

Protein Futures: Future Scenarios for Land-Use in Aotearoa New Zealand

FOOD FARMING AND FRESHWATER ROADSHOW

Otautau

Thursday 20 June 2024

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Outline

1. Emerging proteins – an introduction
2. The project - *Protein Futures: Future Scenarios for Land-Use in Aotearoa New Zealand*
3. Results and implications

Background

- Context – Economic, environmental and landuse impacts from market/technology disruptions.
- Project - *Protein Futures: Future Scenarios for Land-Use in Aotearoa New Zealand (2022-24)*
- Project Goal *To undertake economic and land use modelling of possible scenarios for alternative protein development.*

- Team



- Historical context - examples of technology disruptions to agriculture – wool, margarine, vanilla.

1 Literature review 

2 Interviews with key stakeholders 

3 Modelling 

4 Review results with stakeholders 

5 Communication of results 

Introduction to Emerging Proteins

What are
Emerging
Proteins?

Cultivated



Precision
Fermented

Plant
Proteins



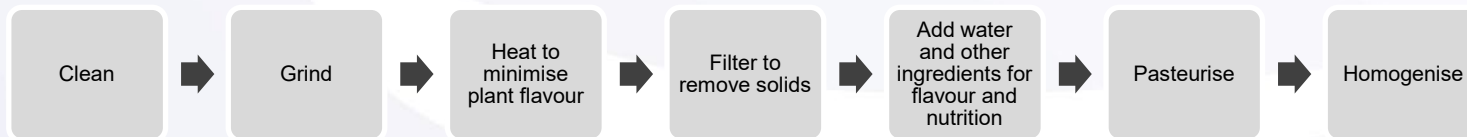
Plant-based

- Plant-based milks have long historical origins
- Can be made from nuts, cereals, seeds, tubers and coconuts
- Provide a similar textural experience to cow's milk
- Need to be fortified to provide similar nutrition



leaf't

Process:



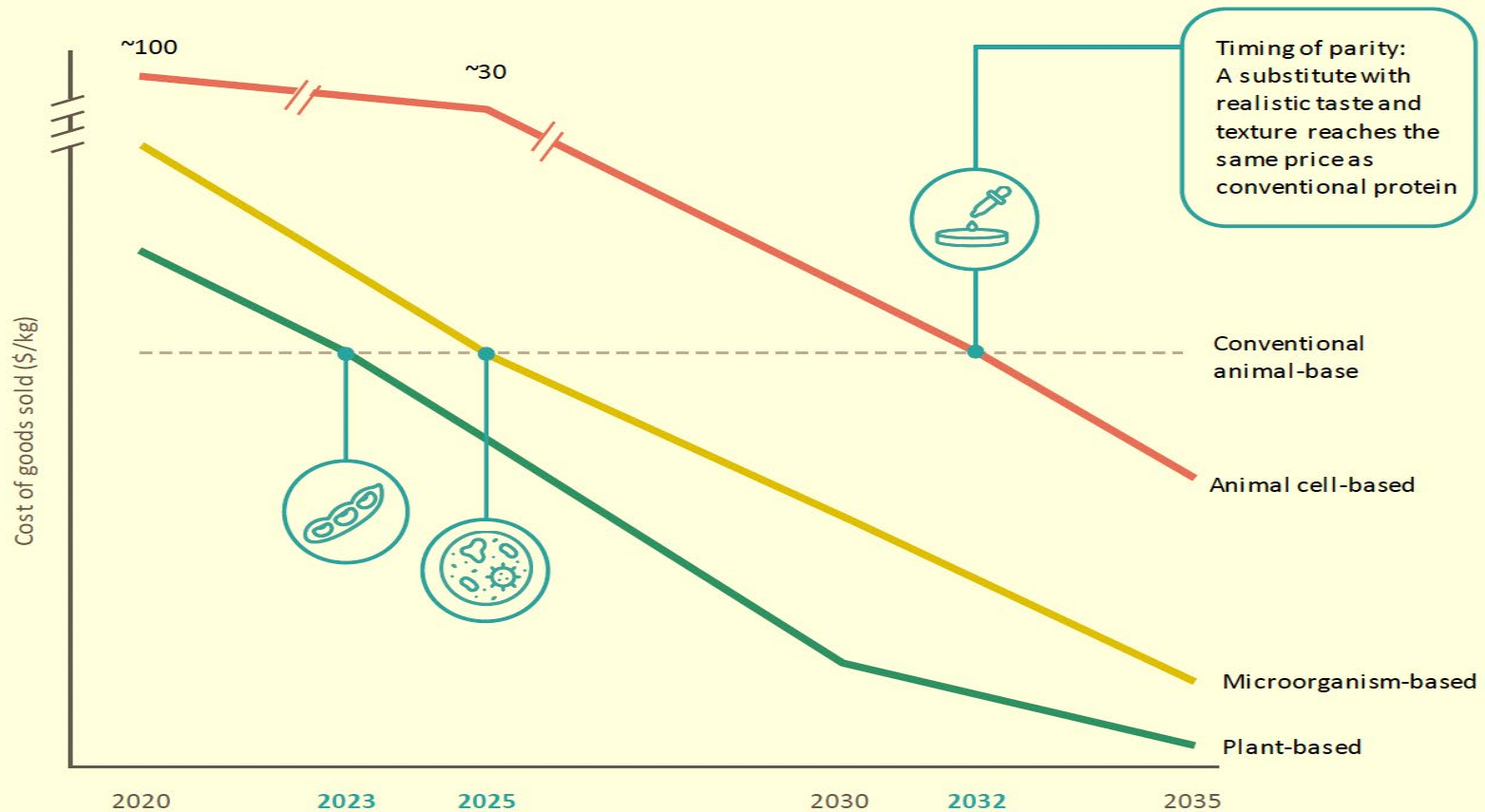
Precision fermentation



Cellular



Price parity estimates

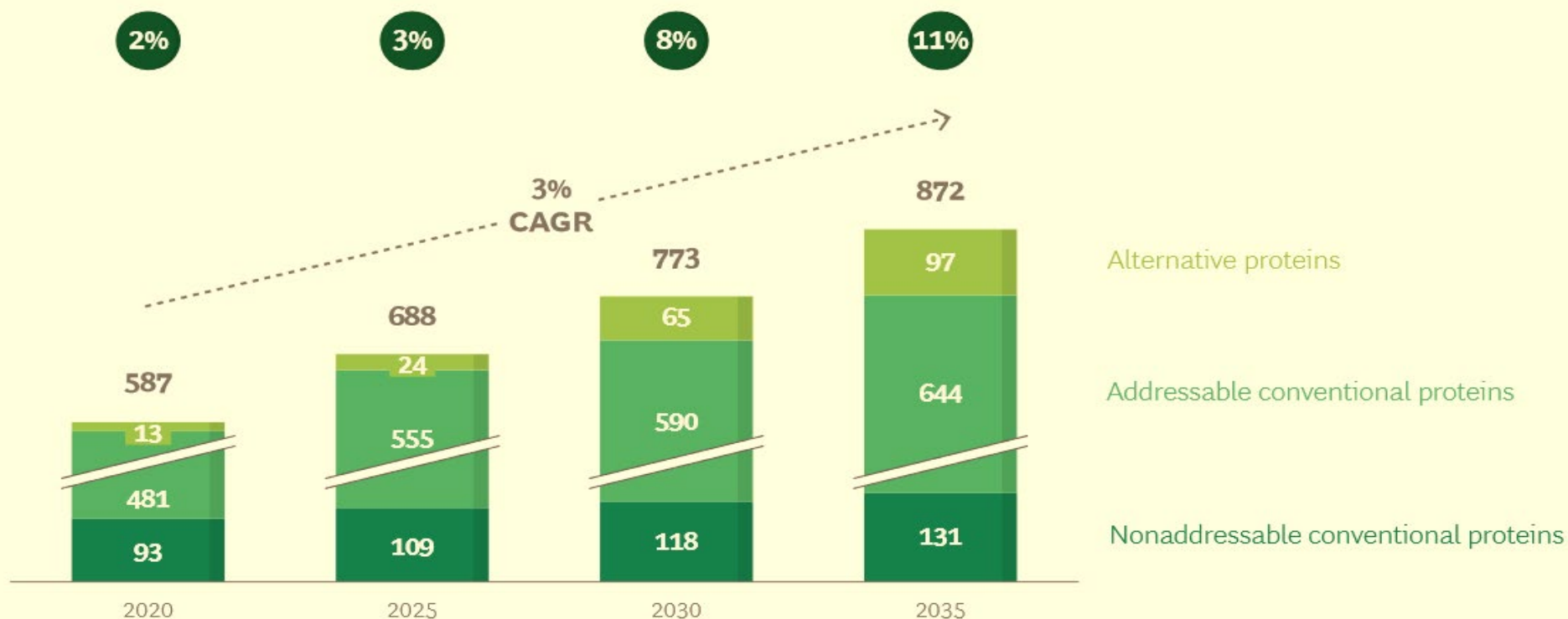


Source: The Good Food Institute. *Reducing the price of alternative proteins* (2020)

Trends in protein demand

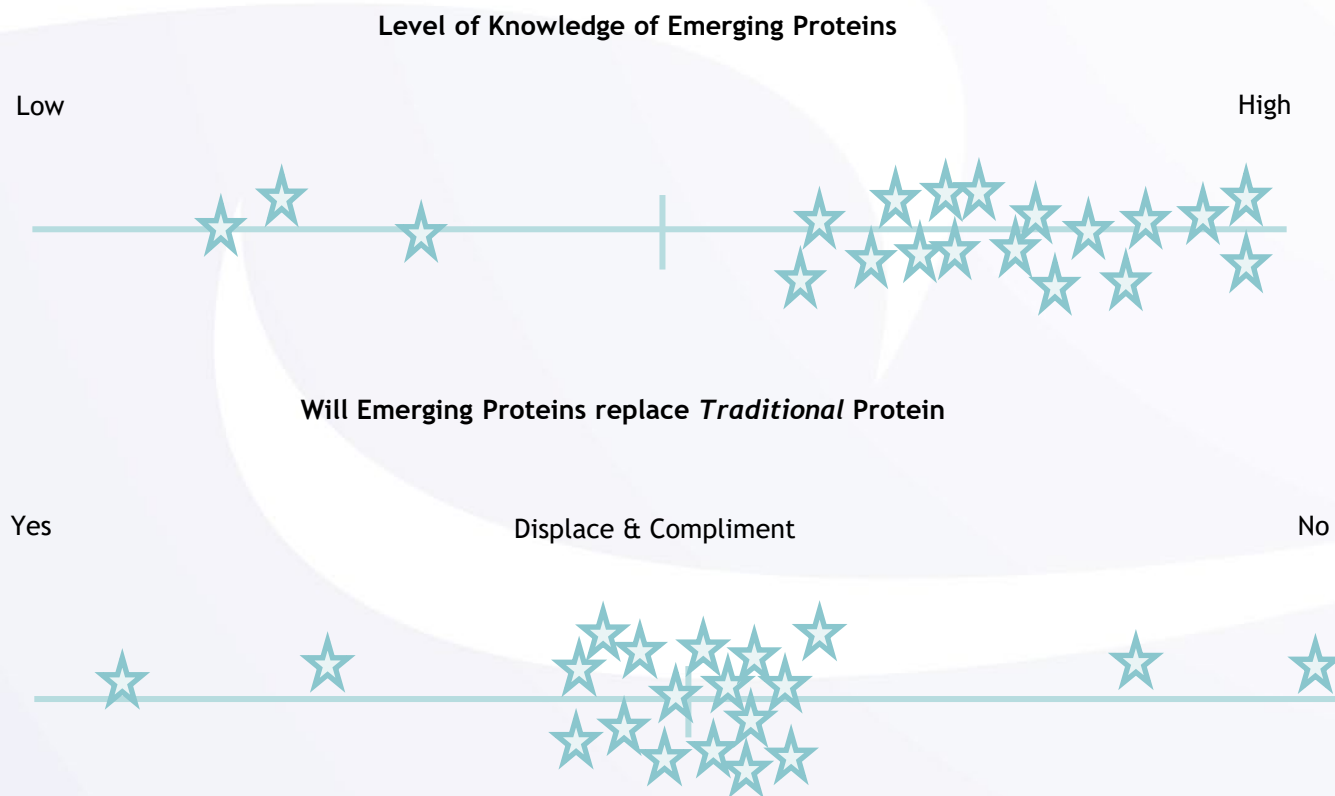
Exhibit 2 - Alternative Proteins Will Very Likely Account for 11% of the Protein Market in 2035

Global consumption of protein products
(% adoption rate, million metric tons, base-case scenario)



Stakeholder Interviews

25 interviews with sector experts



Development of Scenarios

Scenarios were created to outline the potential outcomes around the future for alternative protein in New Zealand based on expert interview, a literature review, and quantitative data from BCG “Food for Thought” research

Scenario 1

- Reflects the current situation of increased demand in alternative proteins.
- Assumes that new alternative proteins contribute towards increased demand but do not significantly affect traditional protein supply chains.
- Slow growth caused by technical barriers.

Scenario 2

- Precision fermentation takes off.
- Demand for plant protein continues but technical issues stall the development of cultivated products.
- Sustainability is a key factor driving consumer acceptance.

Scenario 3

- Plant-based protein products take off, whilst some barriers facing precision fermentation and cultivated products are removed.
- Sustainability is a key driver of consumer acceptance.
- Other emerging proteins shift to support the development of enhanced plant-based products.

Scenario 4

- All current barriers to the success of alternative markets have been removed or are in the process of being overcome.
- Sustainability is a significant factor — price parity is achieved for all alternative proteins.
- Taste and texture has improved.
- Scale of production has increased whilst regulation and market access barriers/tariffs for food are based on GHG emissions and other environmental outcomes.

Proposed land use changes

Scenario 1

Base case —
business as usual

Scenario 2

- 35% reduction in the dairy area
- Arable area increases 50% in Canterbury, Southland, Wairarapa and Horizons

Scenario 3

- 15% reduction in the dairy area
- Arable area doubles across all flat land (25% from dairy, 75% from sheep and beef) — mainly South Island
- 15% reduction in sheep and beef sector goes to forestry

Scenario 4

- 35% reduction in the dairy area
- Arable area doubles across all flat land (25% from dairy, 75% from sheep and beef) — mainly South Island
- 25% reduction in sheep and beef sector goes to forestry

Land Use Change (Ha) (2050)

	Scenario 1 No impact on current land (m)	Scenario 2 Precision fermentation for dairy	Scenario 3 Plant-based products	Scenario 4 All proteins take off
Sheep	4.136	-123,597 (-3%)	-620,531 (-15%)	-1,219,613 (-29%)
Beef	2.692	601,632 (+22%)	-216,604 (-8%)	-133,199 (-5%)
Dairy	2.072	-725,229 (-35%)	-310,812 (-15%)	-725,229 (-35%)
Arable	.494	247,194 (+12%)	494,387 (+37%)	370,790 (+21%)
Hort & Vegetable	.126	0	0	0
Forestry	1.619	0	653,560 (+40%)	1,707,251 (+75%)
Total	11.140			

Results – Economic + Environmental Impacts

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	No impact on current land	Precision fermentation for dairy ingredients becomes competitive	Plant-based products take off	Emerging proteins take off
Gross Output (\$m)	43,489	-4,007	2,457	1,366
Total Change for NZ economy (\$m)	99,282	-7,994	6,951	6,727
Employment (FTE)	321,924	-22,584	22,486	18,410
Value Added (\$m)	46,765	-4,267	2,616	1,771
GHG Emissions (000 t CO2 e)	42,836	-5,615	-5,480	-11,999
N Loss (t)	193,429	-11,427	-9,800	-33,451
P Loss (t)	15,427	-276	-736	-2,725

Results – Regional Impacts

Change from Scenario 1 to 4

	Canterbury	West Coast	Southland
Gross Output (\$m)	1,436	-93	165
GHG Emissions (000tCO ₂ e)	-2,763	-155	- 1,380
N Loss (t)	-8,479	-1,917	- 2,9456
P Loss (t)	-514	-21	- 210

Policy Implications

These new technologies will have impacts – both positive and negative. A national policy or strategy is needed to help New Zealand prepare for the risks and potential opportunities of new proteins.

Unlike previous disruptions like artificial fibres, these technologies will both substitute existing land use, and create new opportunities: including for improved environmental performance.

We should be thinking about how to re-position land-use around more positive environmental qualities by going down this path. Including green labelling.

Scenario Four would entirely meet our GHG reduction requirements from agriculture.



Thankyou

Further Information

<https://ourlandandwater.shorthandstories.com/beyond-meat-and-milk/index.html>

Contact jon@agribusinessgroup.com