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IS THIS THE BEGINNING OF THE END OR THE END OF THE BEGINNING?

Finding the future of the New Zealand food and beverage industry

DISCUSSION DOCUMENT; v1.01; Late 2019

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MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

NEW ZEALAND TRADE & ENTERPRISE
Te Taurapa Tūhono

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LIMITATIONS

This work is based on secondary market research, analysis of information available (e.g. Statistics NZ), and a range of interviews with industry participants and industry experts. Coriolis have not independently verified this information and make no representation or warranty, express or implied, that such information is accurate or complete. In many cases regional data is incomplete or not available and therefore research includes significant modelling and estimates.

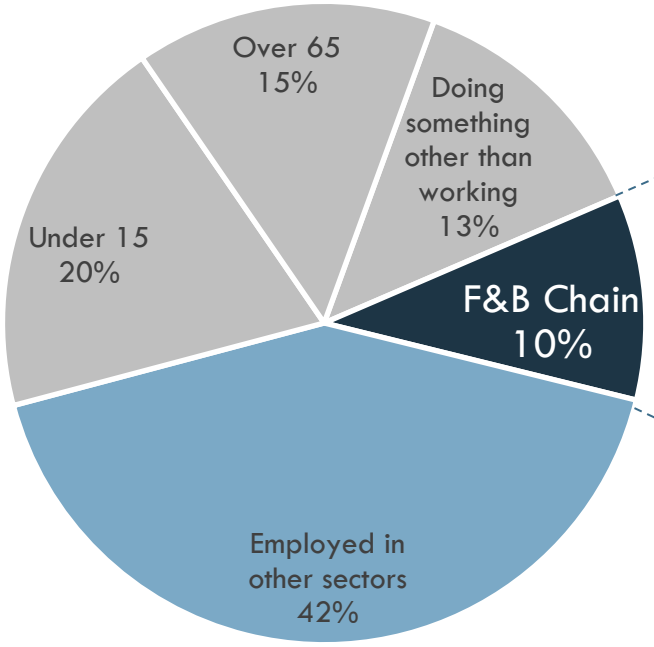
If at any point you are unclear where a number came from or how a conclusion was derived, please contact the authors directly. We are always happy to discuss our work with interested parties.

This discussion document exists to not to give you the answer, but to spark thought and discussion on the future of New Zealand's largest industry.
The views expressed are those of the Coriolis team involved and do not represent Government policy, or the views of the Ministry of Primary Industries, the Ministry of Business, Innovation and Employment or New Zealand Trade and Enterprise.

The wider food chain directly employs one in five working people in New Zealand

NZ POPULATION BY EMPLOYMENT

People; m; 2017



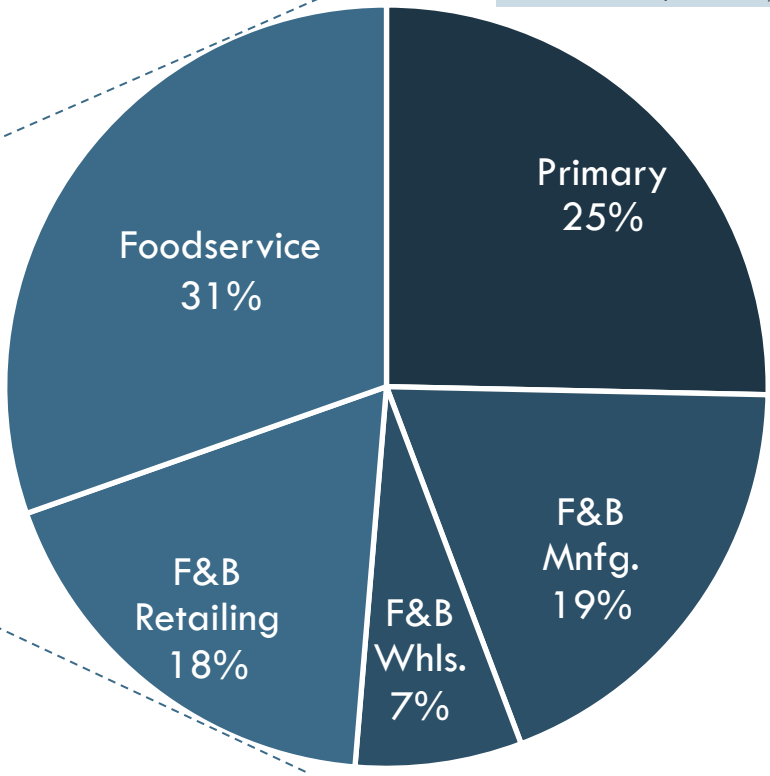
Total = 4.8m

… or one in five of working population

FOOD CHAIN EMPLOYMENT BY SECTOR

People; %; 2017

NOTE: Tight definition; excludes all inputs and support services; if included likely closer to 1/3



Total = 493,000

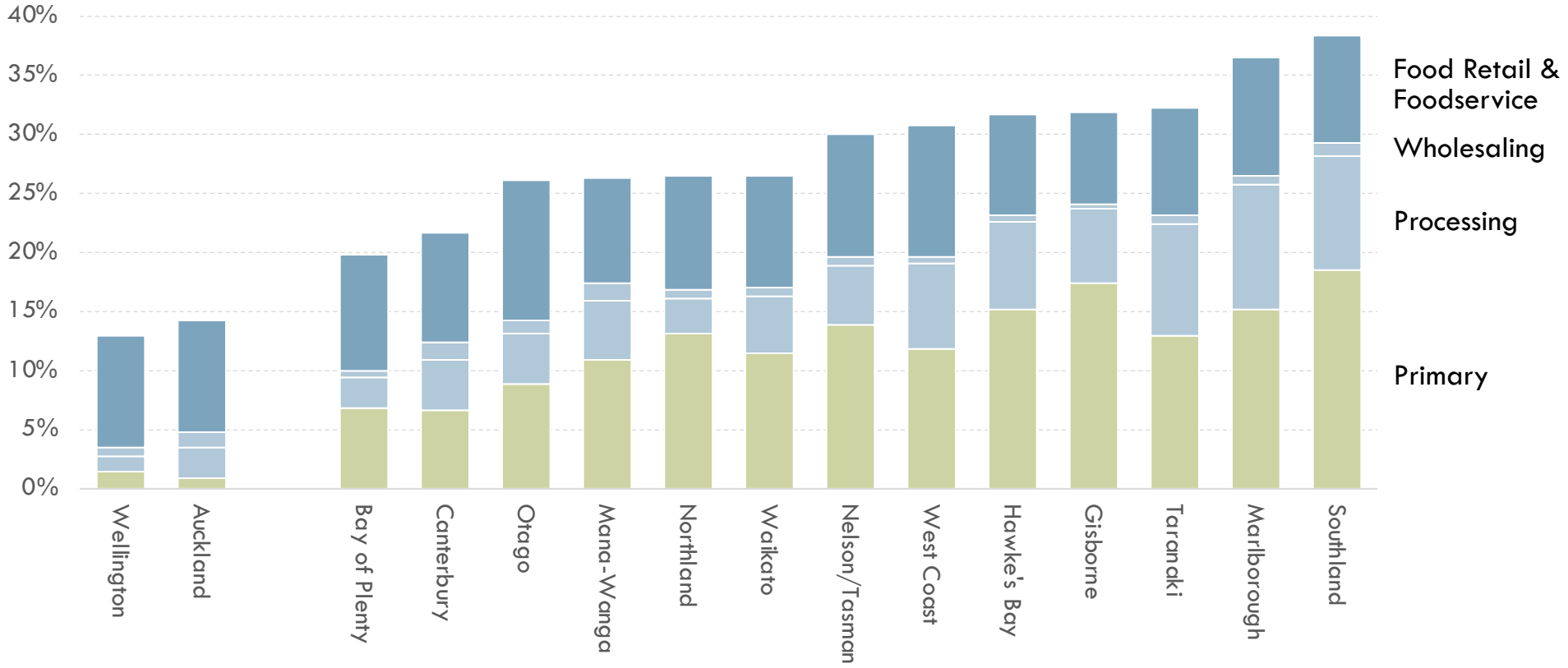
Whls – wholesaling; Mnfg – manufacturing; Source: Statistics NZ; Coriolis analysis and classifications

In regions outside of Wellington & Auckland, this wider food chain directly employs 20-40% of the working population

PERCENT OF REGIONAL EMPLOYMENT IN THE FOOD CHAIN

% of employees; 2018

NOTE: Tight definition; excludes all inputs and support services; if included likely closer to 1/3

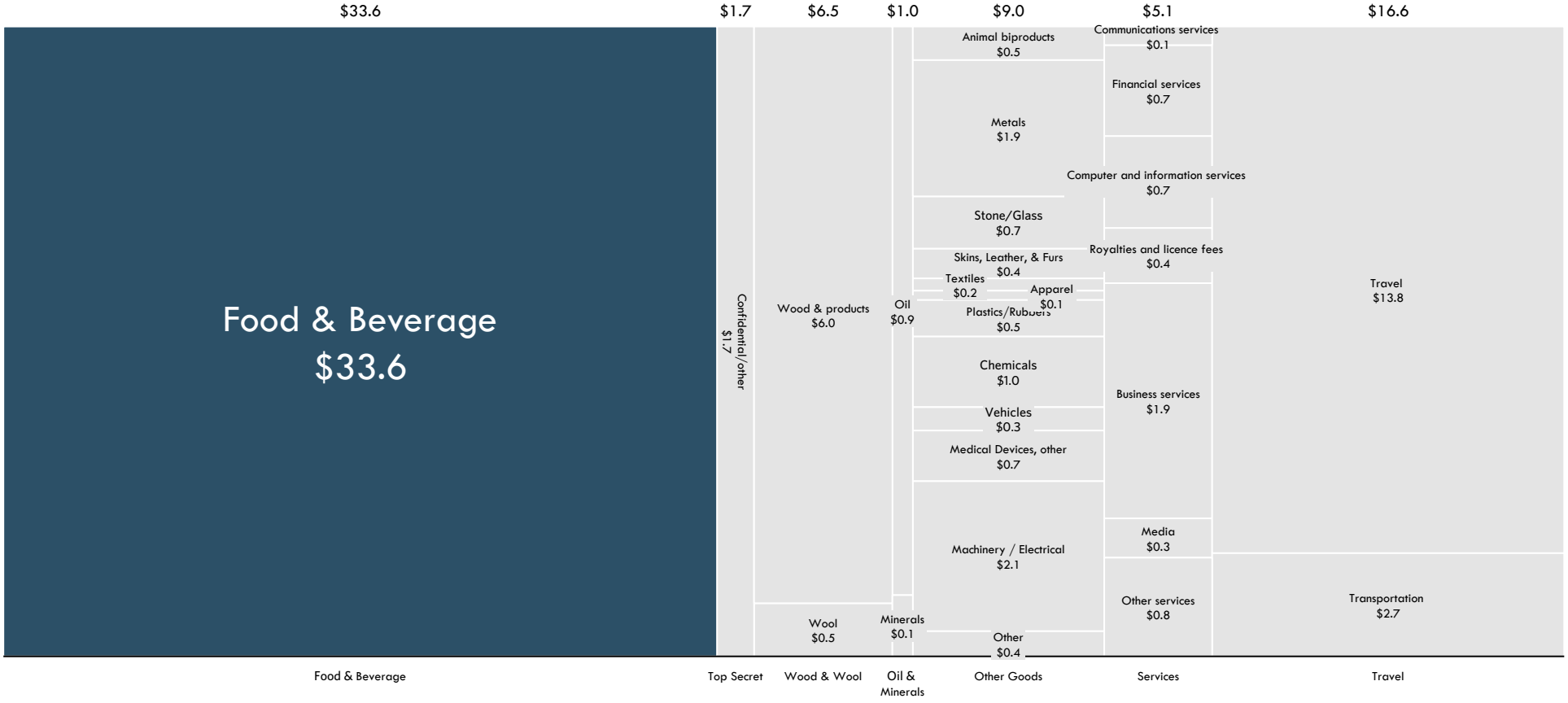


Source: Statistics NZ; Coriolis analysis and classifications

Food & beverage is the major New Zealand export industry, accounting for almost half of total goods and services exports

TOTAL NEW ZEALAND EXPORT OF GOODS AND SERVICES BY CATEGORY

NZ$; b; 2017

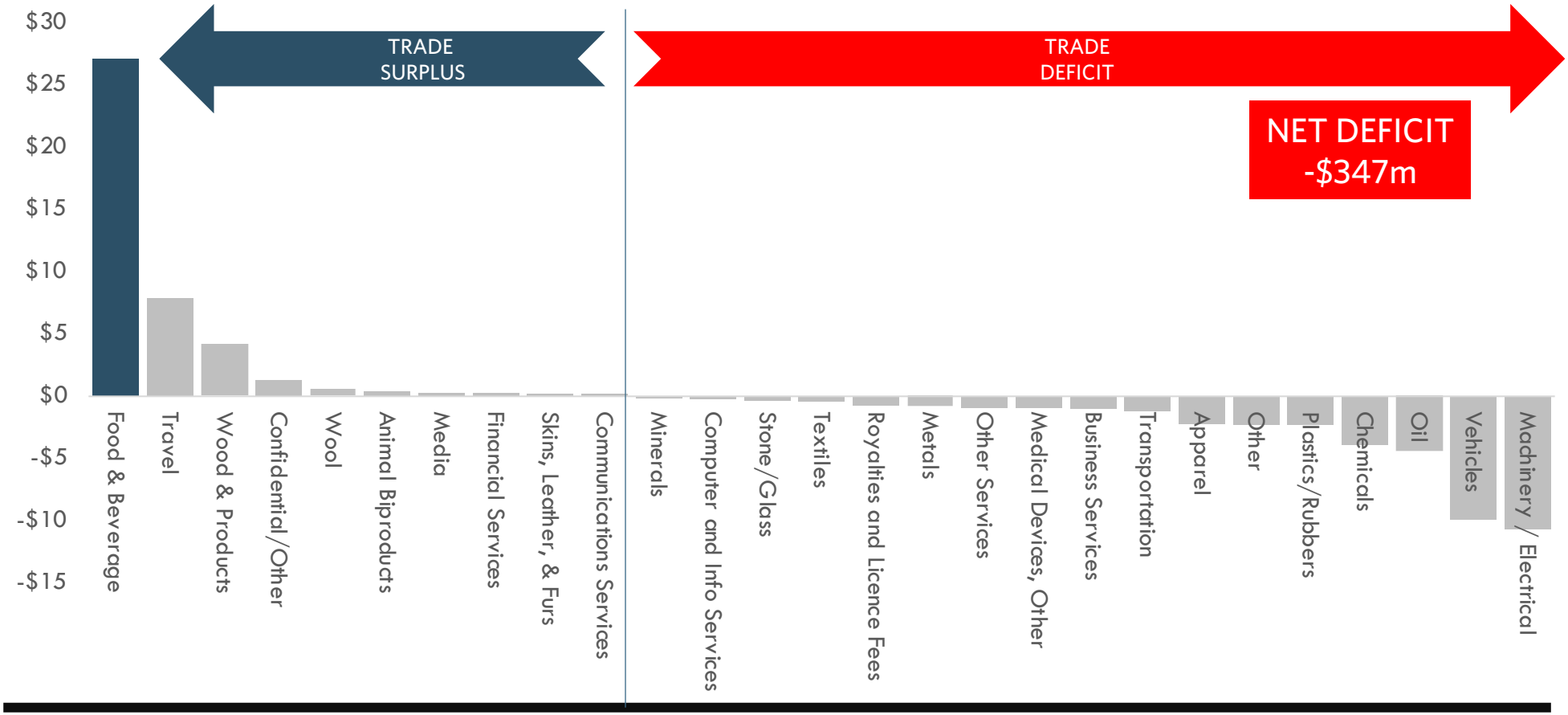


Source: SNZ; Coriolis analysis and classifications

The food & beverage industry achieves a large trade surplus, while most other sectors are underperforming or in deficit

NET TRADE POSITION IN TOTAL NEW ZEALAND TRADE (EXPORTS-IMPORTS)

NZ$; b; 2017



Source: SNZ; Coriolis analysis and classifications

Food & beverage is growing exports strongly, where most other sectors are underperforming or going backwards

10 YEAR NET CHANGE IN TOTAL NEW ZEALAND EXPORTS

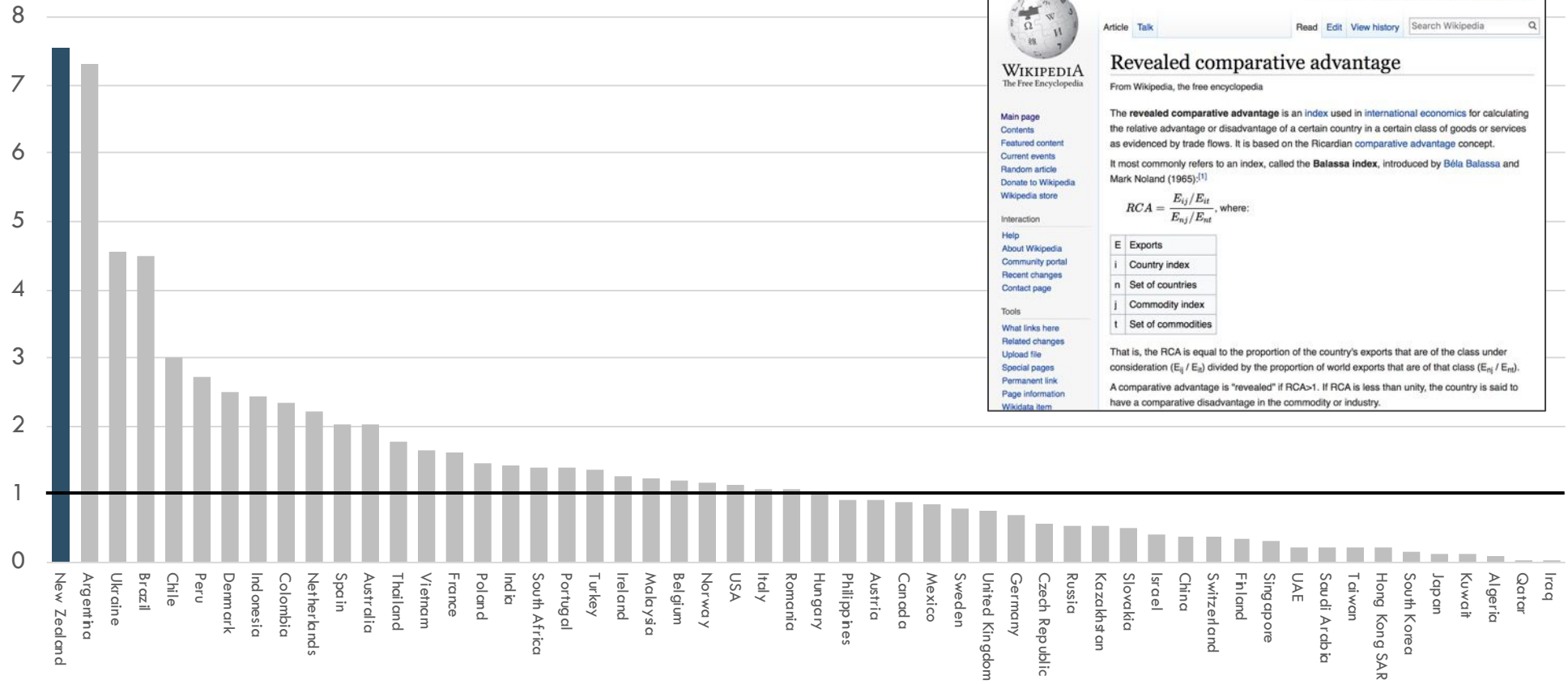
NZ$; b; 2007-2017

Source: SNZ; Coriolis analysis and classifications

New Zealand has the highest 'revealed comparative advantage' in food & beverage of any major exporter

REVEALED COMPARATIVE ADVANTAGE IN FOOD & BEVERAGE

RCI index; top 54 exporting countries; 2016



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Revealed comparative advantage

From Wikipedia, the free encyclopedia

The **revealed comparative advantage** is an index used in international economics for calculating the relative advantage or disadvantage of a certain country in a certain class of goods or services as evidenced by trade flows. It is based on the Ricardian comparative advantage concept.

It most commonly refers to an index, called the **Balassa index**, introduced by Béla Balassa and Mark Noland (1965):[1]

$$RCA = \frac{E_{ij}/E_{it}}{E_{nj}/E_{nt}}$$, where:

E	Exports
i	Country index
n	Set of countries
j	Commodity index
t	Set of commodities

That is, the RCA is equal to the proportion of the country's exports that are of the class under consideration (E_{ij} / E_{it}) divided by the proportion of world exports that are of that class (E_{nj} / E_{nt}).

A comparative advantage is "revealed" if RCA>1. If RCA is less than unity, the country is said to have a comparative disadvantage in the commodity or industry.

Source: UN Comtrade; SNZ; Wikipedia; Coriolis analysis and classifications

Yet, there is a strong consensus in New Zealand that agriculture cannot continue to grow

"We can only feed 40 million people"

"We need to produce less not more"

"We can't possibly produce any more"

"Agriculture is a sunset industry"

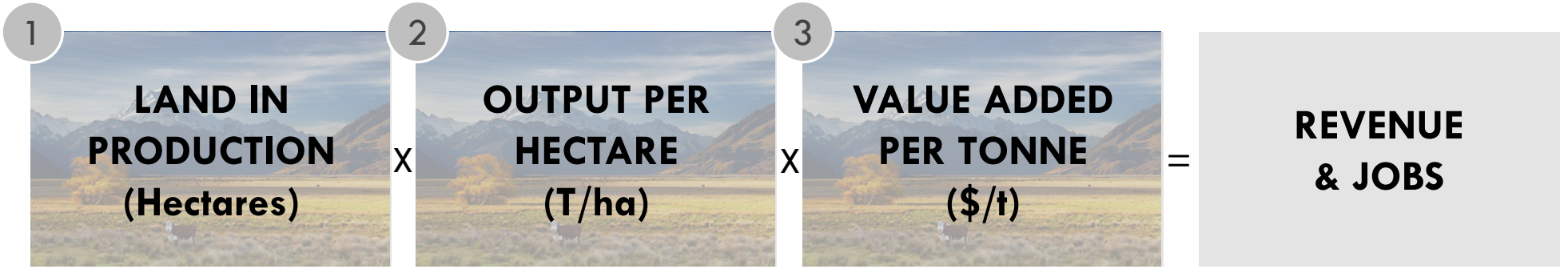
"We are at the limits of the environment"

"Farmers are already producing too much"

This report strongly disagrees with this consensus

THE NEW ZEALAND CONSENSUS INSIDE THE "PASTORAL" BUBBLE THINKING	THE HERETICAL PARADIGM OUTSIDE THE BUBBLE THINKING
New Zealand is a major food producer that leads the world; New Zealand agriculture is highly productive	New Zealand is a minor food producer that uses a large amount of land to produce very little relative output
Current New Zealand land use is ideal and optimal as it was determined by market forces	Land use is a high risk discovery process with no one right answer. Current land use is the result of historical activity
The plants and animals produced in New Zealand are highly suited to the New Zealand environment (climatic and growing conditions) and thus will not change	New Zealand is a large country without a single monolithic climate. Regions vary dramatically in their natural endowment. The animals and plants currently produced are a result of the country or origin of past waves of immigrants
The government does not have a role to play in new industry development; just enforce the rules	The government has played a massive role in the development of all major agricultural products in New Zealand;* the government will need to play a role in the development of new products
New Zealand land use will not change significantly going forward	New Zealand land use will continue to change
New Zealand is globally competitive in the products it currently produces in large quantities; it is not competitive in the products it does not produce or produces in small quantities; therefore New Zealand cannot produce new products as it will not be competitive	Agricultural competitiveness is a dynamic system; new producers can and do enter markets; new entrants start in smaller niche segments and "climb down the cost curve" as volumes grow
No one wants to work in agriculture and there is currently a shortages of low cost labour; therefore agriculture cannot grow	Other rich, developed countries similar to New Zealand employ significantly larger numbers of people in agriculture; technological change is occurring and products vary in their level of automation

Broadly speaking, there are three key drivers available to increase revenue and employment in the agrifood chain



Re-evaluate viability of non-agricultural lands

Limit flow of lands out of agriculture (e.g. urban growth)

Improving yields

Changing land use

Increasing irrigation

Using high productivity production systems (e.g. aquaculture)

Improving products

Improve positioning

Transforming product

1. MORE FARM LAND
New Zealand is unlikely to bring new land into agriculture

1

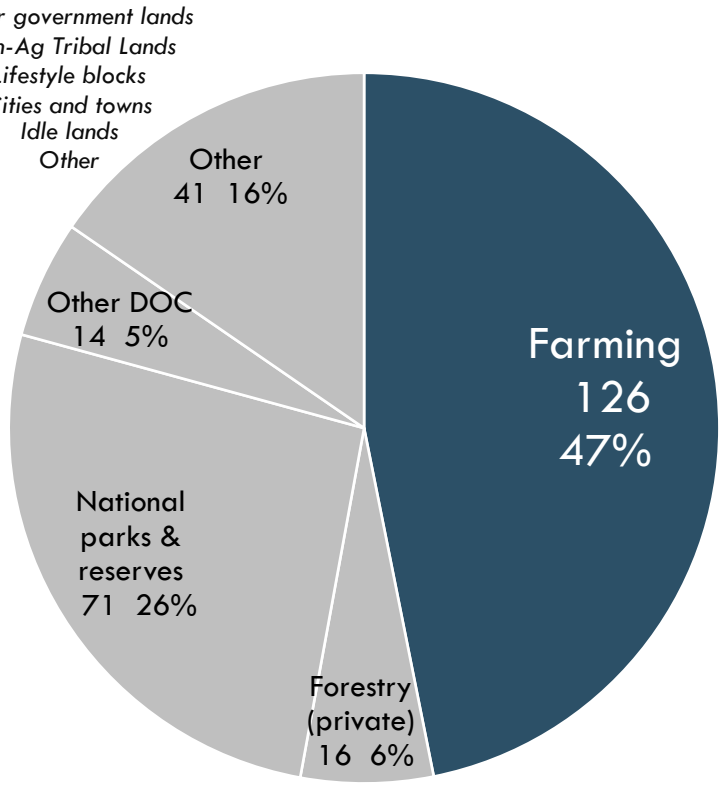
Re-evaluate viability of non-agricultural lands

Limit flow of lands out of agriculture (e.g. urban growth)

Food production uses almost half of New Zealand's land and much of its oceans

NEW ZEALAND LAND USE

km^2; 000; 2010

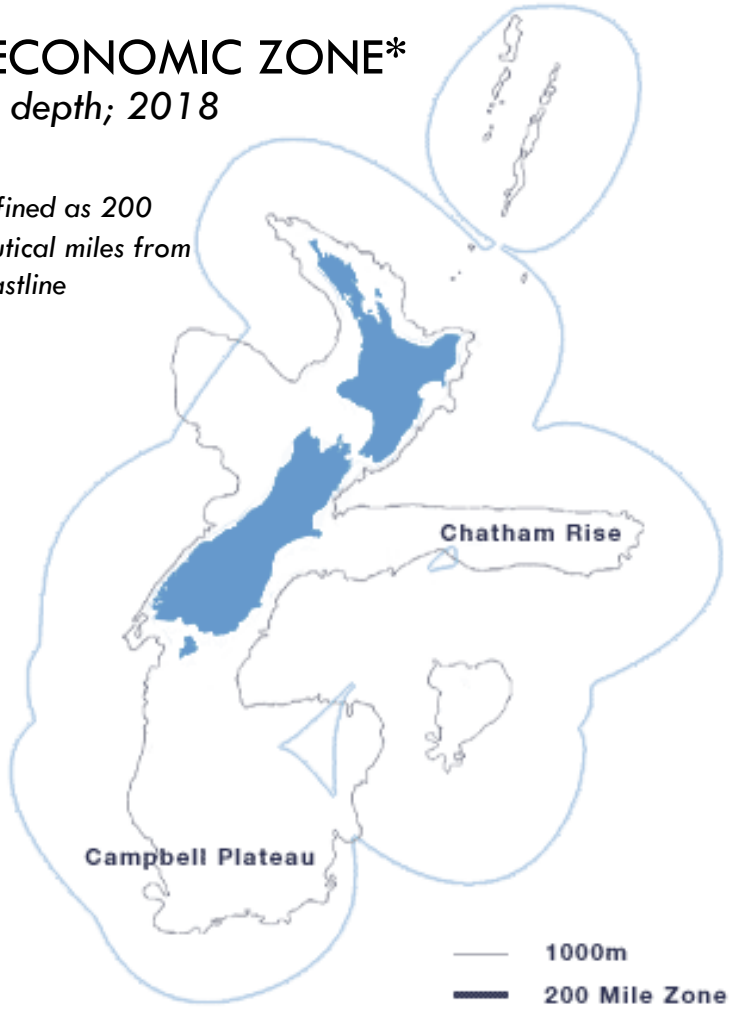


TOTAL = 268,000 km^2

NZ ECONOMIC ZONE*

Area; depth; 2018

Defined as 200 nautical miles from coastline

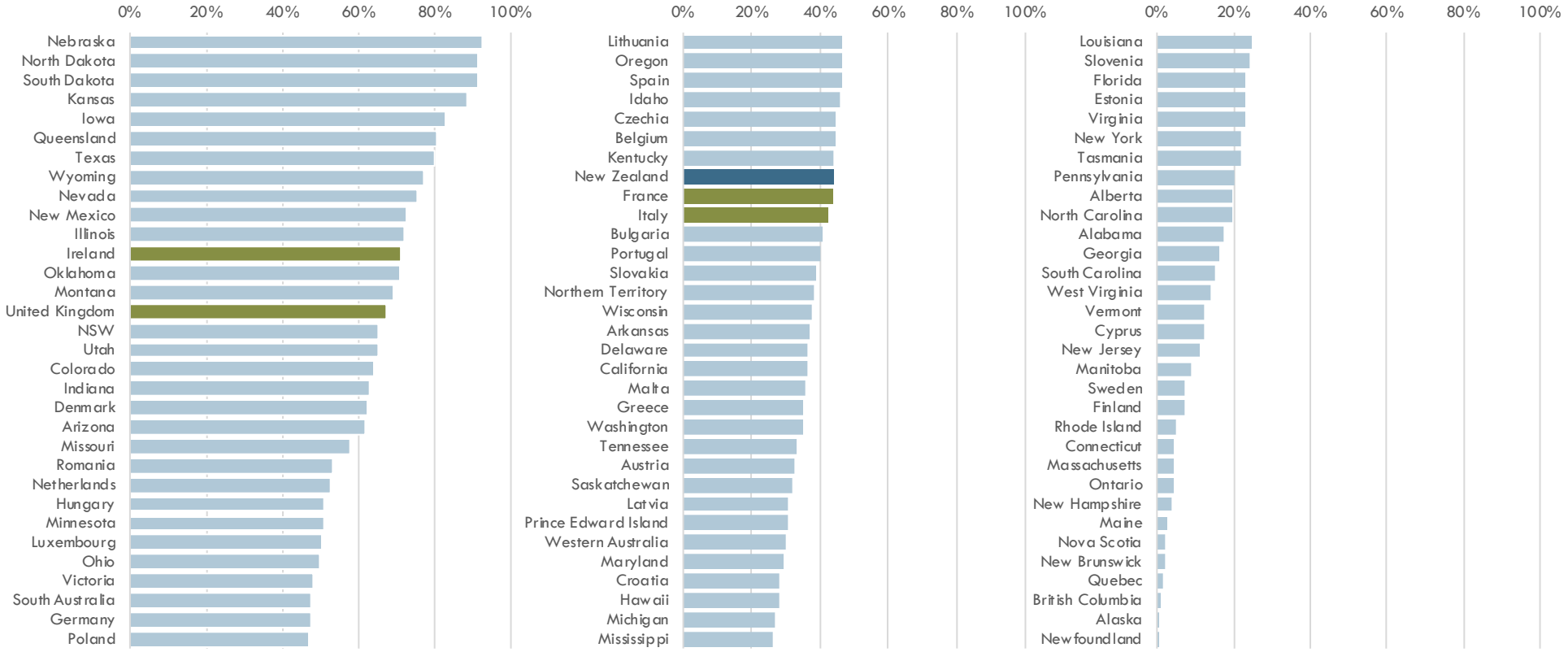


**EEZ; Note: a nautical mile is 1,852 metres; Source: Statistics NZ; Department of Conservation; Sealord; Coriolis analysis*

New Zealand already farms a reasonable percent of its total land area, similar to France or Italy, but much less than Ireland

SHARE OF TOTAL LAND AREA USED IN AGRICULTURE INCLUDING PASTURE/RANGE

% of hectares; 2017 or as available

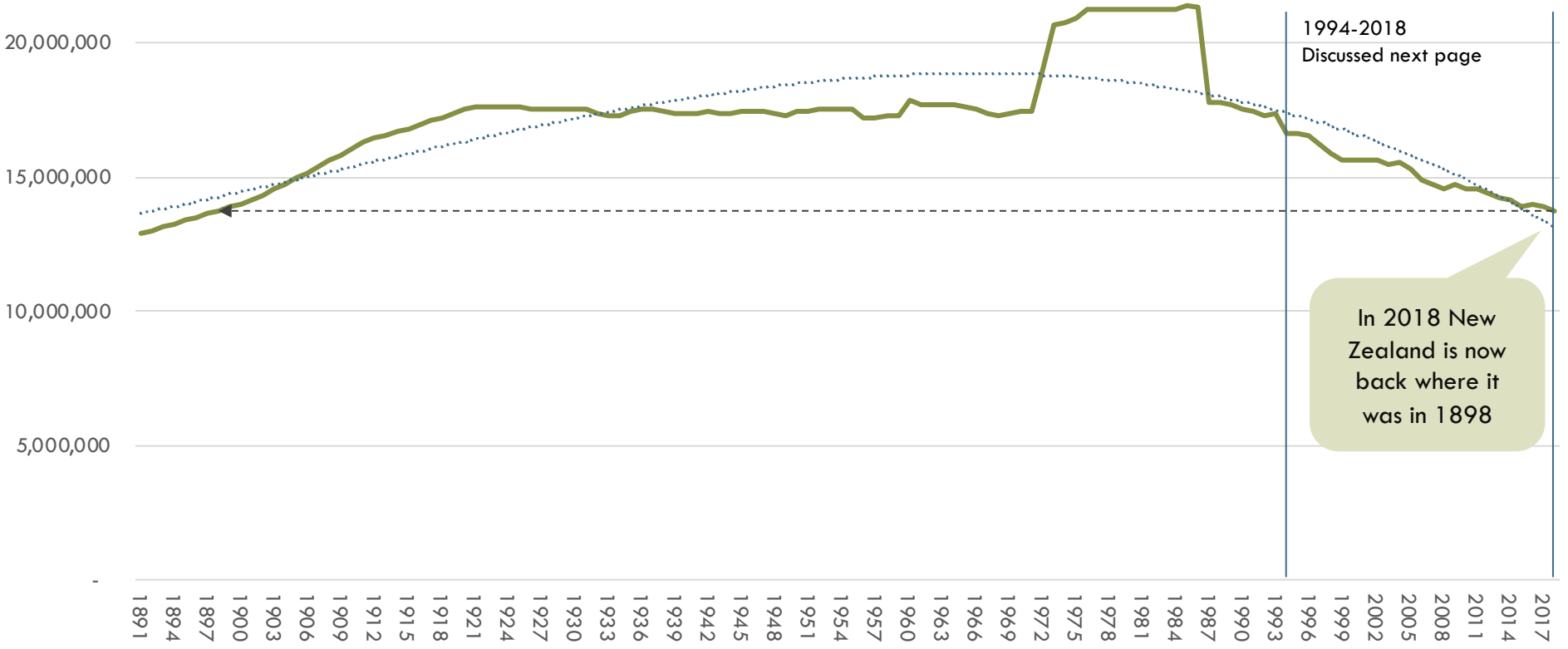


Source: Eurostat; Statistics Canada; USDA Census of Agriculture; ABS; Statistics NZ; Ministry for the Environment (NZ); CIA World Factbook; Coriolis analysis

The amount of land in agriculture in New Zealand has been trending down since the 80's

TOTAL NEW ZEALAND AREA IN FARMING AND PRIVATE FORESTRY

Hectares; 1891-2018

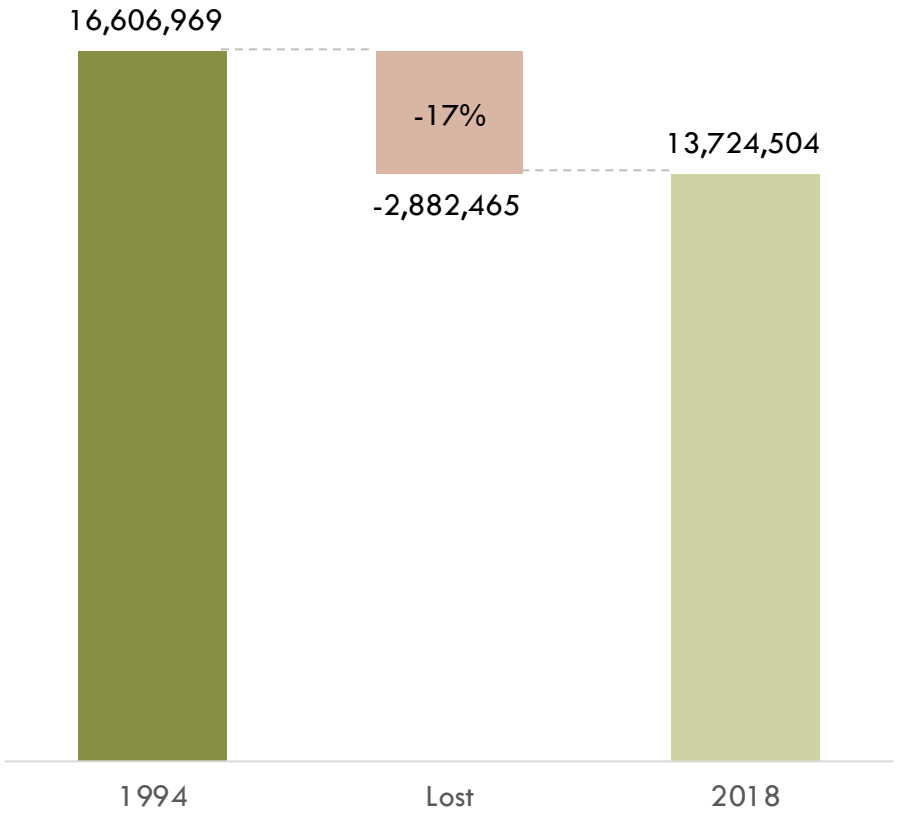


Source: various editions of "A Statistical Account of the Seven Colonies of Australasia"; New Zealand Department of Statistics; Statistics New Zealand; Coriolis analysis

In the last 25 years alone, a large amount of land (-17%) has left farming

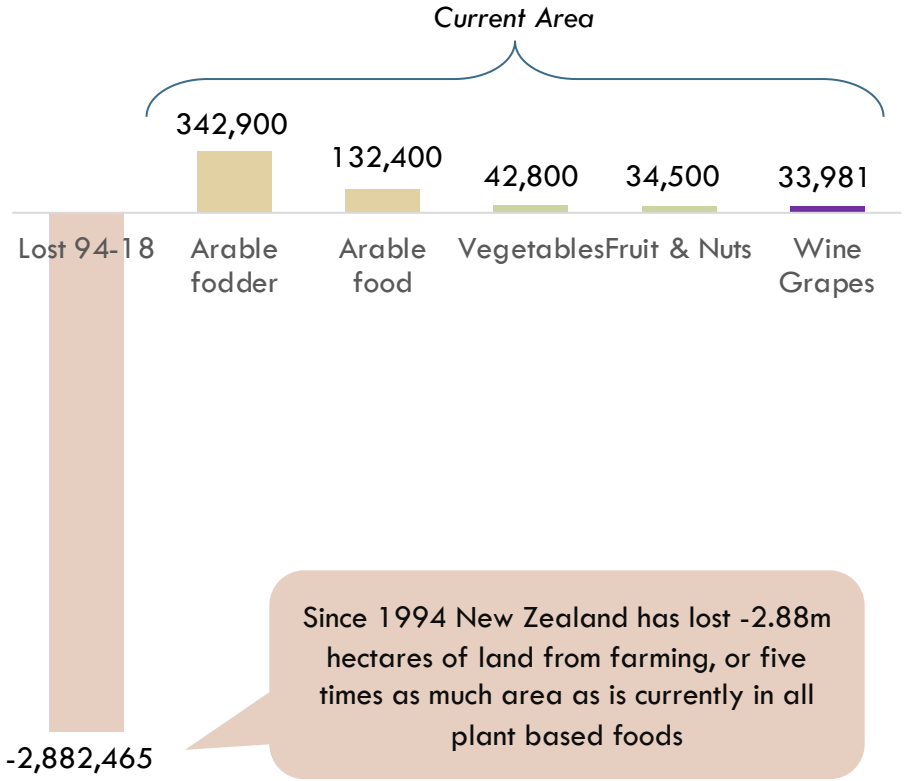
TOTAL AREA ON FARMS

Hectares; 1994-2018



AREA LOST RELATIVE TO SOME USES

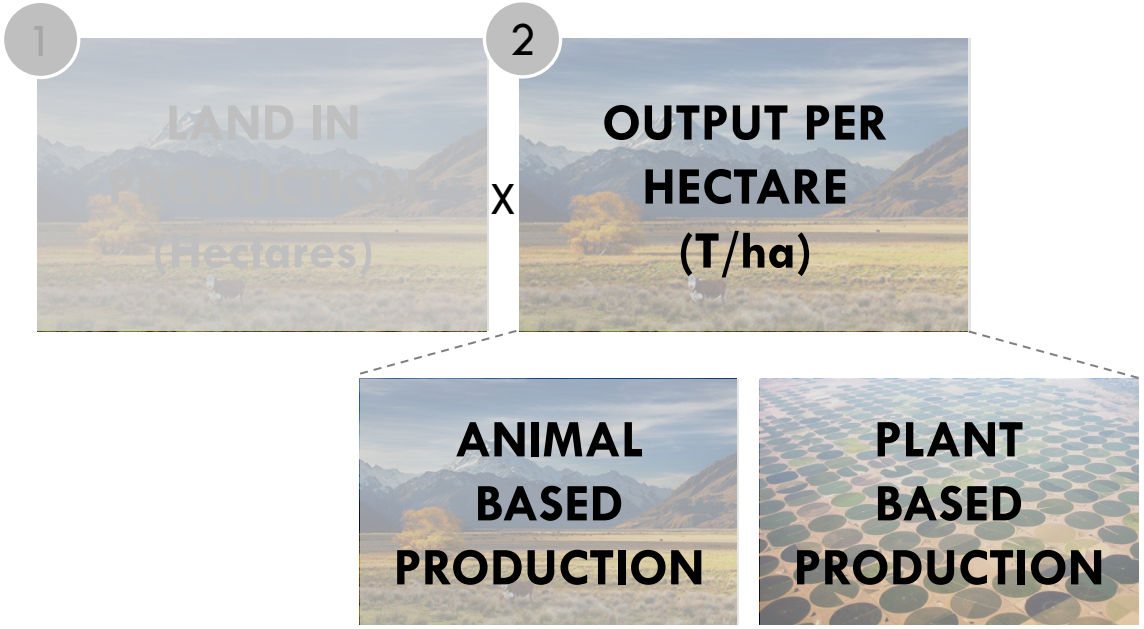
Hectares; lost 94-18 or 2018



Source: Statistics New Zealand; Coriolis analysis

2. HIGHER PRODUCTIVITY

New Zealand is increasing output of existing land through transitioning to higher productivity animal and plant systems

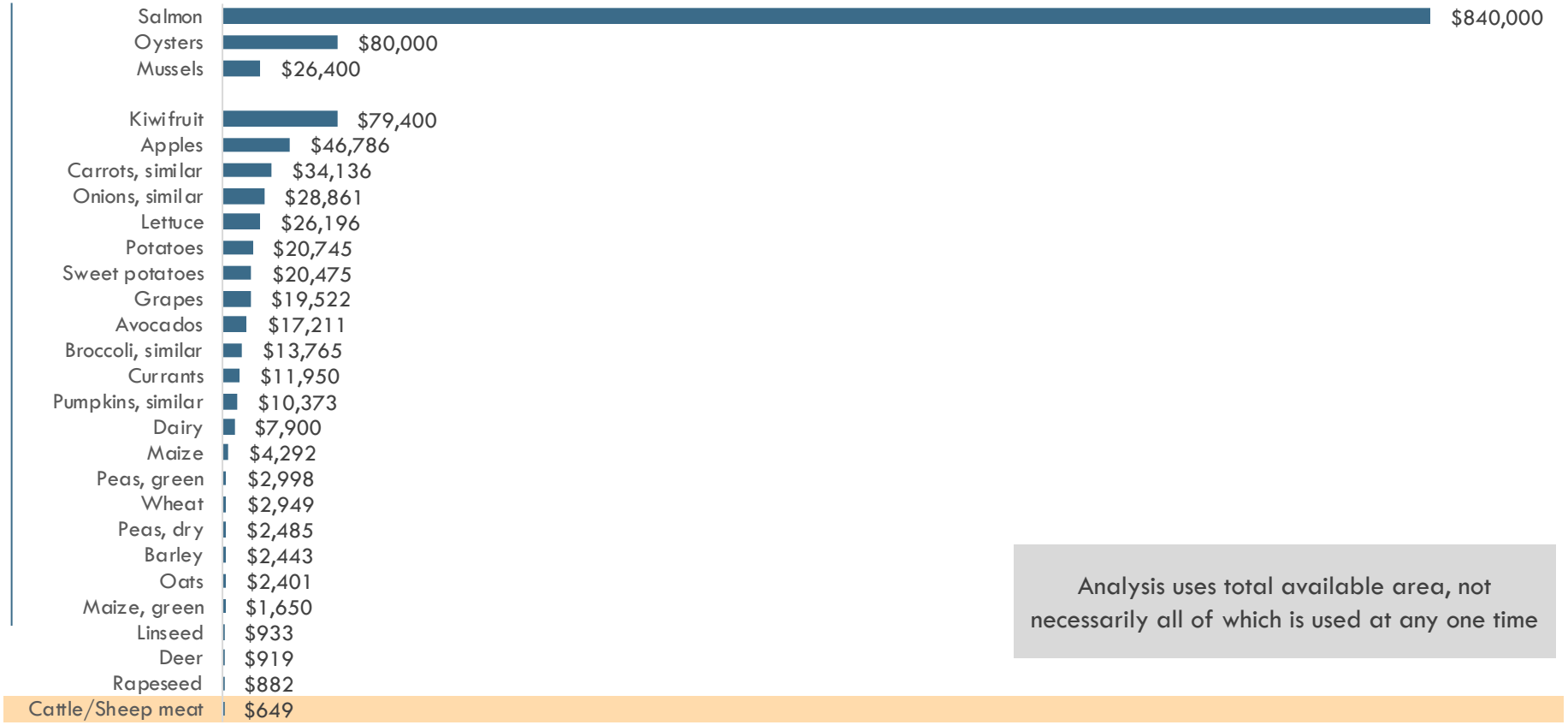


Can we increase productivity (more output from inputs)?; products vary dramatically in terms of value created per hectare

REALISED NEW ZEALAND "FARMGATE" VALUE PER HECTARE OF TOTAL SPACE

NZ$/hectare; 2017 or as available

Top 25 by area sorted by value per hectare



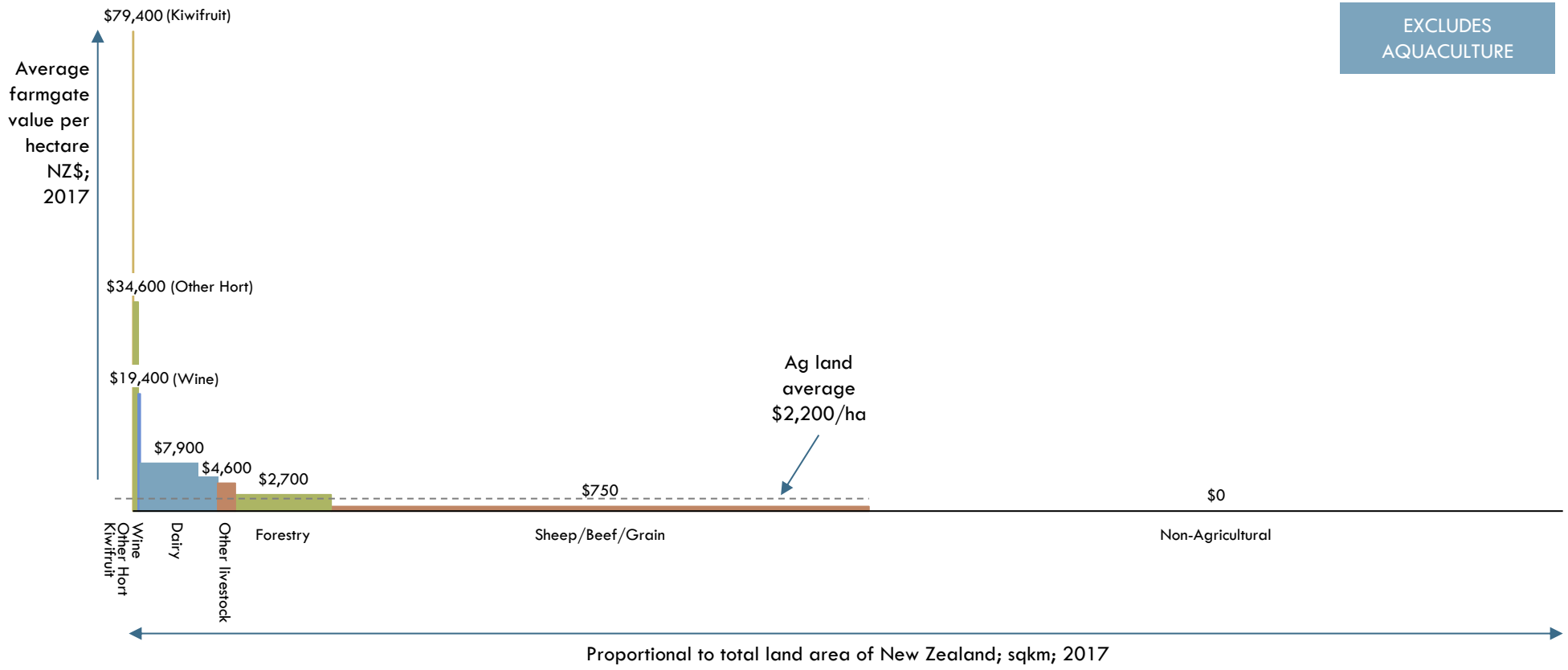
Analysis uses total available area, not necessarily all of which is used at any one time

Note: excludes high productivity, but primarily indoor animals (pigs, chickens, milking sheep and milking goats); Source: UN FAO; UN FISHSTAT; Plant & Food Research Fresh Facts; Statistics NZ; DairyNZ; Beef&Lamb NZ; Zespri; NZKS; Coriolis analysis

Only a small amount of New Zealand's land is currently used at high productivity to create significant value per hectare

NEW ZEALAND AGRICULTURAL LAND USE: AREA VS AG VALUE PER HECTARE

NZ$; actual; hectares; 2017 or as available



Note: Other Hort here also includes nursery and floriculture unable to remove due to limitations of available data; Source: UN FAO database (populated by MPI); PFR Fresh Facts; Zespri Annual Report; NZW annual report; Ministry for the Environment; Statistics NZ; CIA World Factbook; Coriolis analysis

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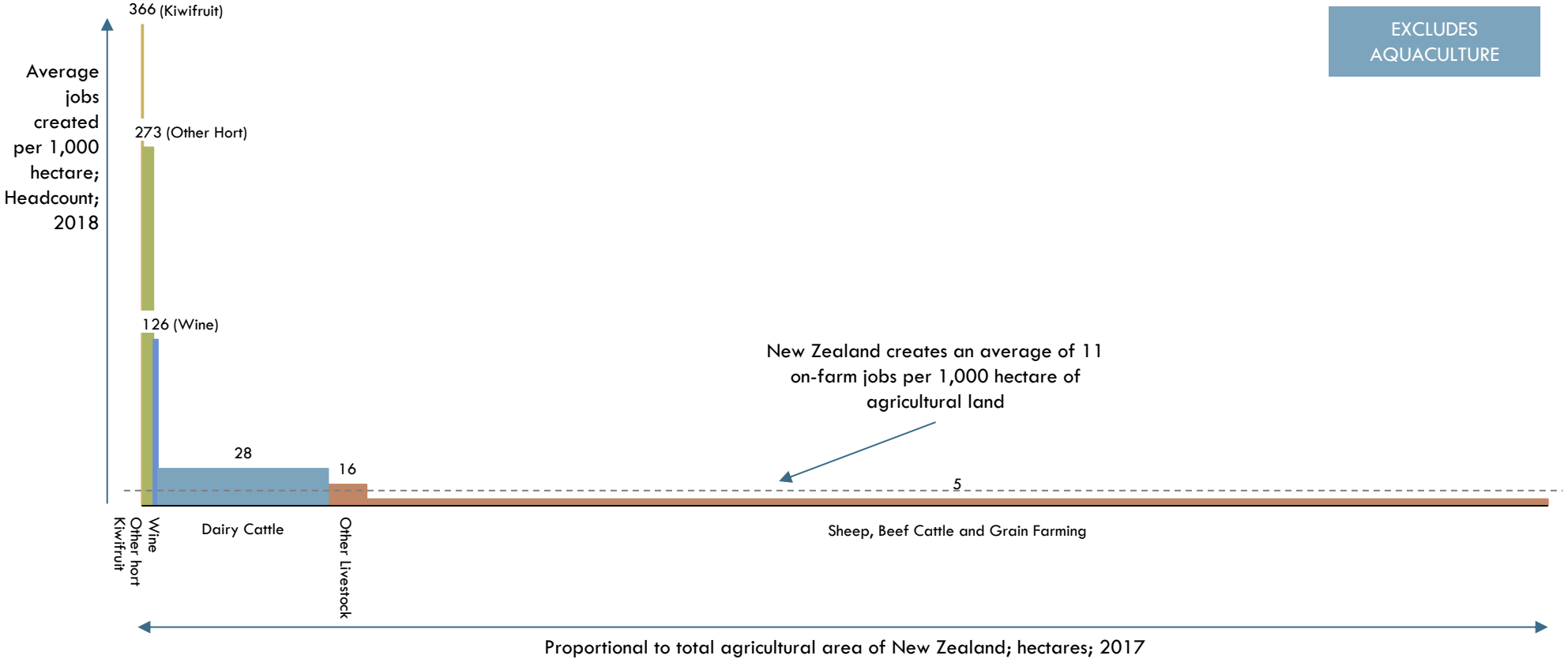
As a result, New Zealand currently produces an average of 11 on-farm jobs per 1,000 hectares of agricultural land

NEW ZEALAND AGRICULTURAL LAND AREA VS ON-FARM JOBS PER 1,000 HECTARES

Headcount/1,000 ha of farmland; actual; hectares; 2017 or as available



Note: Other Hort here also includes nursery and floriculture unable to remove due to limitations of available data; Source: UN FAO database (populated by MPI); PFR Fresh Facts; Zespri Annual Report; NZW annual report; Ministry for the Environment; Statistics NZ; CIA World Factbook; Coriolis analysis

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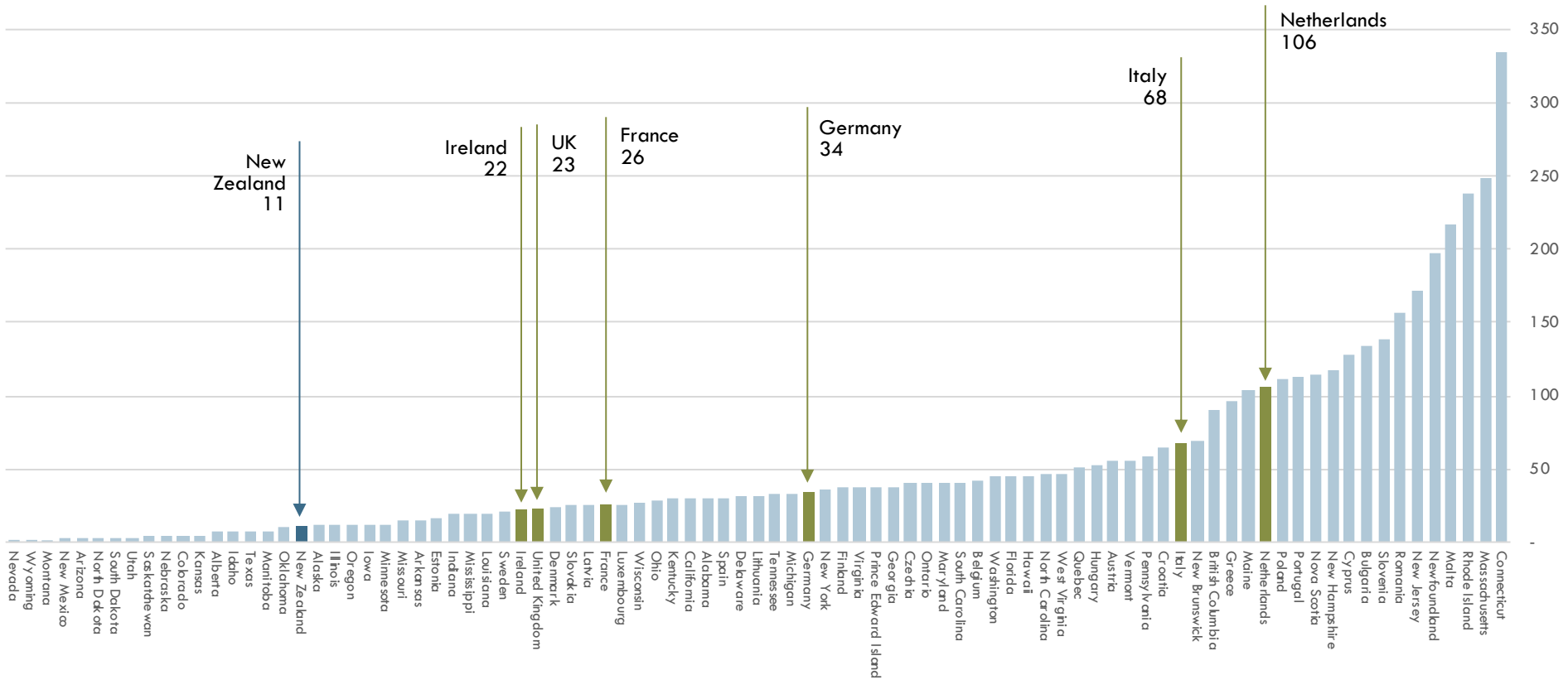
At 11 jobs per hectare, New Zealand is performing like a desert region, rather than a temperate climate foodbowl

There is a strong high level case that New Zealand can create more on-farm jobs

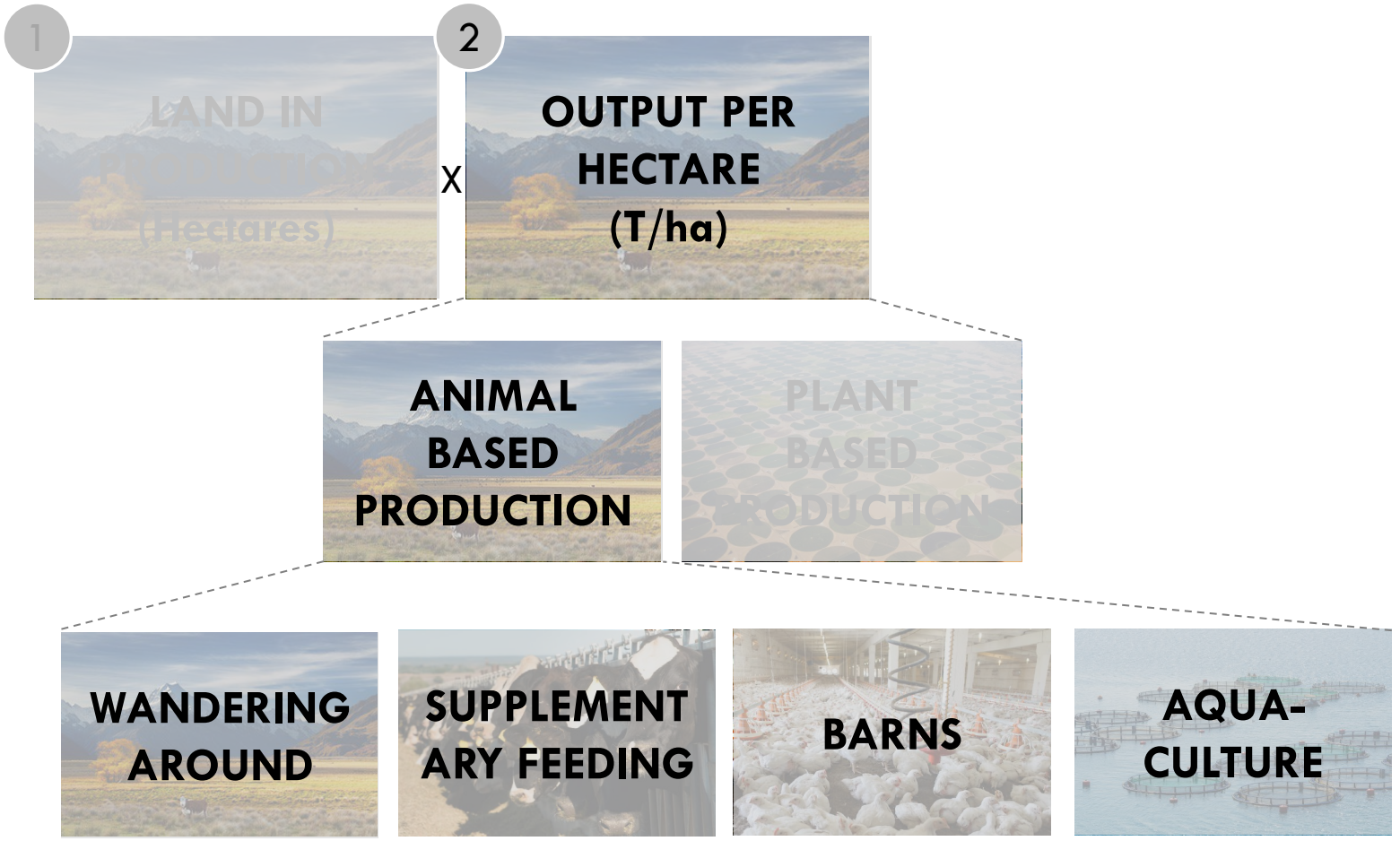
ON-FARM JOBS PER 1,000 HECTARES: NZ VS. PEERS

Headcount/1,000 ha of farmland; 2017 or as available



Source: Eurostat; CIA World Fact Book; StatisticsNZ; USDA NASS; USDA Census of Agriculture; UN FAO AgStat; MPI; LCDB database; Coriolis analysis and estimates

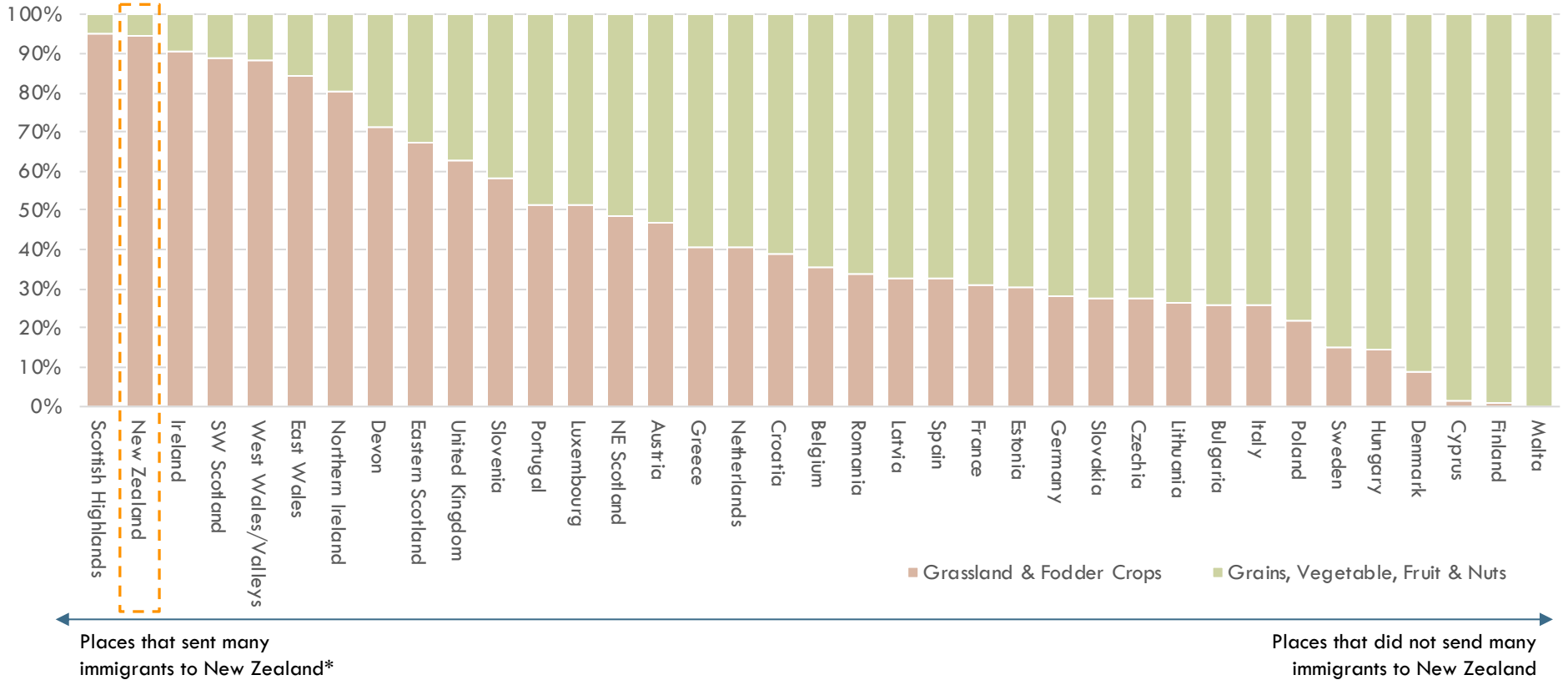
New Zealand is moving to higher productivity animal production systems



Unlike other countries, New Zealand still uses most of its agricultural land for "low density/extensive" animal systems

SHARE OF AGRICULTURAL FARMLAND IN GRASSLAND/PASTURE: NZ VS. EU

% of agricultural area; 2018 or as available

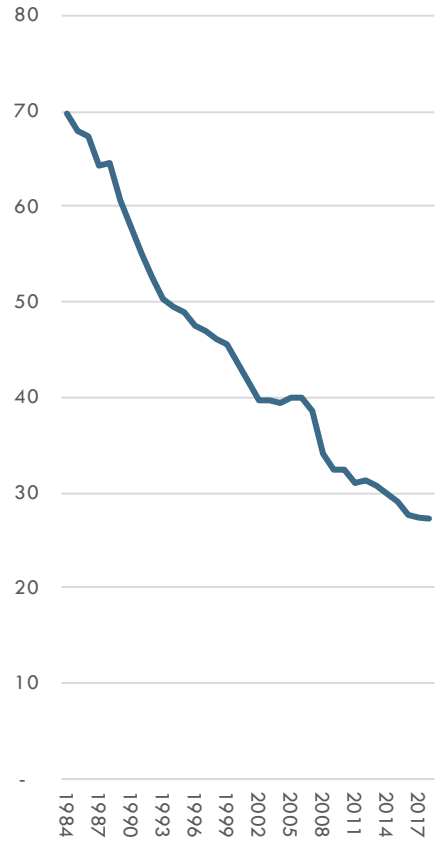


**New Zealand agriculture follows the 'idealised' British Isles pastoralist world view; Source: Eurostat; CIA World Fact Book; StatisticsNZ; UN FAO AgStat; MPI; LCDB database; Coriolis analysis and estimates*

Production of New Zealand's "low density/extensive" animal systems is falling

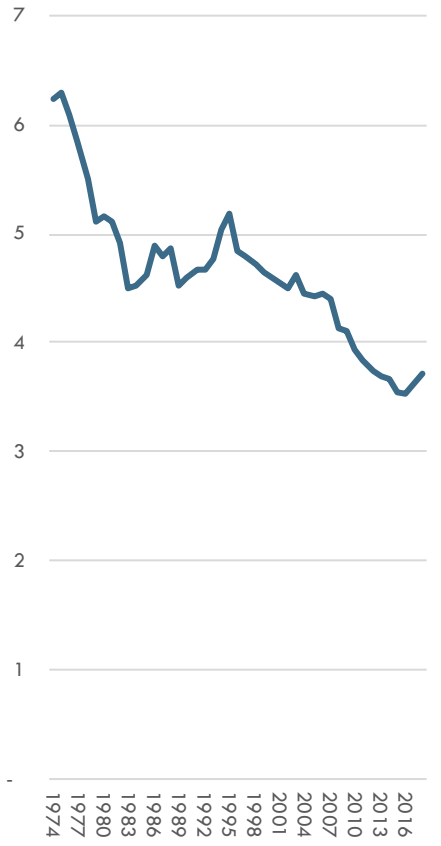
OF SHEEP

Head; m; 1984-2018



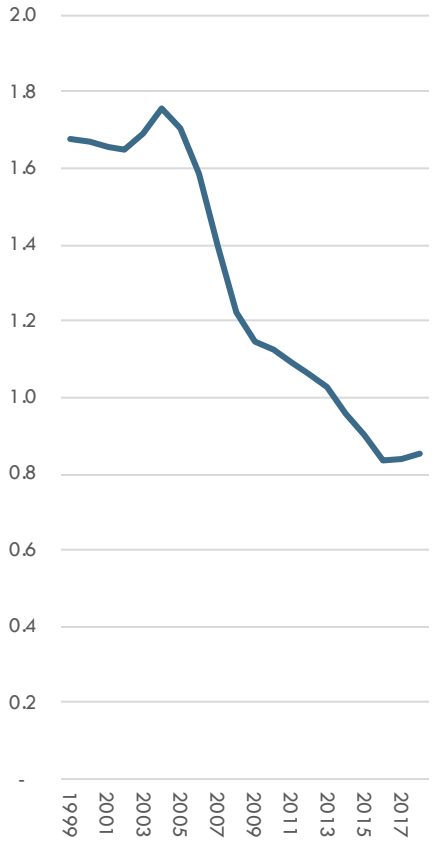
OF BEEF CATTLE

Head; m; 1974-2018



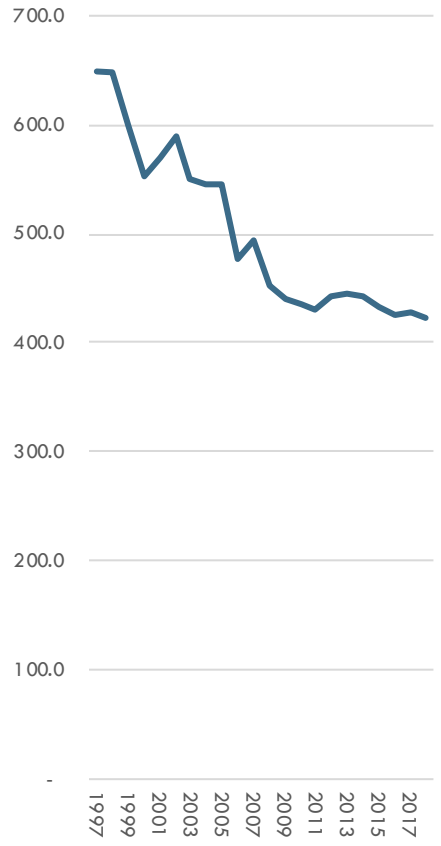
OF DEER

Head; m; 1999-2018



FISH CAPTURE

Tonnes; 000; 1997-2017

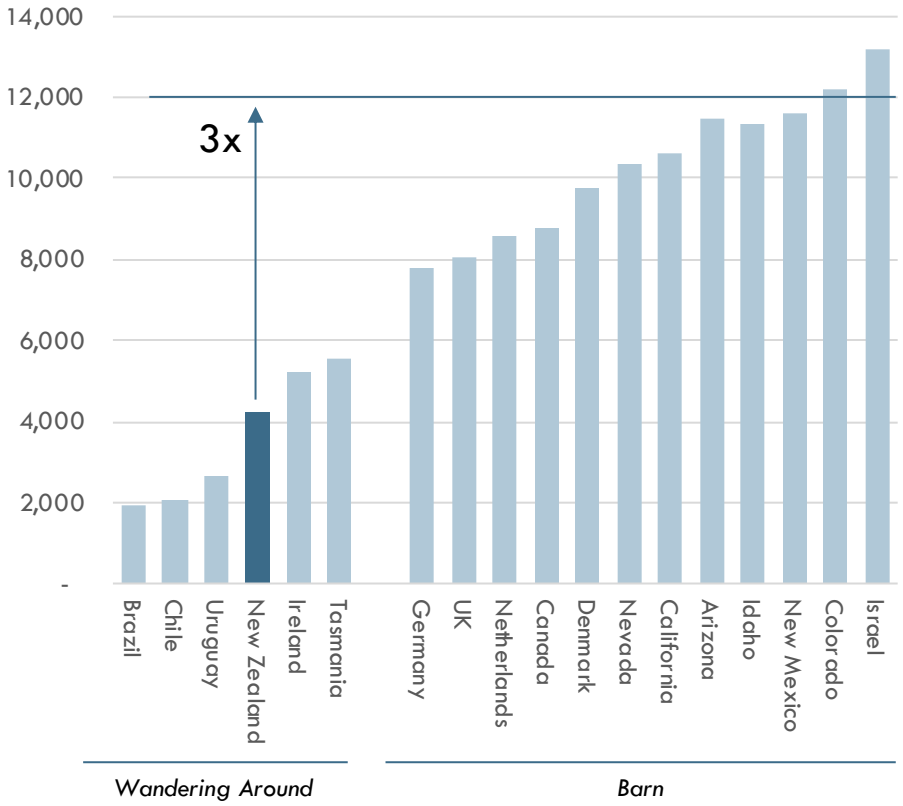


Source: Statistics NZ; UN FAO FishStat; Coriolis analysis

New Zealand "low density/extensive" animals are low yield relative to other developed countries and regions

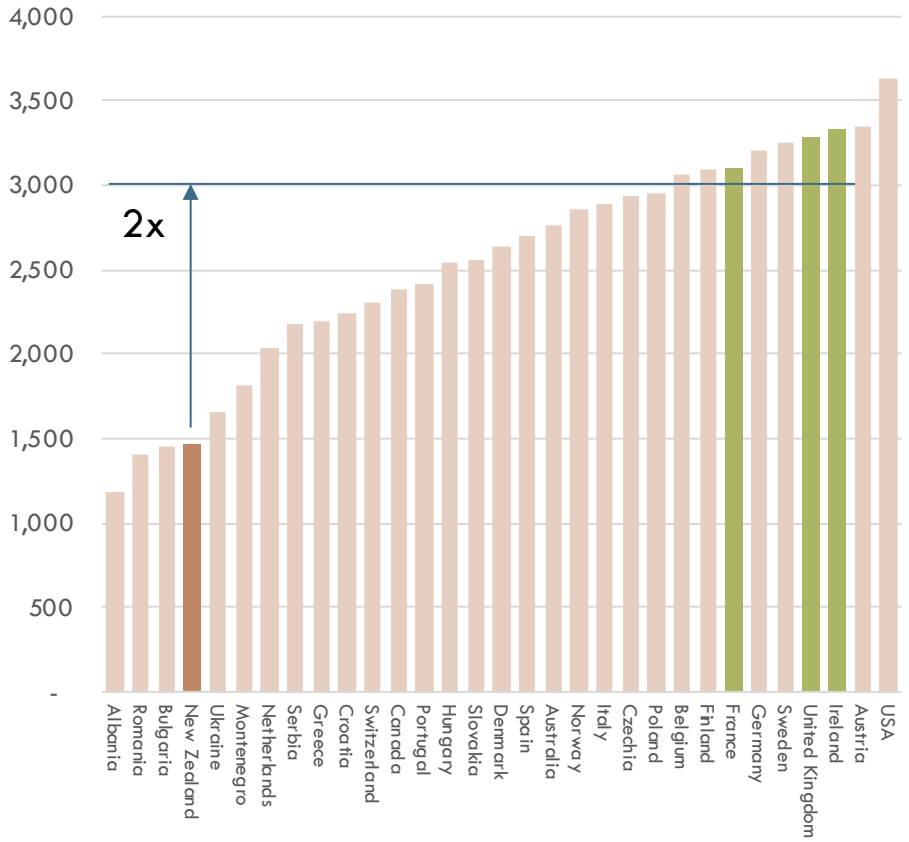
MILK PER COW PER YEAR

Litres; 2018 or as available



MEAT PER CATTLE ANIMAL KILLED

KG; 2018 or as available

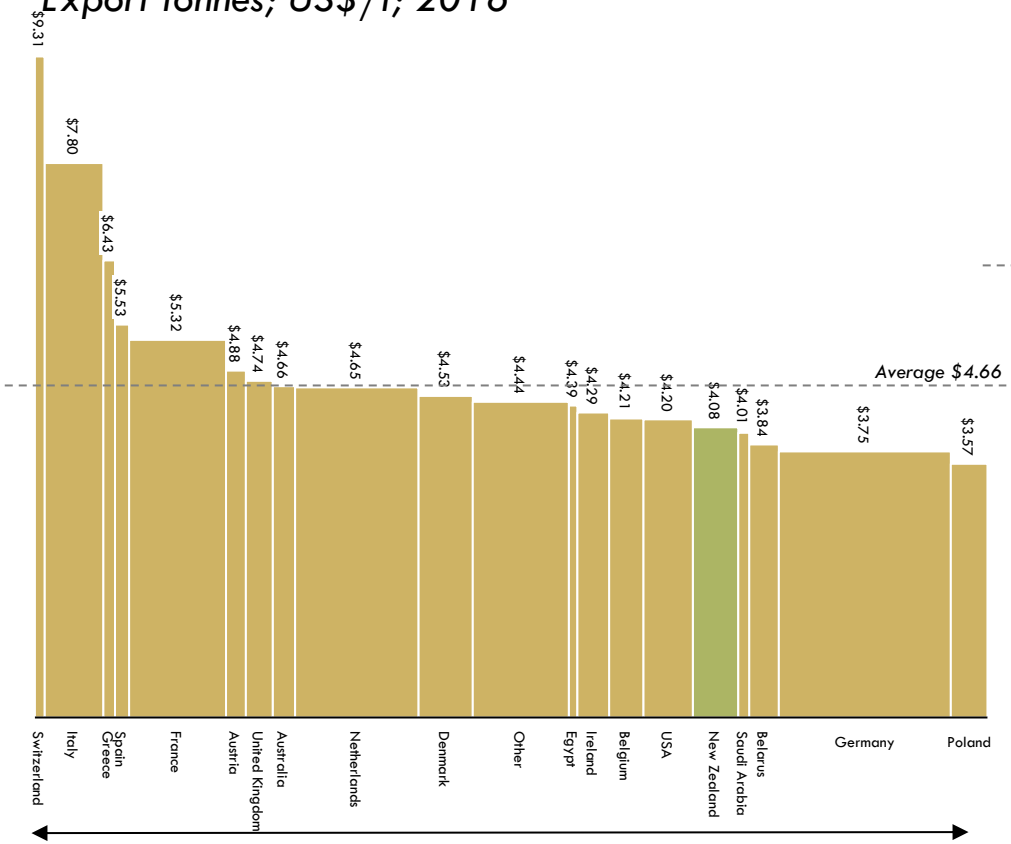


Source: StatisticsNZ; UN FAO AgStat; Coriolis analysis

New Zealand's "low density/extensive" animal products often sell at a discount, not a premium to world prices

GLOBAL CHEESE TRADE: VOL VS. VAL

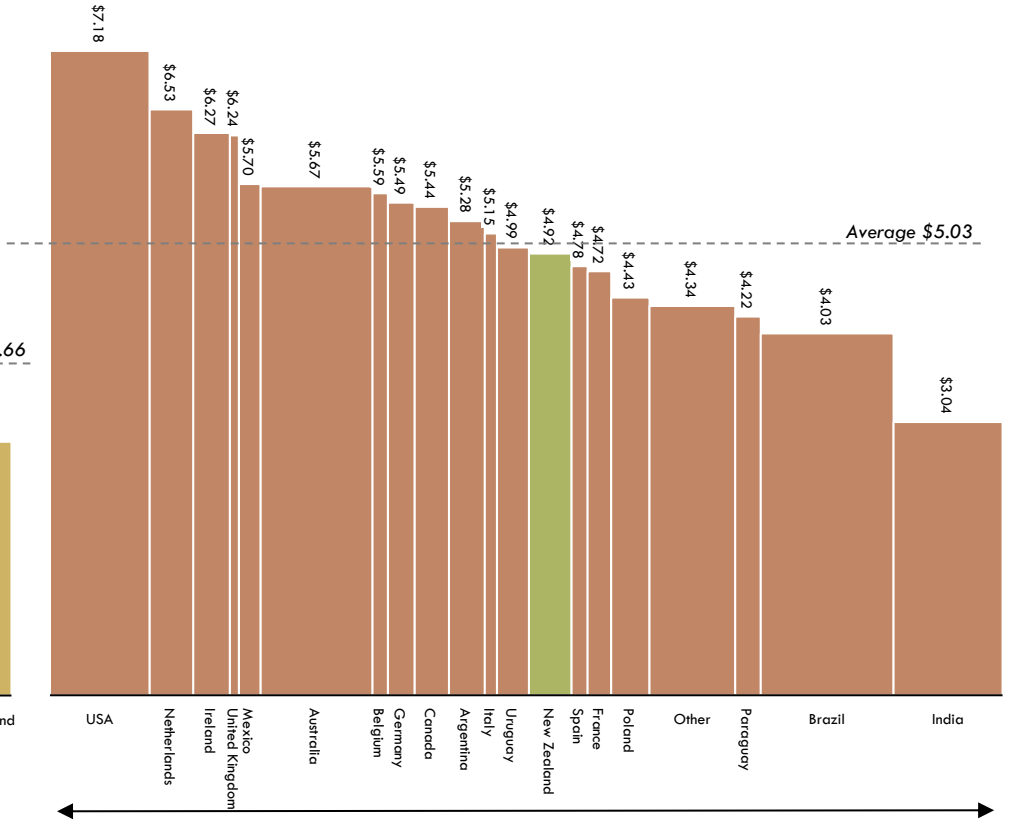
Export tonnes; US$/t; 2016



Proportional to 2018 global export volume; US$ / kg FOB

GLOBAL BEEF TRADE: VOL VS. VAL

Export tonnes; US$/t; 2018



Proportional to 2018 global export volume; US$ / kg FOB

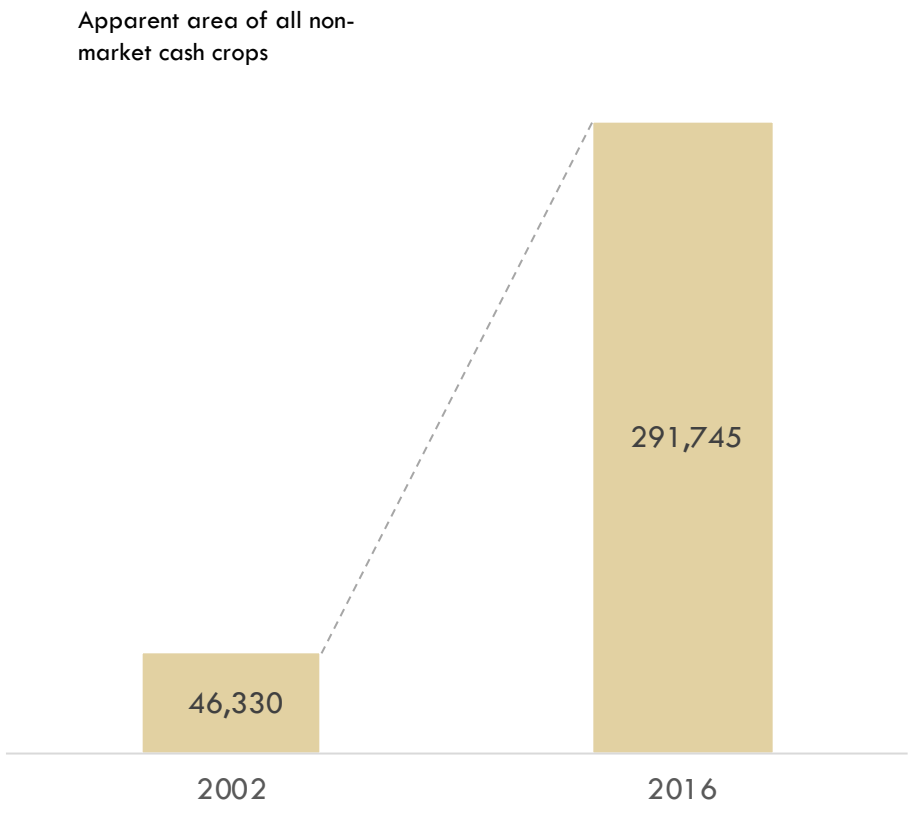
Source: UN Comtrade database; Coriolis classifications and analysis

Being a stable, picturesque country with functioning environmental regulation in the temperate zone (Clean & Green) is not a "moat"

New Zealand is increasing supplementary feeding, through both (1) feed grain production and (2) animal feed imports

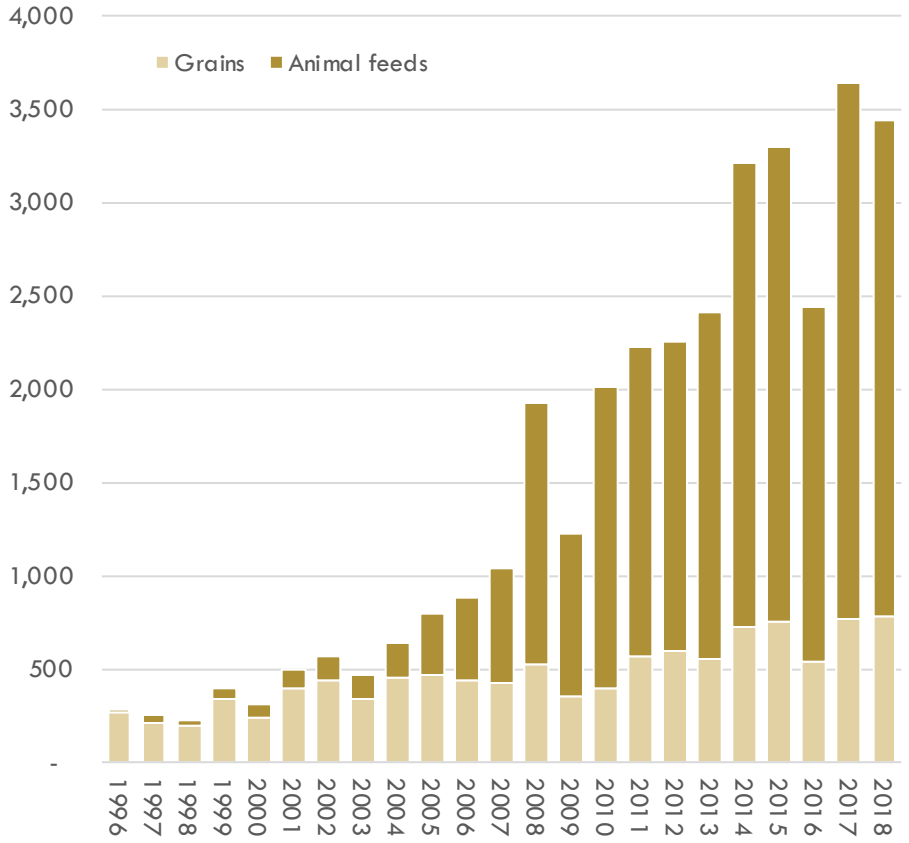
AREA IN FODDER GRAINS

Hectares; 2002 vs. 2016



IMPORTS OF ANIMAL FEEDS/PKE*/ETC.

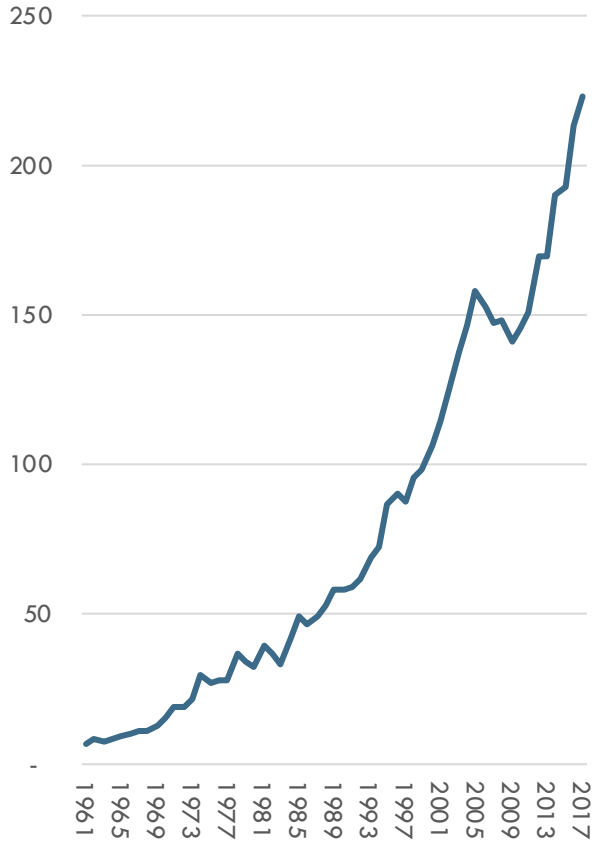
Tonnes; 000; 1996-2018



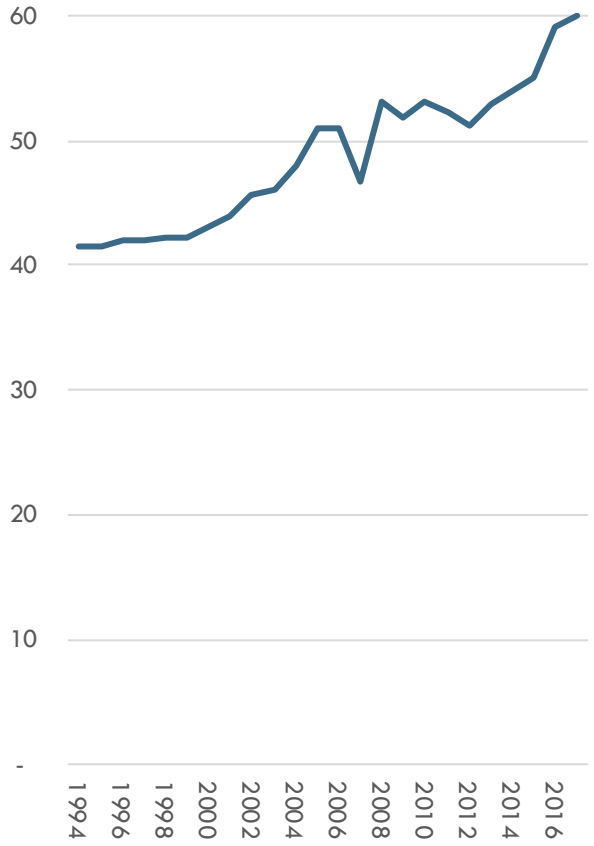
**PKE = Palm Kernel Expeller; Source: StatisticsNZ; UN Comtrade database; LCDB database; Coriolis classifications and analysis*

New Zealand production of barn raised animal protein is growing

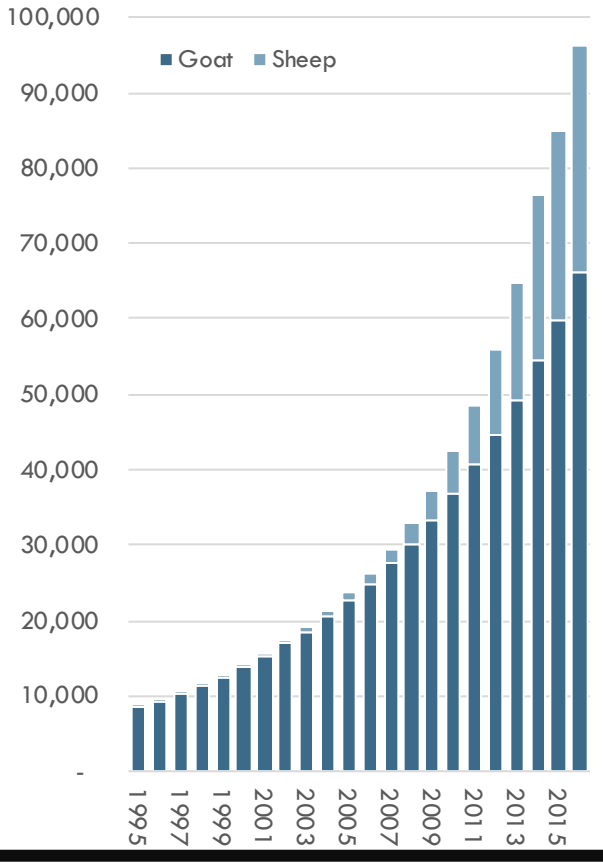
POULTRY MEAT
Tonnes; 000; 1961-2017



EGGS
Tonnes; 000; 1994-2017



MILKING SHEEP/GOATS*
Headcount; 1995-2016

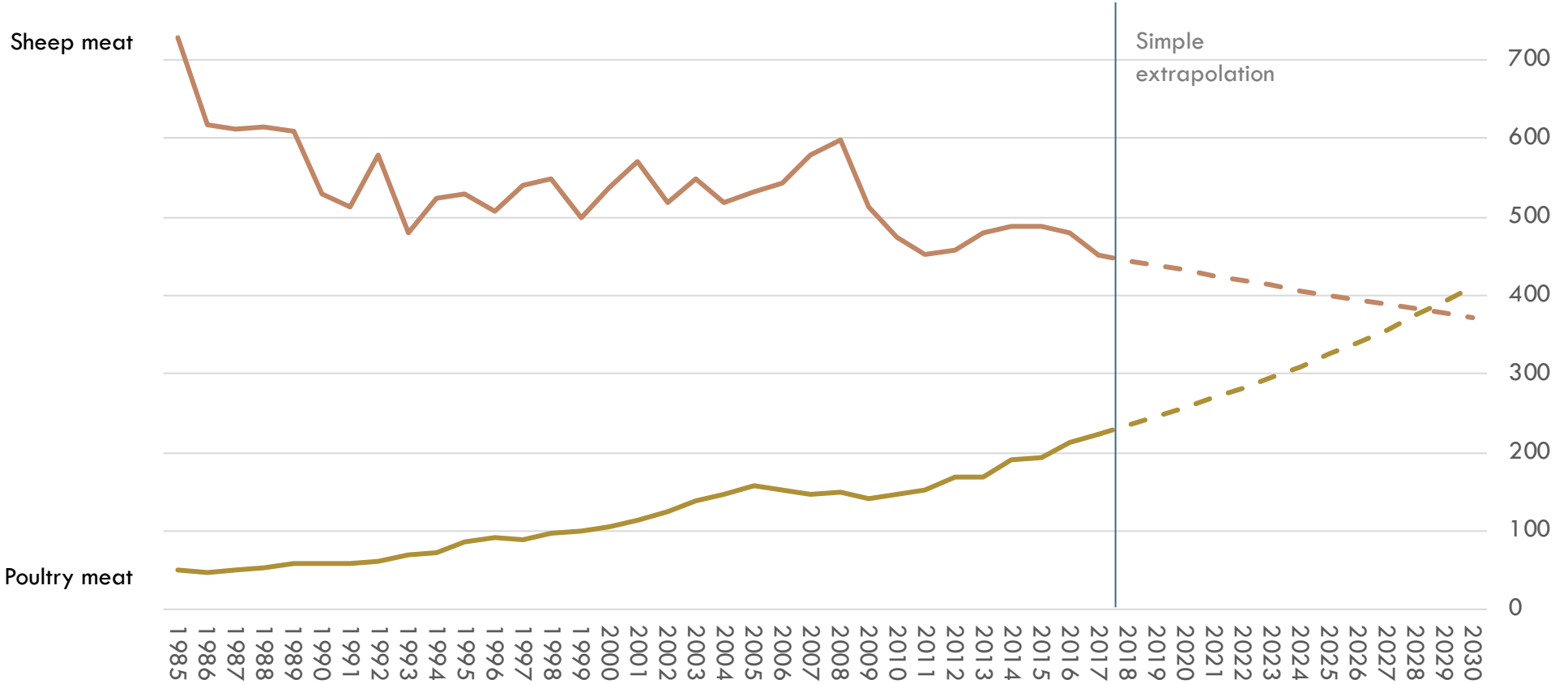


**Mix of barn and grazing; Source: Statistics NZ; UN FAO AgStat; Coriolis analysis and estimates*

Poultry meat has been a long term growth platform for NZ; a simple model suggests production will exceed lamb by 2028

NEW ZEALAND MEAT PRODUCTION VOLUME: LAMB VS POULTRY

T; 000; 1985-2017; 2017-2030f

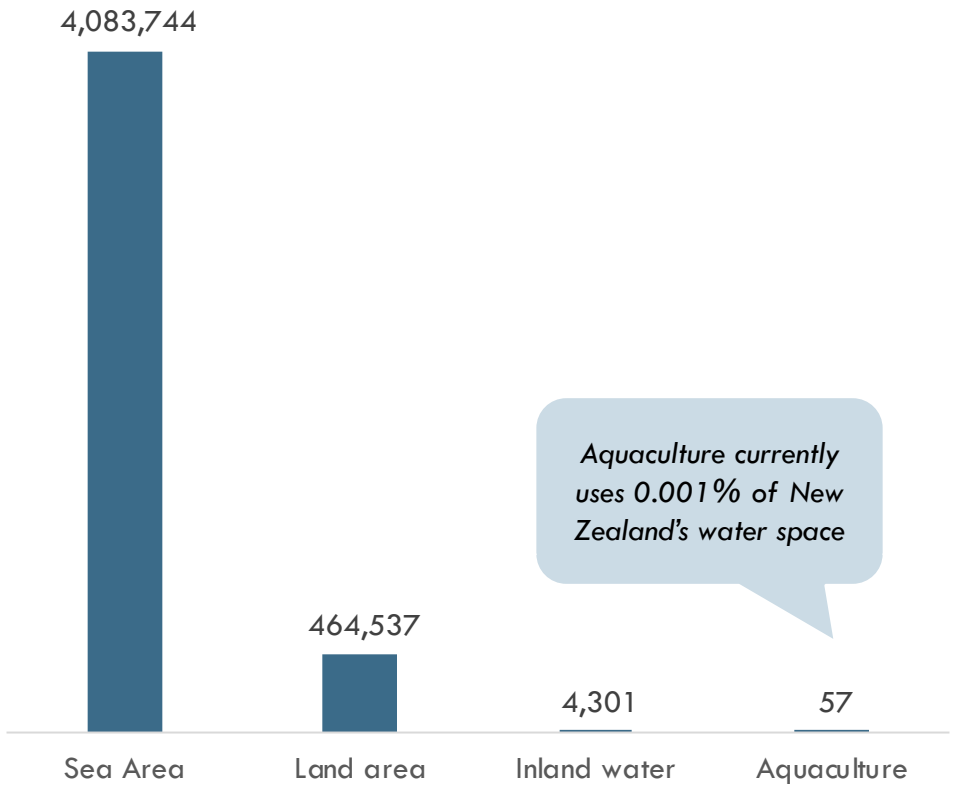


Source: UN FAO AgStat; Coriolis analysis and modelling

New Zealand aquaculture production was growing until it was stalled by "non-market action"

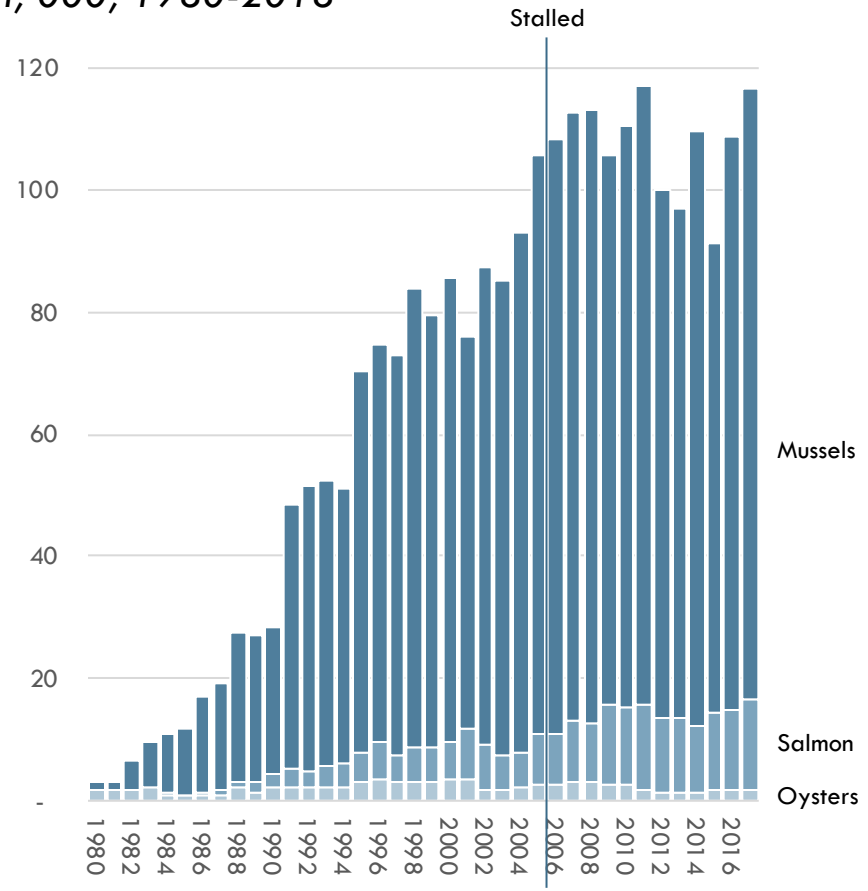
AVAILABLE AREA VS. AQUACULTURE

km^2; 2018



TONNES AQUACULTURE

T; 000; 1980-2018

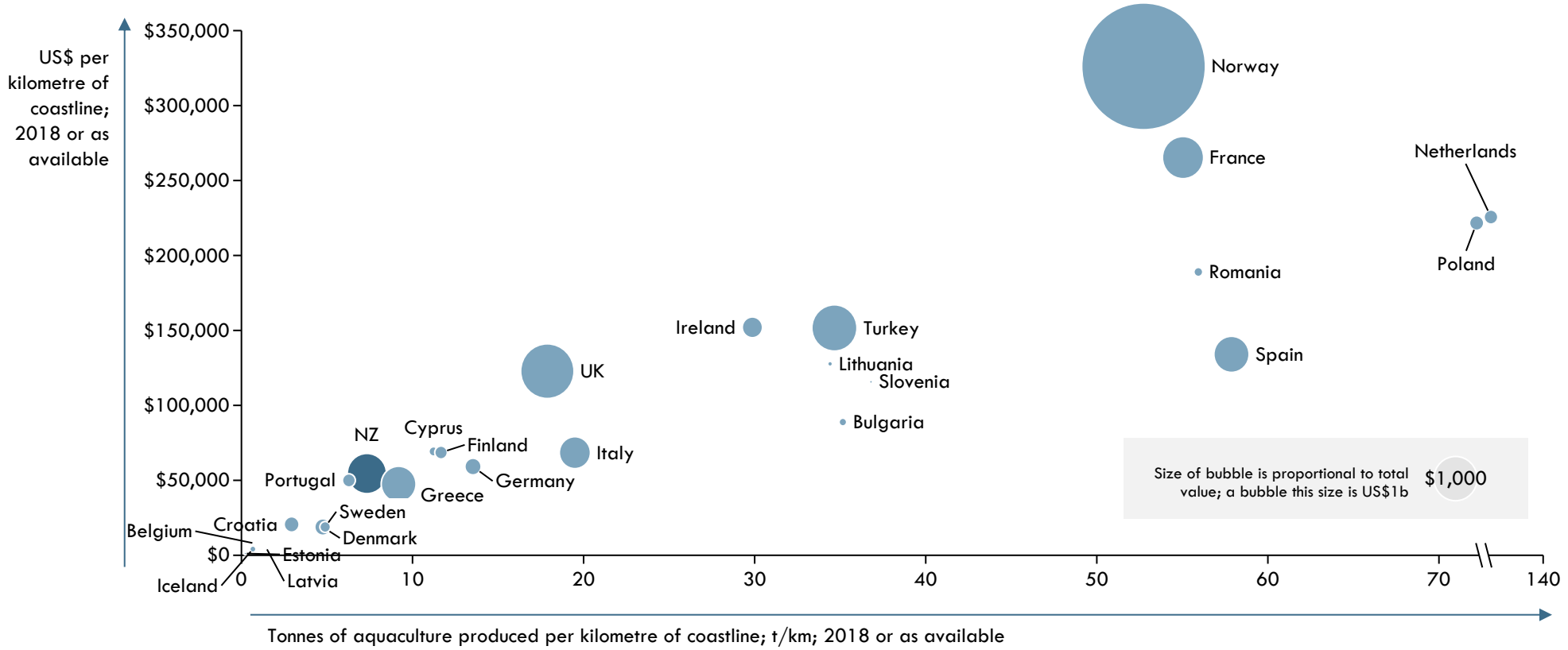


Source: UN FishStat; Statistics NZ; MPI/MAF/MoF; industry sources; Coriolis analysis and estimates

New Zealand has clear potential to produce more aquaculture

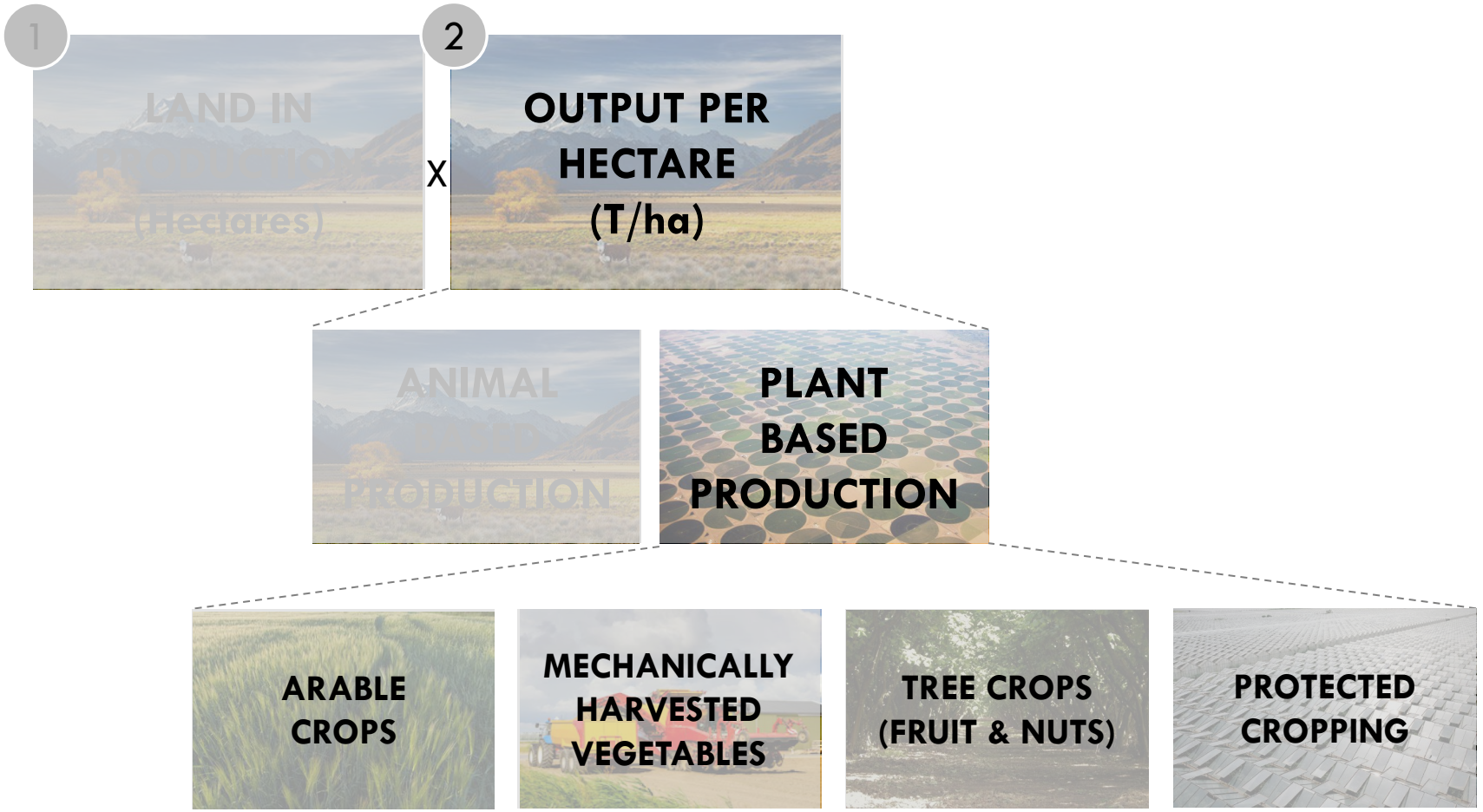
MATRIX: TONNES/KILOMETRE VS DOLLARS/KILOMETRE VS TOTAL INDUSTRY VALUE

T/km (actual); US$/km (actual); total US$m; 2018 or as available



Source: UN FAO FishStat; Eurostat; MPI; CIA World Fact Book; Coriolis analysis

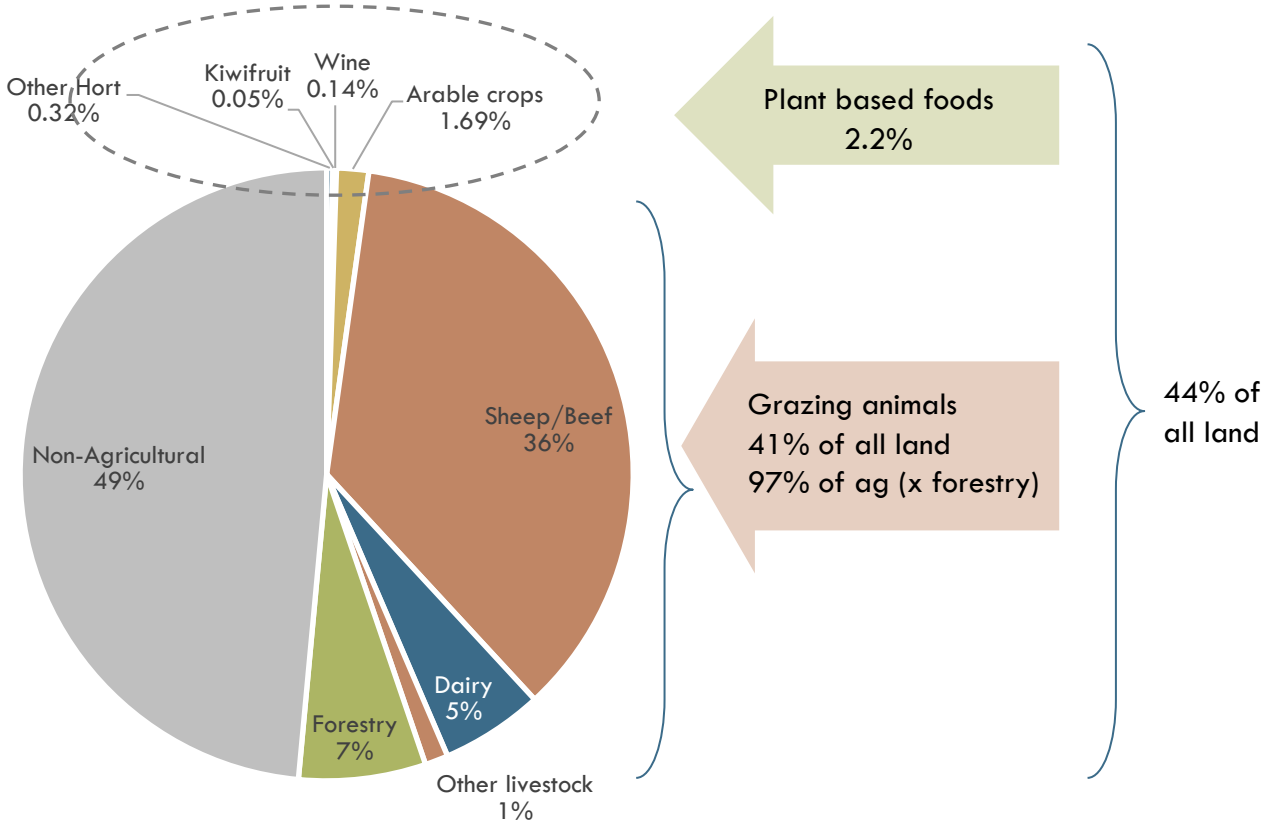
New Zealand is increasing production higher productivity plant production systems



Most New Zealand farm land is currently used to to graze animals; only 2.2% of all land is used for plant based foods

NEW ZEALAND AGRICULTURAL LAND USE

Area; % of area; 2017



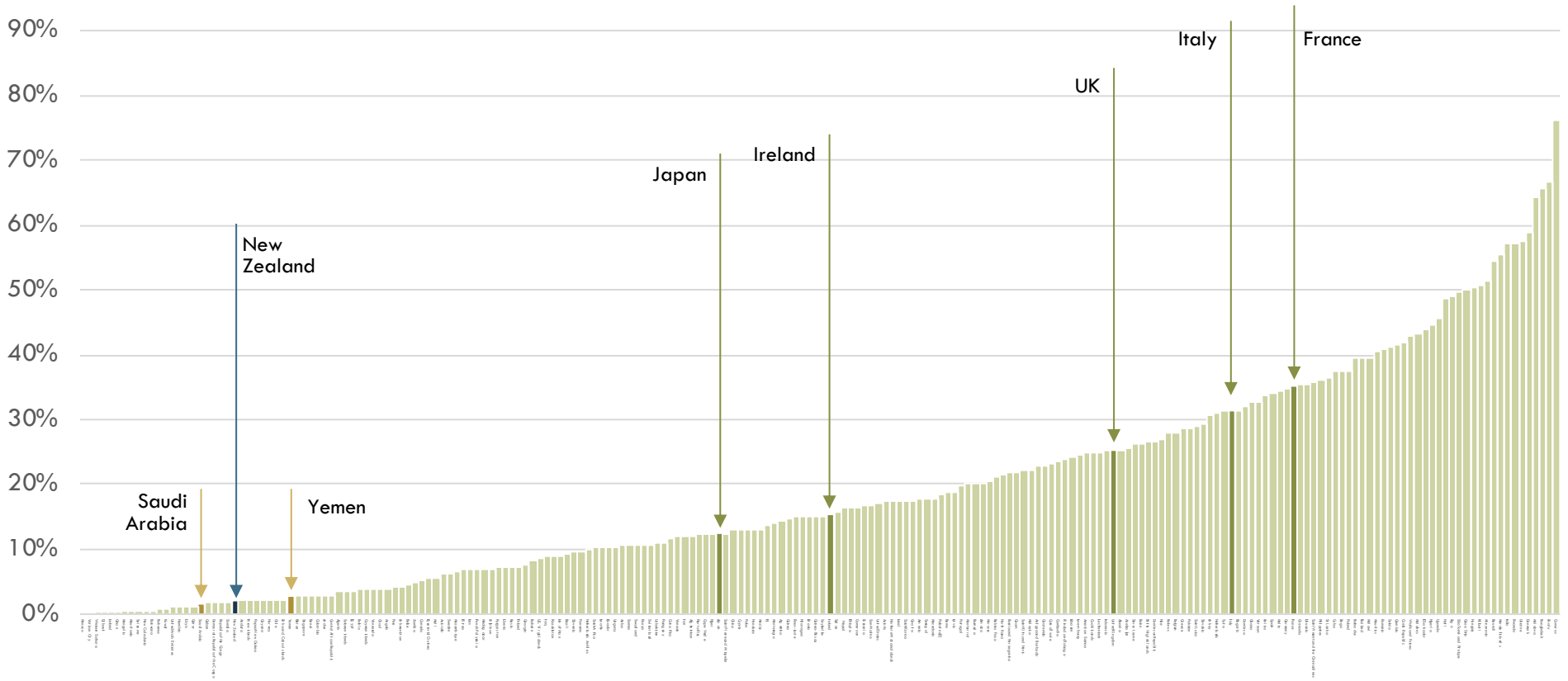
TOTAL = 264,537 sqkm

Source: UN FAO database (populated by MPI); PFR Fresh Facts; Zespri Annual Report; NZW annual report; Ministry for the Environment; Statistics NZ; CIA World Factbook; Coriolis analysis

New Zealand currently performs like a desert country in share of land in plant based foods (grains, vegetables, fruit & nuts)

SHARE OF TOTAL COUNTRY AREA IN GRAINS, VEGETABLES, FRUIT & NUTS

% of total area; N=Earth; 2015 or as available

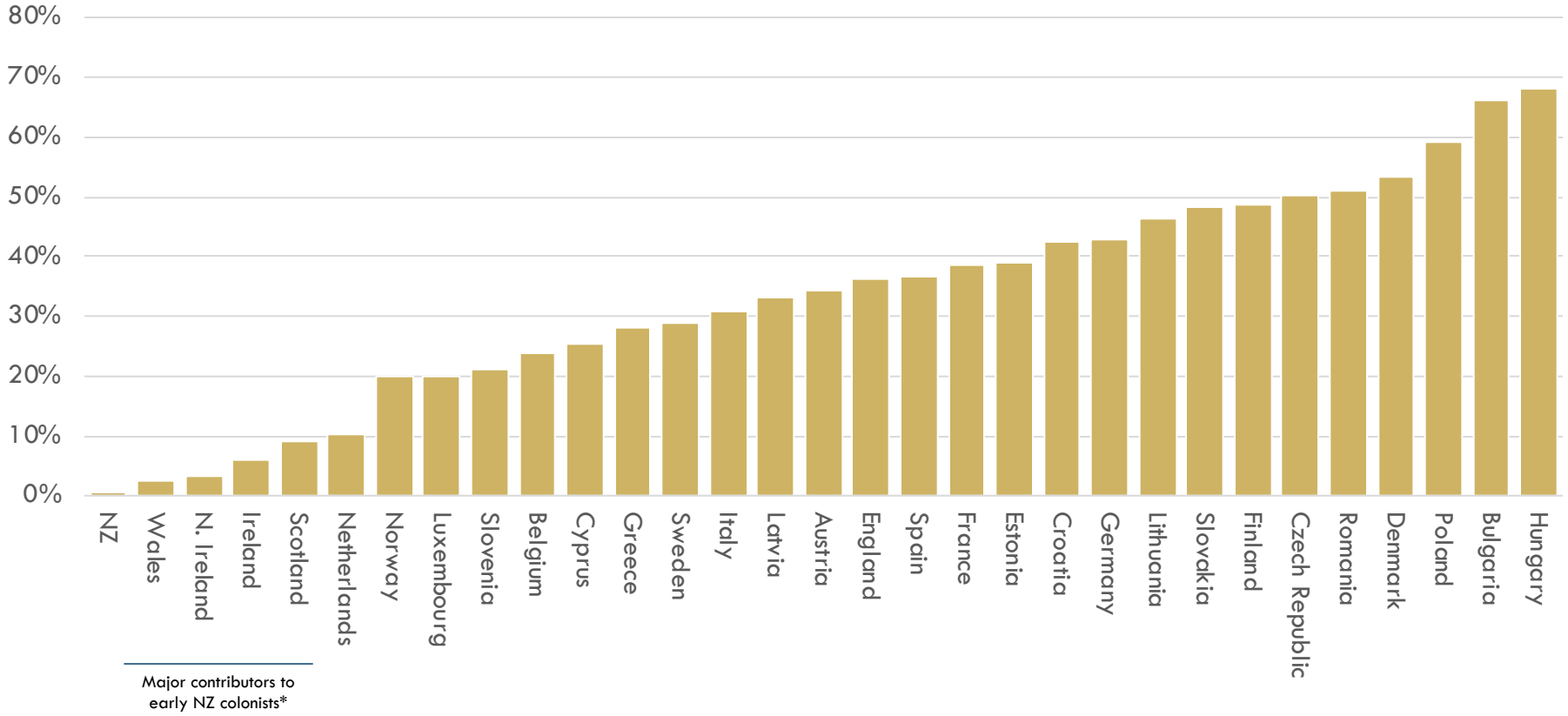


Source: UN FAO AgStat; CIA World Factbook; Coriolis analysis

New Zealand currently uses an almost negligible amount of total land in arable crops

SHARE OF TOTAL COUNTRY AREA IN ARABLE GRAINS & PULSES**

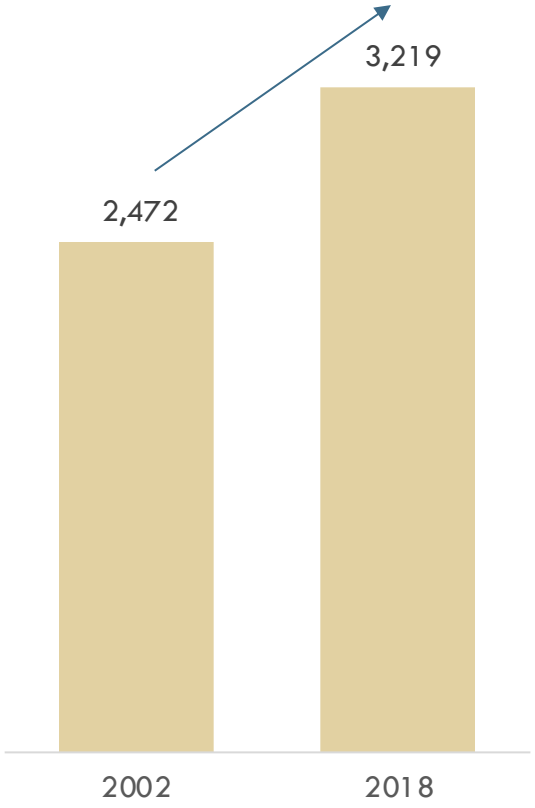
% of area; ha; 2018 or as available



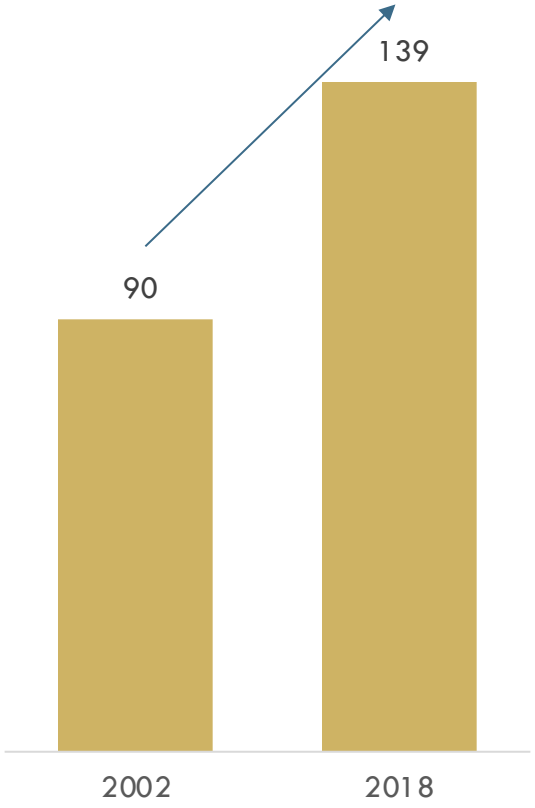
**New Zealand agriculture appears to be overweighed to the 'idealised' British Isles pastoralist world view; ** excludes fodder crops; Source: Eurostat; CIA World Fact Book; StatisticsNZ; UN FAO AgStat; MPI; LCDB database; Coriolis analysis and estimates*

New Zealand is moving to more crop farms with more area per farm and more overall area in arable crops

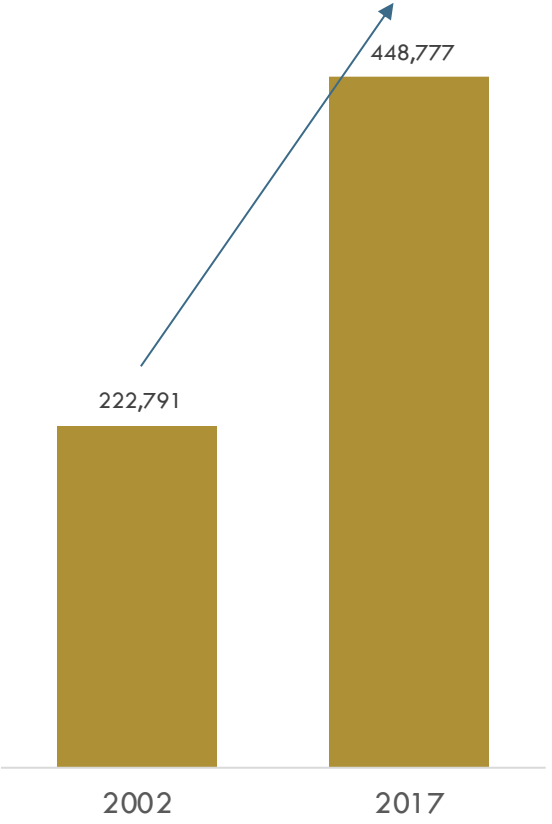
CROP FARM UNITS
#; 02vs18



AVERAGE AREA/UNIT
*m^2; 02vs17/18**



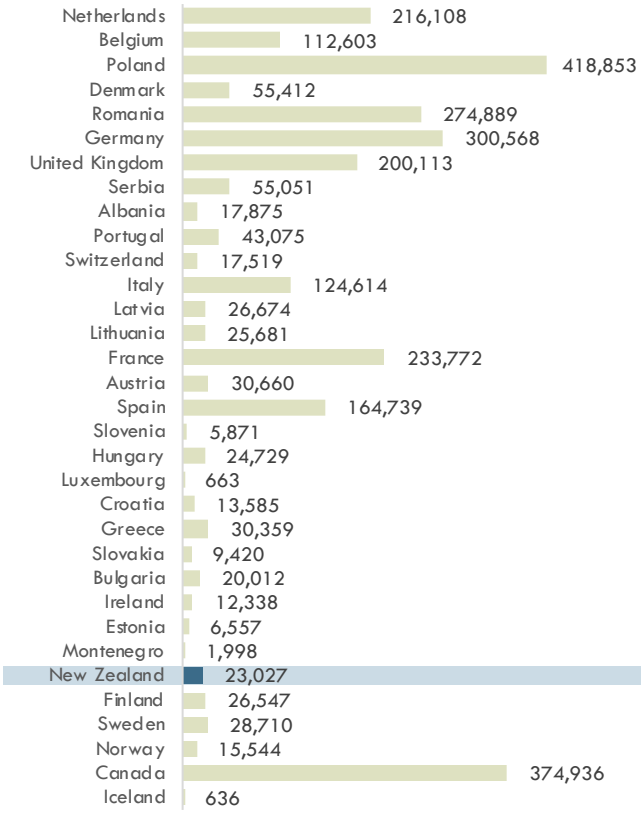
TOTAL AREA IN CROPS**
m^2; 02vs17



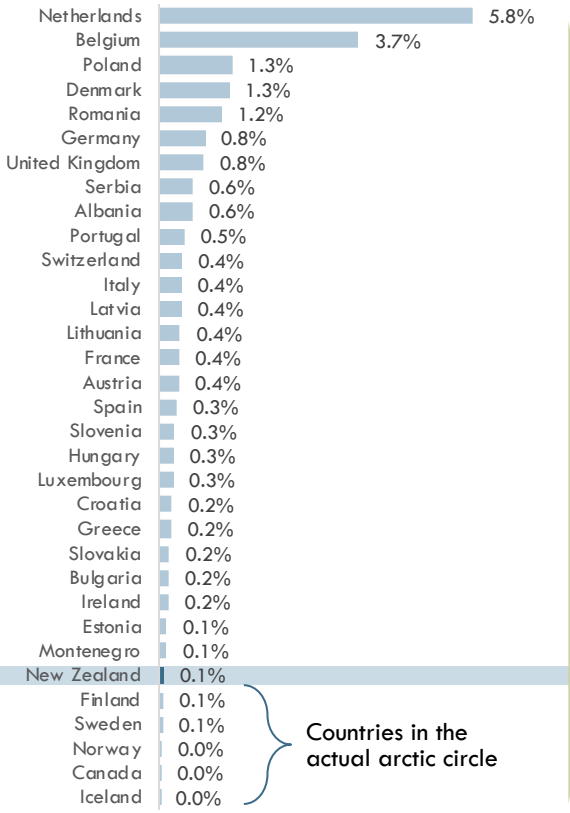
**Uses 2017 area over 2018 units (no 2018 area available); ** Includes fodder; Source: Statistics NZ; UN FAO; MAF/MPI; Ministry for the Environment; Coriolis analysis*

New Zealand can produce more mechanically harvestable vegetables

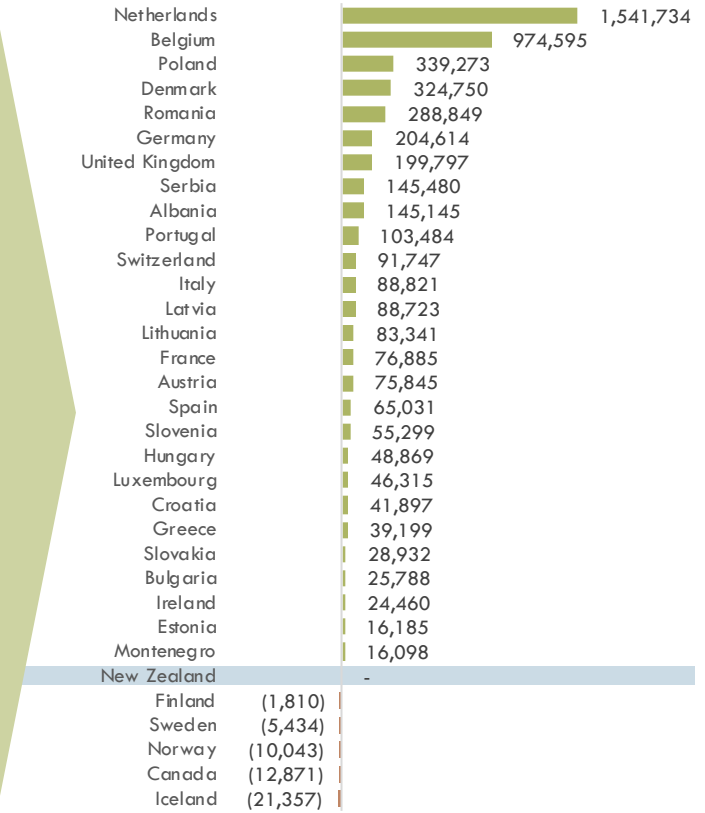
AREA IN MHV*
Hectares; 2017



% OF TOTAL AREA
% of country; km²; 2017



HOW MUCH ADDITIONAL LAND WOULD COME ONLINE IF NZ MATCHED THIS PEER?
Model; New NZ ha in MHV; 2020+

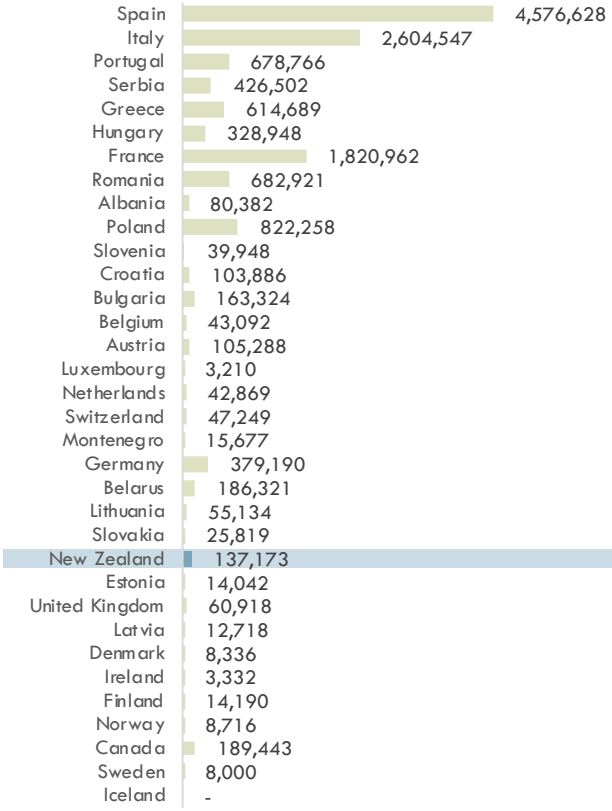


** MHV = Mechanically Harvestable Vegetables (defined as potatoes, sweet potatoes, other root crops, onions, carrots, cabbages, cauliflower and similar); Source: UN FAO; CIA World Factbook; Coriolis analysis*

New Zealand can produce more fruit, nuts and wine grapes

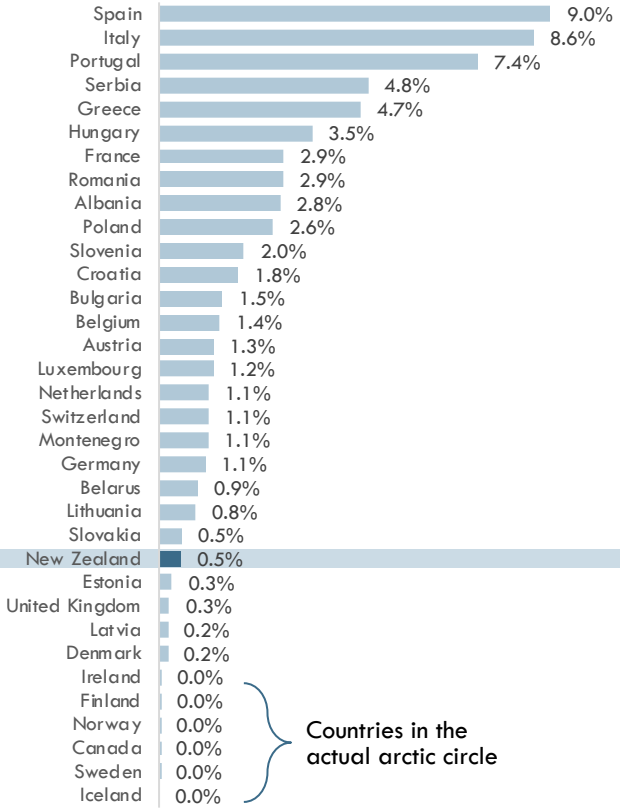
AREA IN F, N & WG

Hectares; 2018 or as available



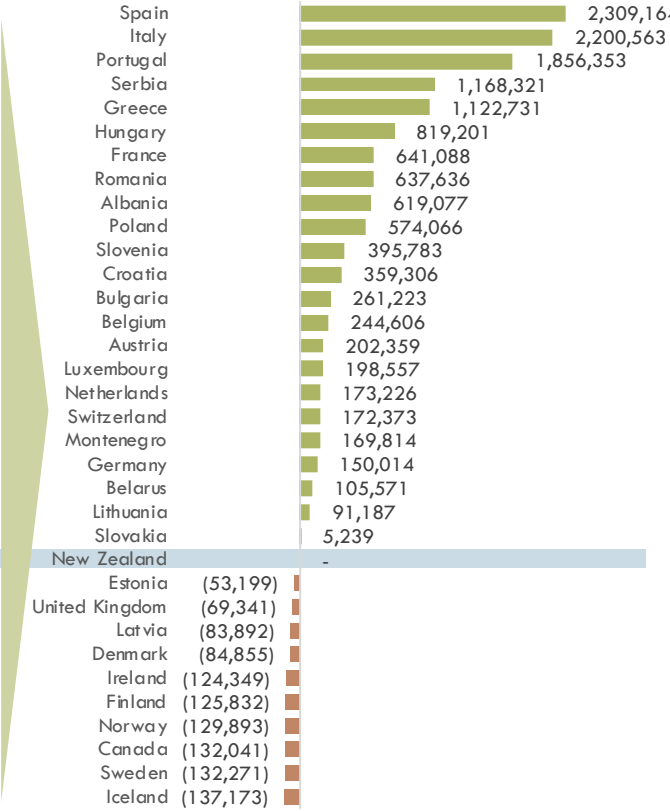
% OF TOTAL AREA

% of country SQKM; 2018 or as



IF NZ MATCHED THIS PEERS %?

New NZ ha in FNWG; 2020+

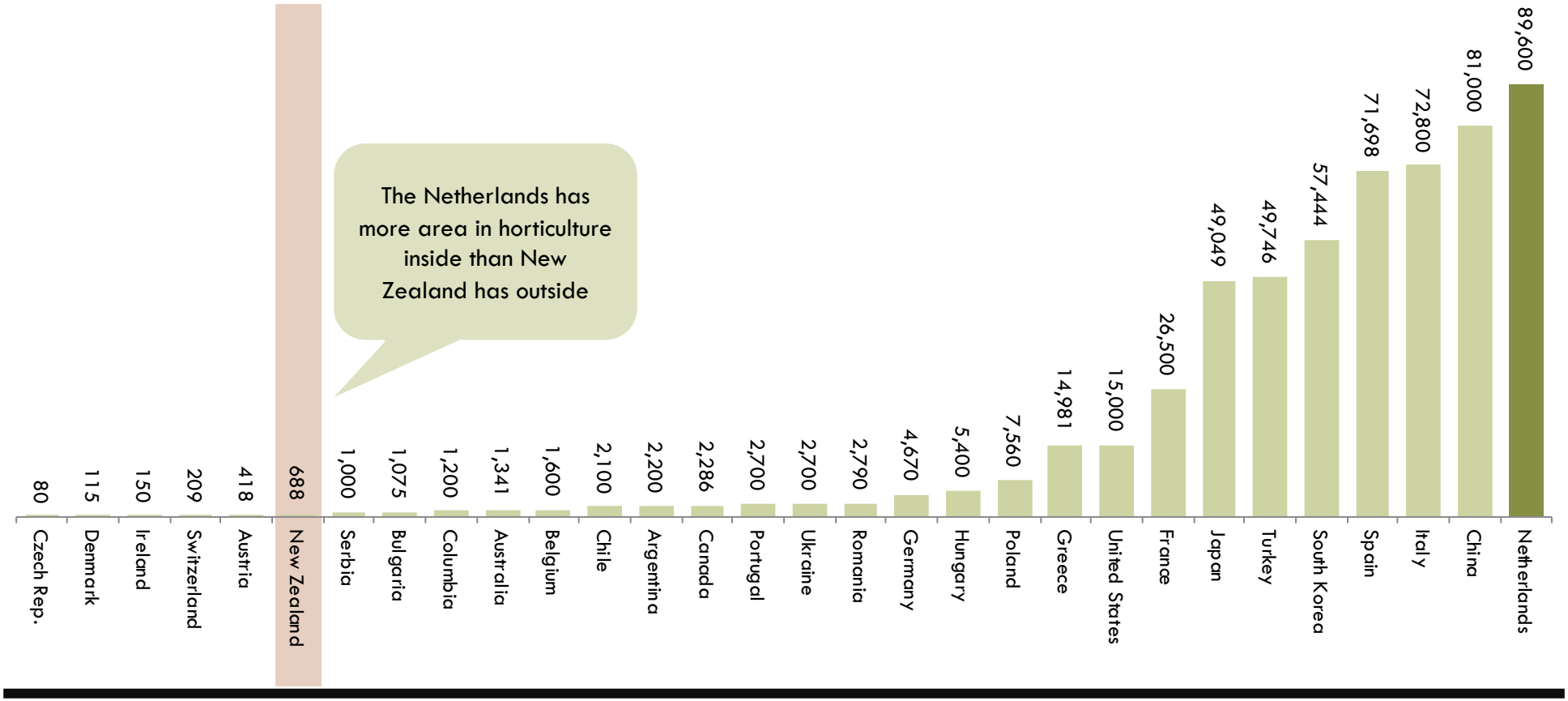


Source: UN FAO AgStat; ; CIA World Factbook; Coriolis analysis

Peers suggest there are opportunities to increase the amount of crop produced in greenhouses

AREA IN GREENHOUSE/UNDER COVER: NEW ZEALAND VS. SELECT PEERS

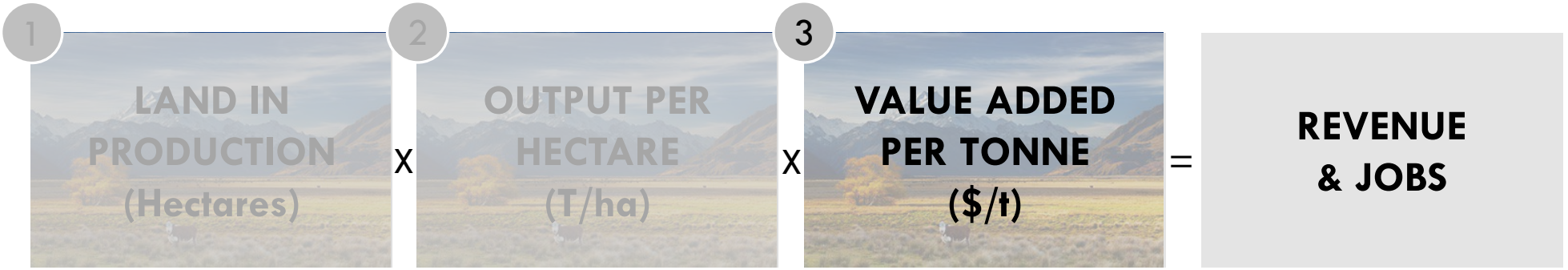
Hectare; 2014 or as available



NOTE: Data is from a wide range of sources and may not be perfectly comparable; many countries include glasshouse, greenhouse/PE tunnel & low tunnel; range of estimates for China (up to 2,760,000ha); Source: Cuesta Roble Consulting; "Greenhouse production systems in Mediterranean area" Leonardi/De Pascale May 2010; "Greenhouse Technology Globally: The future of food"; Coriolis analysis

3. *ADDING VALUE*

The third potential driver is to add more value to existing output



Improving products

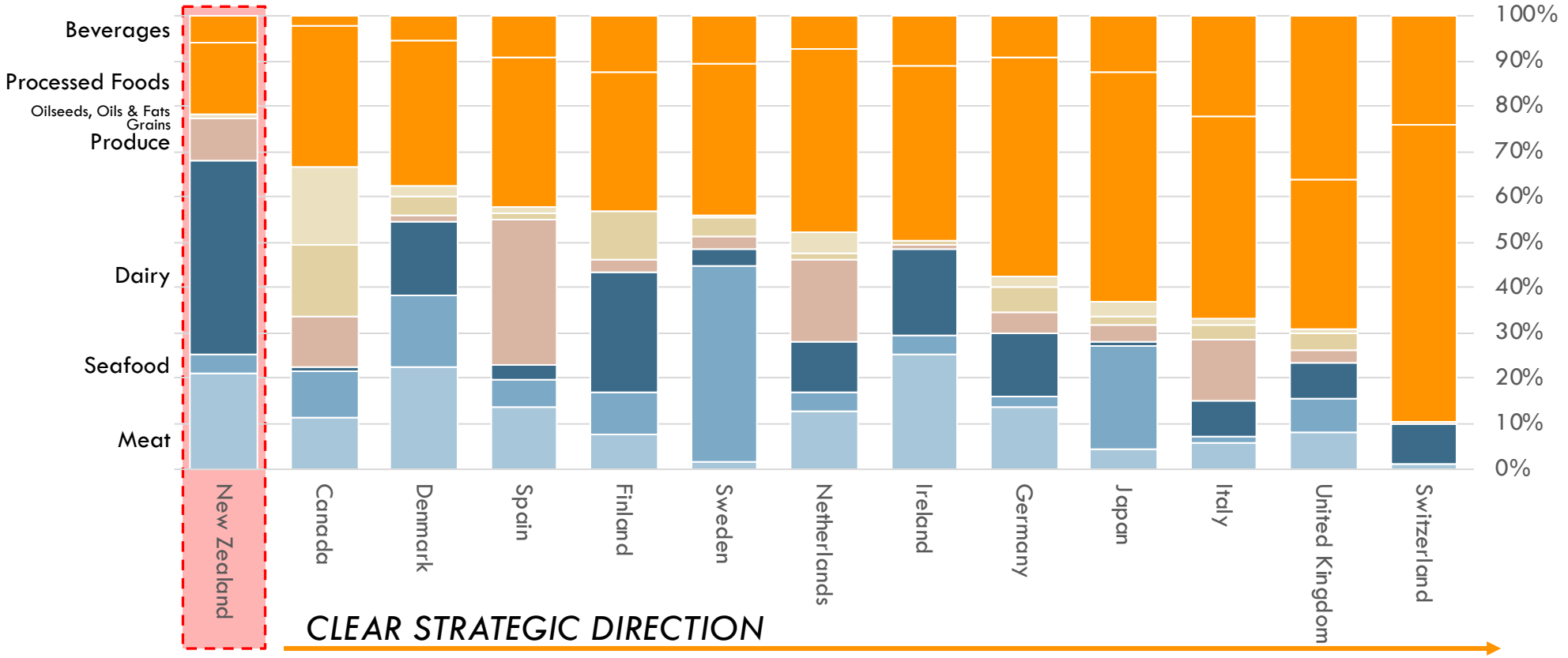
Improve positioning

Transforming product

New Zealand's food & beverage exports are currently still over-weighted to low value-added, unprocessed ingredients

AGRIFOOD EXPORTS VALUE SHARE BY SEGMENT: NZ VS OTHER RICH COUNTRIES

% of value; 2017



Source: UN Comtrade database; Coriolis classifications and analysis

New Zealand predominantly sells ingredients to others; as a result, it is currently missing out on food manufacturing jobs

FIGURE 1: FLOW OF NEW ZEALAND MILK POWDER FROM THE FARMER TO CONSUMER

Simplified model

Photo credit: public domain; Source: Coriolis

The New Zealand food industry has a clear strategic direction towards greater product complexity

Complexity

Bulk Powder | Retail Milk Powder | Retail Infant Formula | Medical & Specialty Infant Formula

Complexity

Fresh | Canned | Frozen | Meal

Ingredient Chocolate Crumb | Instant Chocolate Drink | Retail Bar Chocolate | Assorted/Mixed Chocolates

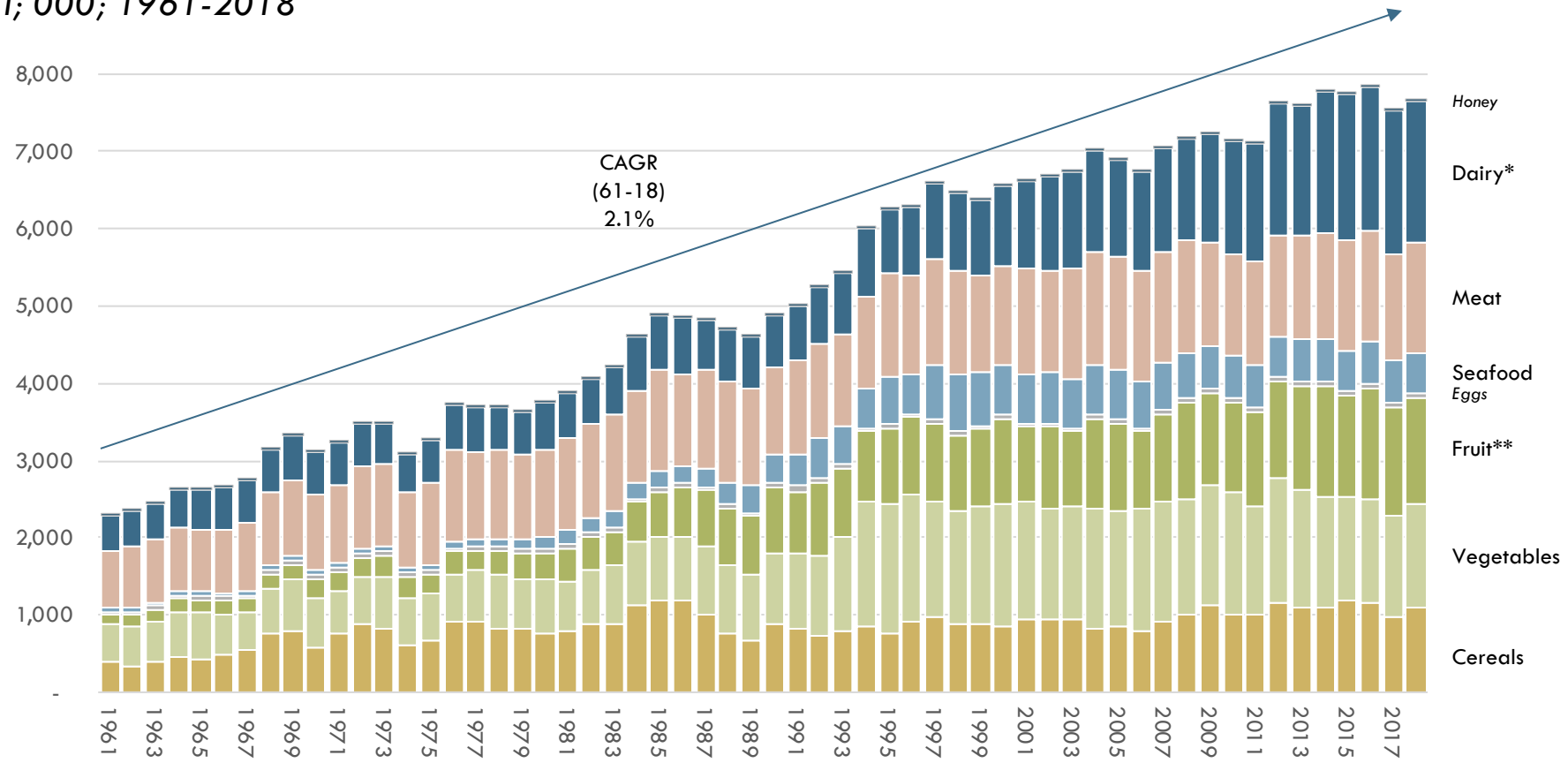
Basic Honey | Manuka Honey | Manuka Honey Lozenges | Medical Honey

Source: The Investor's Guide to the New Zealand Processed Foods Industry 2017; Photo credit: various firms or fair use; low resolution; complete product/brand for illustrative purposes

New Zealand has large and growing volumes of raw materials suitable for making more complex, consumer-ready products

TOTAL NEW ZEALAND FOOD PRODUCTION VOLUME AT FARM GATE[1]

T; 000; 1961-2018

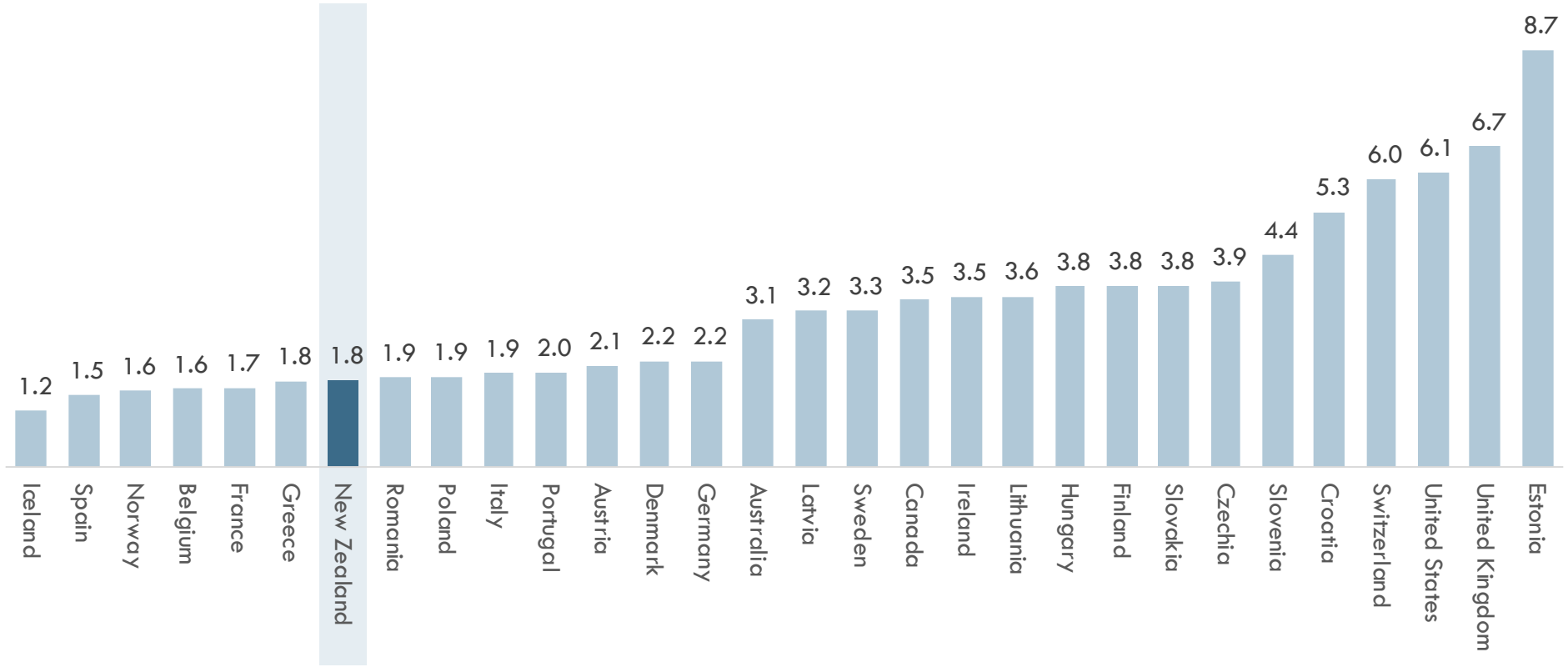


*1. Dockside for seafood production; *Milk is milk solids; meat is dressed but bone-in; seafood is green weight as reported; **Fruit includes wine grapes; honey line is thickened to make it visible;*
Source: United Nations FAOStat & FishStat; MAF/MPI; Coriolis analysis

Peers suggest New Zealand can create more processed foods jobs from its abundant raw materials

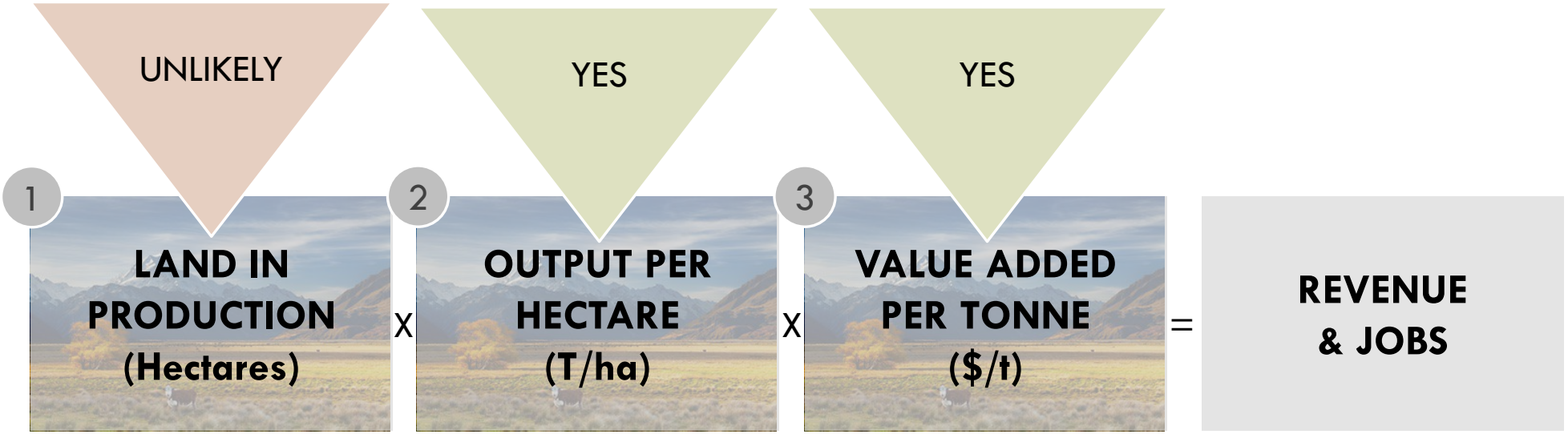
PROCESSED FOODS JOBS PER 1,000 TONNE RAW MATERIALS*

Headcount/1,000t; 2018 or as available



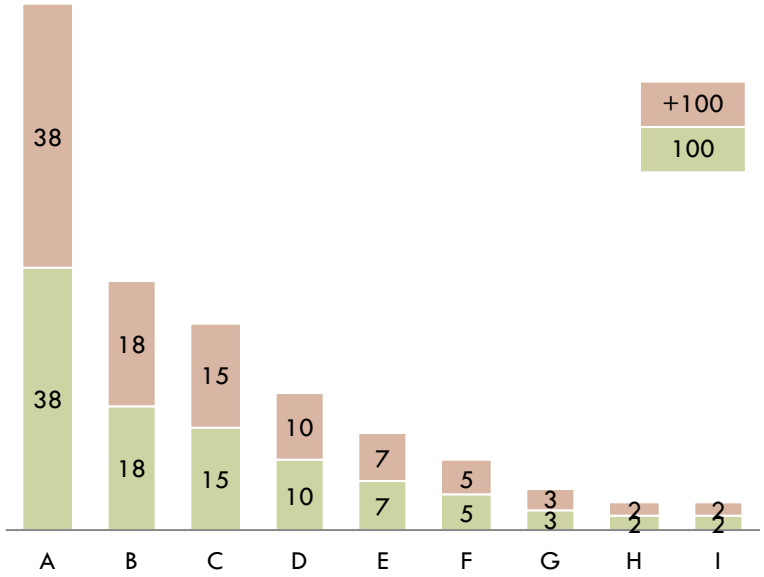
*Non-grain based; Source: UN FAO AgStat; UN FAO FishStat; Eurostat; Statistics Canada; US DOL; USDA NASS; Statistics NZ; Australian Bureau of Statistics; Coriolis classification and analysis

Going forward, growth will come from creating more output from less land and selling it as complex products at a higher prices



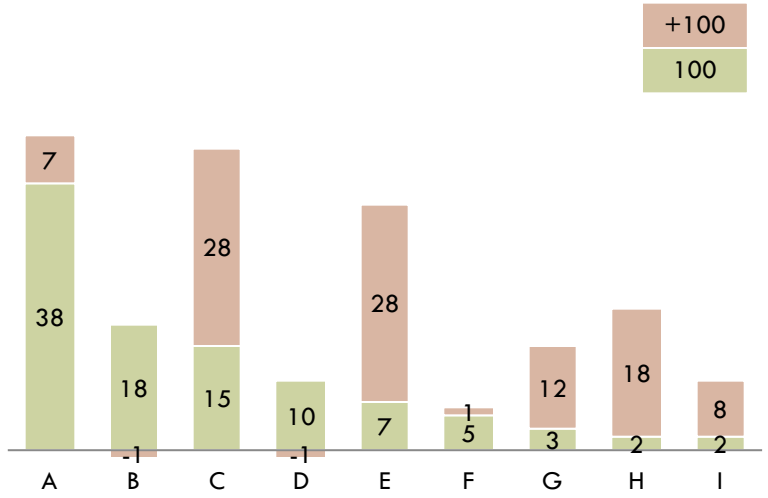
In practice, growth will require some sectors to grow much larger, as other sectors have growth constraints

MODEL 1: EVERYTHING DOUBLES



- Simple story: "Rising tide lifts all ships"
- Assumes all sectors can double in the timeframe
- Often how it is "spun" politically
- Unlikely in reality

MODEL 2: SOME GROW/OTHER NO GROWTH

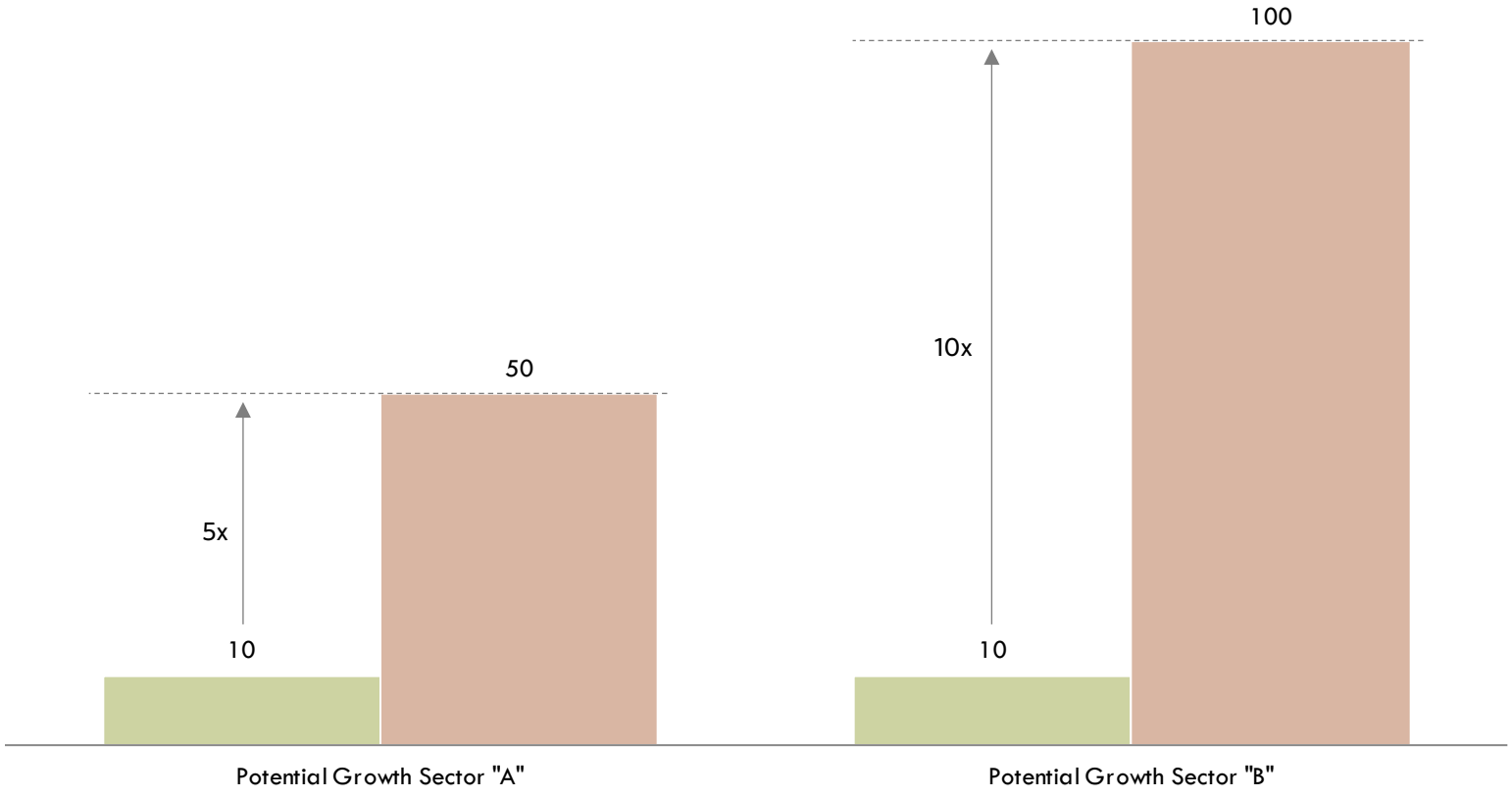


- More complex story: "The Good, the Bad and the Ugly"
- Assumes some sectors cannot grow significantly
- Other sectors will need to grow 5x or 10x to compensate
- Peer group regions suggest this is the likely outcome

Source: Coriolis

Therefore there is a need to focus efforts in sectors with the potential to grow five or ten times larger

SIMPLE GROWTH MODEL SHOWING 5X OR 10X GROWTH



Source: Coriolis

Numerous product categories have been identified that can contribute to this growth

IDENTIFIED PRODUCT CATEGORIES THAT CAN CONTRIBUTE TO GROWTH

Model; 2019

DAIRY	RED MEAT	POULTRY	SEAFOOD	F&V
Advanced/Medical Infant Formula	Meat-Based Snacks	Further Domestic Consumption	Atlantic Salmon	Under Cover/Glasshouse
				Root Crops
Dairy-Based Nutritionals	Branded, Packaged Consumer Case Ready	Target Key Export Markets		Processing Vegetables
				Nuts
Non-Cow Dairy		Develop Value Added Products	Region Suitable Aquaculture	Apples
	Consumer-Ready Convenience Meals			Kiwifruit
Specialty Cheese		Alternative Poultry Species		Avocados
				Emerging Fruit
ARABLE/GRAIN	**OTHER FOODS**	**PROCESSED FOODS**	**WINE**	**OTHER BEVERAGES**
High Dairy Baked Products	Honey	Nutraceuticals	Sparkling Wine	Alcoholic Spirits
Oat 'Milk'		Pet Food	'Cognac'	Water
Seeds	Eggs	Confectionery/Snacking	Non-Marlborough Reds	Cider & Similar
Hemp (F&B usage)		New & Innovative Foods		Premium Non-Alcoholic

Source: Coriolis analysis

Realising this growth opportunity requires three specific sets of potential investors

EXISTING LARGE FIRMS AT SCALE	*NEW LARGE INVESTORS WITH SCALE AND SKILLS*	*NEW AND EMERGING FIRMS*
REINVESTMENT	ATTRACTION	NURTURING
- *Remove barriers to investment* - *Ensure available capital is reinvested in New Zealand (not elsewhere)* - *Sell New Zealand; make the case for investment in F&B here*	- *Identify the right investors (rather than 'waiting for the phone to ring')* - *Focus on firms able to add value to New Zealand volume* - *Sell New Zealand; make the case for investment in F&B here*	- *Encourage both existing small firms and new start-ups* - *Focus effort on scaling small and medium firms into large, globally competitive firms at scale (currently falling over here)*

Source: Coriolis analysis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