

# Key drivers of milk production costs in dairy systems



Mr David Beca  
Red Sky Agri, Australia

National Dairy Conference 2023

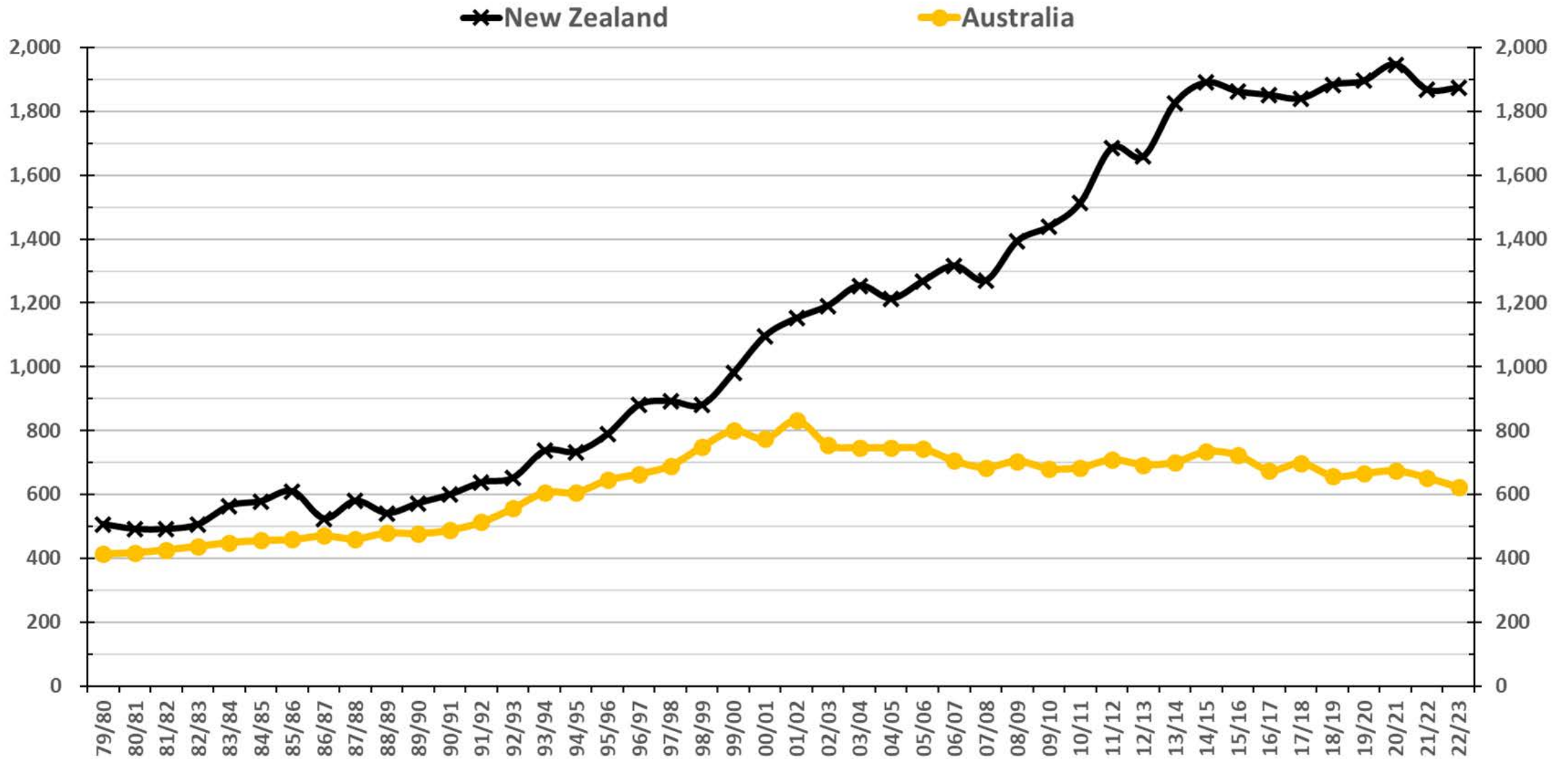
Wednesday, 29 November | Lyrath Hotel, Kilkenny

[www.teagasc.ie/dairycon23](http://www.teagasc.ie/dairycon23)

## Broad outline

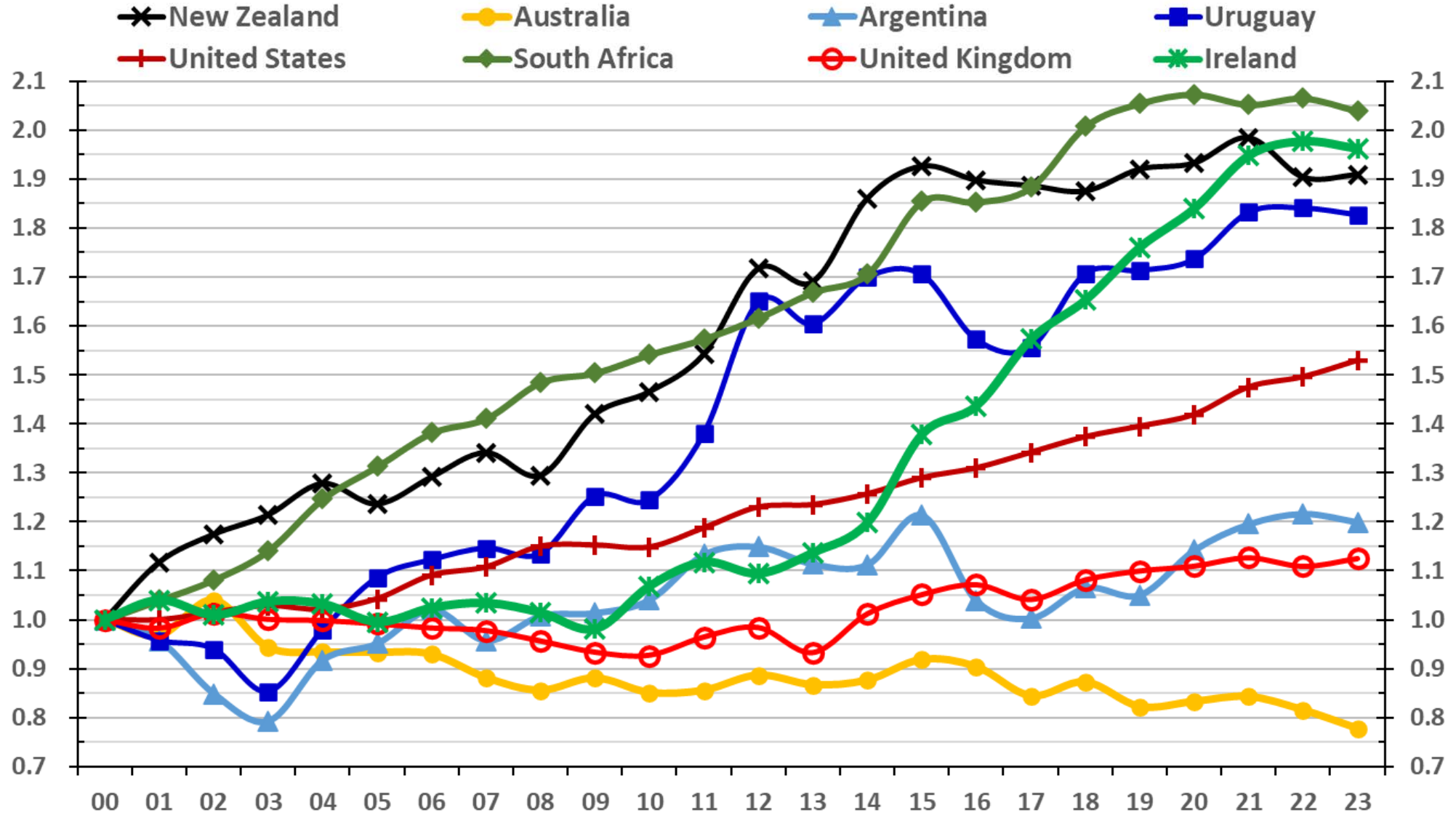
- ❑ International perspectives
- ❑ Factors impacting profit
- ❑ Factors impacting cost of production
- ❑ Pasture harvest impact on profit and cost of production
- ❑ Production system (pasture percentage in cows' diet) impact on profit and cost of production
- ❑ Best practice for analysing business performance and opportunities for change

# New Zealand vs Australia – National milk production (m kgMS)



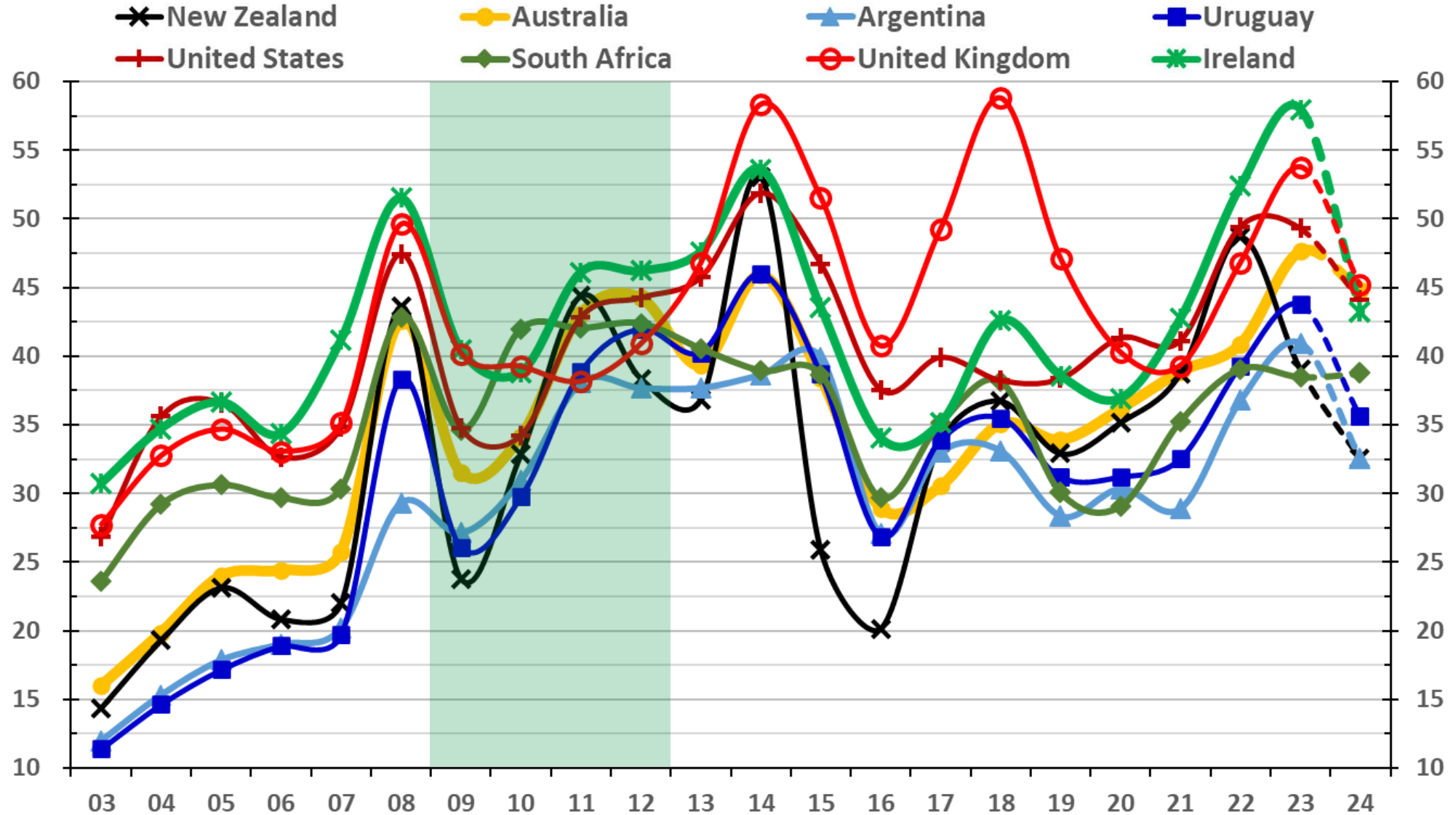
Source: DairyNZ, Dairy Australia (DA)

# International milk supply growth (MS, 1999/2000 =1.0)



Source: DairyNZ, DA, MAGYP, INALE, USDA, MPO, DEFRA, CSO

# Milk price per litre (\$US cents per litre ECM = energy corrected milk)



Source: DairyNZ, DA, MAGYP, INALE, USDA, MPO, DEFRA, CSO

# Known factors (ratios) that causally correlate with profit

Ratios that positively correlate with PROFIT as described by Return on Capital (ROC)			
Primary ratio	R <sup>2</sup>	Secondary ratio or proxy	R <sup>2</sup>
Pasture harvest	0.41		
Pasture cost per tonne dry matter	0.23		
Milk production per hectare	0.20	Stocking rate	0.25
Total feed cost per litre	0.21	Supplement cost per litre	0.20
Core per cow cost	0.20		
Labour cost per cow	0.18	Cows per full-time staff equivalent	0.13
		Labour cost per litre	0.17
		Litres per full-time staff equivalent	0.11
Core per hectare cost per tonne dry matter of pasture harvest	0.17		
Pasture as per cent of diet	0.08	Pasture consumed per cow	0.07

## High level ratios

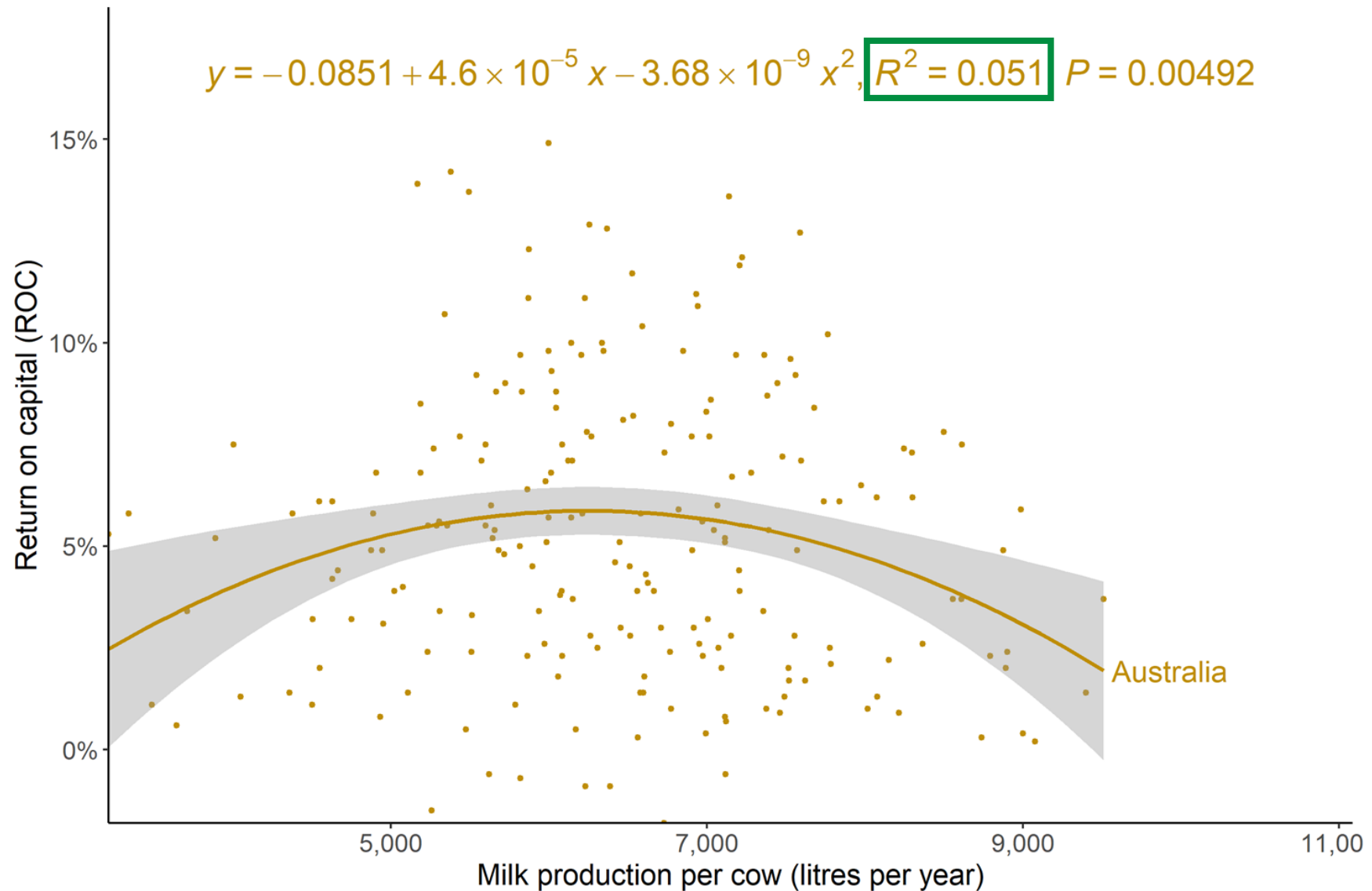
- Profit = Return on capital
- Cost of production
- Profit margin per litre

## Definition of key terms

“**Pasture**” includes all pasture and other crops consumed by the cows in situ as well as any pasture mechanically harvested on the dairy farm

**Return on capital** = 
$$\frac{\text{Operating profit (excluding any finance costs)}}{\text{Total value of all assets employed (incl. leased assets)}}$$

# Milk production per cow impact on profit (return on capital)





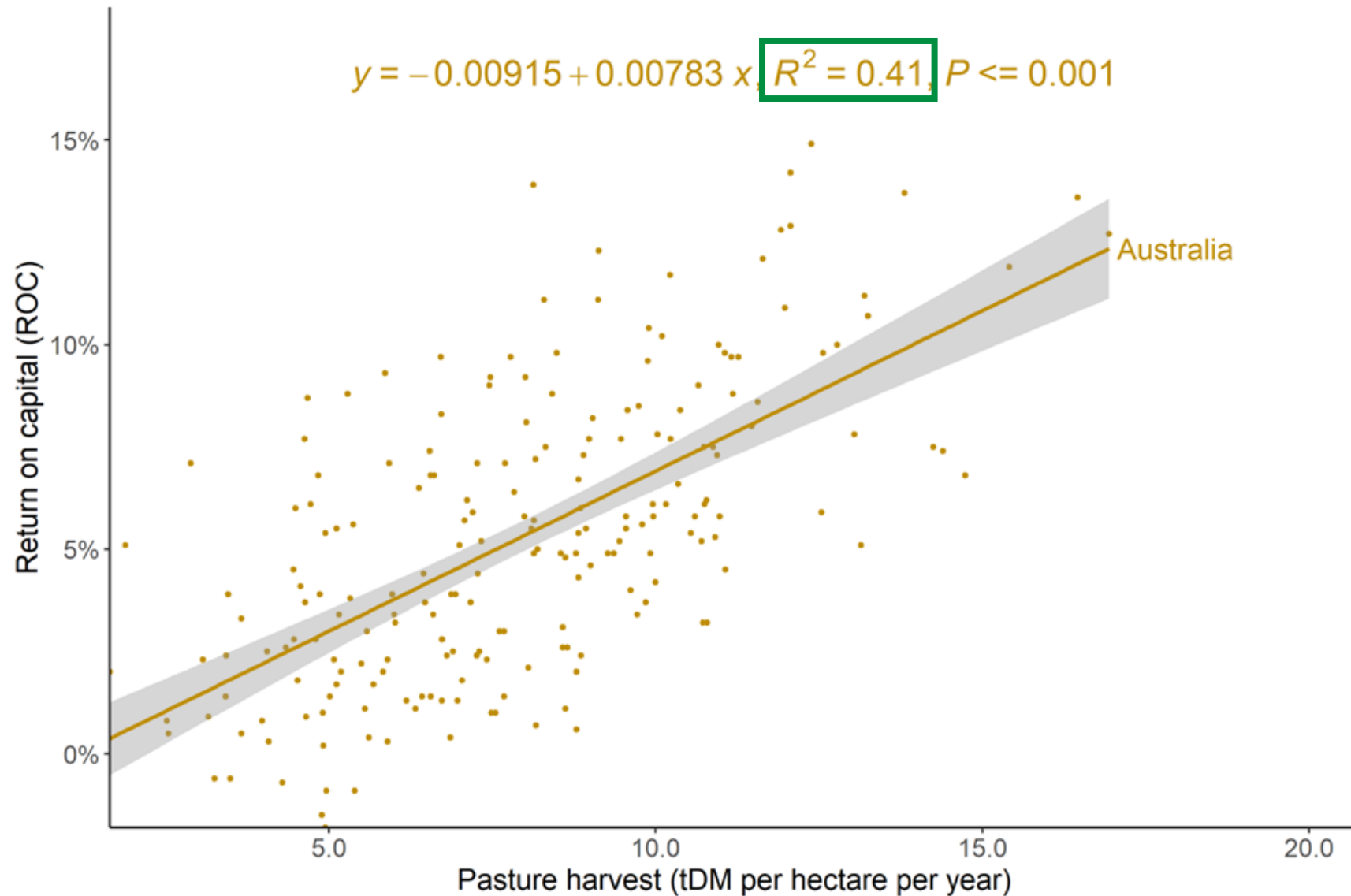
# Known factors (ratios) that causally correlate with profit

Ratios that positively correlate with PROFIT as described by Return on Capital (ROC)			
Primary ratio	R <sup>2</sup>	Secondary ratio or proxy	R <sup>2</sup>
Pasture harvest	0.41		
Pasture cost per tonne dry matter	0.23		
<del>Milk production per hectare</del>	<del>0.20</del>	Stocking rate	0.25
Total feed cost per litre	0.21	Supplement cost per litre	0.20
Core per cow cost	0.20		
Labour cost per cow	0.18	Cows per full-time staff equivalent	0.13
Core per hectare cost per tonne dry matter of pasture harvest	0.17		
Pasture as per cent of diet	0.08		

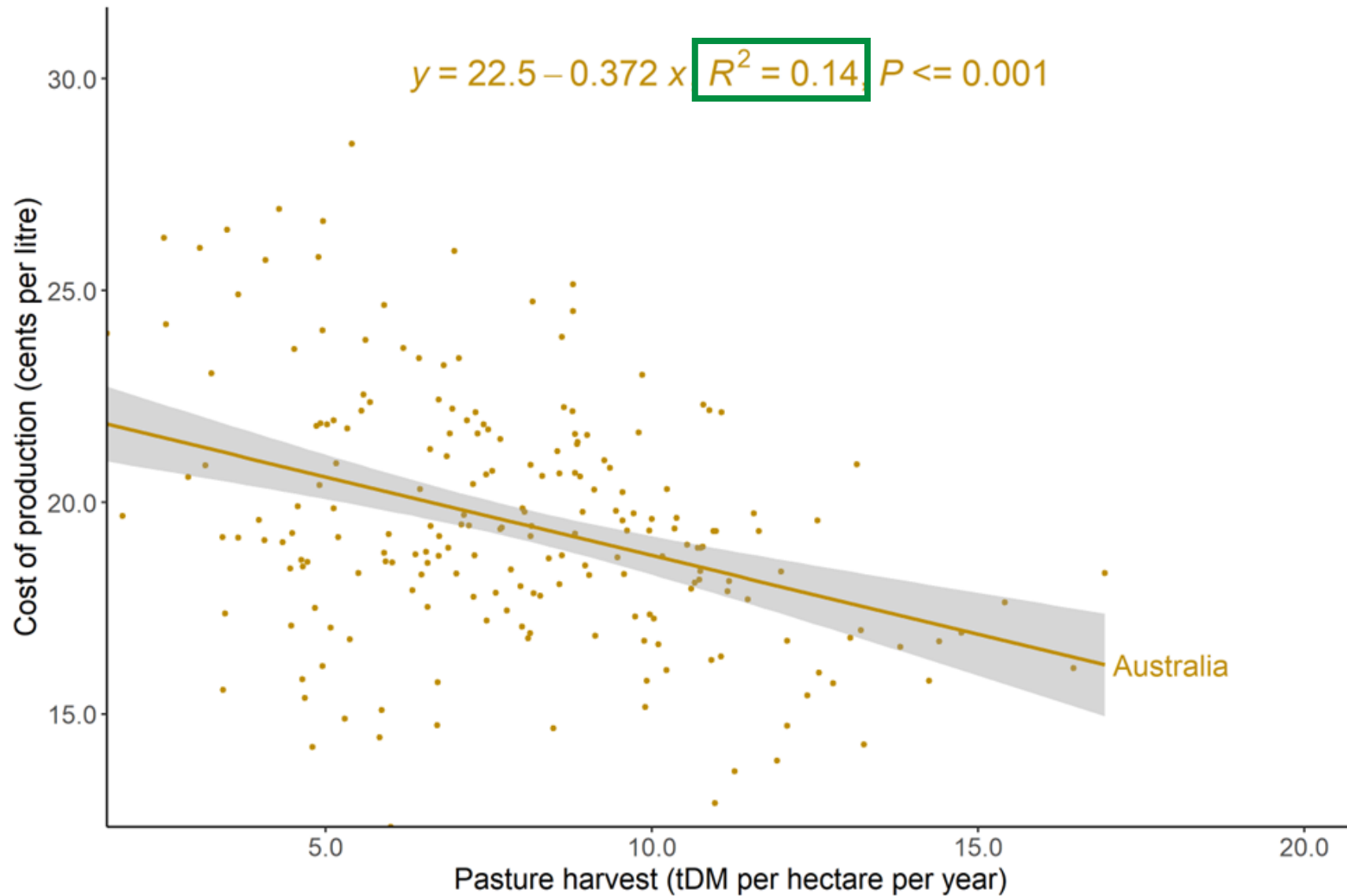
## High level ratios

- Profit = Return on capital
- Cost of production
- Profit margin per litre

# Pasture harvest impact on profit (return on capital)



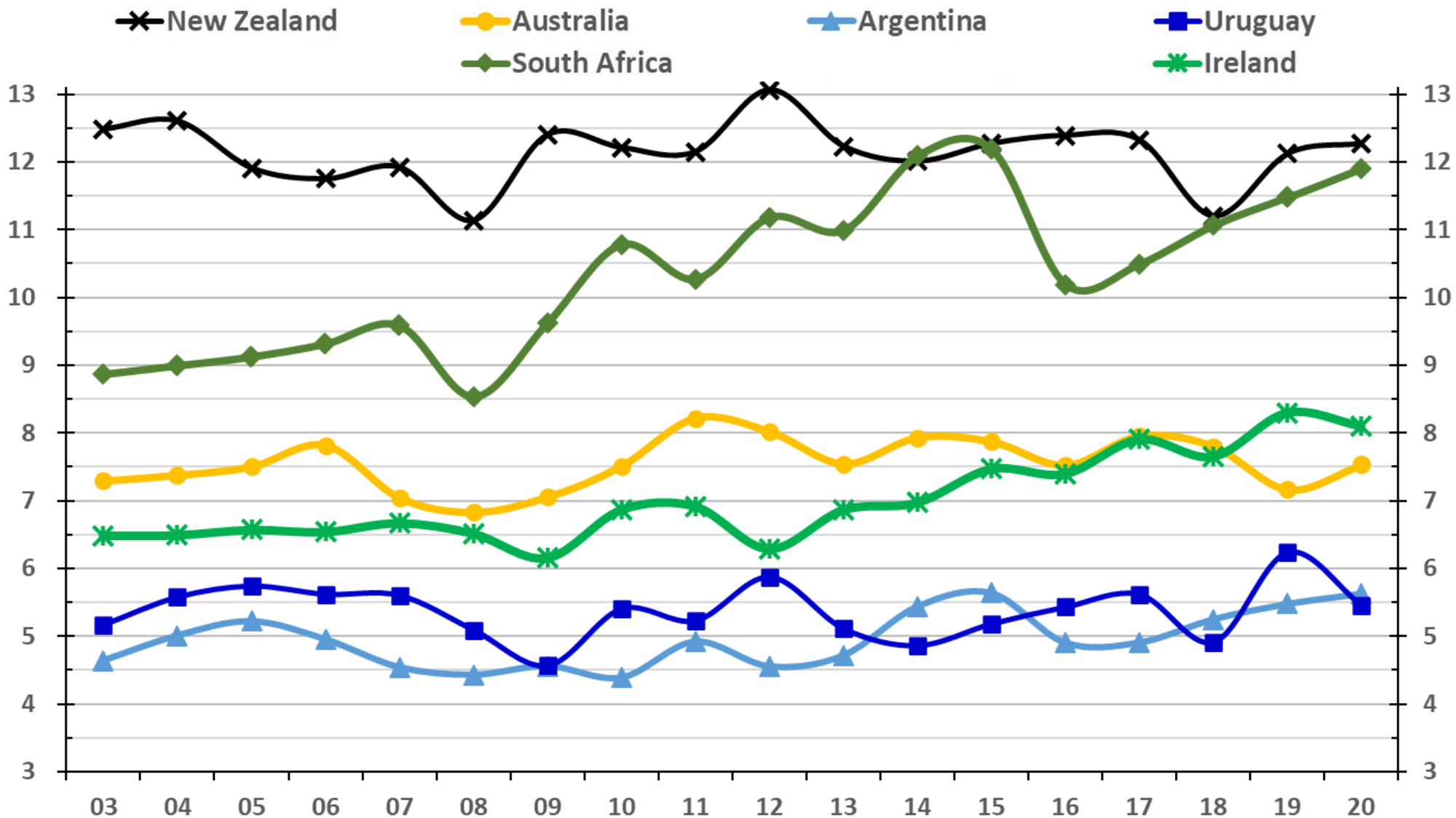
# Pasture harvest impact on cost of production



## Known factors that correlate with pasture harvest

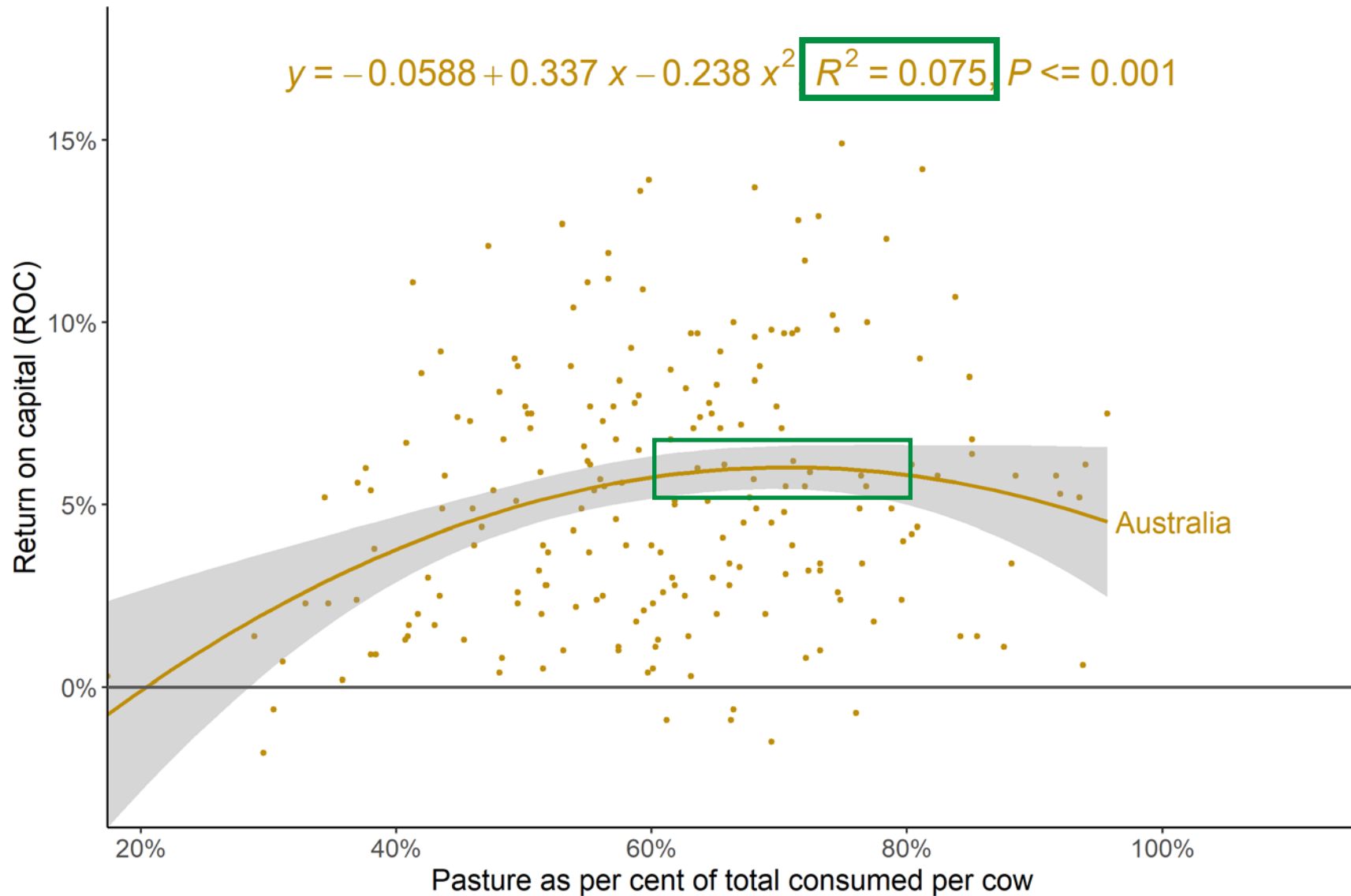
Factors (ratios) that correlate with PASTURE HARVEST		
As pasture harvest INCREASES	Change	R <sup>2</sup>
<b>Return on Capital (PROFIT)</b>	<b>Increases</b>	<b>0.41</b>
<b>Cost of production per litre</b>	<b>Decreases</b>	<b>0.14</b>
Core per hectare cost per tDM of pasture harvest	Decreases	0.31
Pasture cost per tonne dry matter	Decreases	0.23
Supplement cost per litre	Decreases	0.12
Labour cost per cow	Decreases	0.09
Total feed cost per litre	Decreases	0.08
Core per cow cost	Decreases	0.08
<b>Other factors</b>		
Stocking rate impact on pasture harvest	Increases	0.63

# Pasture harvest (tDM per hectare)

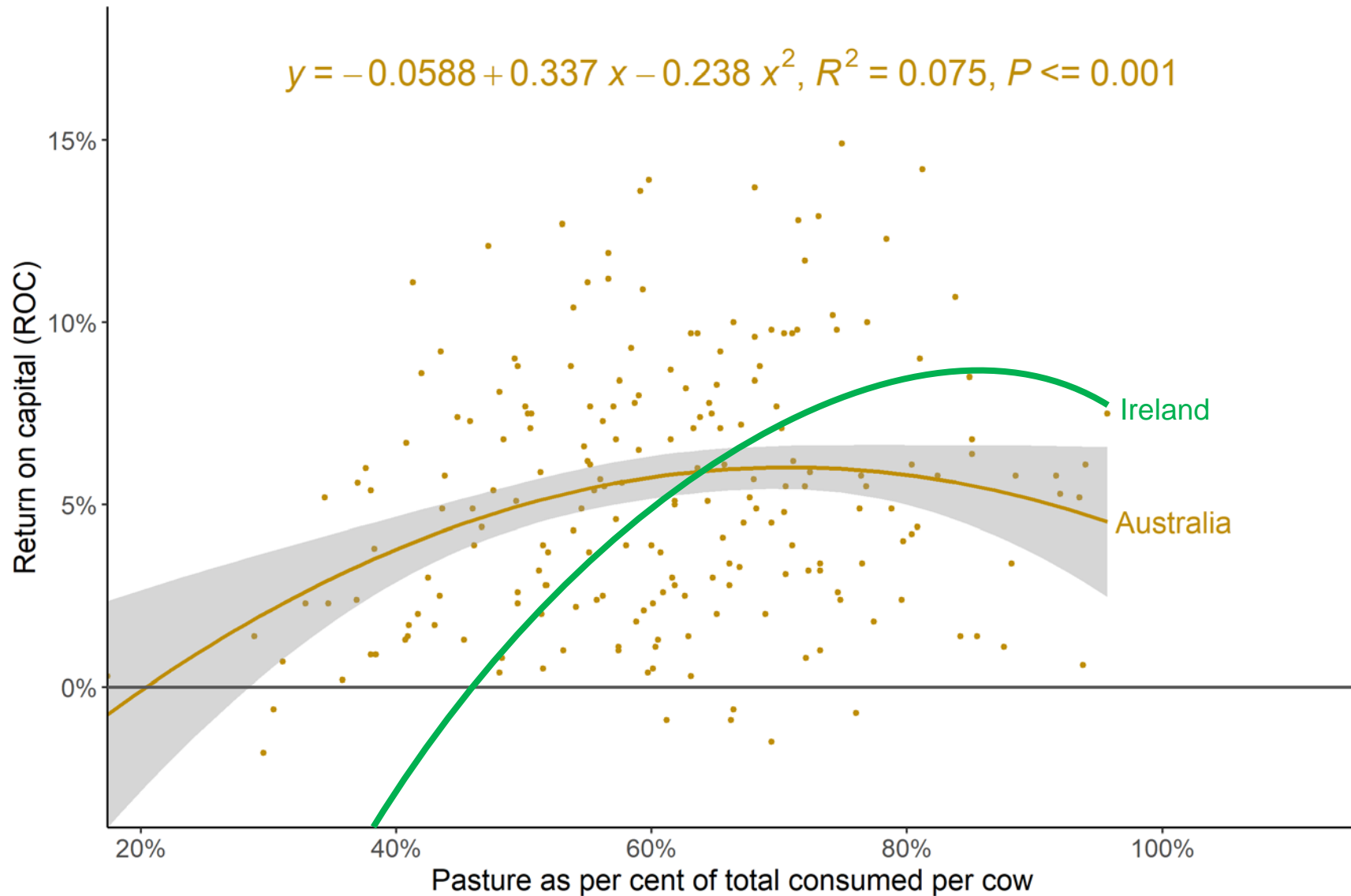


Source: DairyBase (NZ), DFMP, QDAS, Red Sky, AACREA, FUCREA, Teagasc

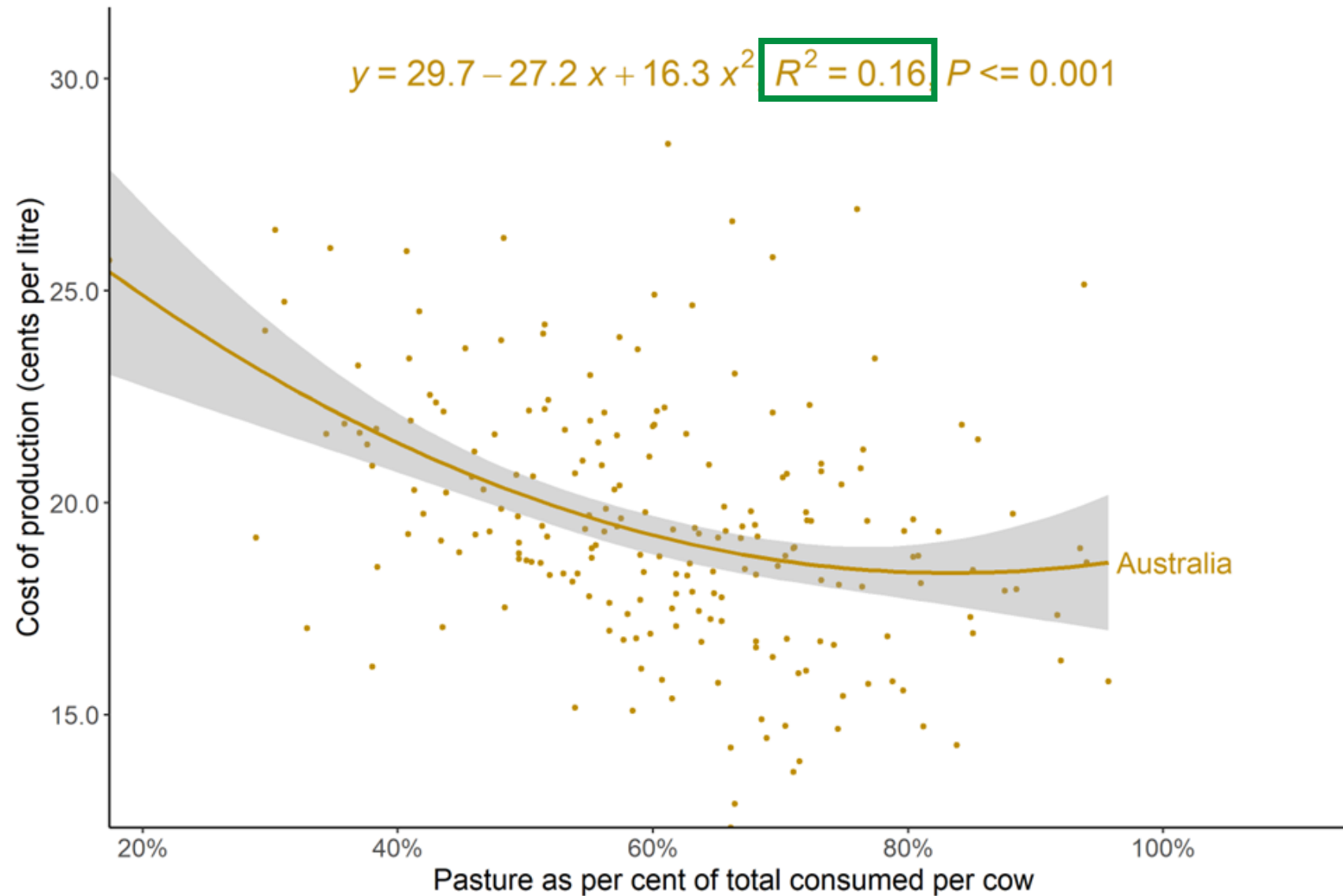
# Pasture as percentage of cows' diet impact on profit (ROC)



# Pasture as percentage of cows' diet impact on profit (ROC)



# Pasture as percentage of cows' diet impact on cost of production

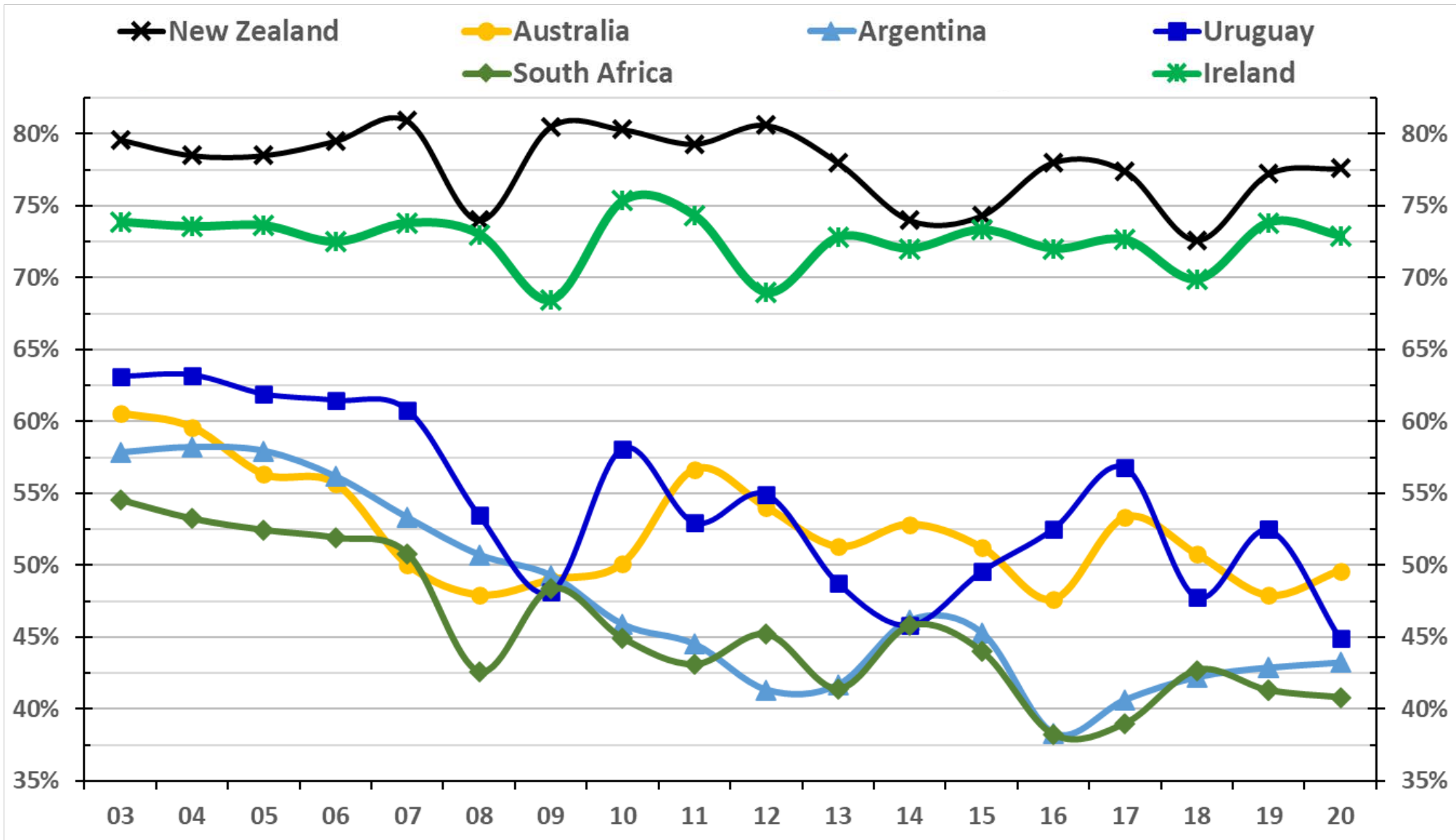




# Known factors that correlate with pasture as percentage of cows' diet

<b>Factors (ratios) that correlate with PASTURE as PERCENTAGE of COWS' DIET</b>		
<b>As pasture as per cent of cows' diet DECREASES</b>	<b>Change</b>	<b>R<sup>2</sup></b>
<b>Return on Capital (PROFIT)</b>	<b>Decreases</b>	<b>0.08</b>
<b>Cost of production per litre</b>	<b>Increases</b>	<b>0.16</b>
Supplement cost per litre	Increases	0.58
Total feed cost per litre	Increases	0.50
Core per hectare cost per tDM of pasture harvest	Increases	0.49
Pasture cost per tonne dry matter	Increases	0.26
Core per cow cost	Increases	0.09
Labour cost per cow	Increases	0.08
<b>Pasture harvest</b>	<b>Decreases</b>	<b>0.10</b>

# Pasture as percentage of cows' diet (%)



Source: DairyBase (NZ), DFMP, QDAS, Red Sky, AACREA, FUCREA, Teagasc

## Known factors that correlate with cost of production

Factors (ratios) that correlate with COST of PRODUCTION		
Cost of production INCREASES as...	Change	R <sup>2</sup>
Total feed cost per litre	Increases	0.46
Supplement cost per litre	Increases	0.37
Concentrate cost per litre	Increases	0.28
Pasture as percentage of cows' diet	Decreases	0.16
Labour cost per cow	Increases	0.27
Core per hectare cost per tDM of pasture harvest	Increases	0.26
Core per cow cost	Increases	0.22
Pasture cost per tonne dry matter	Increases	0.15
Pasture harvest	Decreases	0.14

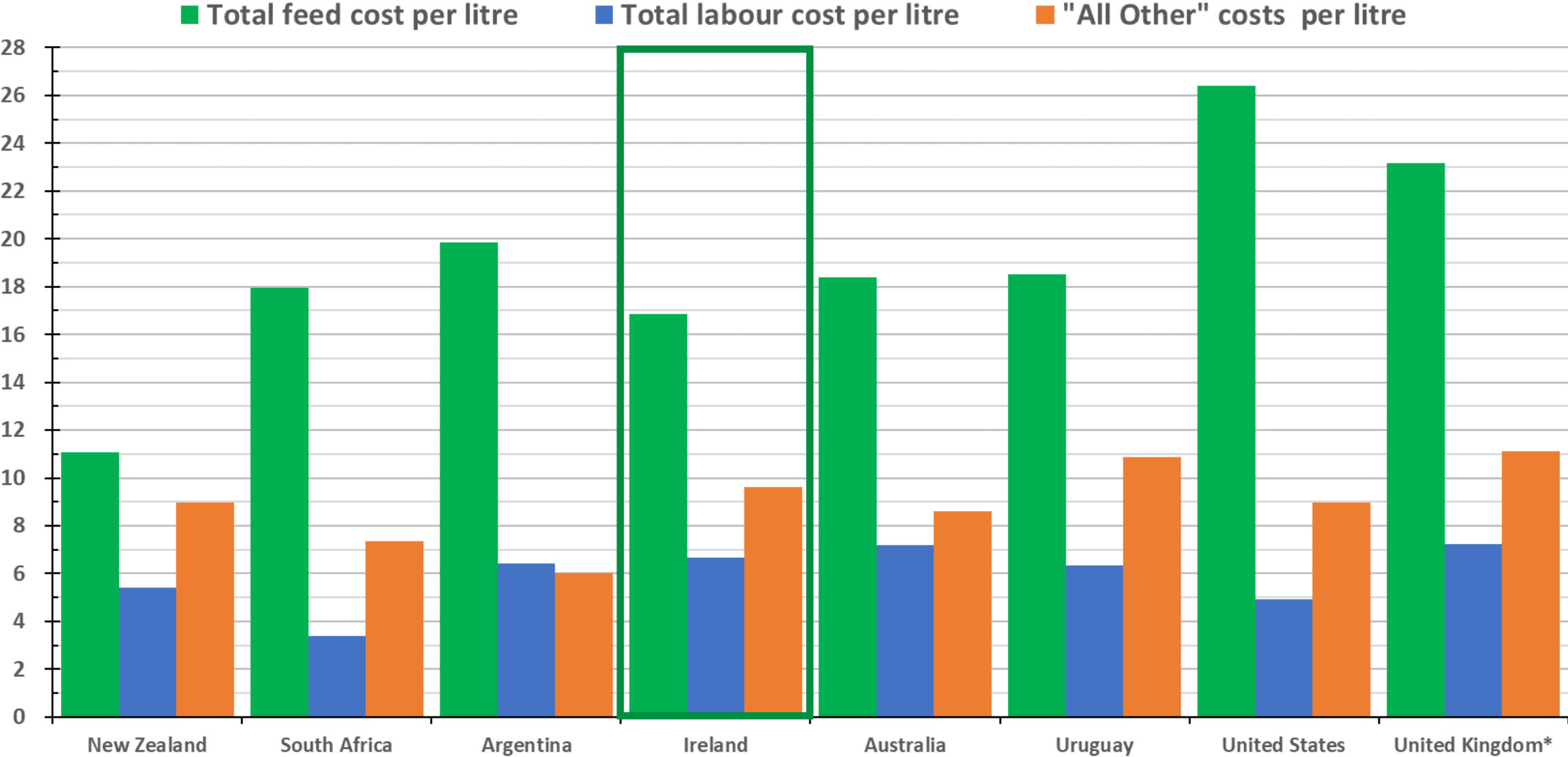
## Split of feed cost, labour cost, and 'all other' costs (\$USc per litre ECM 2015-2020)

2015-2020 (\$US cents/litre ECM)	Total Expenses	Total Feed Cost	Total Labour Cost	"All Other" Costs	Feed Cost as % Total Exp.	Labour Cost as % Total Exp.	"Other" Costs as % Total Exp.
<b>New Zealand</b>	25.4	11.1	5.4	9.0	43.5%	21.3%	35.2%
<b>South Africa</b>	28.7	18.0	3.4	7.4	62.6%	11.8%	25.6%
<b>Argentina</b>	32.3	19.8	6.4	6.0	61.5%	19.8%	18.7%
<b>Ireland</b>	<b>33.1</b>	<b>16.8</b>	<b>6.7</b>	<b>9.6</b>	<b>50.8%</b>	<b>20.2%</b>	<b>29.0%</b>
<b>Australia</b>	34.2	18.4	7.2	8.6	53.8%	21.1%	25.1%
<b>Uruguay</b>	35.8	18.5	6.4	10.9	51.8%	17.8%	30.4%
<b>United States</b>	40.3	26.4	4.9	9.0	65.5%	12.2%	22.3%
<b>United Kingdom*</b>	41.5	23.2	7.2	11.1	55.9%	17.4%	26.8%
<b>Pasture-based farms</b>					<b>40%-65%</b>	<b>10%-25%</b>	<b>15%-35%</b>
Feedlot / confinement farms					60%-70%	10%-15%	15%-30%

All per litre costs based on energy corrected milk (corrected to 4.0% fat and 3.3% protein)

\* United Kingdom costs are estimated

# Split of feed cost, labour cost, and 'all other' costs (\$USc per litre ECM 2015-2020)



Source: DairyBase (NZ), DFMP, QDAS, Red Sky, AACREA, FUCREA, Teagasc, AHDB, Genske Mulder, USDA

## Cost of pasture, concentrate and non-pasture forage (\$US per tDM 2015-2020)

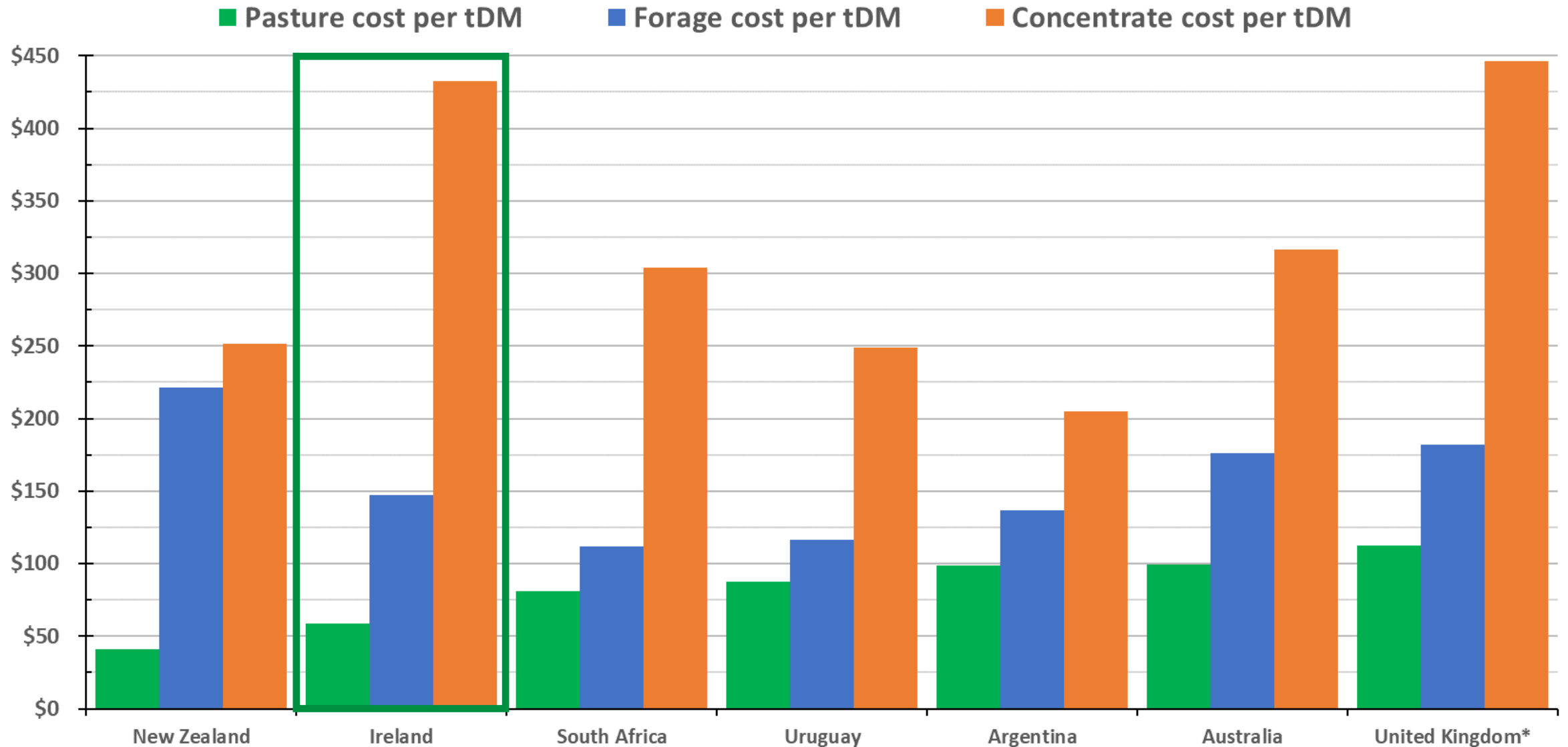
2015-2020 (\$US/tDM)	Pasture Cost *	Concentrate Cost **	Concentrate : Pasture Ratio	Forage Cost **	Forage : Pasture Ratio
<b>New Zealand</b>	\$41	\$251	+ 508%	\$221	+ 436%
<b>Ireland</b>	<b>\$59</b>	<b>\$433</b>	<b>+ 634%</b>	<b>\$147</b>	<b>+ 150%</b>
<b>South Africa</b>	\$81	\$304	+ 275%	\$112	+ 38%
<b>Uruguay</b>	\$87	\$249	+ 185%	\$116	+ 33%
<b>Argentina</b>	\$99	\$205	+ 108%	\$137	+ 39%
<b>Australia</b>	\$99	\$316	+ 219%	\$176	+ 77%
<b>United Kingdom ***</b>	\$113	\$446	+ 296%	\$182	+ 61%

\* Pasture cost includes fertiliser, pasture renovation, greenfeed crops and irrigation

\*\* Concentrate cost and forage cost include wastage and storage costs

\*\*\* United Kingdom pasture and supplement costs are estimated

# Cost of pasture, concentrate and non-pasture forage (\$US per tDM 2015-2020)



Source: DairyBase (NZ), DFMP, QDAS, Red Sky, AACREA, FUCREA, Teagasc, AHDB, Genske Mulder, USDA

## Change in consumed feed cost for Ireland in \$US per tDM as percentage of pasture in the cows' diet changes (2015-2020)

IRELAND average feed cost 2015-2020 (\$US per tonne dry matter)								
Pasture percent of diet	80%	70%	60%	50%	40%	30%	20%	0%
Pasture cost **	\$54	\$61	\$69	\$76	\$84	\$91	\$99	
Concentrate cost ***	\$433	\$433	\$433	\$433	\$433	\$433	\$433	\$433
Forage cost ***	\$147	\$147	\$147	\$147	\$147	\$147	\$147	\$147
Supplement cost ****	\$347	\$347	\$347	\$347	\$347	\$347	\$347	\$319
<b>Average feed cost **</b>	<b>\$112</b>	<b>\$147</b>	<b>\$180</b>	<b>\$212</b>	<b>\$242</b>	<b>\$270</b>	<b>\$297</b>	<b>\$319</b>
<b>Increase cost from 80%</b>		<b>+ 31%</b>	<b>+ 60%</b>	<b>+ 89%</b>	<b>+ 115%</b>	<b>+ 141%</b>	<b>+ 165%</b>	<b>+ 184%</b>

\*\* Pasture cost (and Average feed cost) include pasture cost adjusted for impact of variations in pasture per cent

\*\*\* Concentrate cost and forage cost include wastage and storage costs

\*\*\*\* Supplement cost based on 70% concentrate plus 30% forage, except for 0% pasture which is split 60:40



# Known factors that are impacted when production systems change

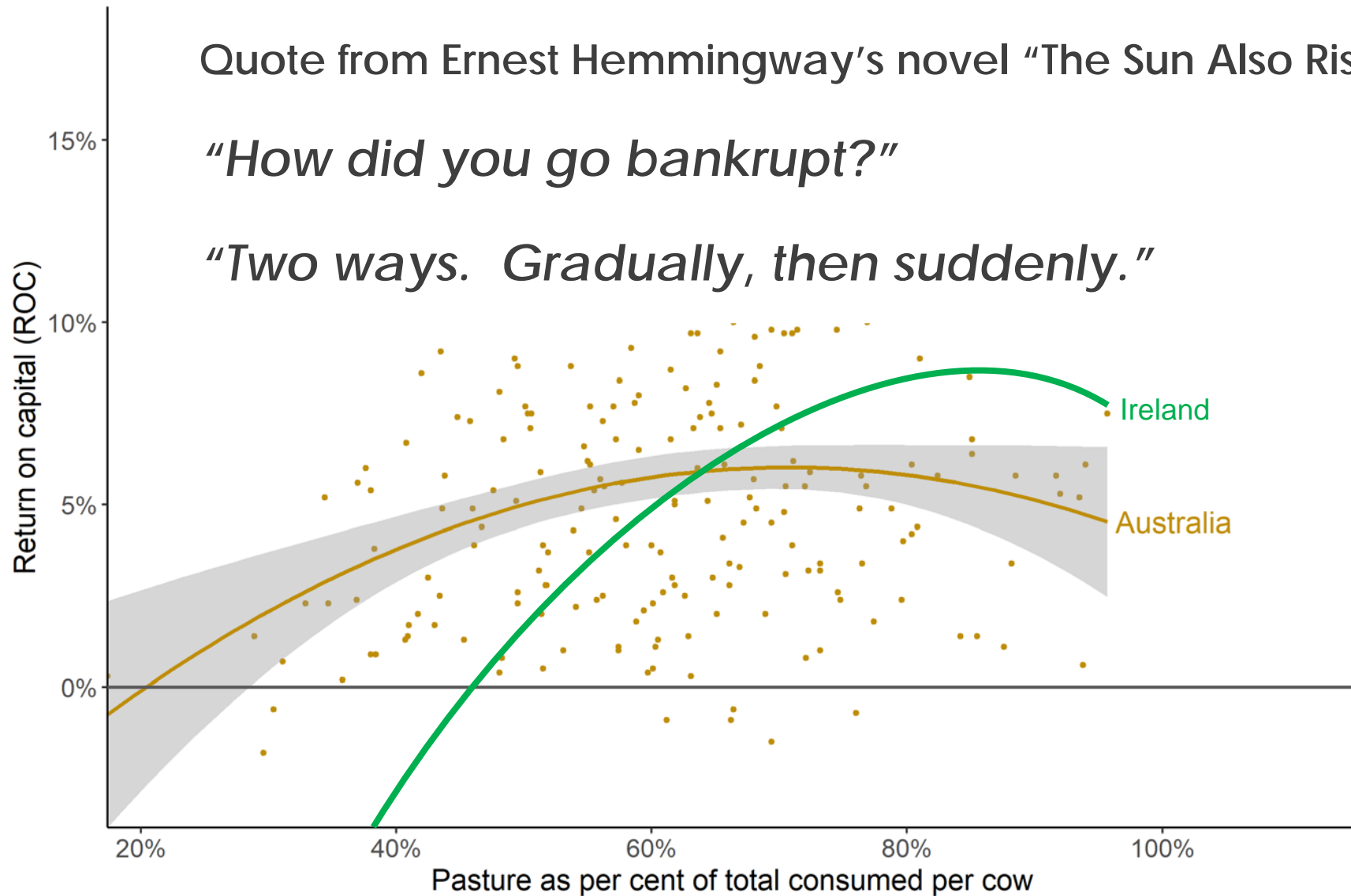
Calculated impact of 1% decrease in pasture percentage of cows' diet		
Ratios impacted	Impact	1% change
Milk production per cow	Increases	+ 0.48 %
Animal health per cow	Increases	+ 1.09 %
Breeding & herd testing per cow	Increases	+ 1.06 %
Dairy shed expenses per cow	Increases	+ 0.47 %
Electricity per cow	Increases	+ 0.46 %
Grazing & support area per cow	Decreases	- 1.00 %
Repairs & maintenance per cow	Increases	+ 0.49 %
Vehicle expenses per cow	Increases	+ 0.61 %
Total labour cost per cow	Increases	+ 0.42 %
Depreciation per cow	Increases	+ 0.75 %
<b>Pasture harvest per tDM</b>	<b>Decreases</b>	<b>- 0.99 %</b>

# Pasture as percentage of cows' diet impact on profit (ROC)

Quote from Ernest Hemmingway's novel "The Sun Also Rises":

*"How did you go bankrupt?"*

*"Two ways. Gradually, then suddenly."*



## So how do you make good decisions...

Use the “whole farm approach” to analyse options

Understand which ratios causally correlate with profit and monitor these

Always focus on pasture harvest as the primary driver of profit...

...and percentage of pasture in the cows' diet (production system) as the primary driver of cost of production, which determines economic resilience

High labour efficiency and tight cost control complete the picture

And if you still end up heading down a high cost of production and low profit 'path', plan with great care your 'exit' strategy...

...and hope you have maintained a pasture-genotype cow

Thank you