Whitiwhiti Ora Productive Potential – Report on Method for Estimating Economics of Horticultural, Arable, and Alternate Dairy Land Uses – Final Data Release

March 2024 Milestone Report

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1 Introduction

This report briefly describes the collation of information to support the land use opportunities assessment. The focus of the economics work has been to produce estimates of economic returns for land uses in the Productive Potential workstream. This report outlines the generation of base information on the economics of horticultural and arable land uses, and the generation of mapping information that draws on the productivity information generated by Plant and Food Research (PFR) in the production stream of WWO work.

2 Method

2.1 Data sources

Contractors were procured for the generation of base information on a range of land uses. These were:

Land use	Contractor	Contributing data sources	Nature of data
Apples	AgFirst	Grower survey	Observed
Avocados	LWP	NZ Avocado Growers, ANZ	Observed
Blueberry	Agribusiness Group	Growers (limited number)	Constructed
Cherry	Agribusiness Group	Growers (limited number)	Constructed
Kiwifruit – Gold	Fruition	Grower database	Observed/Constructed
Kiwifruit - Green	Fruition	Grower database	Observed/Constructed
Wine grape - Pinot noir	LWP	Operating budget: MPI, New Zealand Winegrowers, 2020. Capital costs: SLMACC Project 405422 (Thomas, et al., 2020)	Observed
Wine grape - Sauvignon blanc	LWP	MPI, New Zealand Winegrowers, 2020	Observed
Maize - grain	Agribusiness Group	Growers (limited number)	Constructed
Onions	Agribusiness Group	Growers (limited number)	Constructed
Vining Peas	Agribusiness Group	Growers (limited number)	Constructed
Process Potatoes	Agribusiness Group	Growers (limited number)	Constructed
Wheat	Agribusiness Group	Growers (limited number)	Constructed
Chestnut	SLMACC	AgFirst 2019	Constructed
Manuka Honey	SLMACC	2020 report	Constructed
Hops	Agribusiness Group	Growers (limited number)	Constructed
Macadamia	Agribusiness Group	Growers (limited number)	Constructed
Seed potato	Agribusiness Group	Growers (limited number)	Constructed
Fresh potato	Agribusiness Group	Growers (limited number)	Constructed
Tomato	Agribusiness Group	Growers (limited number)	Constructed
Beetroot	Agribusiness Group	Growers (limited number)	Constructed
Sweetcorn	Agribusiness Group	Growers (limited number)	Constructed
Squash	Agribusiness Group	Growers (limited number)	Constructed
Broccoli	Agribusiness Group	Growers (limited number)	Constructed
Spinach	Agribusiness Group	Growers (limited number)	Constructed
Lettuce	Agribusiness Group	Growers (limited number)	Constructed

Cabbage	Agribusiness Group	Growers (limited number)	Constructed
Cauliflower	Agribusiness Group	Growers (limited number)	Constructed
Field Peas	Agribusiness Group	Growers (limited number)	Constructed
Navel oranges	Agribusiness Group	Growers (limited number)	Constructed
Valencia oranges	Agribusiness Group	Growers (limited number)	Constructed
Encore mandarins	Agribusiness Group	Growers (limited number)	Constructed
Satsuma mandarins	Agribusiness Group	Growers (limited number)	Constructed
Meyer lemons	Agribusiness Group	Growers (limited number)	Constructed
Dairy Goaats	AgFirst	Growers (limited number)	Constructed
Dairy Sheep	AgResearch	Research project[1]	Constructed
Edible Fungi Bianchetto Intensive	Mycotree	Consultant projections	Constructed
Edible Fungi Bianchetto Extensive	Mycotree	Consultant projections	Constructed
Edible Fungi Perigord Intensive	Mycotree	Consultant projections	Constructed
Edible Fungi Perigord Extensive	Mycotree	Consultant projections	Constructed
Edible Fungi Saffron Milk Cap Intensive	Mycotree	Consultant projections	Constructed
Edible Fungi Saffron Milk Cap Extensive	Mycotree	Consultant projections	Constructed

The economics work collated information from a range of sources, and updated this information to the most recent available data.

We distinguish between two types of data sources:

- Observed data, which is based on the actual performance of businesses undertaking a land use, ideally directly from their accounting information. In the best case observed data is major surveys of industries, such as is undertaken by DairyNZ, Beef and Lamb NZ, Zespri, and MPI in the case of the pipfruit and viticulture sectors. Observed data should generally be considered to be biased toward better performing businesses, simply because willingness to participate in a survey is less likely for poorly performing properties. In the case of the major industry surveys there are some controls on this that limit this bias.

- Constructed data, which is based on budgets created by consultants or experienced experts. While this can have an element of observation in it, particularly where consultants have clients whose data may be referred to in constructing the budgets, inevitably the choice of parameters will reflect the experience and expertise of the individual constructing the data, and furthermore will be subject the common heuristics of availability bias and confirmation bias.

Where possible the estimates of economic returns have been based on observed data rather than constructed data. However for many of the minor land uses there is little reliable observed information. In particular for land uses which are highly competitive domestically or in the export sector, industry participants can be reluctant to release information that may be used by competitors or customers, so observed data is very difficult to obtain and constructed data sources are the best available.

[1] New Zealand Food Innovation South Island (FoodSouth) 2020.

2.2 Spatial differentiation

Spatial differentiation of the base input data was undertaken where supported by data sources. This is greatest with the sheep and beef sector, and least with the smaller sectors. Where spatial productivity information is available from Plant and Food Research this has been used to estimate the associated economic returns for those land uses. Elsewhere only a single estimate of the economic indicators is available.

2.3 Data timing

Where possible current data sources are used. However in some cases the older data is more specific and appropriate for the task. In these instances, and where possible, the data is updated with more recent information on the returns and expenses, with the Business Price Index (BPI, StatsNZ) for agriculture used to update expenses where no other information is available.

2.4 Indicators

The indicators used are:

1. Location: refers to the location where the base budget data was sourced. Where this is non-specific, the designation National is used.
2. Type of analysis: some budgets provided cover the whole operation assuming that only one enterprise is present on the property (Whole Property), while others are the returns from a single crop within the context of a larger operation (Gross Margin). The latter is suitable for arable crops, where the crop may be only grown for a year as part of a rotation, and some of the costs are not directly attributable to the crop.
3. Adjusted Yield: the adjusted production used for the calculation of revenue, expenses and labour. This is calculated using a production scalar, which is the PFR estimates of production in their suitability mapping, adjusted for average (or budgeted) industry production. In adjusting the production we scale all the PFR production estimates based on the ratio of Suitability Category 1/industry production for the categorically mapped land uses (arable and vegetable crops), and the average of the production on all pixels where the average of top 10% of PFR yield / industry production for the continuously mapped land uses (fruit crops). As noted above where PFR estimates of production are not available, a single estimate of returns is provided. Note that for Apples and Pears, base yield is provided as Gross yield in tonnes, and Export Yield in trays. The spatial yield is Export Yield only.
4. Revenue: Gross income from the land use, based on the Adjusted Yield times the unit price.
5. Expenses: the farm working expenses, non capital related standing charges (insurance, rates, ACC, irrigation fees, etc), and depreciation (where available). It does not include interest, rent, amortisation or any other capital related charges, nor does it include an allowance for owner wages of management which are considered to incorporated into the profit from the farm, with the expectation that any actual management fees are included in wages.

   Where spatial production information is available, the expenses were adjusted for any changes that may occur as a result of difference in levels of yield. Typically this

includes the cost of harvest where hand harvesting is undertaken, packing freight etc where the costs are driven by the volume or weight of product. In some cases, such as some arable crops, fertiliser application may vary in line with expected production, and in these cases fertiliser costs are adjusted.

6. Operating profit: Revenue minus Expenses

7. Capital required (not mapped): a single point estimate of the capital required for the land use, excluding the value of the land. This cost is indicative only because there can be a very wide range of items in here and it can be highly dependent on the location and context. However it provides a useful comparator between different land uses.

8. On farm labour: the number of Full Time Equivalents (FTEs) per 10 ha of land use. Estimated from the expenditure on wages and salaries, and for crops where contractors are used for key tasks (planting,pruning, harvest, packing etc) a labour content of the contractor budget is also estimated. The expenditure on labour is converted to Full Time Equivalents using a national average cost per horticulture sector labour unit ($52,345/year), and may not reflect regional differences in pay rates. It also does not take into account the seasonal nature of some of the labour demands, so will typically involve a larger number of people employed over a shorter period than a year.

9. Total Gross Domestic Product (GDP), Household Income (HHI) and employment (FTE/10ha): the contribution to regional economic indicators associated with an increase in 1 ha of a land use in a region. The includes the flow on effects of purchases from suppliers and from households associated with the enterprise spending money in the community. These were calculated using the direct GDP, HHI and FTE/10ha from the operating budgets, and adding the flow on impacts (indirect + induced) from the regional input-output (IO) tables. Regional IO tables provided by Butcher Partners Ltd based on 2019/20 StatsNZ national IO table (see Table 4). Employment estimates were inflation updated (CPI 11%).

10. Time to production (not mapped): this is variable and is specified as either an estimate of the period elapsed before some income is received from the land use, or time to near full production. The nature of this is specified in the base information and in some cases both pieces of information are provided.

11. Infrastructure requirements (not mapped): specific infrastructure needs in order to successfully grow and harvest the crop. This does not include general items such as sheds and tractors etc which would be normally expected on a horticultural or arable unit.

12. Market (Export/Domestic): destination of the primary output.

13. Volatility of returns: subjective assessment of the historic or likely volatility of returns. High volatility is associated with marked changes in demand or more typically supply of the product, while low volatility arises in industries with established and long term consumer demand, high barriers to entry and well established marketing channels. Some products, such as hops, have been assessed as high volatility not because of historic volatility, but because of the potential for high volatility in the future given the small size of the market internationally, and the low barriers to entry indicating the potential for oversupply.

14. Marketing Structures: describes the degree to which there are available structures to sell the primary output. As an example kiwifruit has a well developed marketing structures with Zespri, whilst blueberry has a poorly developed marketing structure and growers will have to individually market their product.

15. Reliability (not mapped): A categorical estimate of the relative uncertainty associated with the data. The three categories are:

    - Low – data sources are poor with little spatial differentiation and high or unknown potential variability in returns from the land use.
    - Moderate – some observed data, but little spatial differentiation and considerable or unknown potential for variability in the returns from the land use.
    - High: Reasonably good observed data, with some good spatial differentiation and variability in returns is known.

16. Entrepreneurship required: a qualitative observation of the degree to which the grower will have to develop the product and its market.

    - Low – well established knowledge of growing and supporting industry (contractors, consultants etc) and good marketing structures.
    - Moderate - moderately established knowledge of growing and/or some supporting industry (contractors, consultants etc) and/or some marketing structures.
    - High - poor established knowledge of growing and/or poor supporting industry (contractors, consultants etc) and/or poor marketing structures.

17. Data source (not mapped): the source of the data in the table.

Table 1: Calculation of derived indicators

Mapped item	Calculation	Notes
Adjusted Yield	Production Scalar * Table Production	Production scalar is described above. There are also adjustments for regional variation in industry performance in Kiwifruit, Avocados, Apples,
Revenue	Yield * Unit Returns	
Expenses	Fixed Expenses + (Variable Cost/Unit * Production)	
Operating Profit	Revenue – Expenses	
FTE/10ha	(Fixed Labour + (Labour Cost/unit*Production))/ 52345*10	Labour derived directly from budgets
Total GDP	Operating Profit + (Fixed Labour + Labour Cost/unit*TIF Production)+ Revenue * VA $\text{Multiplier}_{\text{Region (indirect and induced)}}$	GDP uses labour and profit from budgets, and generic multiplier for indirect and induced flow on effects.
Total HHI	Operating Profit + (Fixed Labour + Labour Cost/unit*Production) + Revenue * HHI $\text{Multiplier}_{\text{Region(indirect and induced)}}$	HHI uses labour from budgets, and generic multiplier for indirect and induced flow on effects.
Total FTE/10 ha	(FTE/10ha + Revenue / 1000000 * FTE $\text{Multiplier}_{\text{Region(indirect and induced)}}$) * 10	FTE uses labour from budgets, and generic multiplier for indirect and induced flow on effects.

3 Notes

- The production estimates for those crops where suitability was classified in a categorical manner (ie scored 1,2,3 or 4) the production estimates are based on the "Constraints Managed" version of the maps. For each crop therefore it is necessary for the user to take into account any constraints which have been removed in estimating this production – typically the addition of irrigation is a key adjustment where areas are too dry for reliable crop production. It is noted that the fruit crops for which the productivity is estimated in a continuous manner, irrigation has been assumed to be used where required.
- Pipfruit: data provided by Agribusiness Group Ltd based on previously published information.
- Avocados: Data from the NZ Avocado Growers Council was used to estimate production areas and average export volumes over the last five years for each of the main growing districts for the period 2018 - 2021. The export volumes for each growing district were pro-rated up by the ratio of total industry returns to export returns, to estimate the total returns per ha in each growing district. The ANZ report (ANZ, 2018) was used to estimate expenses, with the expense data updated using the BPI June 2018 – June 2021. Updated to 2023 with estimates of current prices from SOPI 2023.
- Kiwifruit: Fruition Horticulture provided detailed development costs and budgets based on industry knowledge and Zespri databases. It should be noted that this budget relies entirely on contractors to undertake orchard operations, which is common in well developed areas but may be more difficult in areas where kiwifruit growing is not well developed. Kiwifruit production was calibrated by region based on the relative growing

performance provided by Fruition. Updated to 2023 using Zespri orchard gate returns, average of last 4 years.

- Blueberries: data provided by Agribusiness Group Ltd, based on industry knowledge and work undertaken for HortNZ. The model presented in the mapping data is a covered production system.
- Cherries: Returns for cherries were developed by Agribusiness Group Ltd. No development budget was available, so development costs were taken from SLMACC Project 405422 (Thomas, et al., 2020). These development costs were not updated due to the general nature of the estimates available.
- Vegetables: data provided by Agribusiness Group Ltd, based on industry knowledge and work undertaken for HortNZ.
- Arable: data provided by Agribusiness Group Ltd, based on industry knowledge and work undertaken for HortNZ.
- Viticulture: data was estimated from MPI monitoring data (MPI, 2020) (MPI, 2019). 2017 – 2019 data was used for Pinot Noir and 2018-2020 for Sauvignon Blanc. No development budget was available so development cost data was taken from SLMACC Project 405422 (Thomas, et al., 2020). Prices updated to 2022 using MPI Viticulture Monitoring report data for Marlborough.
- Edible fungi data is based on information from a specialist consultant in the area (Mycotree), using unpublished data generated for a case study in the Waimakariri district.
- Dairy Goats are based on information provided by an AgFirst consultant, and because of the recent difficulties in the industry had to be constructed from a number of sources. Dairy sheep information is based on data from AgResearch and AgFirst. Price information in these two industries is difficult to access and has been volatile recently, so care should be taken with this information.
- All data was updated to June 2023 using Business Price Index and Capital Goods Price Index from the Business Price Indexes series (Statistics NZ, 2023), and Labour cost index from the Labour Market Statistics series (Statistics NZ 2023).

4 Updating data post publication

The data provided here has a base time period of June 2023 These data will potentially become out of data the further from their derivation period they are used. While a full analysis would be required to bring them fully up to date, users can bring them closer to their present day prices by indexing the data provided.

We suggest that until 2025 no update for production per ha is required as differences are likely to represent year to year variations rather than changes in the underlying productivity of the crop.

Revenue should be updated from the most specific source available. Price data is available for pastoral sector, wheat and maize from arable crops, and pipfruit, kiwifruit, avocadoes, viticulture. For other horticultural crops, either no update, update with CPI, or update using

the Other Horticultural Products category in Situation and Outlook for Primary Industry (MPI). More guidance is given for each product in the tables.

The main source of indexes for updating expenses is StatsNZ Business Price Indexes which is found among their information on the economy (**Economy | Stats NZ**). New updates are made every quarter. Within the Business Price Index series Farm Expenses Price Index should be used, and within the Farm Expenses Price Index there are tables for each of the horticulture, arable, sheep and beef and dairy sectors. The sector specific to the crop being considered should be used to update the expenses provided here.

For updating the household income it is necessary to use Labour Cost Index. This is found at StatsNZ under their Labour Market Statistics **Labour market | Stats NZ**. New releases are made every quarter.

The calculations required are:

- $Revenue_{(updated)}$ = (Current price or price $index_{(crop)}$ / June 2023 price or price $index_{(crop)}$) * $Revenue_{(table\ or\ layer)}$
- $Expenses_{(updated)}$ = (Current farm expenses price $index_{(Hort,\ Arable,\ S\&B,\ Dairy)}$ / June 2023 farm expenses price $index_{(Hort,\ Arable,\ S\&B,\ dairy)}$) * Variable and Fixed $Expenses_{(table\ or\ layer)}$
- $GDP_{(updated)}$ = $GDP_{(table\ or\ layer)}$ * (Current price or price $index_{(crop)}$ / June 2023 price or price $index_{(crop)}$)
- $HHI_{(updated)}$ = $HHI_{(table\ or\ layer)}$ * (Current Labour Price / June 2023 Labour price index)
- Employment – no change

Table 2: Summary of indicators (includes limited indicator set for a number of crops not mapped)

Land use	Location of base budget	Type of analysis	Yield	Yield Units (TBC)	Revenue (on farm)	Variable expenses	Fixed expenses	Operating Profit ($/ha)	Capital ($/ha)	On farm labour (FTE/10ha)	Total GDP ($/ha)	Total HHI ($/ha)	Total employment (FTE/10ha)	Time to commercial yield	Infrastructure
Apples Hawkes Bay	Hawkes Bay	Whole property	2640	TCE	$101,000	$49,000	$33,000	$19,000	$100,000 - 200,000	8.6	$109,000	$68,000	12.2	1-2 years for initial production, 5 - 6 years for full production	Packhouse, coolstore, pollination services
Apples Nelson	Nelson	Whole property	2670	TCE	$92,000	$46,000	$33,000	$12,000	$100,000 - 200,000	8.0	$79,000	$54,000	10.1	1-2 years for initial production, 5 - 6 years for full production	Packhouse, coolstore, pollination services
Avocado - Avocado National	Bay of Plenty	Whole property	12.4	tonnes	$41,000	$5,000	$25,000	$12,000	$70,000	2.6	$44,000	$23,000	4.0	5 years (50%), 10 years 100%	Packhouse, transport
Beetroot	Hawkes Bay	Gross margin	60	tonnes	$17,000	$2,000	$10,000	$5,000						0	Harvester, tractor, storage or contractor
Blueberry	National	Whole property	12000	kg	$284,000	$108,000	$111,000	$65,000	$473,000	25.7	$320,000	$198,000	34.7	4	Packhouse and chiller
Brocolli	Pukekohe / Horizons / Canterbury	Gross margin	12.0	tonnes	$22,000	$8,000	$5,000	$10,000	$0					0	Harvester, tractor, storage or contractor
Cabbage	Pukekohe / Horizons / Canterbury	Gross margin	60	tonnes	$29,000	$14,000	$7,000	$8,000	$0					0	Harvester, tractor, storage or contractor
Cauliflower	Pukekohe / Horizons / Canterbury	Gross margin	70	tonnes	$30,000	$13,000	$6,000	$11,000	$0					0	Harvester, tractor, storage or contractor
Cherry	Central Otago	Whole property	15000	kg	$231,000	$141,000	$34,000	$56,000	200000 - 500000 (top is covered orchard)	24.5	$281,000	$180,000	32.1	6 to 8	Packhouse and chiller
Chestnut	Waikato	Whole property	NA	NA	$10000 to $18,750	#N/A	#N/A	$5000 to $9960	$25,000 - $40,000	NA	NA	NA	NA	6	
Fresh Potato	Pukekohe	Gross margin	50	tonnes	$20,000	$3,000	$13,000	$3,000	$0					0	Harvester, tractor, storage or contractor
Hops	Nelson	Whole property	1740	kg	$63,000	$2,000	$14,000	$47,000	$194,000					1 year to 50%, 2 years to 100% production	Hop drying ovens, pelletising equipment.
Kiwifruit - Gold BOP	Bay of Plenty	Whole property	14000	TCE	$164,000	$10,000	$47,000	$106,000	$1,072,000	7.3	$215,000	$76,000	12.5	4 (>50%) to 6 (100%)	Packhouse, coolstore, pollination services
Kiwifruit - Green BOP	Bay of Plenty	Whole property	11000	TCE	$98,000	$6,000	$46,000	$46,000	$229,000	6.4	$122,000	$56,000	9.6	4 (>50%) to 6 (100%)	Packhouse, coolstore, pollination services
Lettuce	Pukekohe / Horizons / Canterbury	Gross margin	10.0	tonnes	$30,000	$13,000	$8,000	$9,000	$0					0	Harvester, tractor, storage or contractor
Maize	North Island	Gross margin	11.6	tonnes	$5,000	$1,000	$1,000	$3,100	$0	0.1	$5,000	$1,000	0.1	0	Harvester, tractor, storage or contractor
Onions	Pukekohe	Gross margin	40.5	tonnes	$22,000	$4,000	$15,000	$4,100	$0	0.1	$14,400	$5,000	0.1	0	Harvester, tractor, storage or contractor
Onions	Canterbury	Gross margin	40.5	tonnes	$22,000	$4,000	$15,000	$4,100	$0	0.1	$14,400	$5,000	0.1	0	Harvester, tractor, storage or contractor
Potatoes - Process	Horizons/Canterbury	Gross margin	58.0	tonnes	$25,000	$3,000	$13,000	$8,300	$0	0.1	$16,900	$4,100	0.1	0	Harvester, tractor, storage or contractor
Spinach	Pukekohe / Horizons / Canterbury	Gross margin	30.0	tonnes	$66,000	$30,000	$5,000	$31,000	$0					0	Harvester, tractor, storage or contractor
Squash	Pukekohe / Horizons / Canterbury	Gross margin	13.3	tonnes	$9,000	$2,000	$5,000	$1,900	$0					0	Harvester, tractor, storage or contractor
Sweetcorn	Hawkes Bay	Gross margin	22.0	tonnes	$11,000	$1,000	$4,000	$5,600	$0					0	Harvester, tractor, storage or contractor
Tomato	Hawkes Bay	Gross margin	130.0	tonnes	$27,000	$3,000	$13,000	$11,800	$0					0	Harvester, tractor, storage or contractor

Truffles		Whole property			$40–$140,000	#N/A	#N/A	$30,000–$110,000	$40,000					7	
Vining Peas	Canterbury	Gross margin	8.5	tonnes	$3,400	$0	$1,000	$2,000	$0	0.1	$3,800	$1,000	0.1	0	Harvester, tractor, storage or contractor
Wheat	Canterbury	Gross margin	8.7	tonnes	$4,000	$1,000	$2,000	$1,400	$0	0.1	$3,500	$1,100	0.1	0	Harvester, tractor, storage or contractor
Wine grape-Pinot noir	Central Otago	Whole property	5.2	tonnes	$18,000	$0	$13,000	$5,000	$172,000	1.4	$18,000	$10,000	1.9	2-4 years	Winemaking facilities or transport
Wine grape-Sauvingon blanc	Marlborough	Whole property	12.6	tonnes	$26,000	$1,000	$13,000	$12,000	$172,000	1.4	$28,000	$12,000	2.2	2-4 years	Winemaking facilities or transport
Navel Oranges	Northland	Whole property	50160	kg	$29,000	$7,000	$18,000	$4,000	$37,000					3	Packhouse
Valencia Oranges	Northland	Whole property	60000	kg	$32,000	$7,000	$16,000	$9,000	$35,000					3	Packhouse
Encore Mandarins	Northland	Whole property	40000	kg	$42,000	$8,000	$19,000	$15,000	$40,000					3	Packhouse
Satsuma Mandarins	Northland	Whole property	25000	kg	$39,000	$6,000	$18,000	$15,000	$40,000					3	Packhouse
Meyer Lemons	Northland	Whole property	55000	kg	$56,000	$14,000	$19,000	$23,000	$55,000					3	Packhouse
Dairy Goats	Waikato	Whole property	1,230	kgMS	$16,000	$9,000	$3,600	$3,400	$96,300	0.61	$13,200	$4,700	0.73	0	Milking shed, barn, feed silos, processing infrastructure
Dairy Sheep	Waikato	Whole property	750	kgMS	$13,900	$8,900	$2,400	$2,600	$18,200	0.56	$11,500	$4,000	0.63	0	Milking shed, barn, feed silos, processing infrastructure
Edible Fungi Bianchetto Intensive	Canterbury	Gross margin			$42,000	$0	$10,000	$32,000	$66,000	1.13	$56,000	$16,000	2.47	4 for first crop, 7 for full	Milking shed, barn, feed silos, processing infrastructure
Edible Fungi Bianchetto Extensive	Canterbury	Gross margin			$20,000	$0	$8,000	$12,000	$14,000	0.71	$25,000	$8,000	1.35	4 for first crop, 7 for full	Milking shed, barn, feed silos, processing infrastructure
Edible Fungi Perigord Intensive	Canterbury	Gross margin			$78,800	$0	$10,000	$69,000	$71,000	1.30	$110,000	$25,000	3.82	8 for first crop, 11 for full	Milking shed, barn, feed silos, processing infrastructure
Edible Fungi Perigord Extensive	Canterbury	Gross margin			$78,800	$0	$10,000	$69,000	$67,000	1.30	$110,000	$25,000	3.82	8 for first crop, 11 for full	Milking shed, barn, feed silos, processing infrastructure
Edible Fungi Saffron Milk Cap Intensive	Canterbury	Gross margin			$7,700	$0	$3,000	$4,400	$60,500	0.59	$10,800	$4,900	0.84	3 for first crop, 6 for full	Milking shed, barn, feed silos, processing infrastructure
Edible Fungi Saffron Milk Cap Extensive	Canterbury	Gross margin			$2,000	$0	$0	$1,500	$11,300	0.08	$2,800	$900	0.15	3 for first crop, 6 for full	Milking shed, barn, feed silos, processing infrastructure

Table 3: Qualitative assessments of data, markets and entrepreneurship required

Land Use	Primary Market (Export/ Domestic)	Volatility of returns	Marketing structures	Reliability	Entrepreneurship required	Source
Apples	Export	Moderate	Developed	Moderate	Low	AgFirst for operating budget, Tupu NZ for development costs
Avocado	Mixed	High	Developed	Moderate	Low - Moderate	Industry data, ANZ 2017
Blueberry	Mixed	Moderate	Undeveloped	Low - Moderate	Moderate - High	Agribusiness Group
Cherry	Export	High	Channels available	Low - Moderate	High	Agribusiness Group
Chestnut	Domestic	High	Undeveloped	Low	High	SLMACC
Citrus	Domestic	Moderate	Channels available	Low	Moderate - High	Agribusiness Group
Hops	Mixed	High	Channels available	Low	Moderate - High	Agribusiness Group
Kiwifruit	Export	Moderate	Developed	Moderate	Low	Fruition
Maize	Domestic	Low	Developed	Moderate	Low	Agribusiness Group
Onions	Mixed	Moderate	Individual	Low - Moderate	Moderate	Agribusiness Group
Potatoes - Process	Domestic	Moderate	Developed	Low - Moderate	Low	Agribusiness Group
Vining Peas	Domestic	Low	Developed	Low - Moderate	Low	Agribusiness Group
Wheat	Domestic	Moderate	Developed	Low - Moderate	Low	Agribusiness Group
Wine grape	Export	High	Developed	Moderate	Low - Moderate	MPI, New Zealand Winegrowers
Dairy Goats	Export	High	Channels available	Moderate	Moderate	AgFirst
Dairy Sheep	Export	High	Channels available	Moderate	Moderate	AgResearch
Edible Fungi	Domestic	High	Undeveloped	Low - Moderate	Very High	Mycotree

Table 3: Source of data for updating indicators in table and spatial layers (see Section 4)

Crop	Revenue	Expenses	Labour
Apples Hawkes Bay	SOPI Horticulture: Apples and Pears Average Export Price	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Apples Nelson	SOPI Horticulture: Apples and Pears Average Export Price	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Avocado - Avocado National	SOPI Horticulture: Average Export Price	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Beetroot	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Blueberry	Google search or industry sources	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Brocolli	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Cabbage	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Cauliflower	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Cherry	Google search or industry sources	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Chestnut	Google search or industry sources	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Fresh Potato	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Hops	Google search or industry sources	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Kiwifruit - Gold BOP	SOPI Horticulture: Kiwifruit Average Export Price, Zespri Orchard Gate return	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Kiwifruit - Green BOP	SOPI Horticulture: Kiwifruit Average Export Price, Zespri Orchard Gate return	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Lettuce	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Maize	SOPI Main report can be used for approximate update. For more detailed data NZX Grain and Feed Insight (subscription only)	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Onions	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Potatoes - Process	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Spinach	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Squash	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI

Crop	Revenue	Expenses	Labour
Sweetcorn	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Tomato	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Truffles	Google search or industry sources	#N/A	#N/A
Vining Peas	Google search or industry sources	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Wheat	SOPI Main report Figure 26 can be used for approximate update. For more detailed data NZX Grain and Feed Insight (subscription only)	StatsNZ Farm Expenses Index Arable Farms, Item SEF49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Wine grape-Pinot noir	Either: SOPI Horticulture: Wine Average Export Price: NZ Wine Annual Report Statistics Summary of NZ Wine, Average Grape Price ($NZ/t); or MPI Viticulture Monitoring Report.	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Wine grape-Sauvingon blanc	Either: SOPI Horticulture: Wine Average Export Price: NZ Wine Annual Report Statistics Summary of NZ Wine, Average Grape Price ($NZ/t); or MPI Viticulture Monitoring Report.	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Navel Oranges	Google search or industry sources	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Valencia Oranges	Google search or industry sources	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Encore Mandarins	Google search or industry sources	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Satsuma Mandarins	Google search or industry sources	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Meyer Lemons	Google search or industry sources	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Dairy Goats	Google search or industry sources	StatsNZ Farm Expenses Index Dairy Farms, Item SEC49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Dairy Sheep	Google search or industry sources	StatsNZ Farm Expenses Index Dairy Farms, Item SEC49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI
Edible fungi	Google search or industry sources	StatsNZ Farm Expenses Index Horticulture and Fruitgrowing Farms, Item SEA49	Labour Cost Index Table 3.1 Salary and wage rates by industry and by occupation, Item SG41A1 for Agriculture, SG41Z9 for HHI

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Table 4: Regional multipliers for indirect and induced flow on impacts (Source: Butcher Partners Ltd, 2022)

Fruit Crops Multipliers (derived from the Horticultural sector)	Northland	Auckland	Waikato	Bay of Plenty	Taranaki	Manawatu-Wanganui	Wellington	Nelson	Tasman	Marlborough	Canterbury	Otago	Southland	West Coast	Hawke's Bay	Gisborne
Indirect and Induced VA MultiplierRegion	0.37	0.41	0.42	0.43	0.27	0.37	0.29	0.33	0.27	0.32	0.51	0.42	0.29	0.25	0.43	0.33
Indirect and Induced HHI MultiplierRegion	0.19	0.22	0.22	0.23	0.13	0.19	0.15	0.17	0.13	0.17	0.27	0.22	0.15	0.13	0.23	0.17
Indirect and Induced FTE MultiplierRegion	3.30	2.80	3.35	3.41	1.93	3.30	2.26	2.87	2.43	2.97	3.91	3.47	2.22	2.09	3.77	3.07
Arable Multipliers (derived from the Sheep, Beef and Arable sector)																
Indirect and Induced VA MultiplierRegion	0.34	0.27	0.34	0.33	0.22	0.34	0.22	0.21	0.27	0.29	0.45	0.37	0.29	0.22	0.37	0.28
Indirect and Induced HHI MultiplierRegion	0.16	0.14	0.16	0.16	0.10	0.16	0.11	0.11	0.12	0.13	0.21	0.17	0.13	0.10	0.18	0.13
Indirect and Induced FTE MultiplierRegion	2.87	1.75	2.59	2.40	1.47	2.87	1.54	1.75	2.53	2.20	3.11	2.83	2.02	1.74	2.85	2.51