIOS

Scenario 1
Conventional

Scenario 2
Hybrid

Scenario 3
Regenerative



Emissions

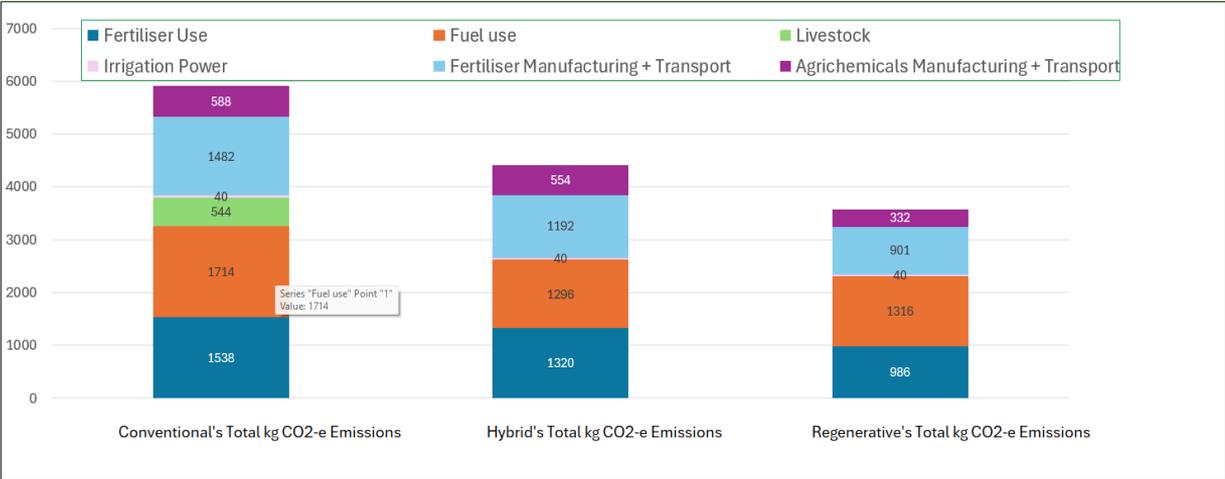
Total Carbon Equivalent Emissions

Conventional 5906

Hybrid 4401

Regenerative 3575

Emission Graphs: kg CO2-e



Emissions

Total Carbon Equivalent Emissions

Conventional 5906

Hybrid 4401

Regenerative 3575

Summary Outputs

Conventional

| Total Emissions | kg CO ₂ -e | kg CO ₂ | kg CH ₄ CO ₂ -e | kg N ₂ O CO ₂ -e |
|--|-----------------------|--------------------|---------------------------------------|--|
| Fertiliser Use | 1538 | 183 | 0.00 | 1355 |
| Fuel Use | 1714 | 1687 | 2.56 | 23.91 |
| Livestock | 544 | 0 | 544 | 0 |
| Irrigation Power | 40 | 38 | 1.42 | 0.04 |
| Fertiliser Manufacturing + Transport | 1482 | 1482 | 0 | 0 |
| Agrichemicals Manufacturing + Transport | 588 | 588 | 0 | 0 |

Hybrid

| Total Emissions | kg CO ₂ -e | kg CO ₂ | kg CH ₄ CO ₂ -e | kg N ₂ O CO ₂ -e |
|--|-----------------------|--------------------|---------------------------------------|--|
| Fertiliser Use | 1320 | 146 | 0 | 1174 |
| Fuel use | 1296 | 1276 | 1.93 | 18.08 |
| Livestock | 0 | 0 | 0 | 0 |
| Irrigation Power | 40 | 38 | 1.42 | 0.04 |
| Fertiliser Manufacturing + Transport | 1192 | 1192 | 0 | 0 |
| Agrichemicals Manufacturing + Transport | 554 | 554 | 0 | 0 |

Regenerative

| Total Emissions | kg CO ₂ -e | kg CO ₂ | kg CH ₄ CO ₂ -e | kg N ₂ O CO ₂ -e |
|--|-----------------------|--------------------|---------------------------------------|--|
| Fertiliser Use | 986 | 181 | 0 | 805 |
| Fuel use | 1316 | 1296 | 1.96 | 18.36 |
| Livestock | 0 | 0 | 0 | 0 |
| Irrigation Power | 40 | 38 | 1.42 | 0.04 |
| Fertiliser Manufacturing + Transport | 901 | 901 | 0 | 0 |
| Agrichemicals Manufacturing + Transport | 332 | 332 | 0 | 0 |

Emissions Scope

Conventional

| Scope | Total kg CO ₂ -e |
|--------------------|-----------------------------|
| Scope One | 3796 |
| Scope Two | 40 |
| Scope Three | 2071 |

Hybrid

| Scope | Total kg CO ₂ -e |
|--------------------|-----------------------------|
| Scope One | 2616 |
| Scope Two | 40 |
| Scope Three | 1745 |

Regenerative

| Scope | Total kg CO ₂ -e |
|--------------------|-----------------------------|
| Scope One | 2303 |
| Scope Two | 40 |
| Scope Three | 1233 |

What have we learnt?

- 'Regen process vegetable system' is a work in progress
- Working within factory constraints
- Pragmatic decision making Still in transition
- We are growing 11 - 12 crops, not 6 -7 (cover crops are a big deal!)
- We're getting good yields
- Diesel, nitrogen fertiliser, and stock have high emissions
- If it was easy we'd already be doing it



Thank you!

LandWISE