Webinar #1

What are the three dominant factors that farmers should focus on to increase profit on dairy farms?

Which are the essential ratios for dairy farmers to monitor if higher profit is the goal and how do these ratios change when pasture harvest increases, milk production per cow increases, and farm production systems change?

David Beca

28 & 29 October 2020

Eastern Cape & KwaZulu-Natal

Standard Bank

BARENBRUG

Presentation outline

- Background to data analysis
- Identifying core group of ratios relating to profit
- Review impacts of changes to pasture harvest
- Review impacts of changes to milk production per cow
- Review impacts of changes to production systems (i.e. changes to per cent of pasture in the diet)
- Conclusions

Sources of data – all processed through Red Sky

Australia data

207 Australian dairy farms from a unique unbiased dataset of a single year (2005/06)

Huge range of production systems and environments due to industry-wide funding of data collection

Milk price, supplement prices & weather all within 'norms'

South Africa data

244 South African dairy farm datasets across 4 years from 2014/15 to 2017/18…plus a further 60+ from 2018/19 reviewed

Biased to KZN and a single consultancy business (Intelact)

2017/18 very high milk price, 2018/19 very low milk price & poor weather

Over 140 relationships were statistically reviewed for each country

Basis of statistical analysis

Graphs show an equation, an R^2 value and a P value

$y = 0.0155 + 2.54 \times 10^{-6}\, x,\ R^2 = 0.2,\ P <= 0.001$

R^2 value is proportion of variation on y-axis explained by x-axis

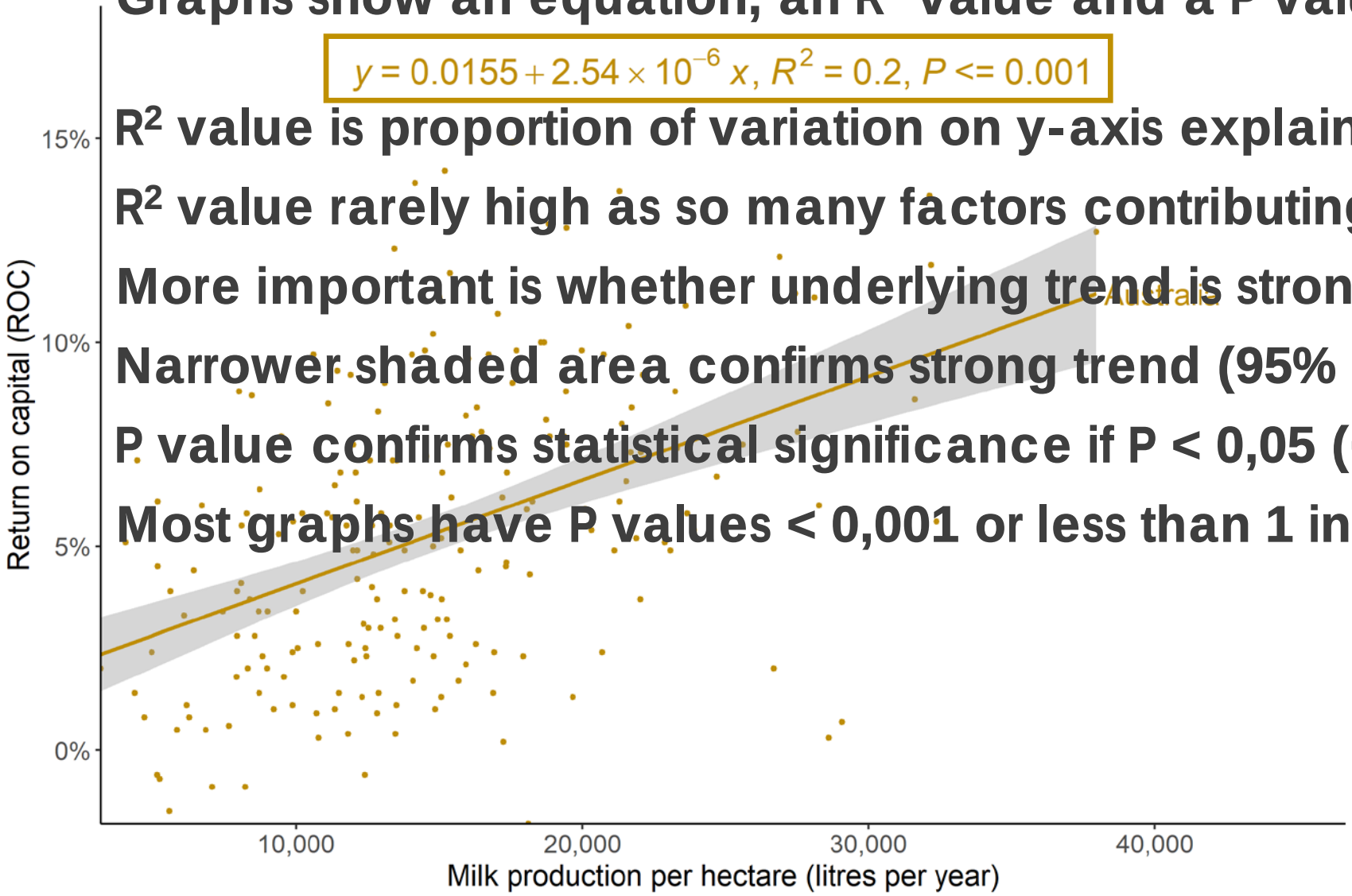
R^2 value rarely high as so many factors contributing to profit

More important is whether underlying trend is strong

Narrower shaded area confirms strong trend (95% confidence interval)

P value confirms statistical significance if P < 0,05 (< 1 in 20 random)

Most graphs have P values < 0,001 or less than 1 in 1000 random



Correlations and causations

Correlations confirmed by statistical analysis

Causations more difficult to prove as need further evidence – an argument needs to be constructed

Correlations in dairying are multi-factorial so associations between two variables need to be considered carefully

- Example: Neal and Roche 2020

Neal and Roche 2020

Paper titled: “Profitable and resilient pasture-based dairy farm businesses in New Zealand”

Paper outlined that the top quartile farmers produced approx 340 litres/cow more than average farmers (statistically significant)

…so some would infer that higher production per cow is more profitable

BUT the more profitable farmers;

1. Did NOT use more supplement per cow (no statistical difference)
2. DID harvest more pasture per hectare (statistically significant)
3. DID have lower expenses per hectare and per litre (statistically significant)
4. DID have less capital employed in the business (statistically significant)

So an association between two variables may be statistically significant, but may not represent a simple causal relationship

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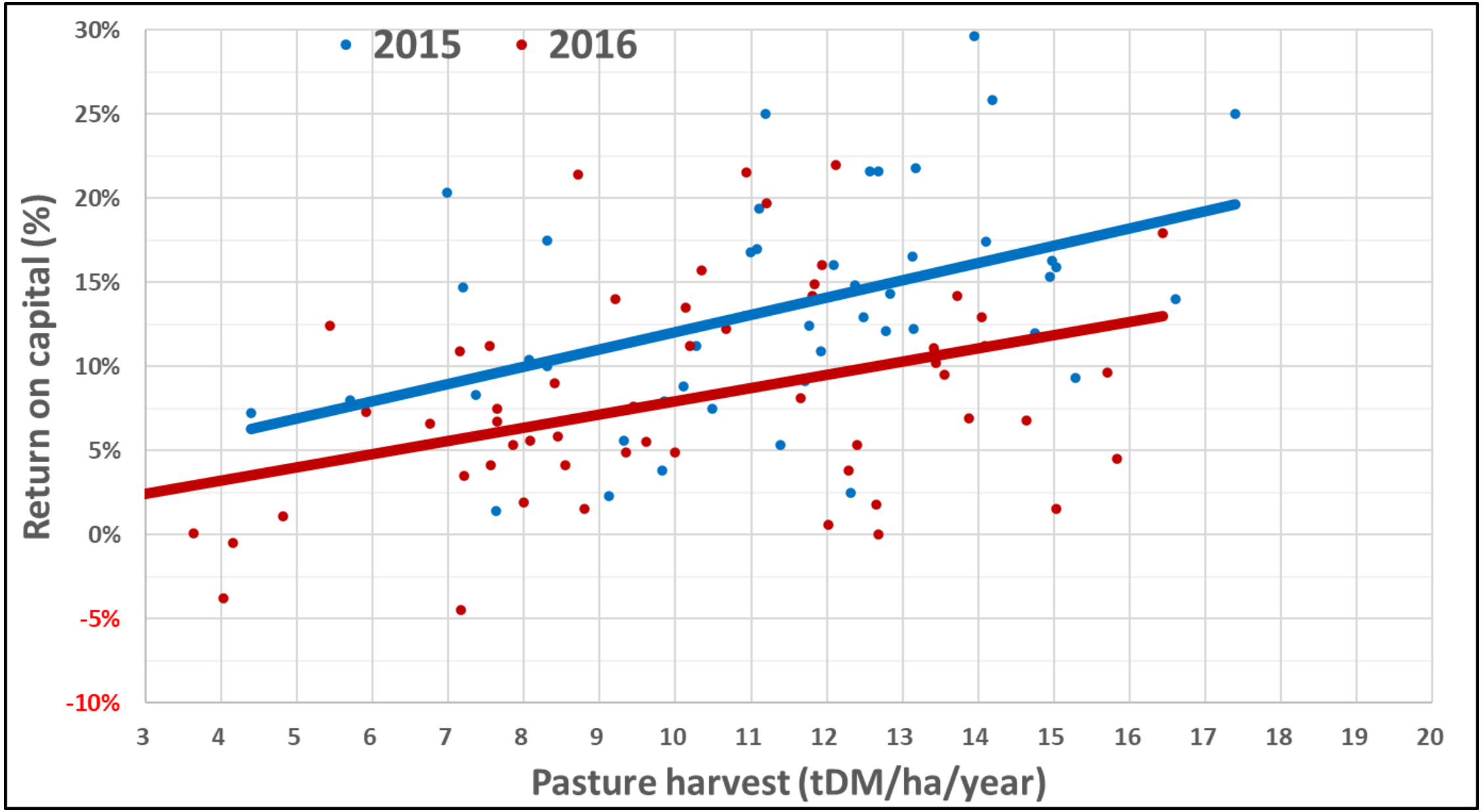
Significant causal relationships don't 'reverse' when trading conditions change – the trends flatten or steepen, tipping points move…

Pasture harvest impact on profit (South Africa)



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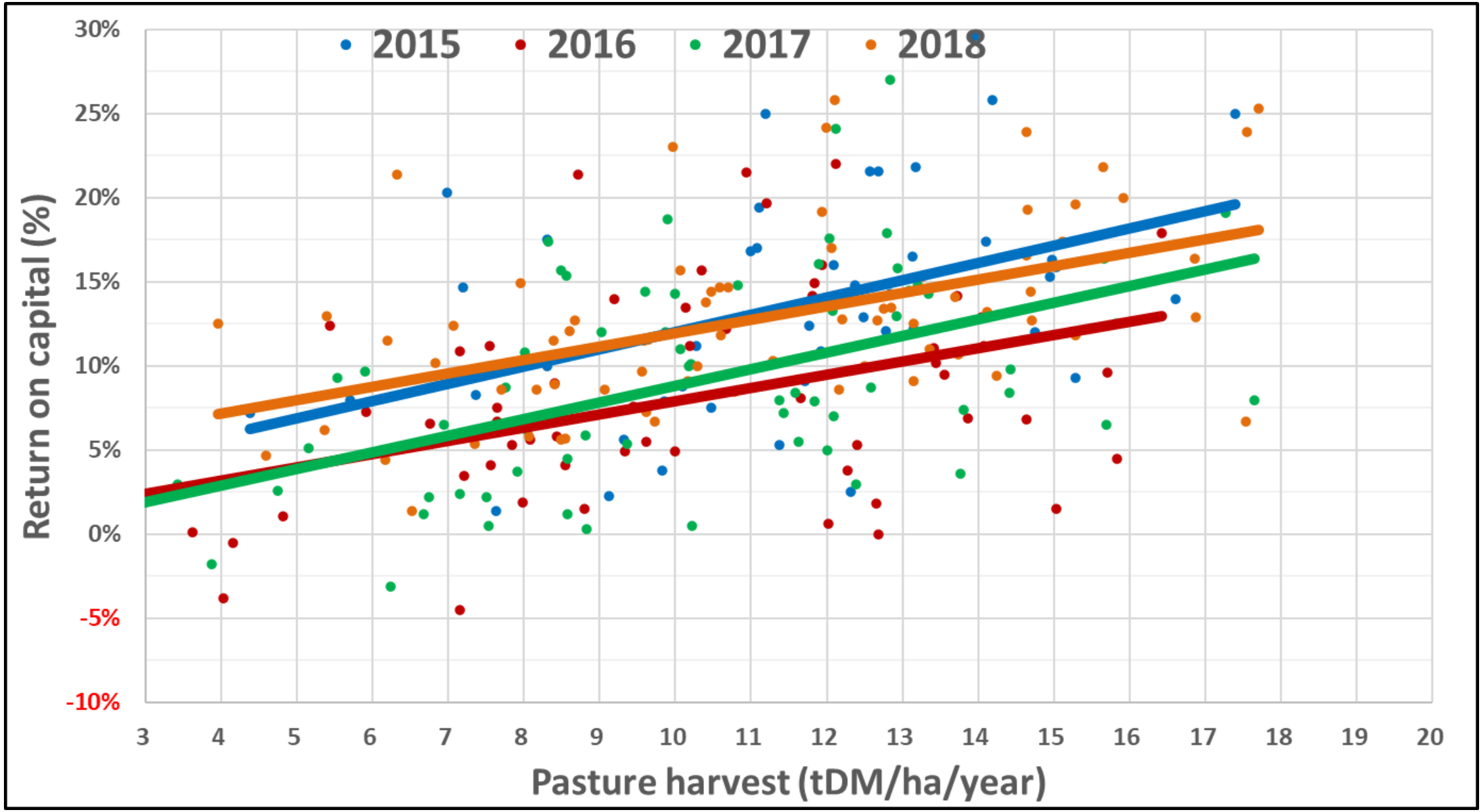

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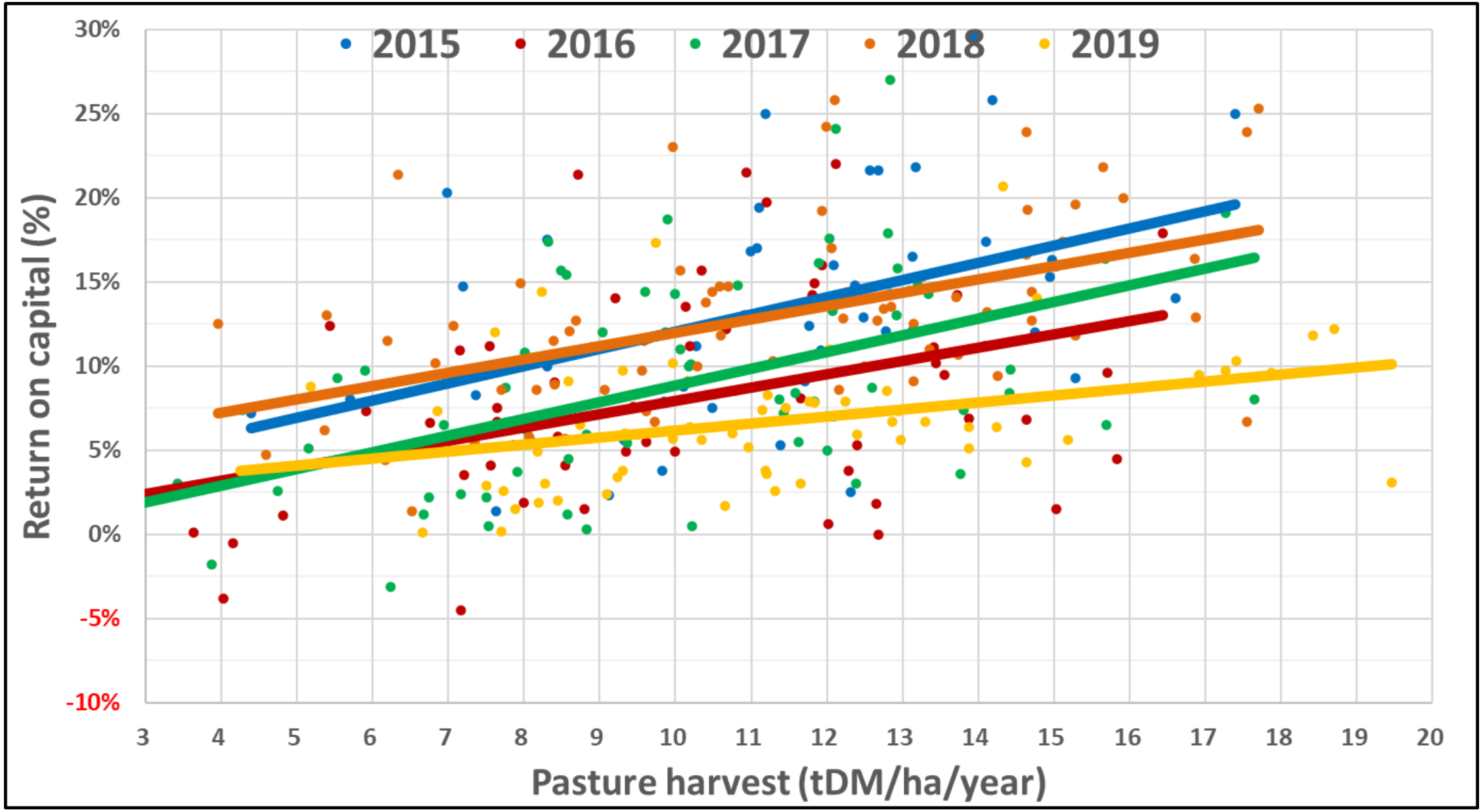
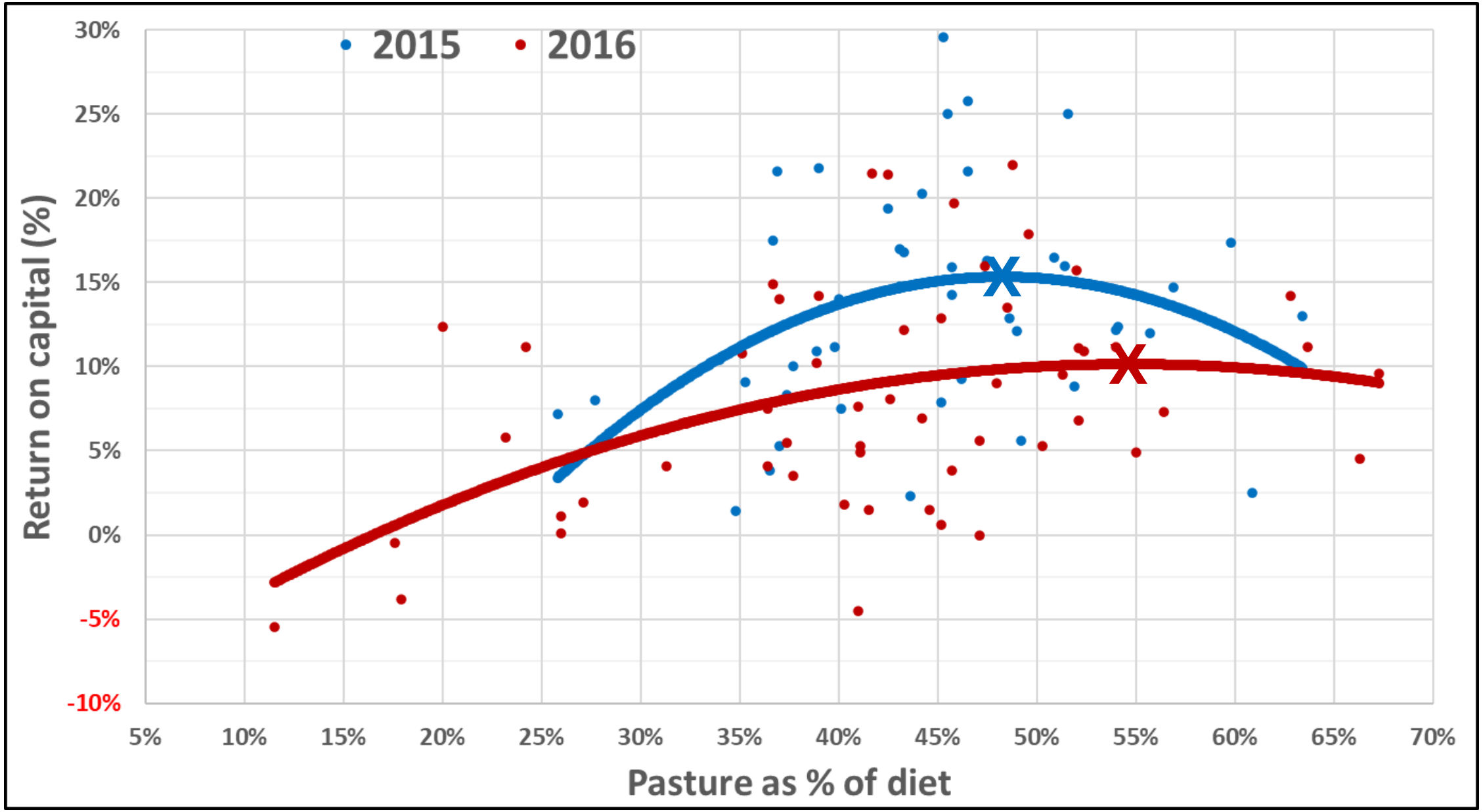


Pasture as % of diet impact on profit (South Africa)



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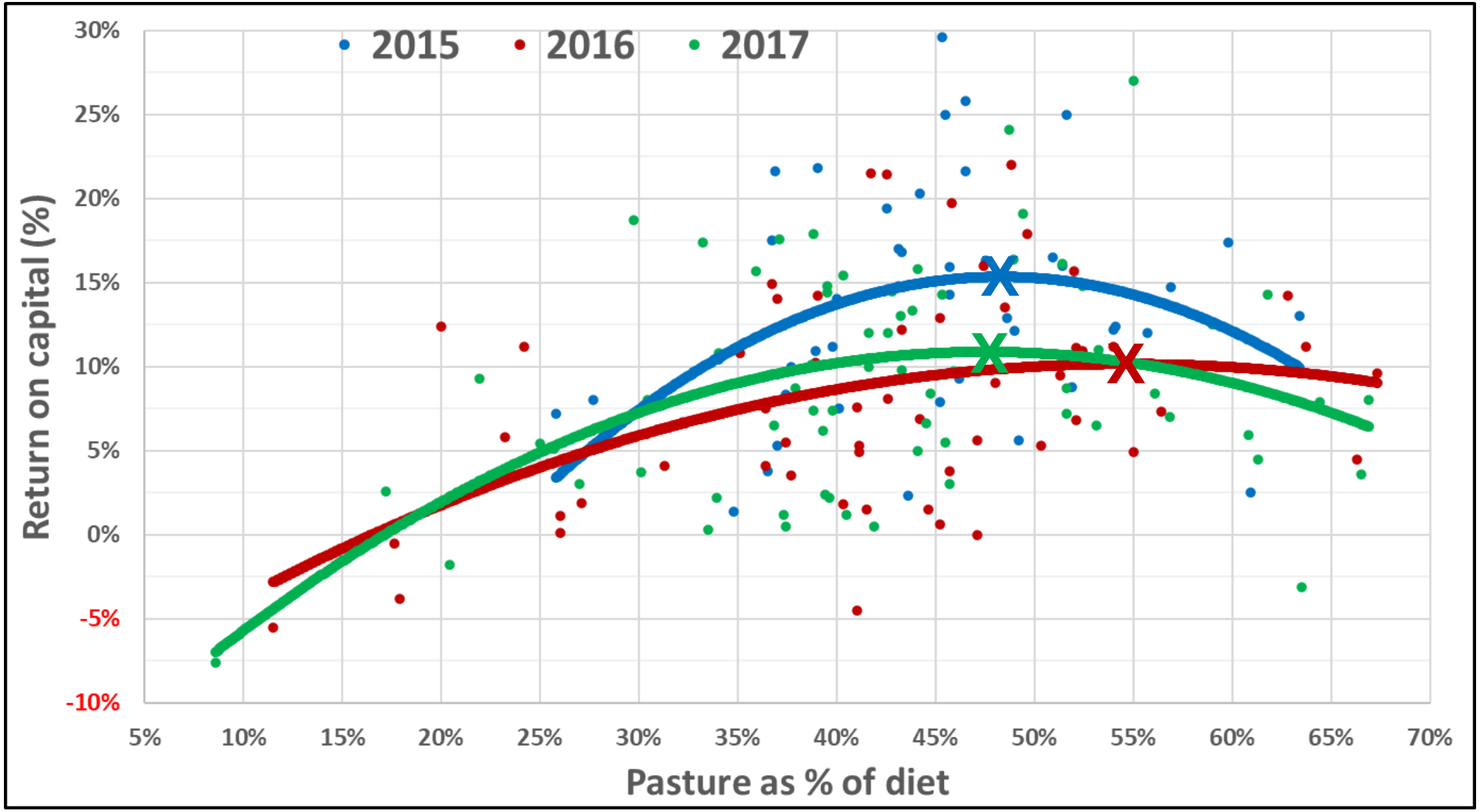

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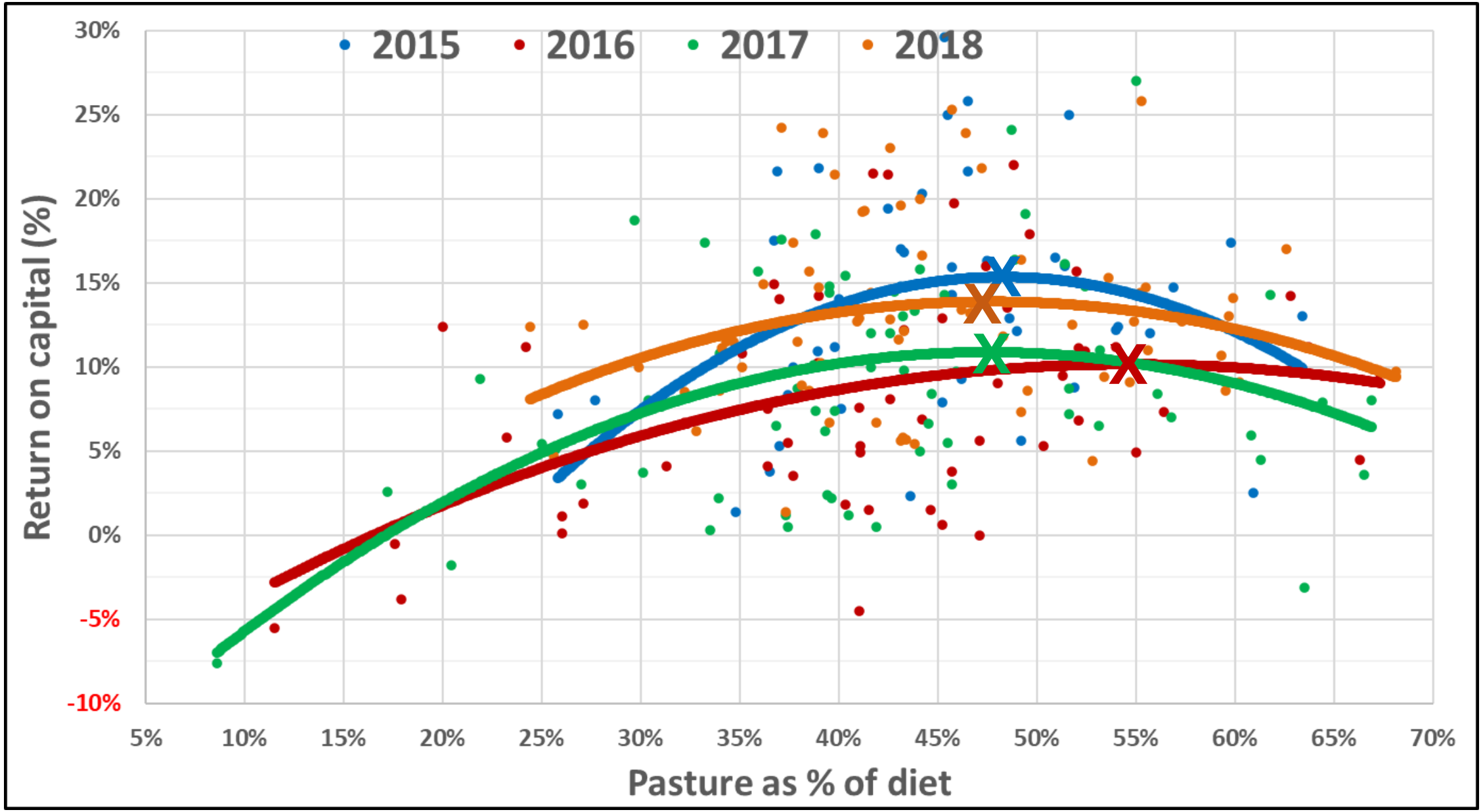

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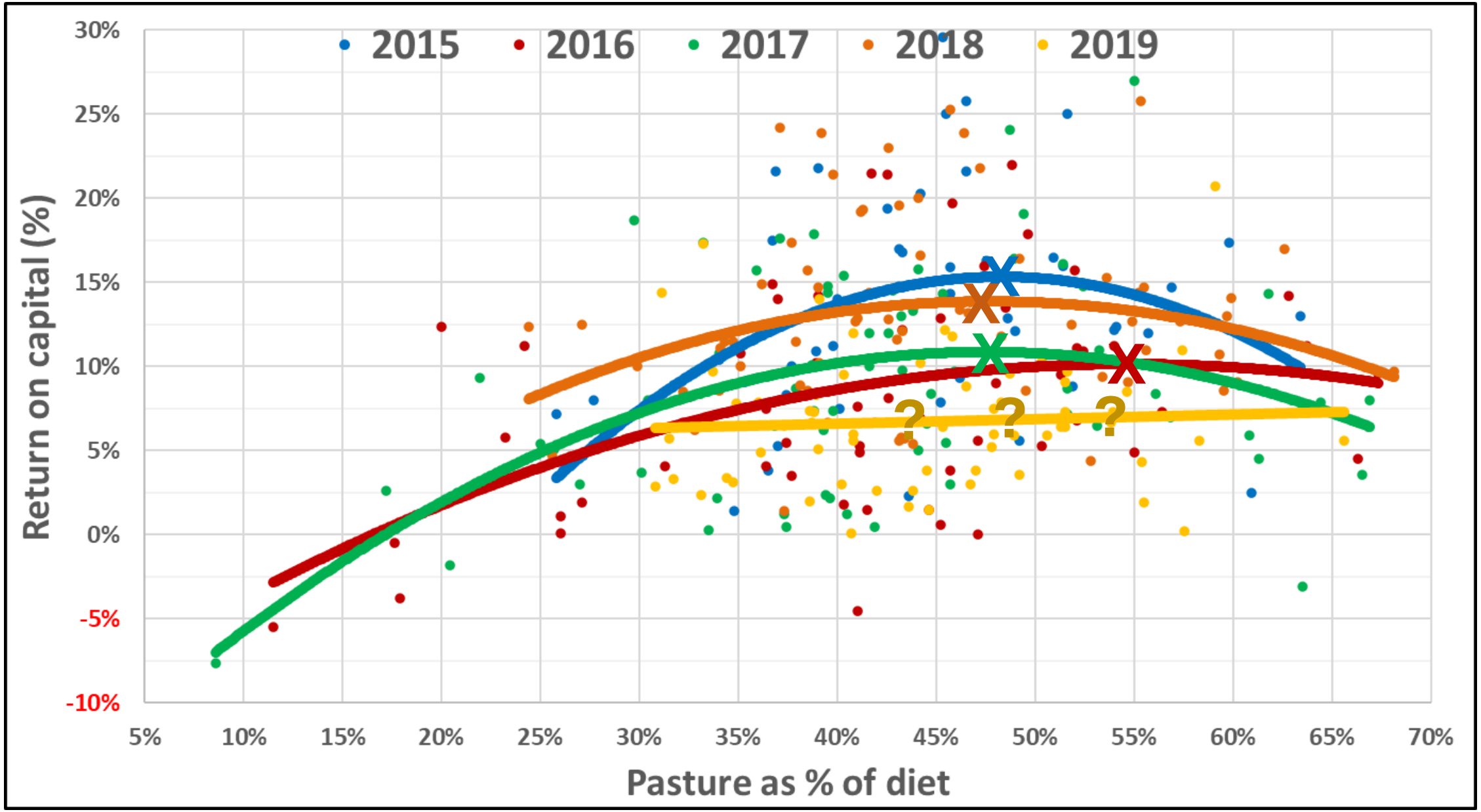

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Significant causal relationships don't 'reverse' when trading conditions change – the trends flatten or steepen, tipping points move…

Similarly causal relationships are consistent across all pasture-based regions **and countries**…with slope of curves and tipping points moving

Identifying and prioritising key profit ratios

The following slides describe the key outcomes of all the analysis

Published paper 'in press' (Australian data):

Beca, D. (2020), 'Key Determinants of Profit for Pasture-based Dairy Farms', *Australasian Agribusiness Perspectives* 23, Paper 16, pp. xxx-xxx.

http://redskyagri.com/page/redsky_52.html

Unpublished addendum with South African data

Beca, D. (2020 unpublished), 'Addendum to Key Determinants of Profit for Pasture-based Dairy Farms – South Africa versus Australia'.

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Mark Neal (DairyNZ) completed statistical analysis and provided insights

Gonzalo Tuñon (Argentina) completed original analysis and provided insights

Prioritised list of key ratios

Primary ratio	R^2	P	Secondary ratio or proxy	R^2	P
Return on total capital (ROC) [defines profit]	**Comparator for other ratios**		Profit per hectare	0,79	<= 0,001
			Profit per cow	0,73	<= 0,001
Operating profit margin	0,75	<= 0,001	Profit per litre	0,76	<= 0,001
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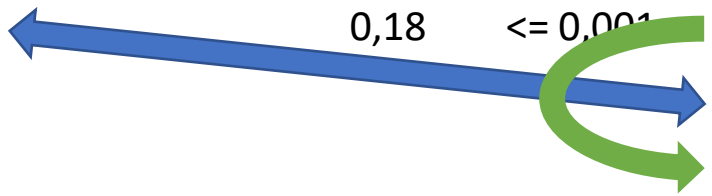

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			Profit per cow	0,73	0,85
Operating profit margin	0,75	0,79	Profit per litre	0,76	0,79
Cost of production per litre	0,44	*0,30*	Total expenses per litre	0,51	*0,23*
Pasture harvest	0,41	*0,24*	SA Irrigated R^2 = 0.30 and SA Dryland R^2 = 0.37		
Pasture cost per tonne dry matter	0,23	0,19			
Milk price	0,20	0,14			
Milk production per hectare	0,20	0,16	Stocking rate	0,25	*0,03*
Supplement cost per litre	0,20	0,12	Total feed cost per litre	0,21	0,18
Core per cow cost	0,20	*0,00*			
Labour cost per cow	0,18	*0,00*	Cows per full-time staff equivalent	0,13	0,10
			Labour cost per litre	0,17	0,13
			Litres per full-time staff equivalent	0,11	*0,26*
Core per hectare cost per tonne dry matter of pasture harvest	0,17	0,15			
Pasture as per cent of diet	0,08	0,17	Pasture consumed per cow	0,07	0,23

Prioritised list of key ratios

Primary ratio	AU R^2	SA R^2	Secondary ratio or proxy	AU R^2	SA R^2
Return on total capital (ROC) [defines profit]	**Comparator for other ratios**		Profit per hectare	0,79	0,76
			Profit per cow	0,73	0,85
Operating profit margin	0,75	0,79	Profit per litre	0,76	0,79
Cost of production per litre	0,44	*0,30*	Total expenses per litre	0,51	*0,23*
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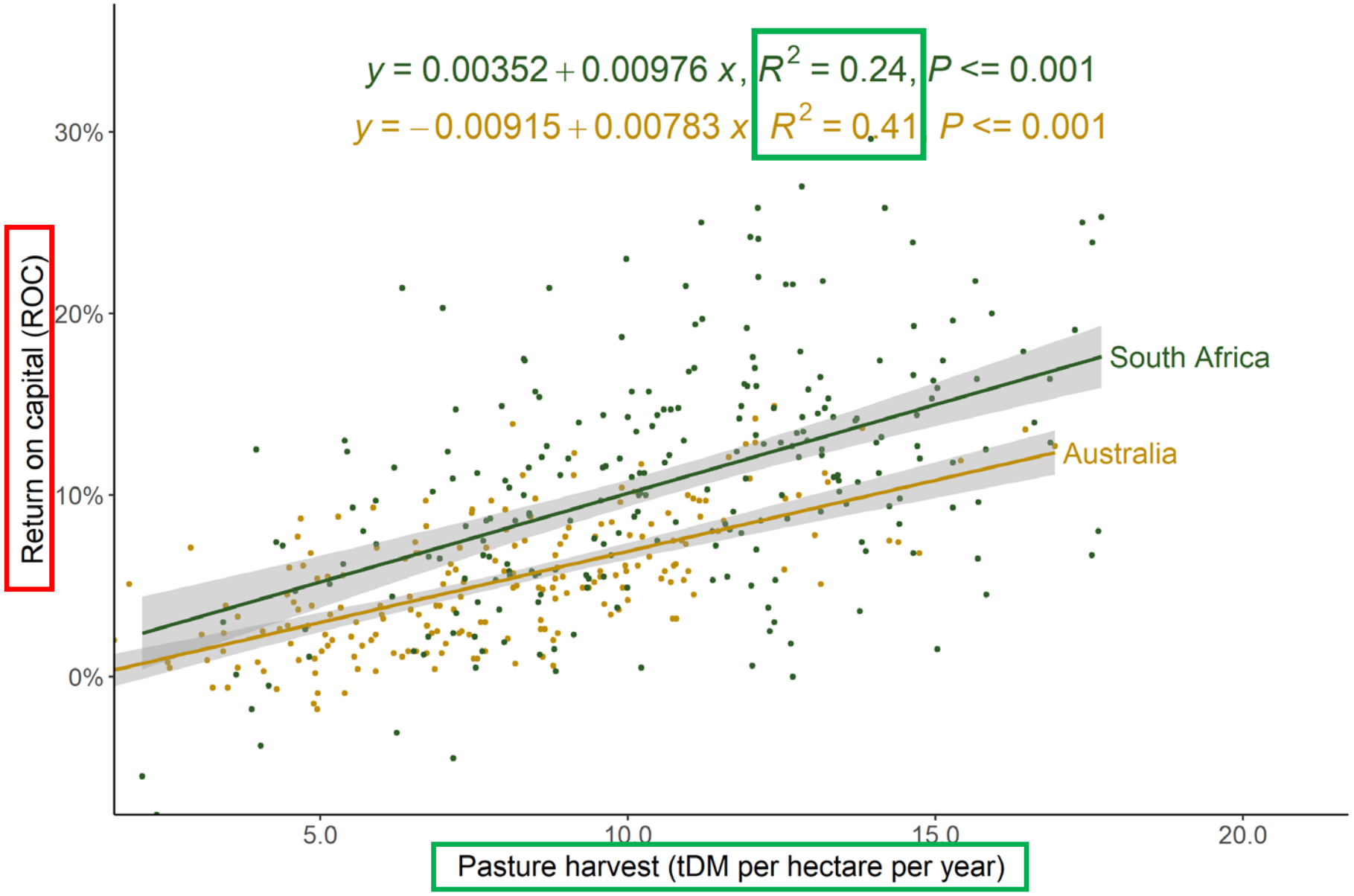
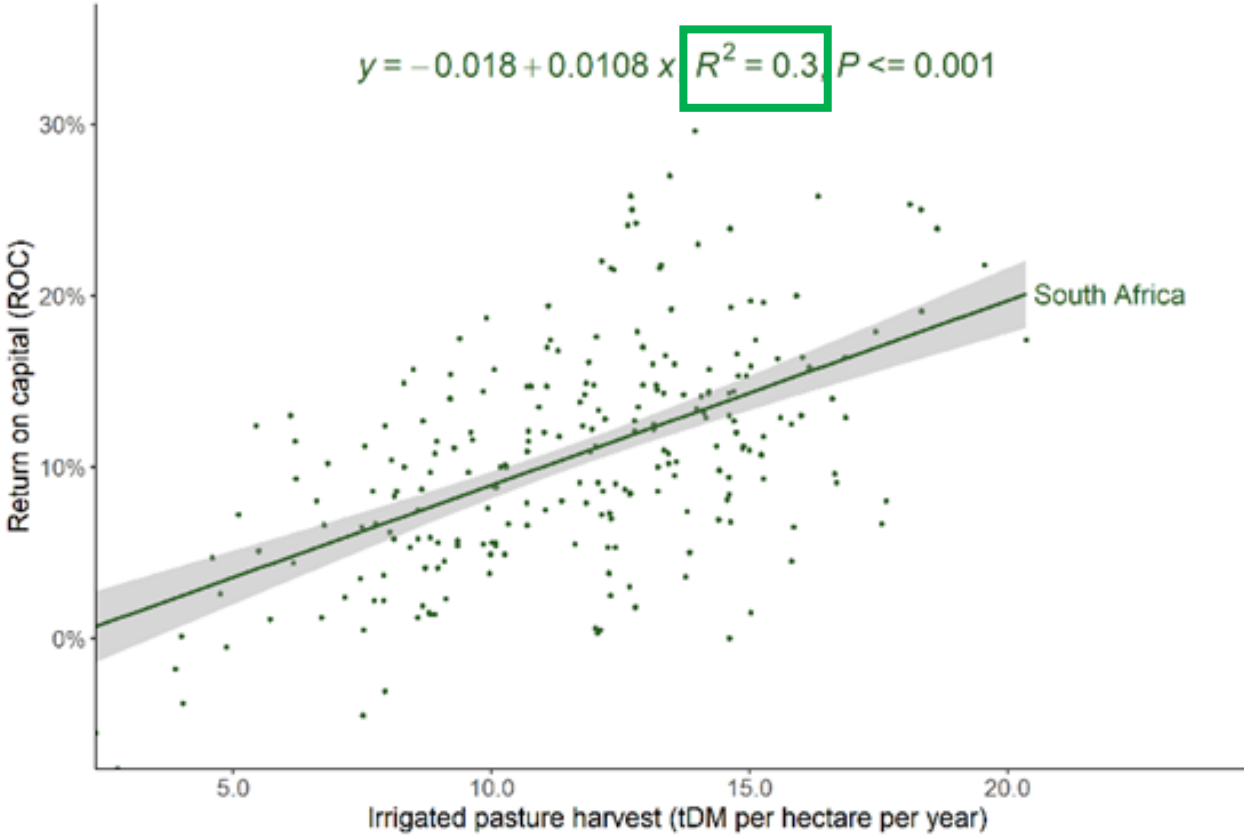
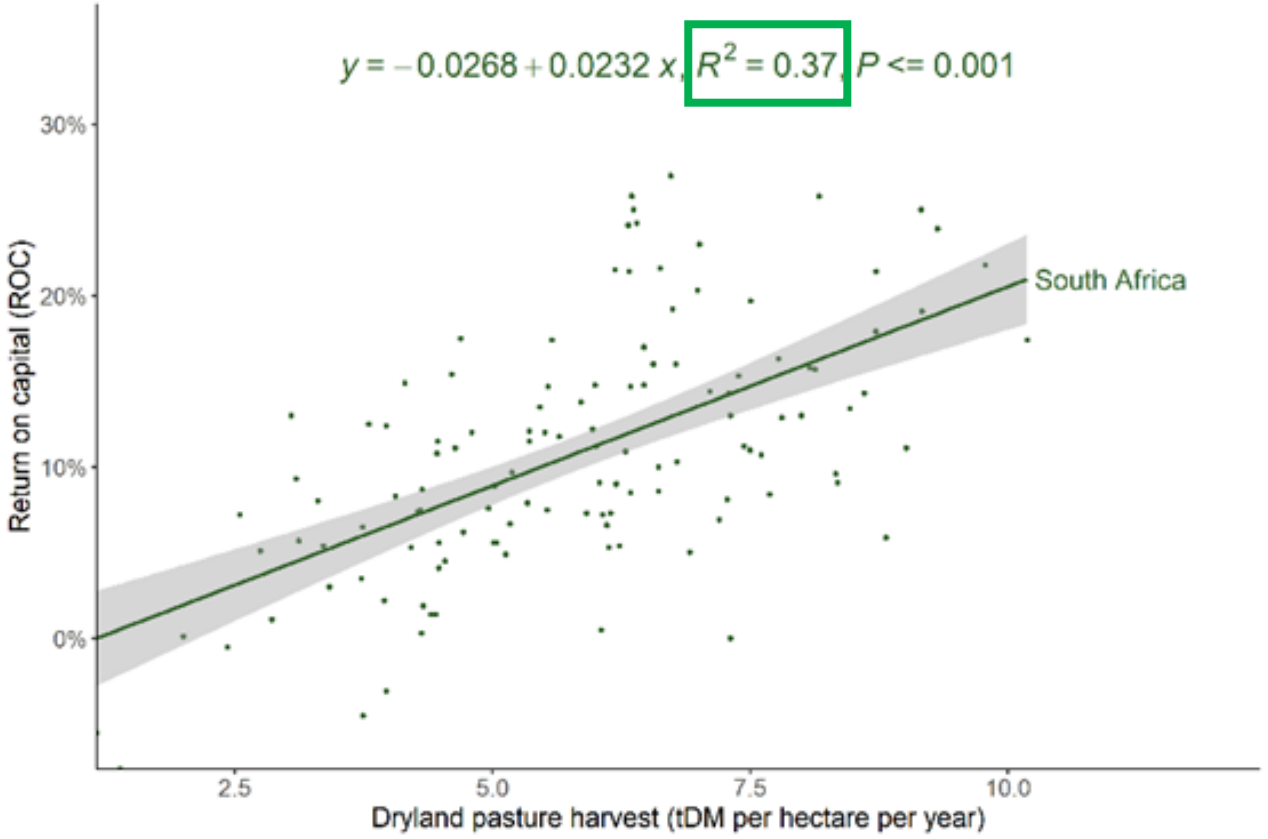
Pasture harvest impact on profit



Pasture harvest impact on profit

Irrigated vs Dryland





Prioritised list of key ratios – conflicts or bias with SA data

Primary ratio	AU R^2	SA R^2	Secondary ratio or proxy	AU R^2	SA R^2
Return on total capital (ROC) [defines profit]	**Comparator for other ratios**		Profit per hectare	0,79	0,76
			Profit per cow	0,73	0,85
Operating profit margin	0,75	0,79	Profit per litre	0,76	0,79
Cost of production per litre	0,44	*0,30*	Total expenses per litre	0,51	*0,23*
Pasture harvest	0,41	*0,24*	SA Irrigated R^2 = 0.30 and SA Dryland R^2 = 0.37		
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Core per cow cost	0,20	*0,00*			
Labour cost per cow	0,18	*0,00*	Cows per full-time staff equivalent	0,13	0,10
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Core per hectare cost per tonne dry matter of pasture harvest	0,17	0,15			
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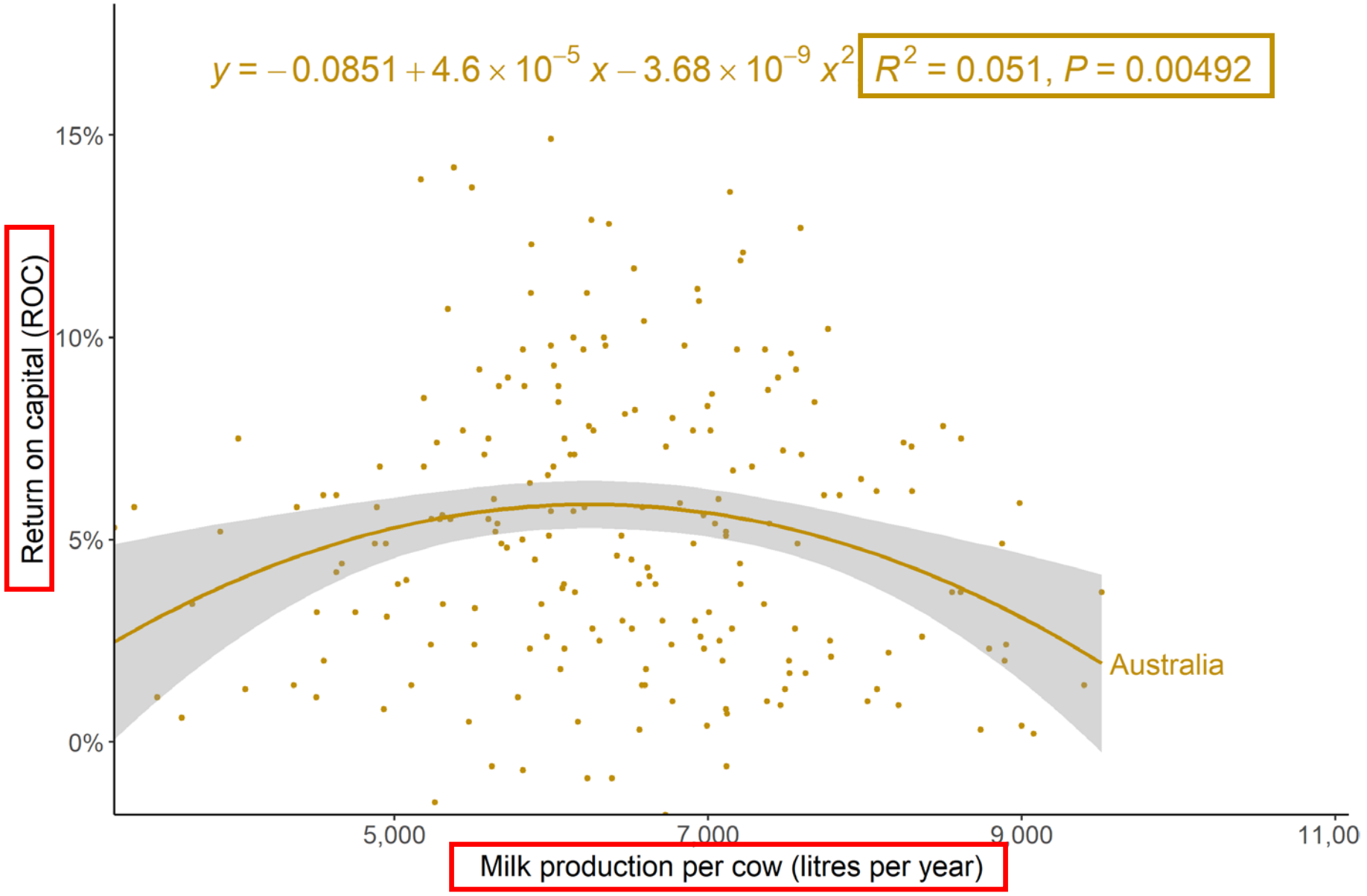
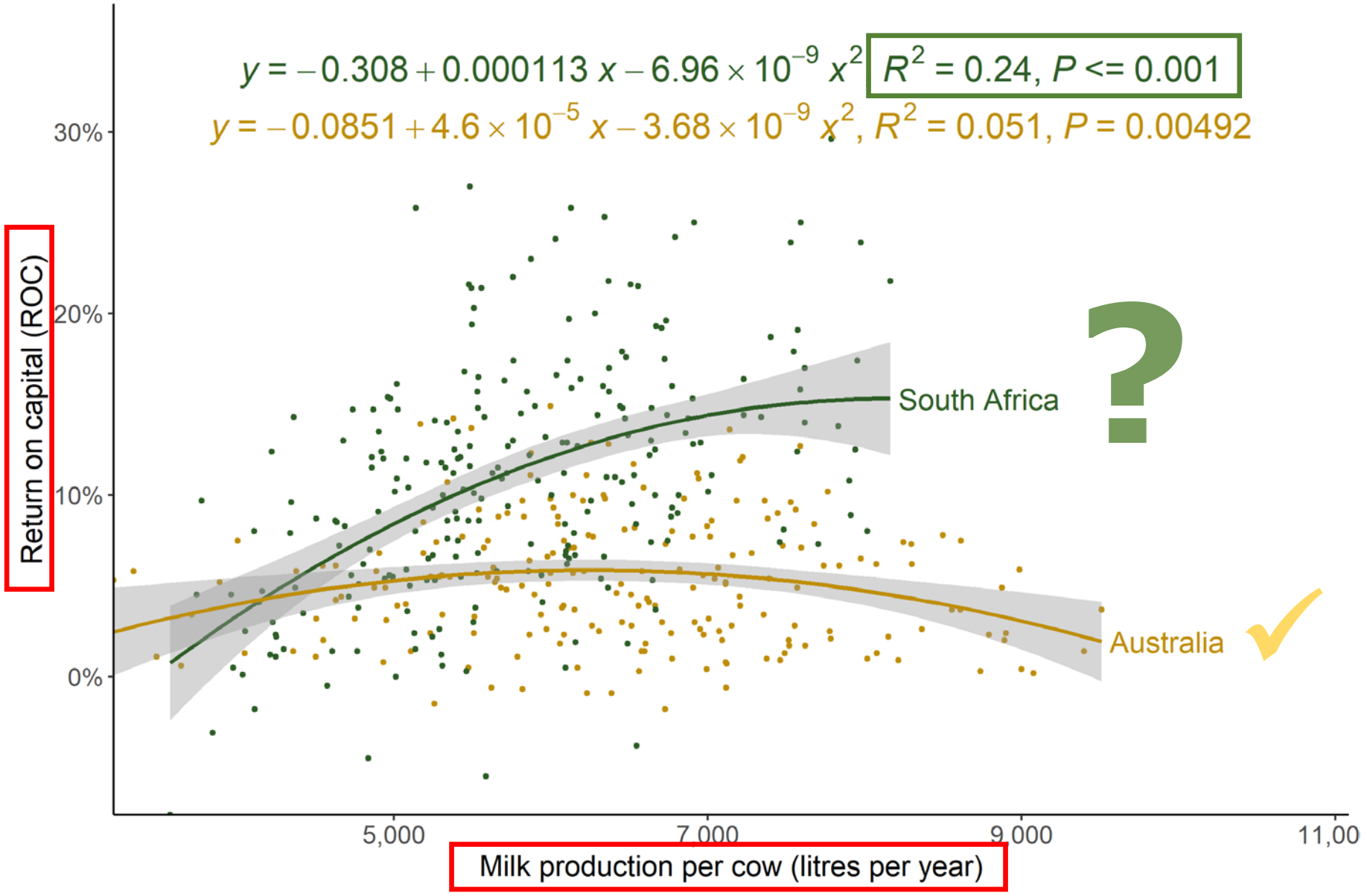
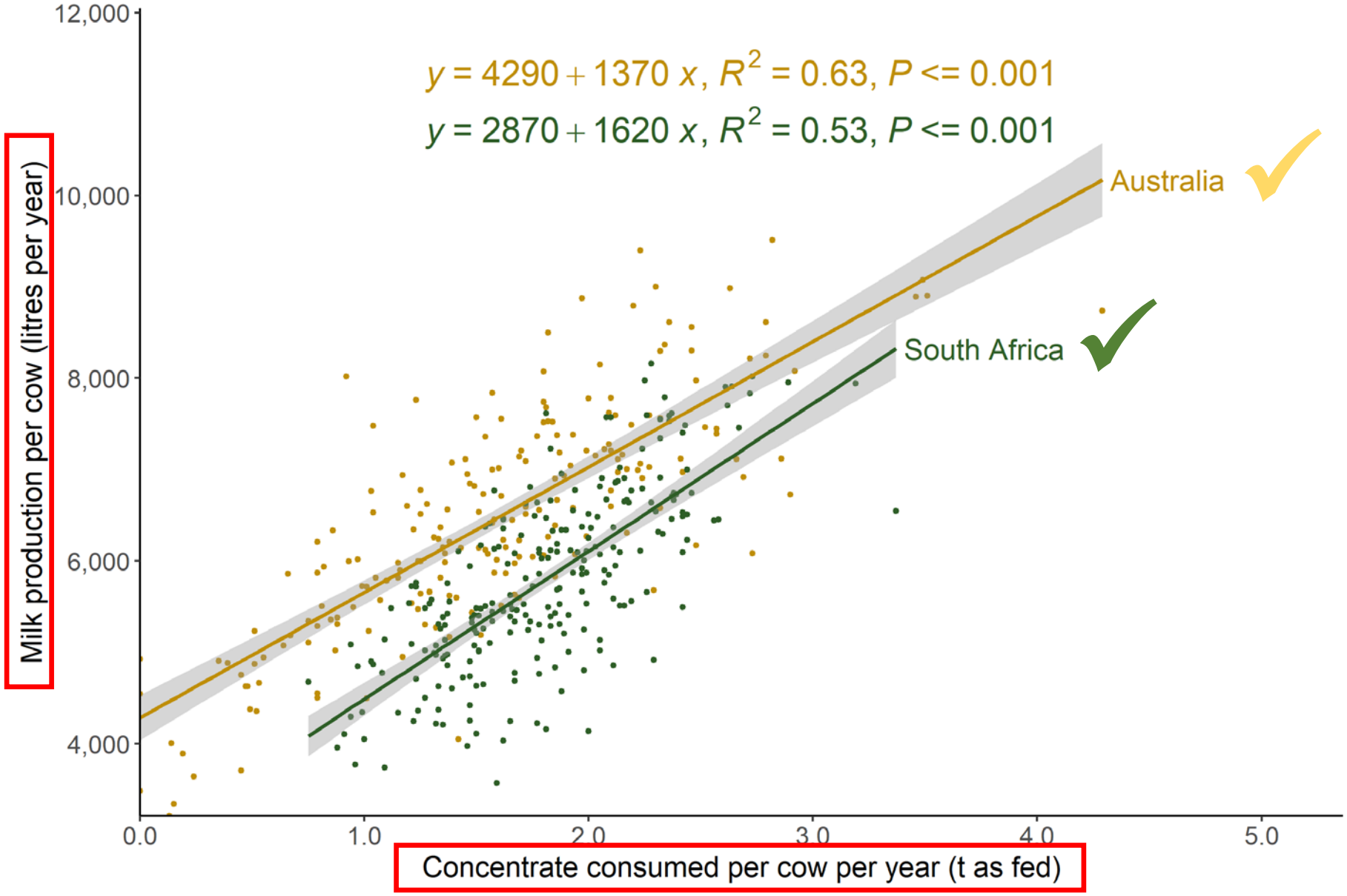
Bias in South Africa data–milk production per cow?



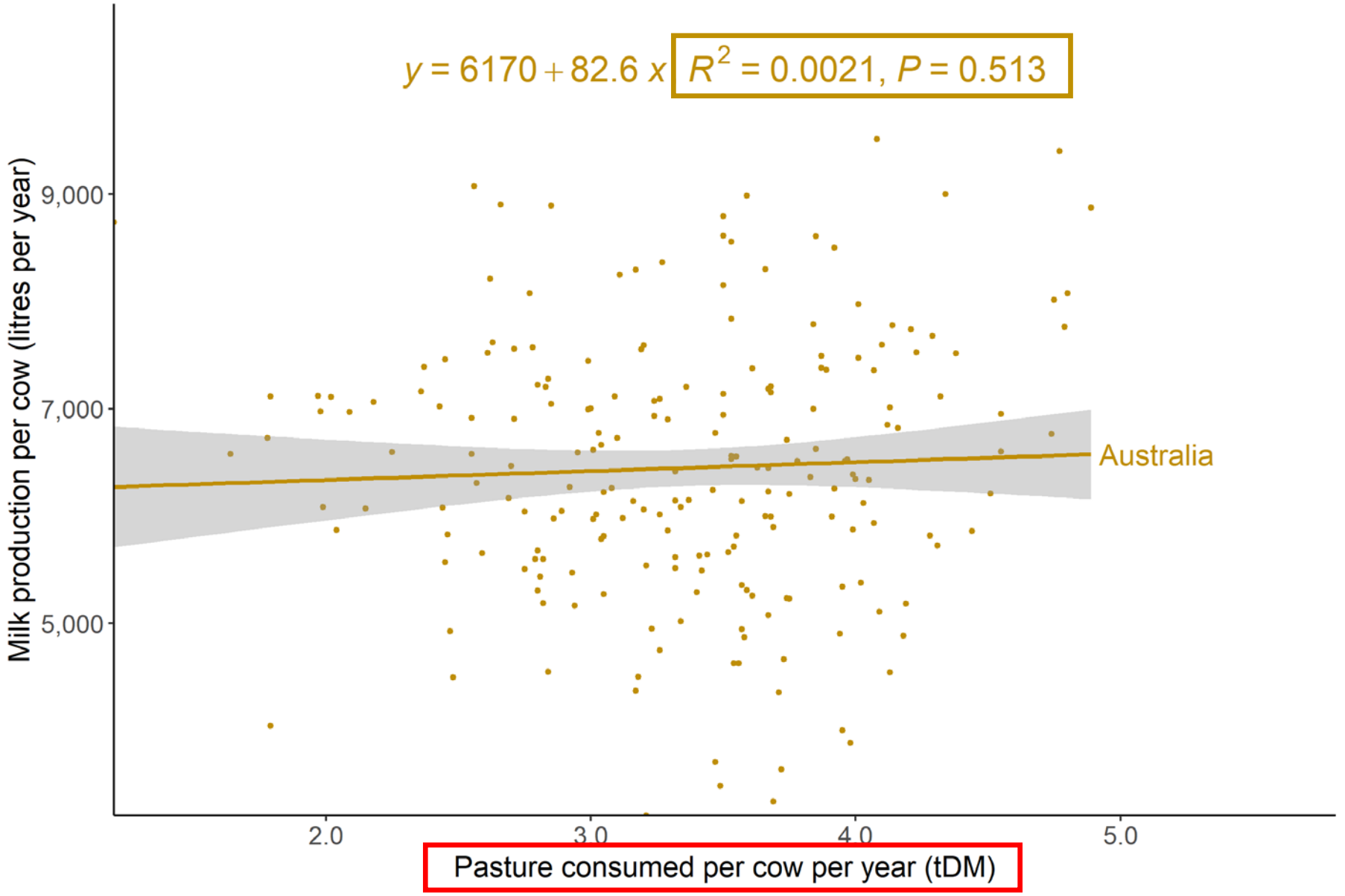
Bias in South Africa data–milk production per cow?



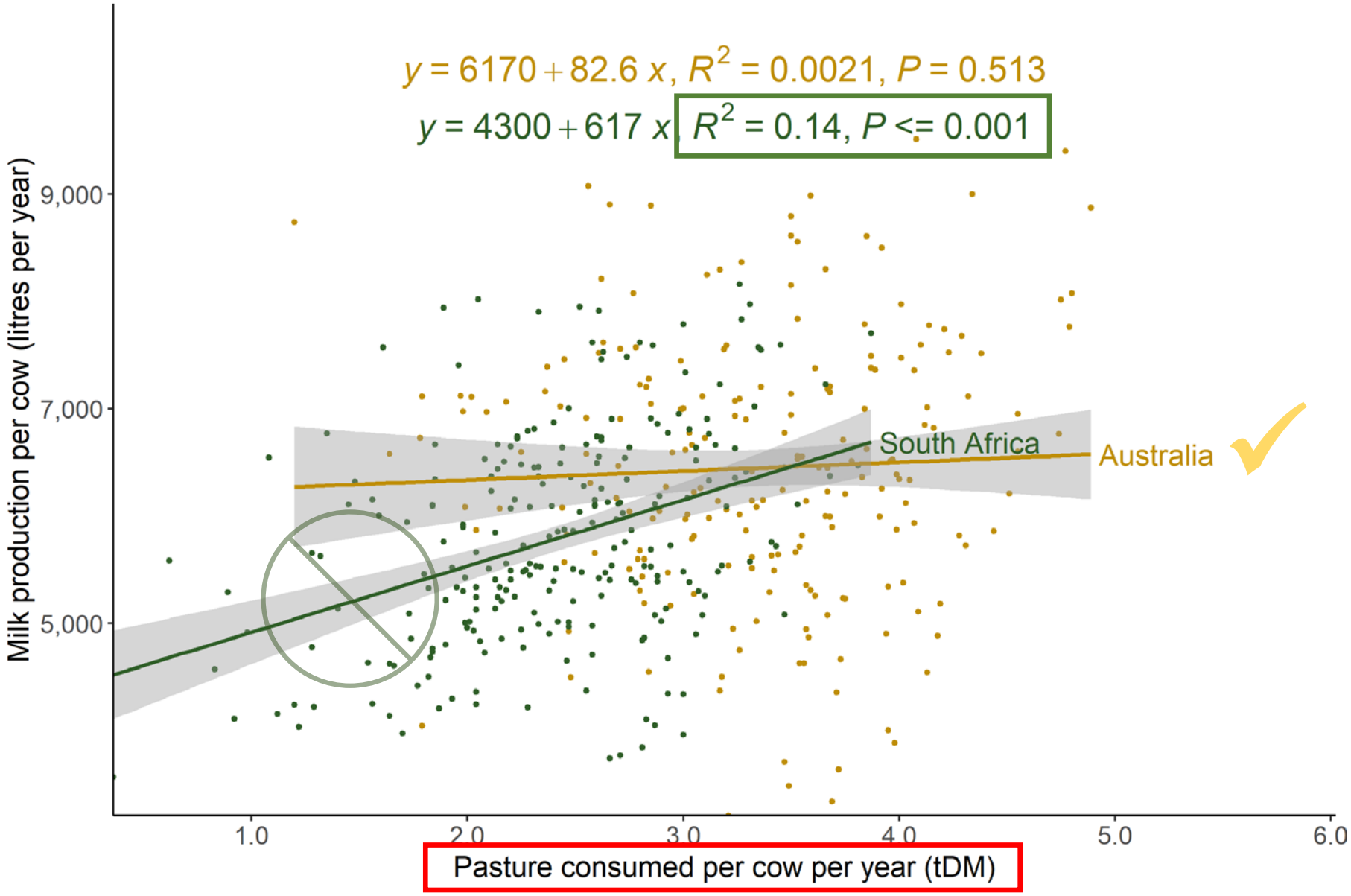
Bias in South Africa data–concentrate fed per cow?



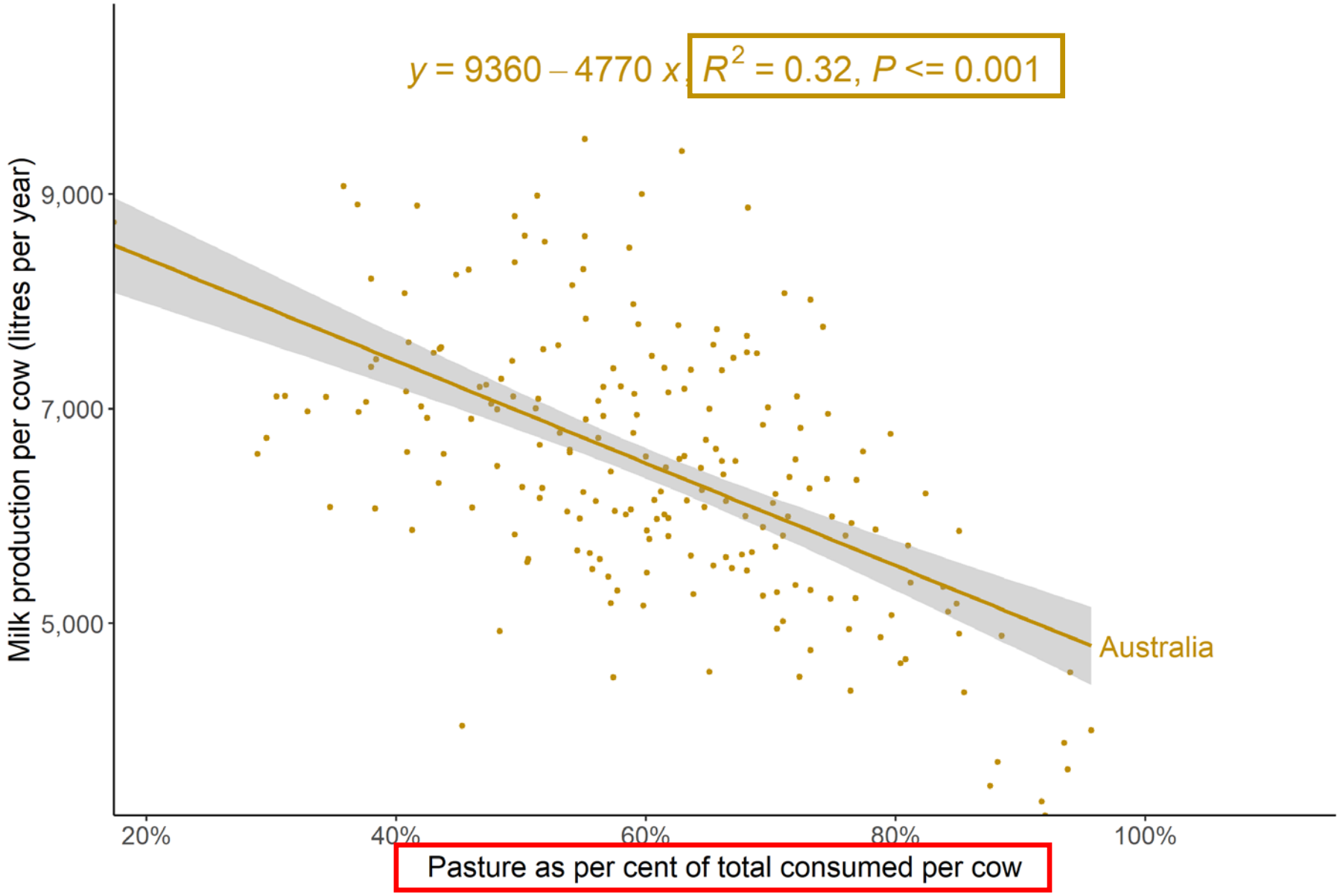
Bias in South Africa data–pasture consumed per cow?



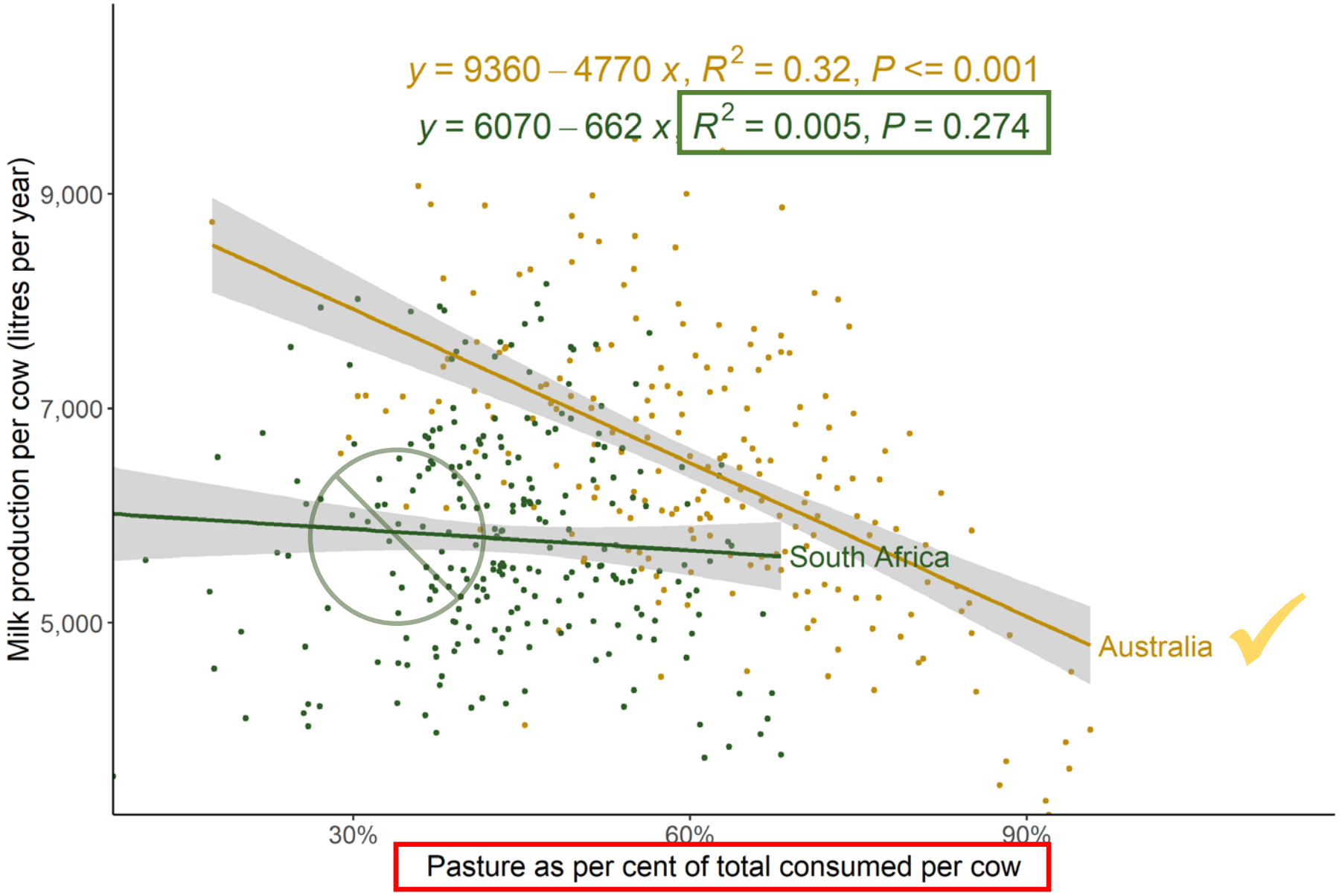
Bias in South Africa data–pasture consumed per cow?



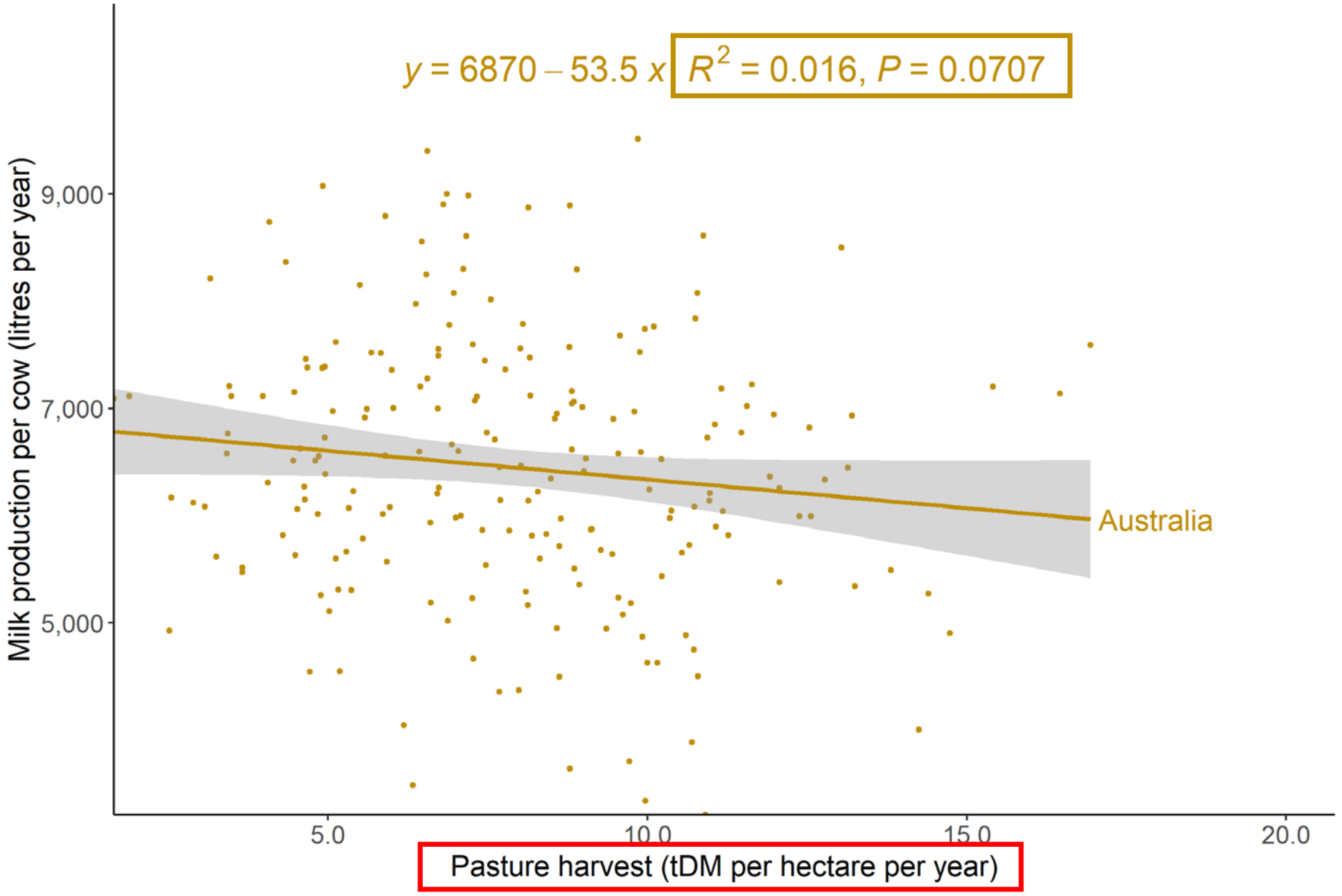
Bias in South Africa data–pasture as % of cows diet?



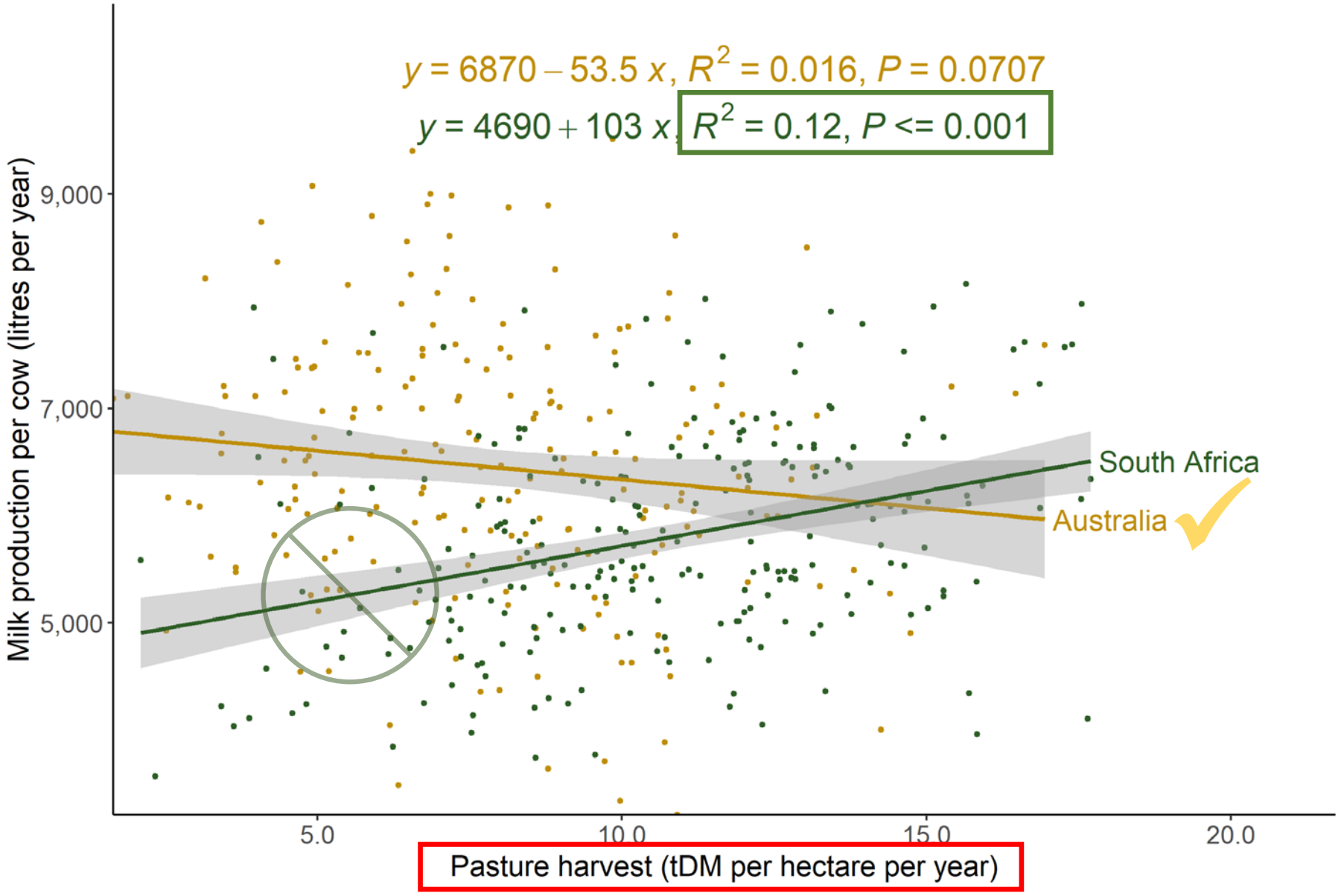
Bias in South Africa data–pasture as % of cows diet?



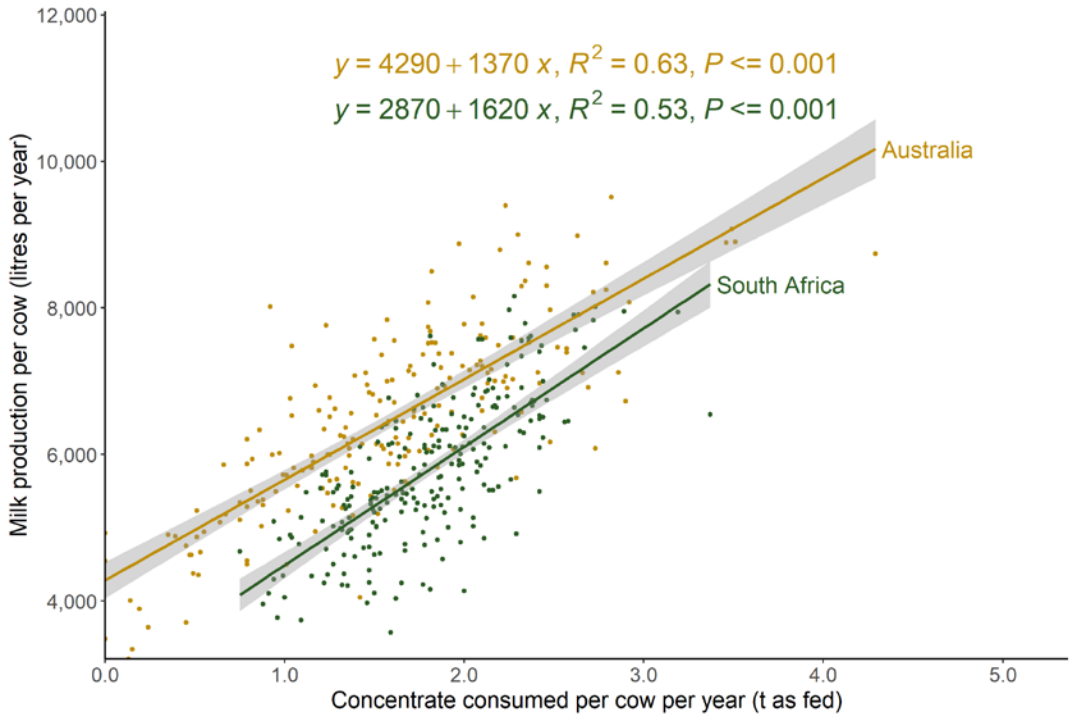
Bias in South Africa data – pasture harvest?

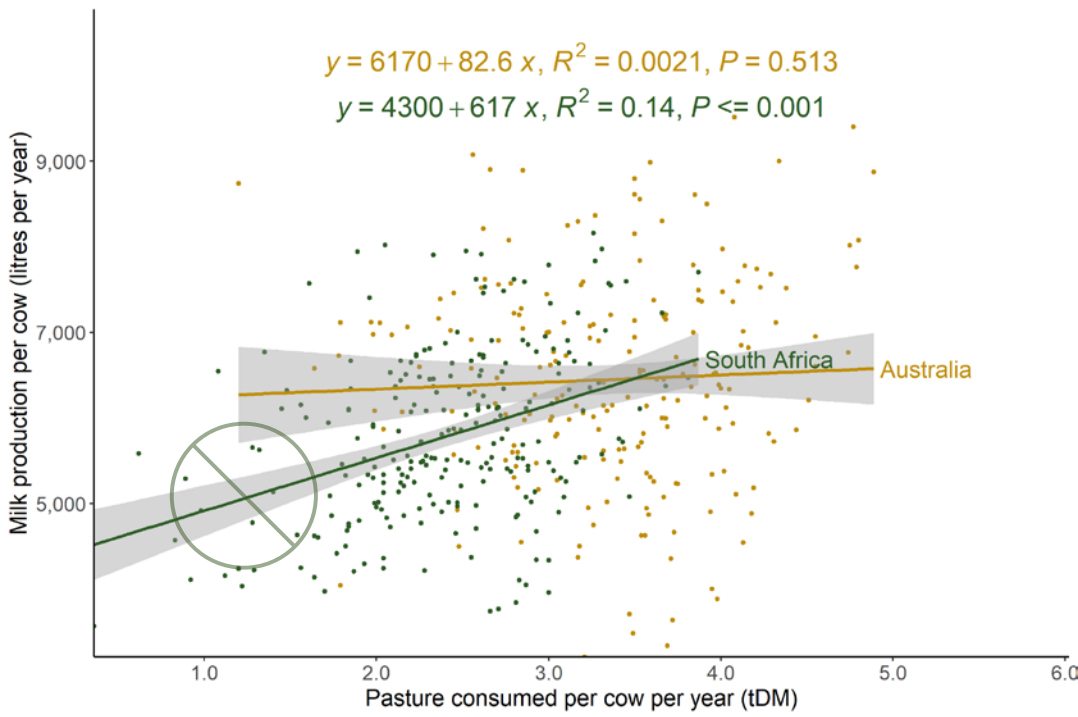


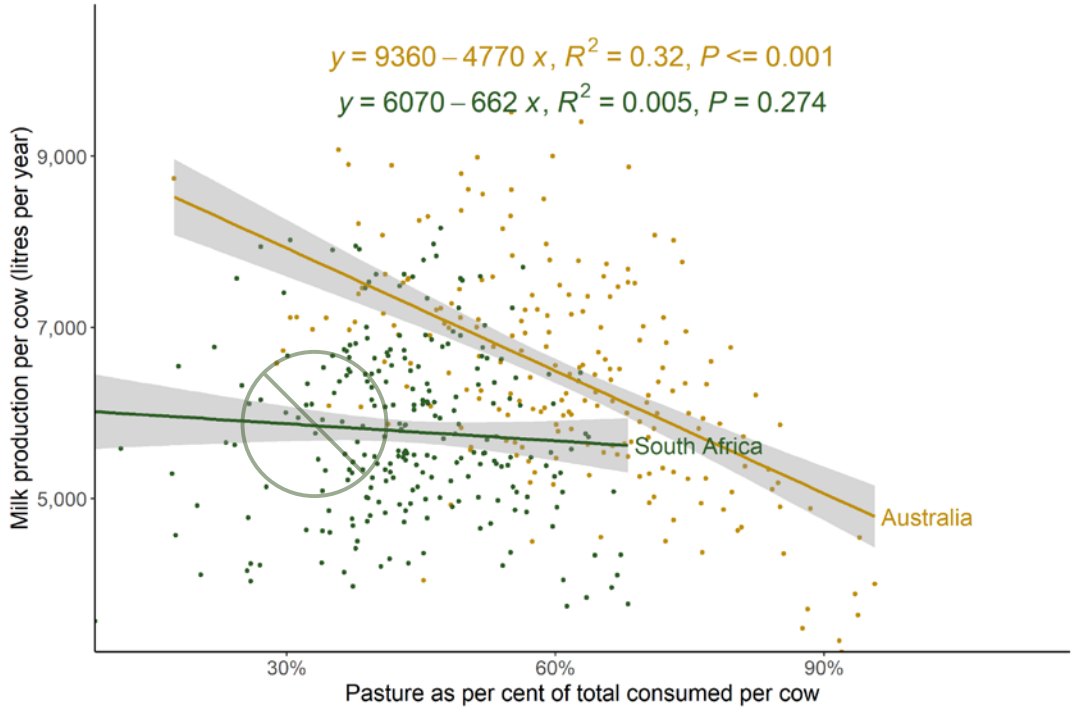
Bias in South Africa data – pasture harvest?

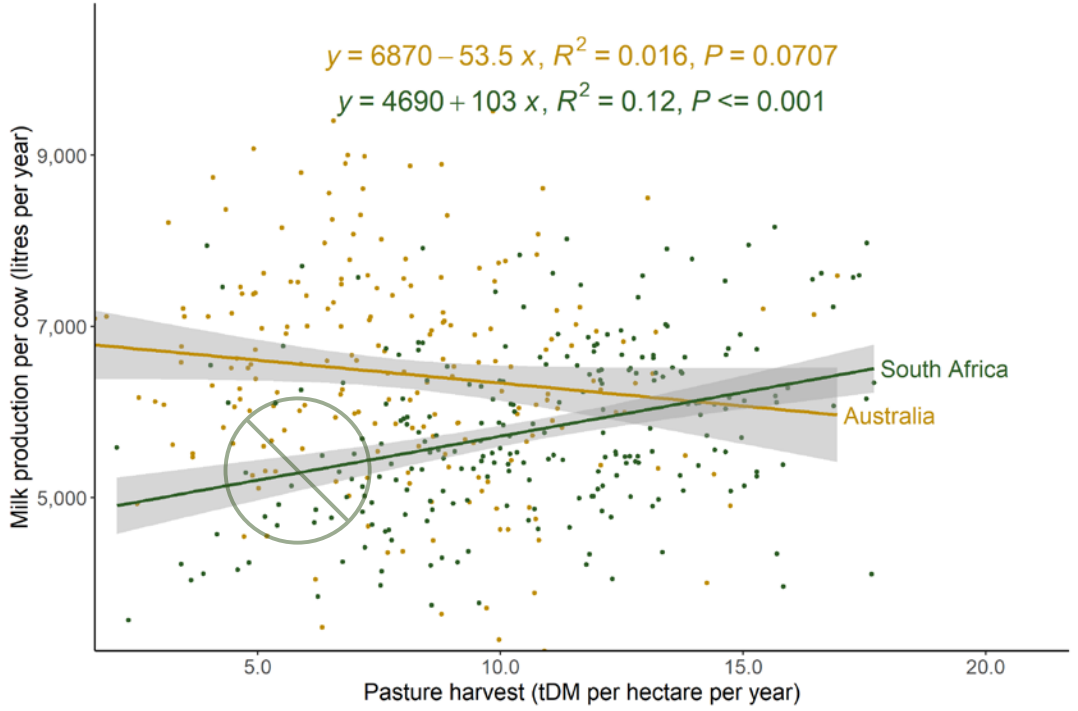


Bias in South Africa data









Ratios of low (or no) utility

Ratios of low utility	R^2	P	(some impractical to apply)
Milk production per cow	0,05	0,0049	Little to no positive or negative correlation with ROC
Income over feed costs per litre	0,28	<= 0.001	Would need to be calculated on monthly or weekly basis
Income over feed costs per cow	0,25	<= 0.001	Would need to be calculated on monthly or weekly basis
Grams concentrate per litre	0,10	<= 0.001	Would need to be calculated on monthly or weekly basis
Grams supplement per litre	0,08	<= 0.001	Would need to be calculated on monthly or weekly basis

Ratios of low (or no) utility

Ratios of low utility	AU R^2	SA R^2	(some impractical to apply)
Milk production per cow	0,05	*0,24*	Little to no positive or negative correlation with ROC
Income over feed costs per litre	0,28	0,30	Would need to be calculated on monthly or weekly basis
Income over feed costs per cow	0,25	0,54	Would need to be calculated on monthly or weekly basis
Grams concentrate per litre	0,10	0,06	Would need to be calculated on monthly or weekly basis
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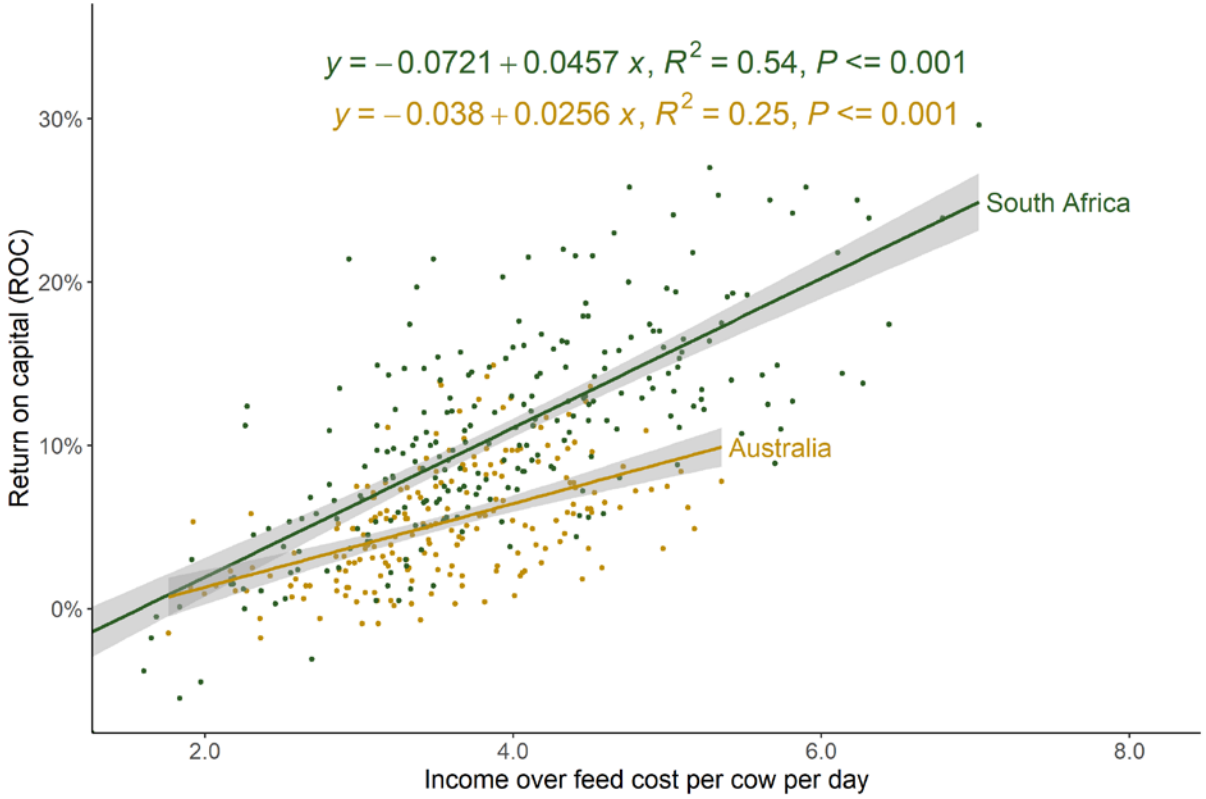

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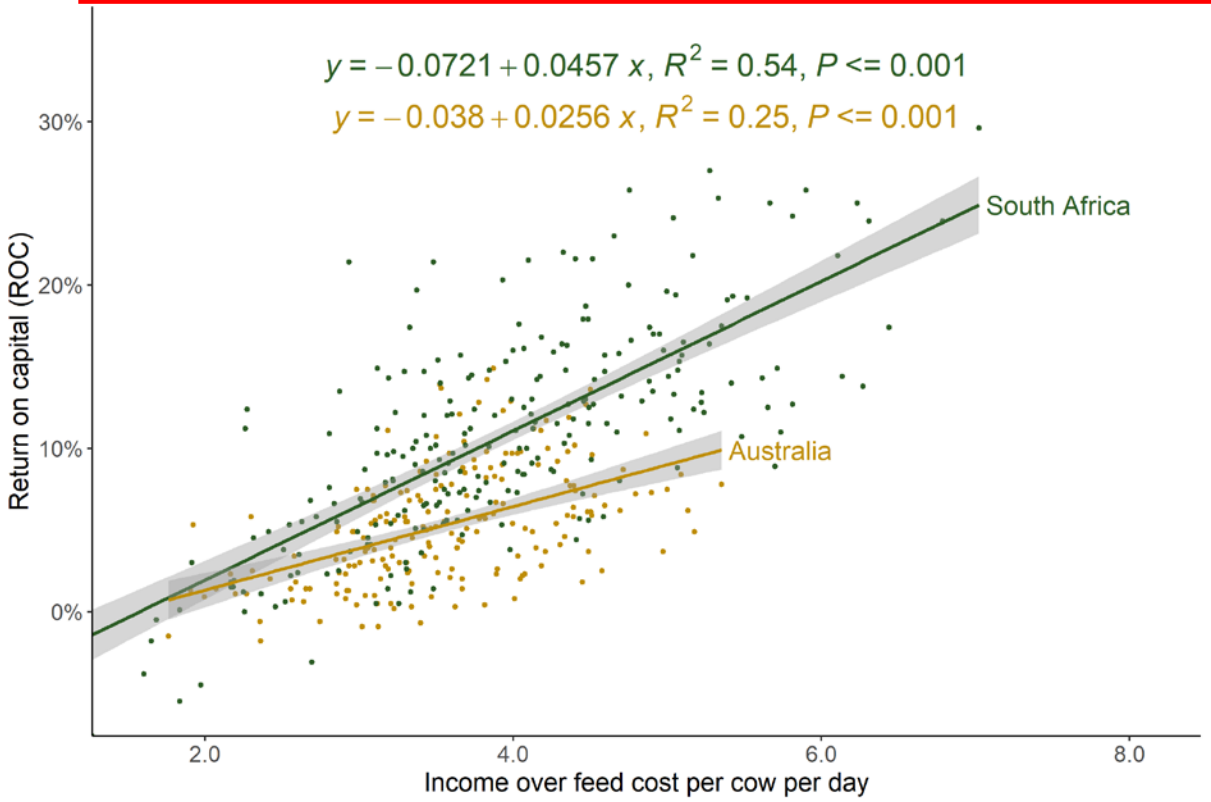

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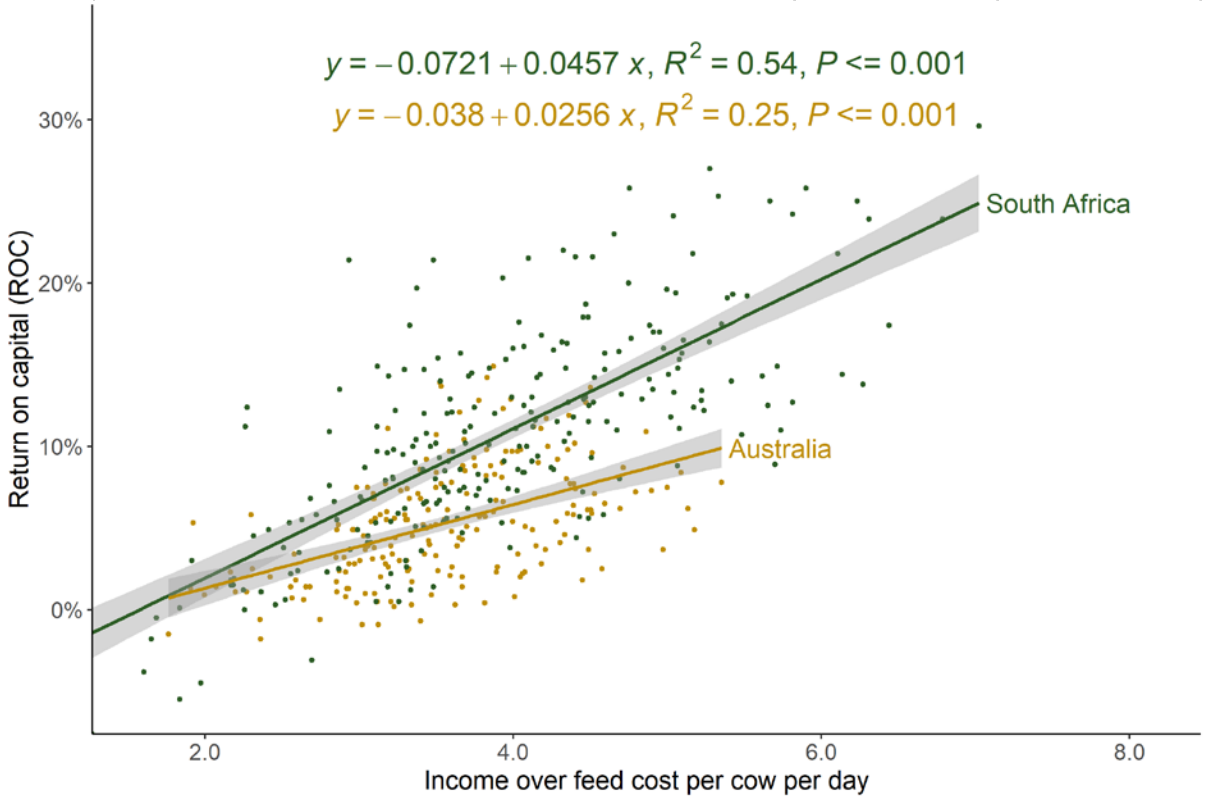

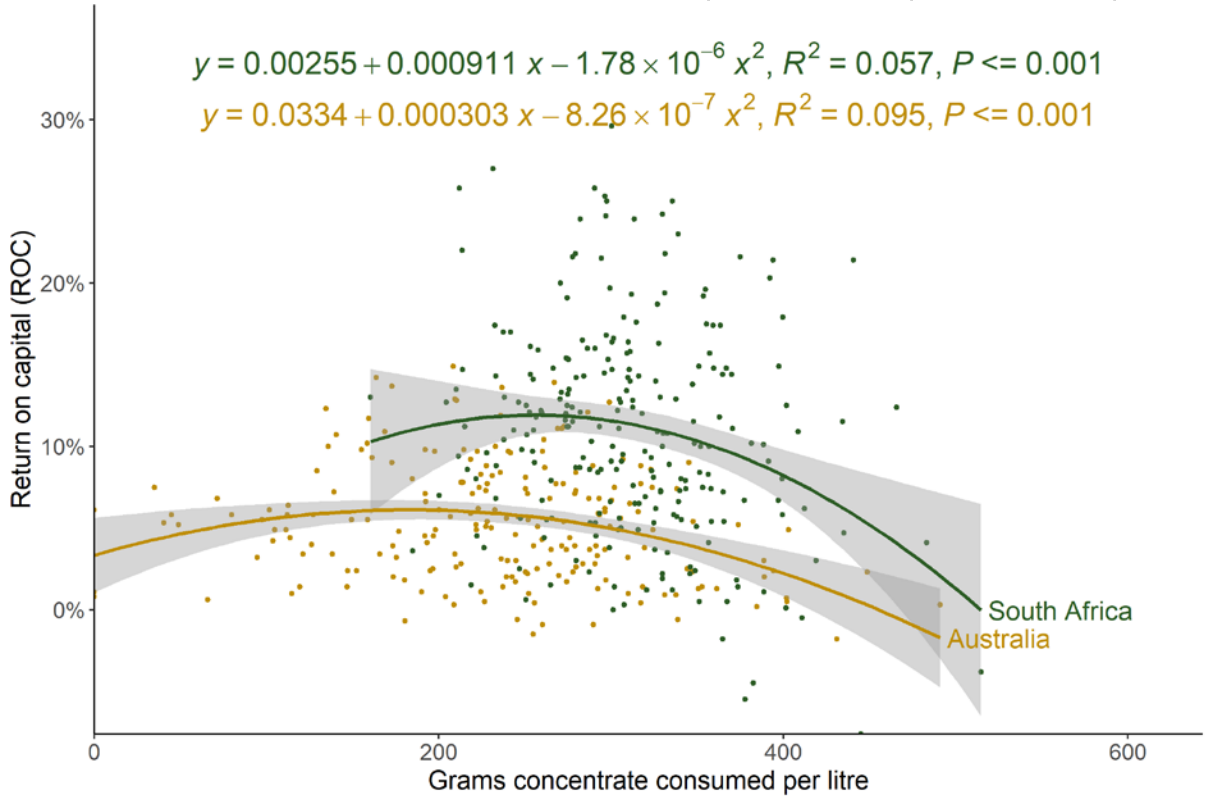

Prioritised list of key ratios – feedlot farms

Primary ratio	AU R^2	SA R^2	Secondary ratio or proxy	AU R^2	SA R^2
Return on total capital (ROC) [defines profit]	**Comparator for other ratios**		Profit per hectare	0,79	0,76
			Profit per cow	0,73	0,85
Operating profit margin	0,75	0,79	Profit per litre	0,76	0,79
Cost of production per litre	0,44	*0,30*	Total expenses per litre	0,51	*0,23*
Pasture harvest	0,41	*0,24*	SA Irrigated R^2 = 0.30 and SA Dryland R^2 = 0.37		
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Supplement cost per litre	0,20	0,12	Total feed cost per litre	0,21	0,18
Core per cow cost	0,20	*0,00*			
Labour cost per cow	0,18	*0,00*	Cows per full-time staff equivalent	0,13	0,10
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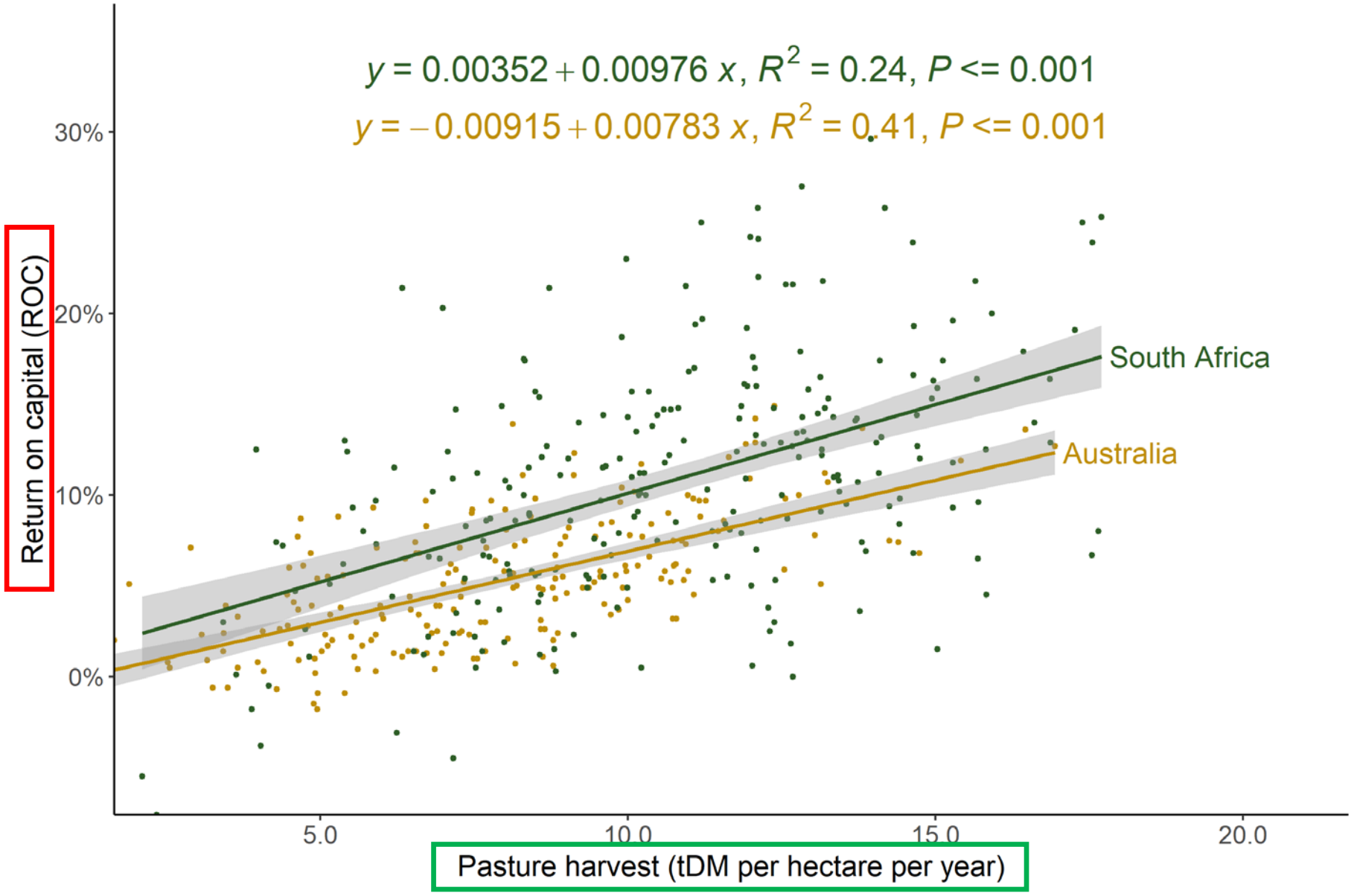
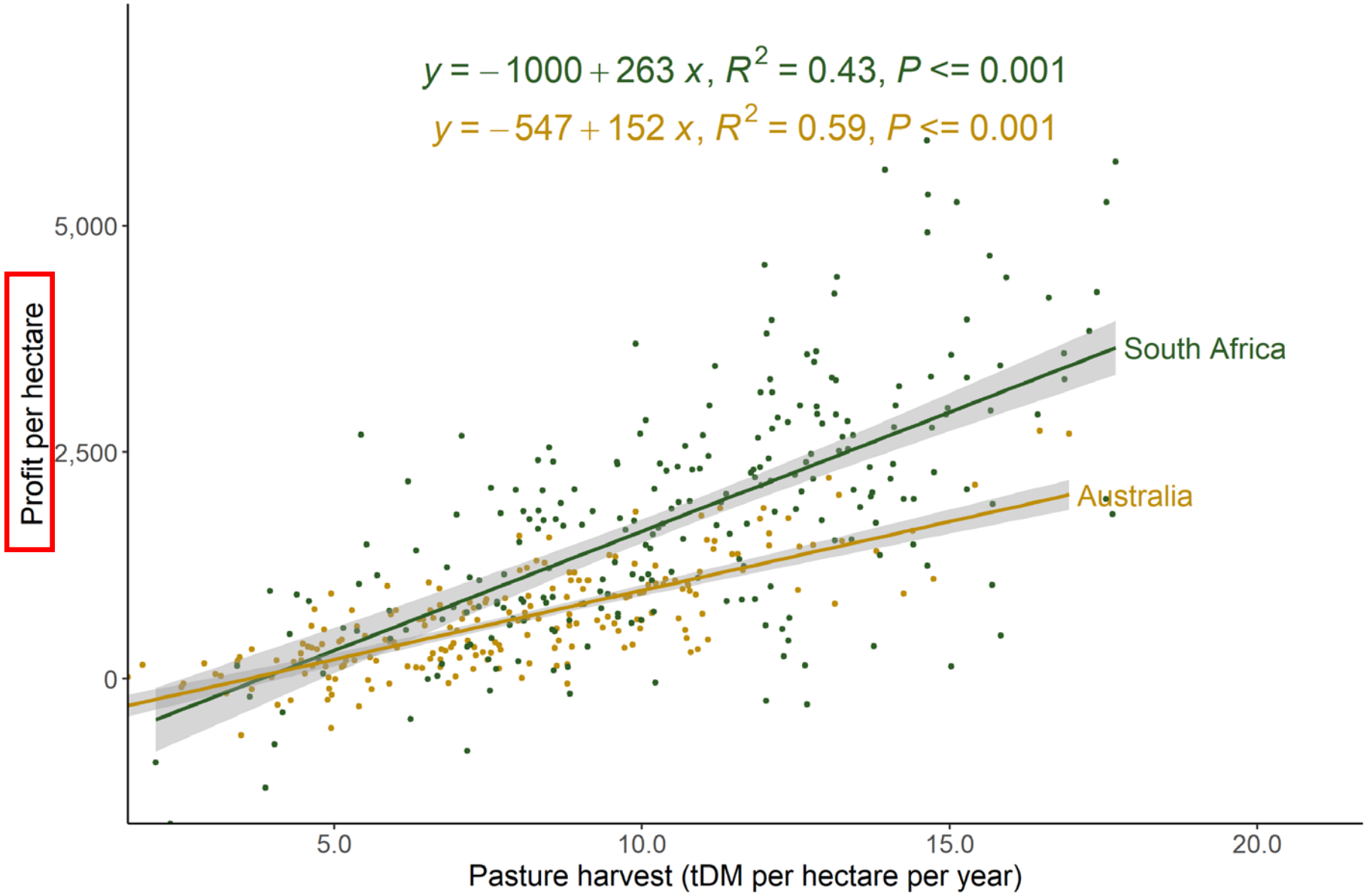
Income over feed costs per cow			**Income over feed costs per litre**		

Primary factors impacted by pasture harvest



Primary factors impacted by pasture harvest



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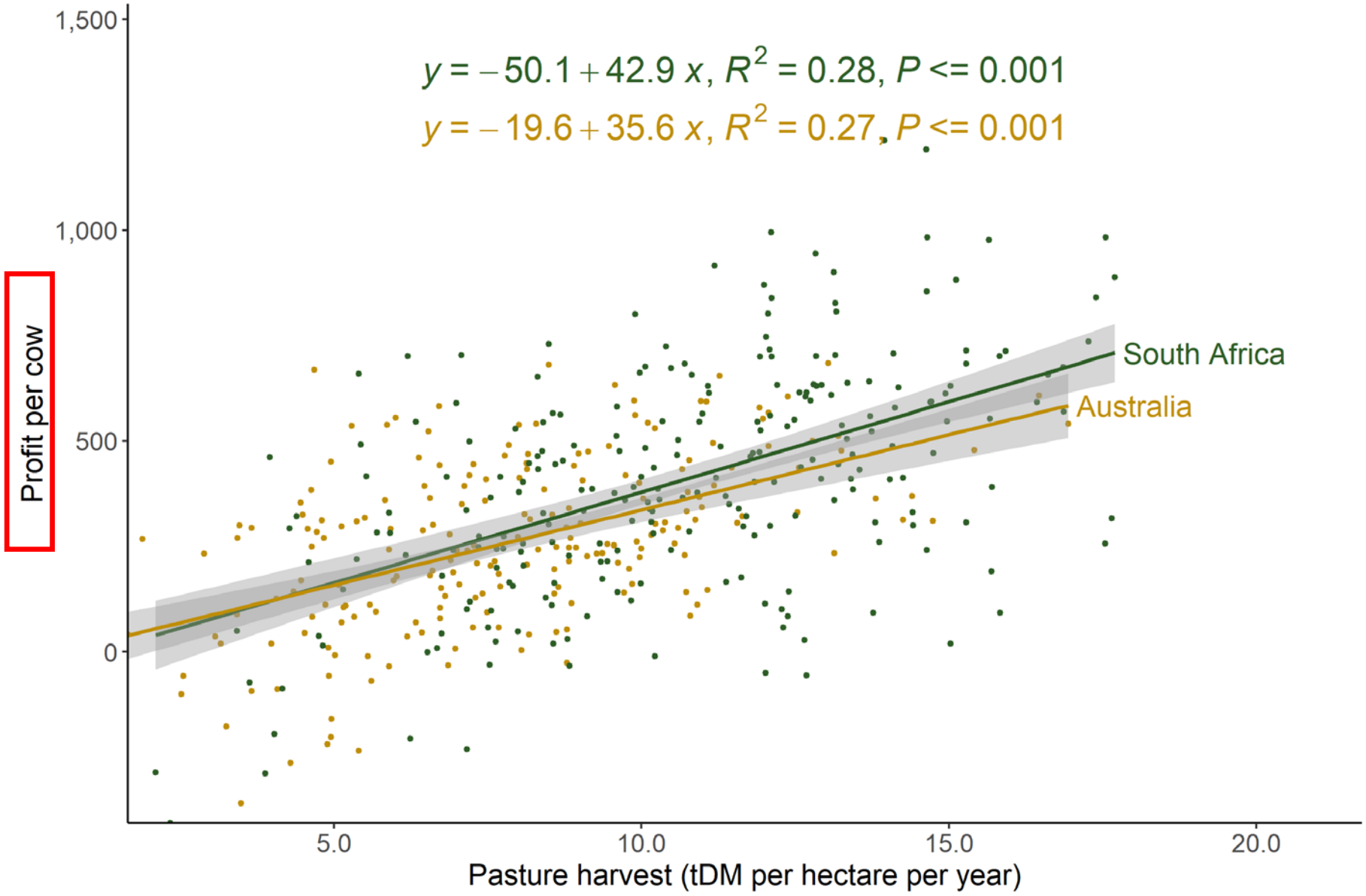

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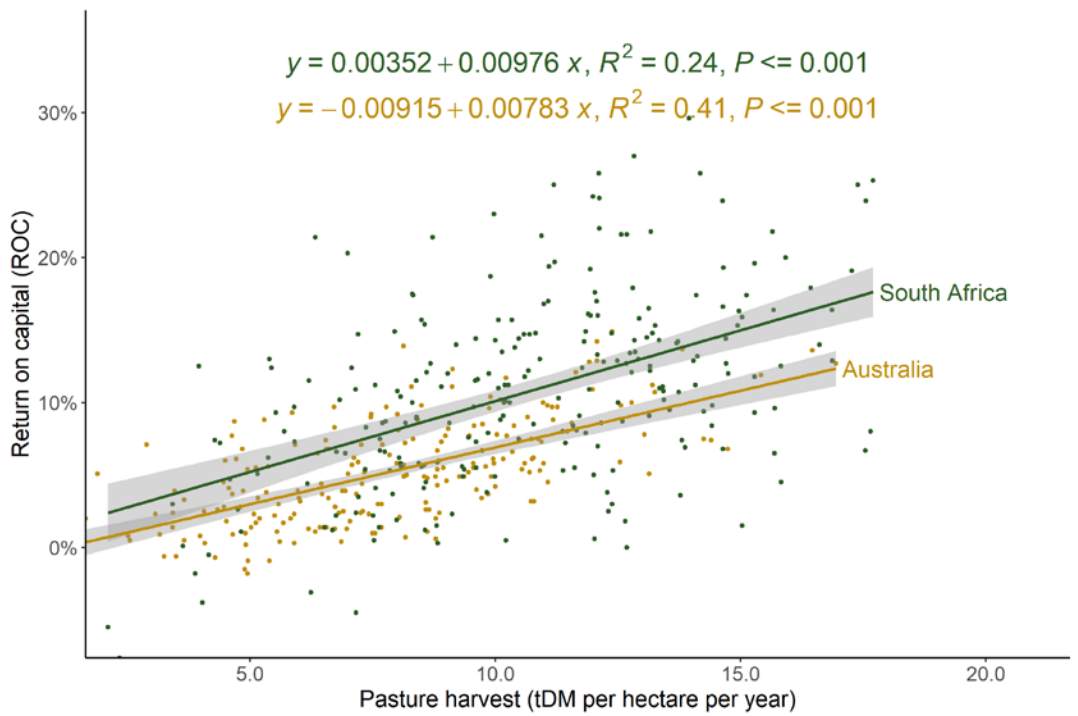
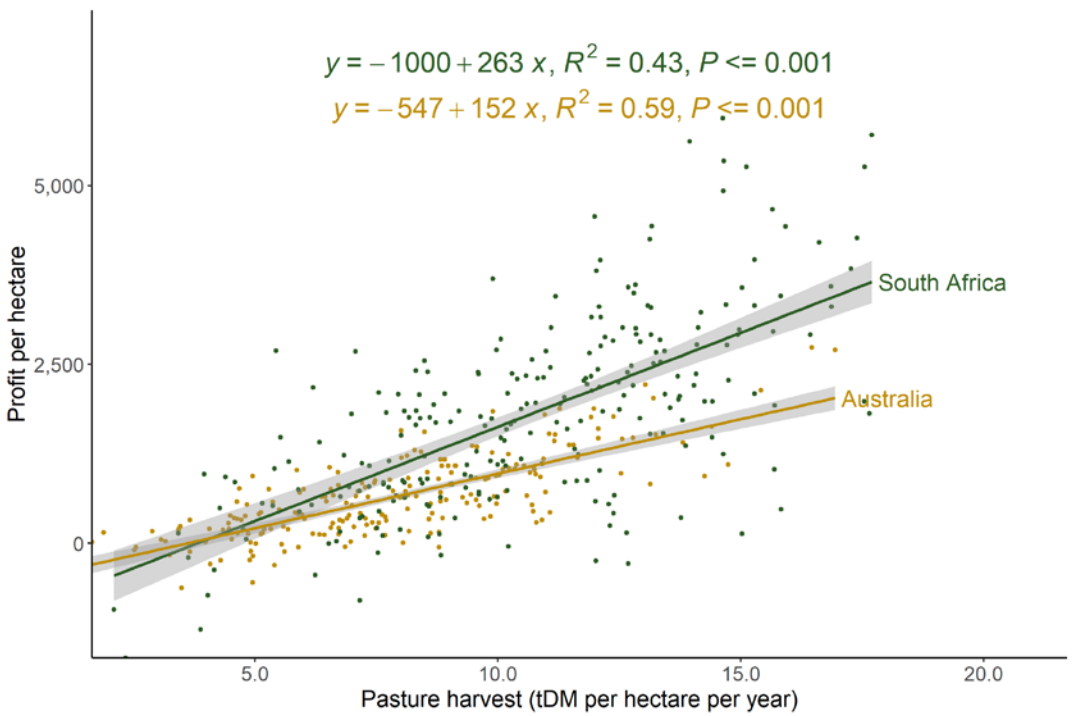
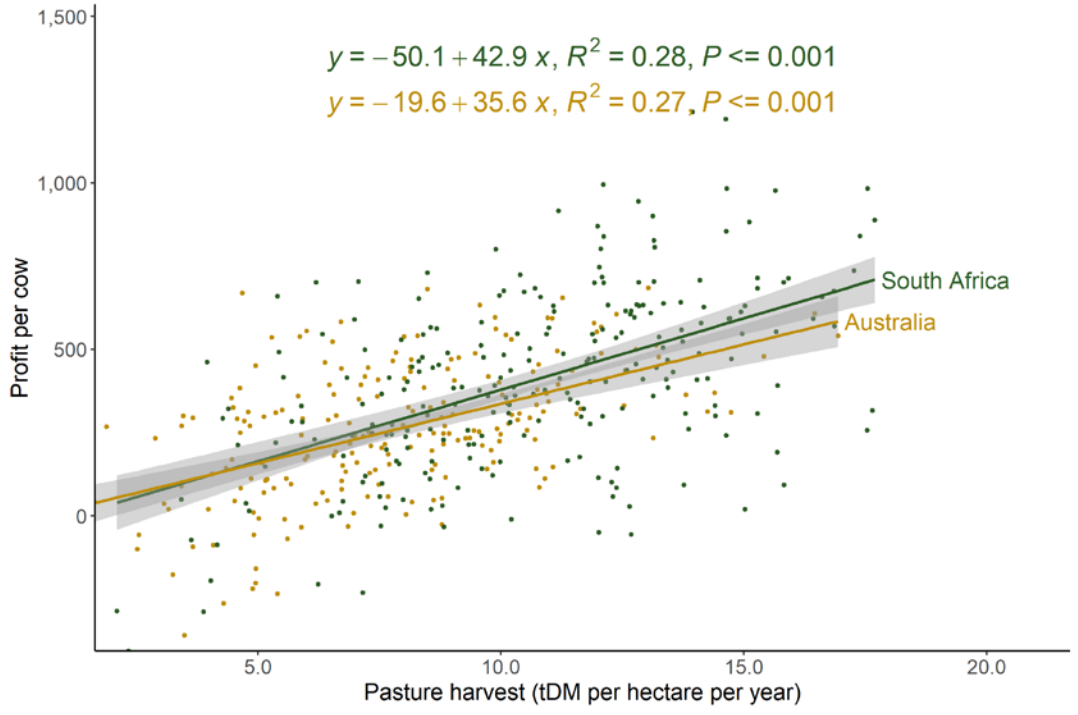
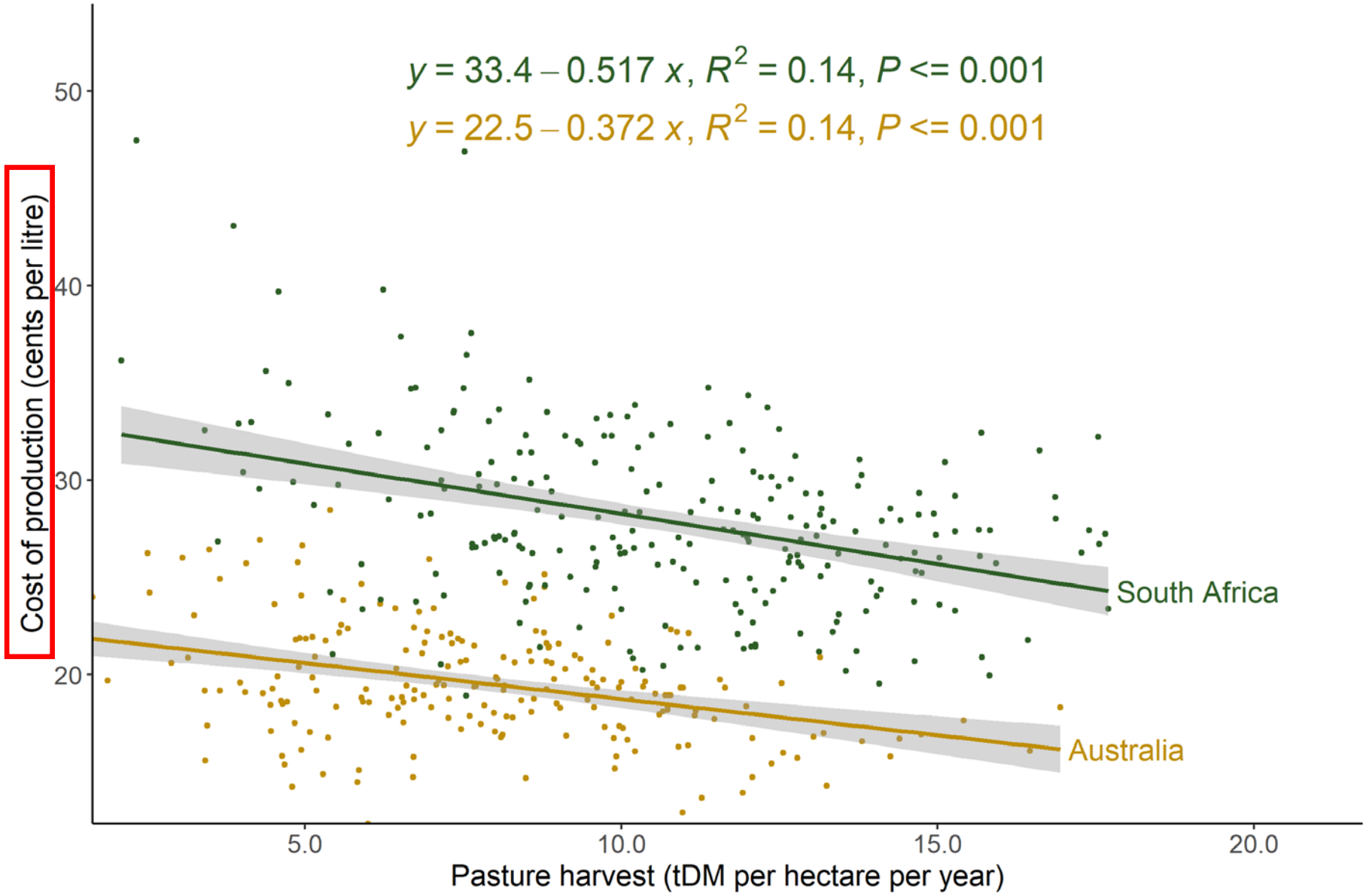






Primary factors impacted by pasture harvest



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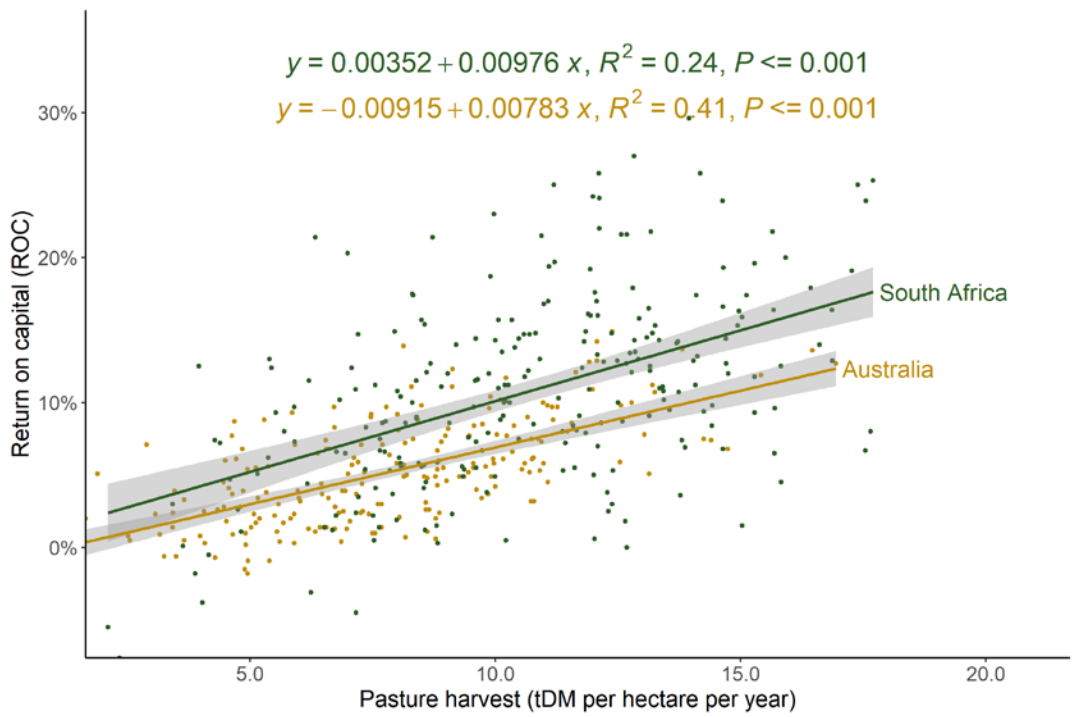
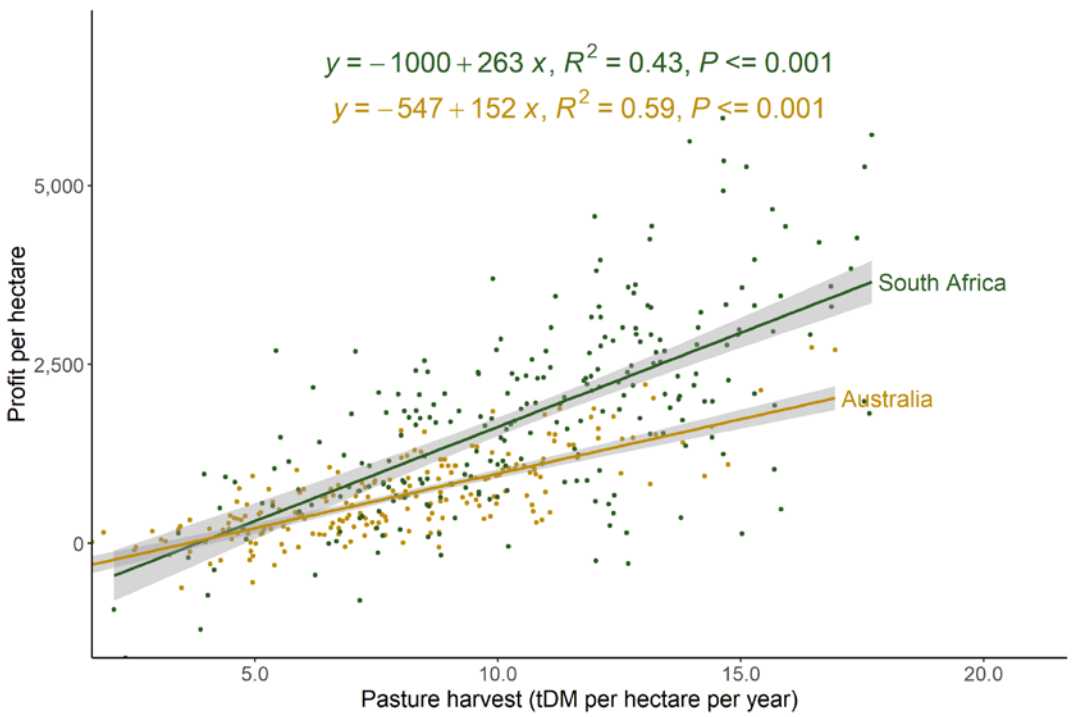
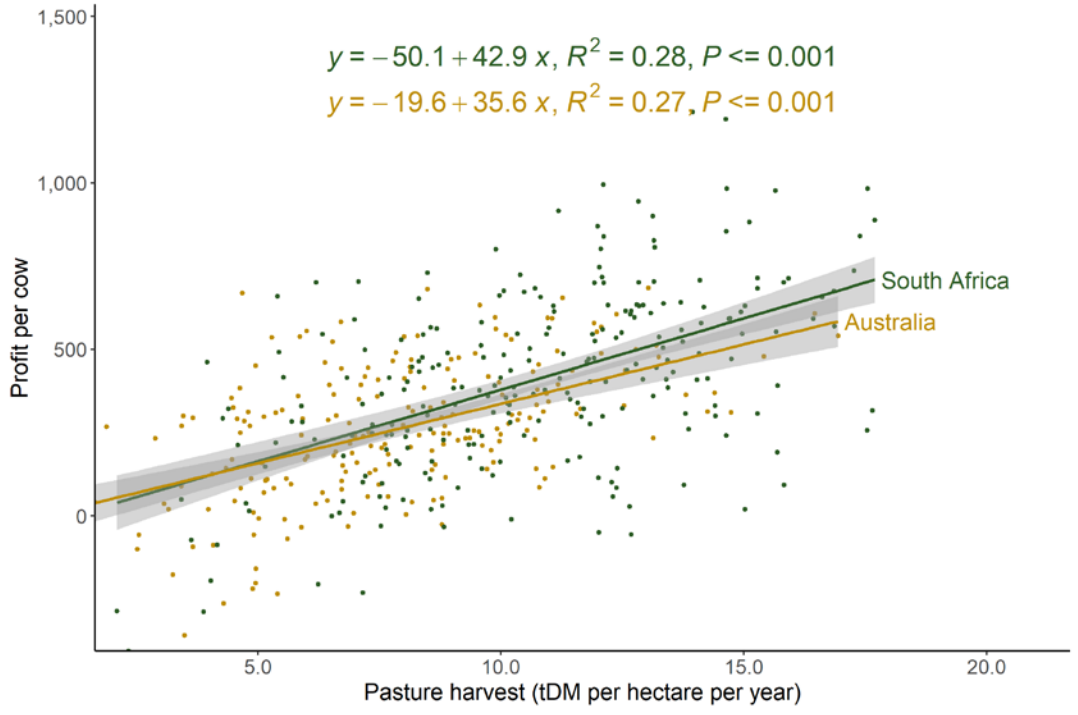
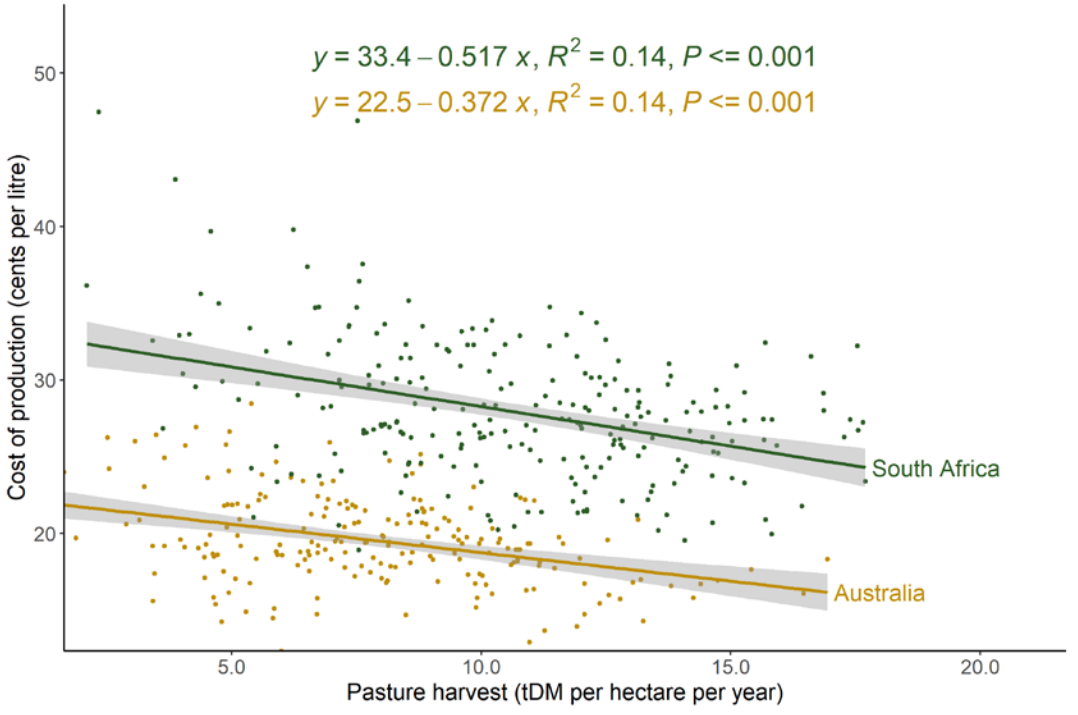
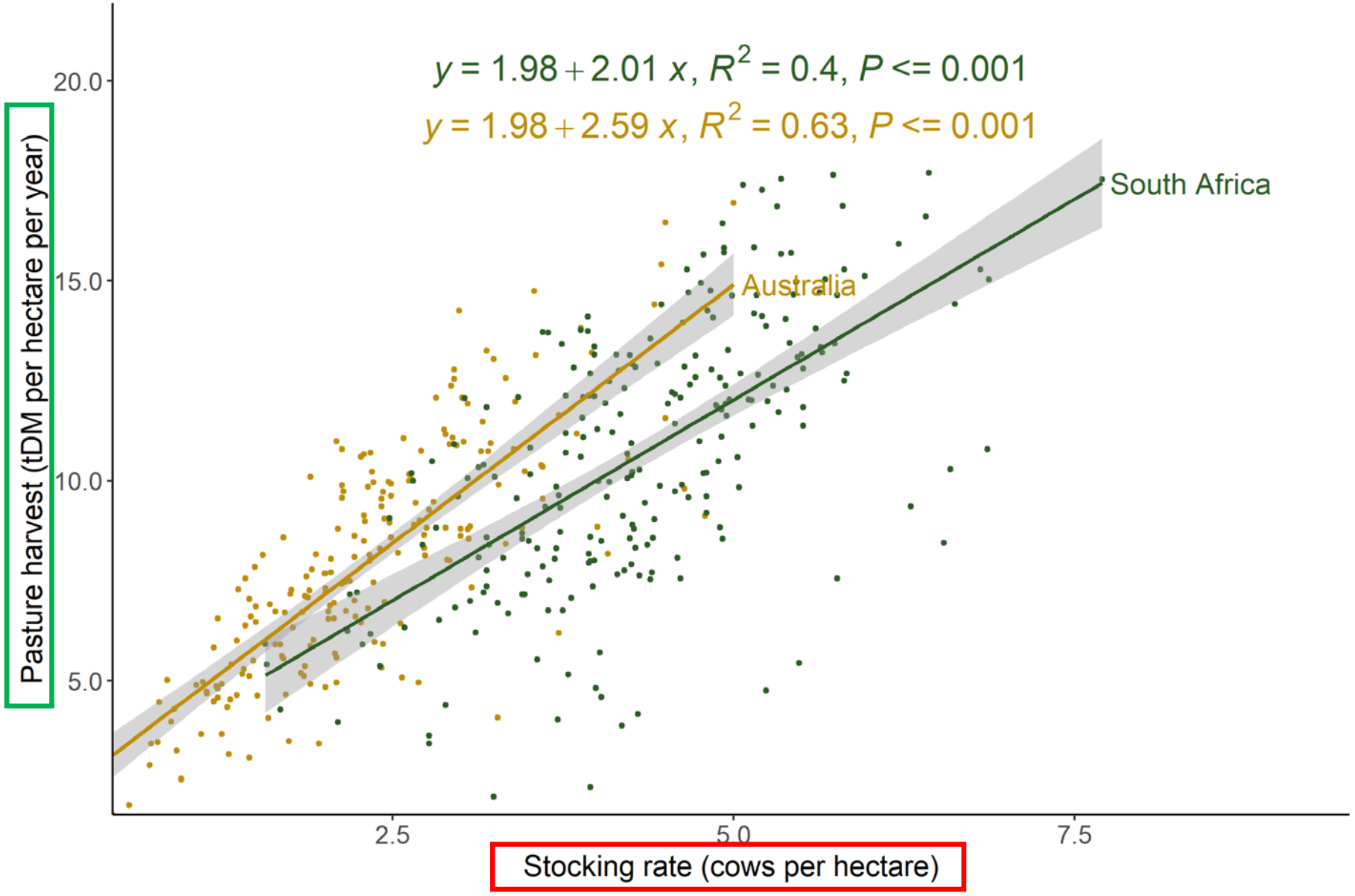




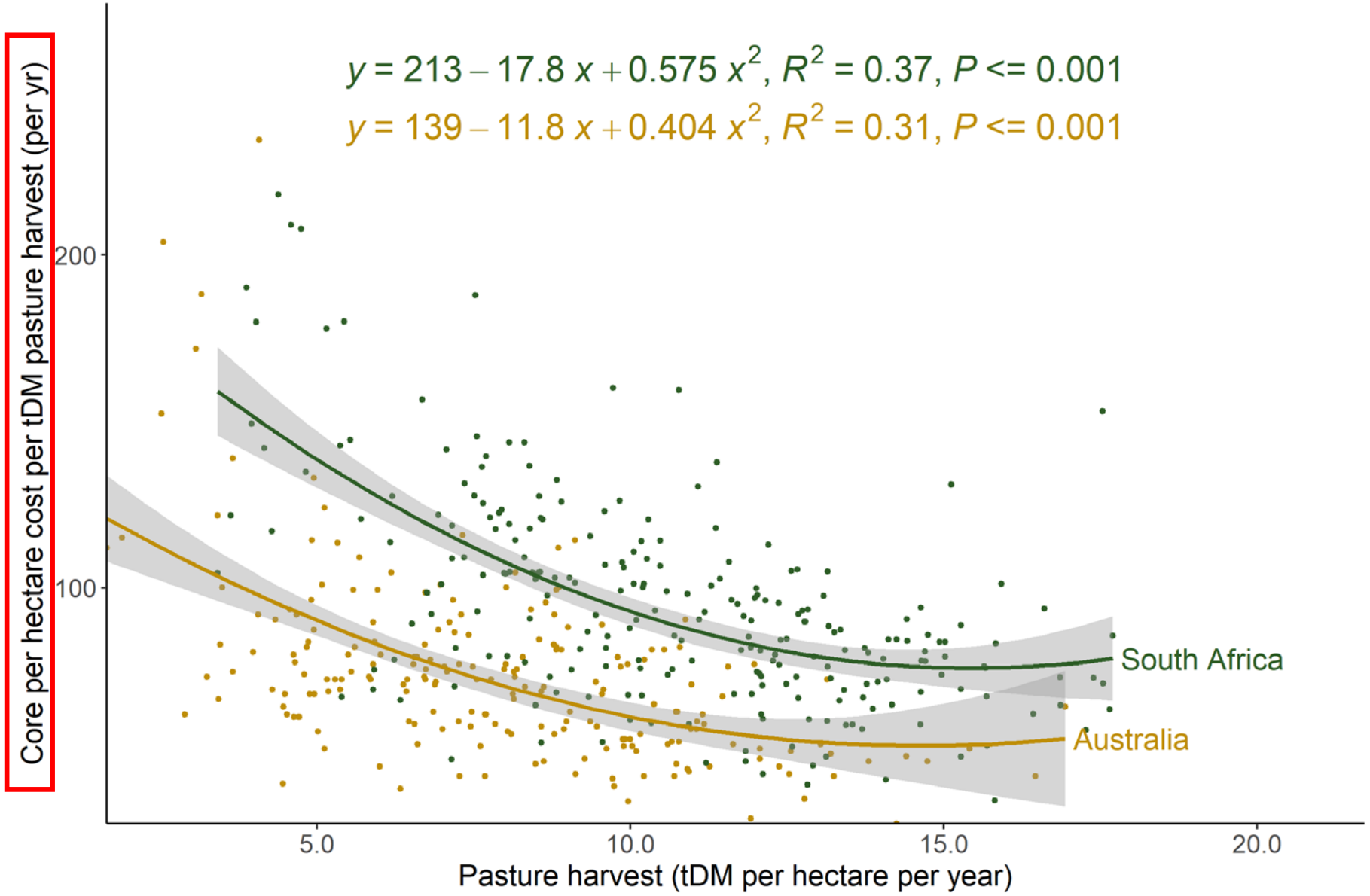




Primary factors impacted by pasture harvest



Primary factors impacted by pasture harvest



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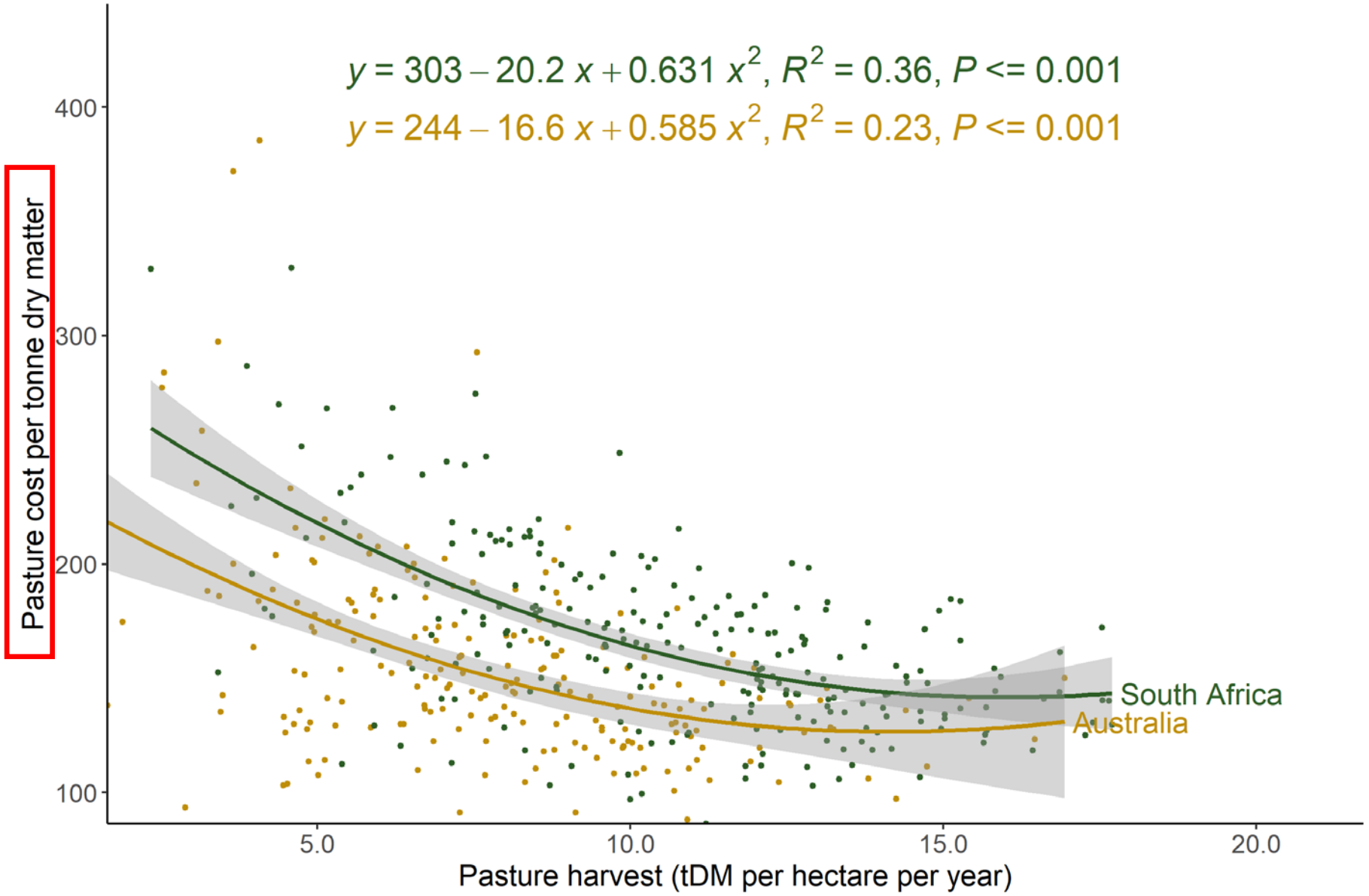

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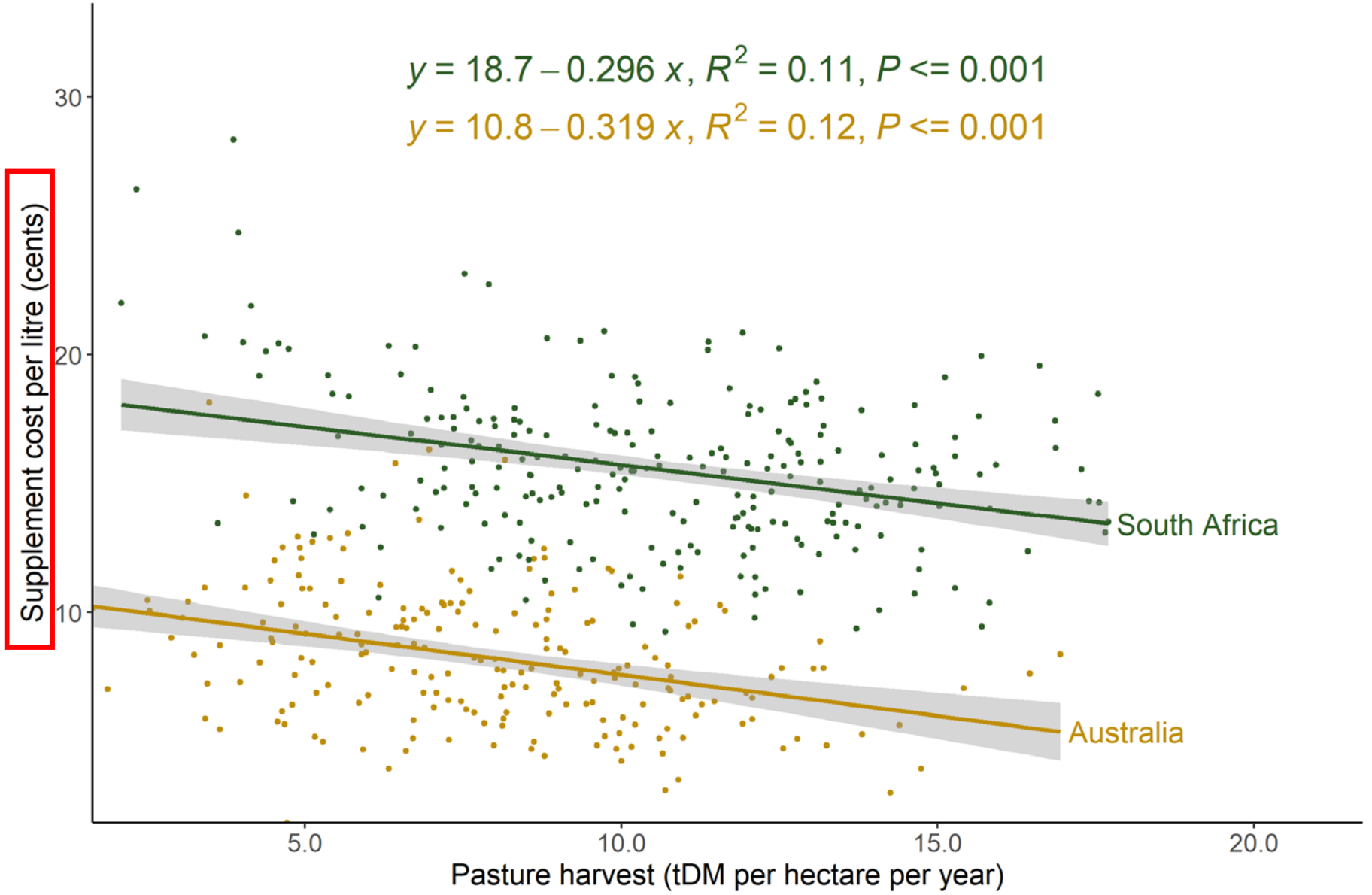

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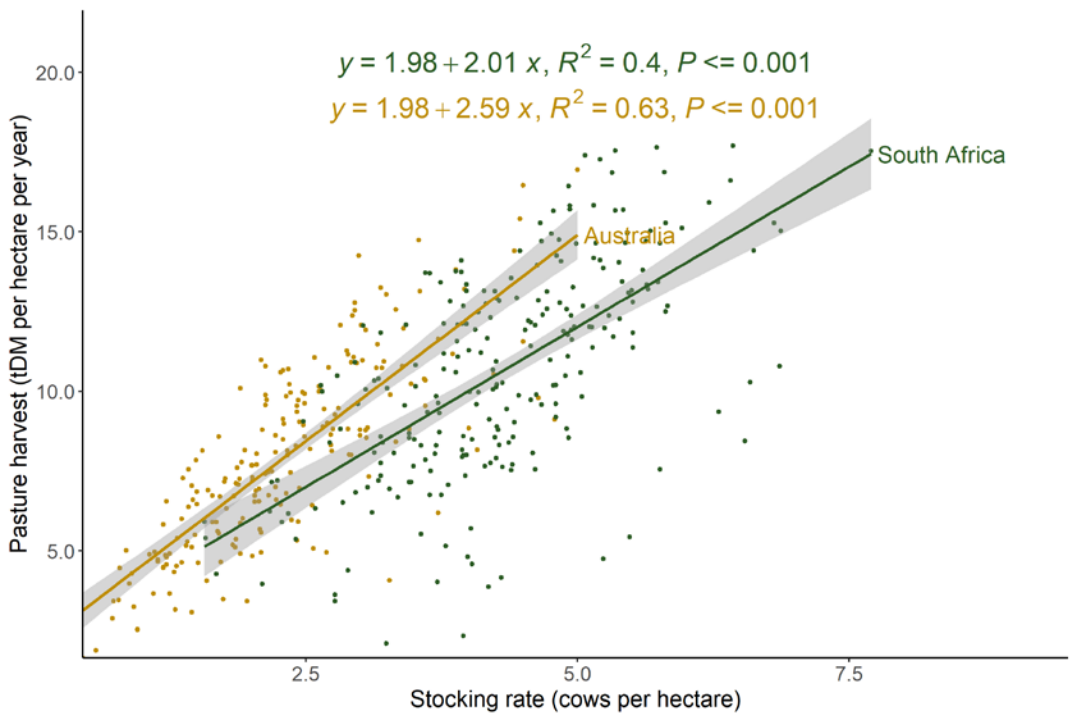
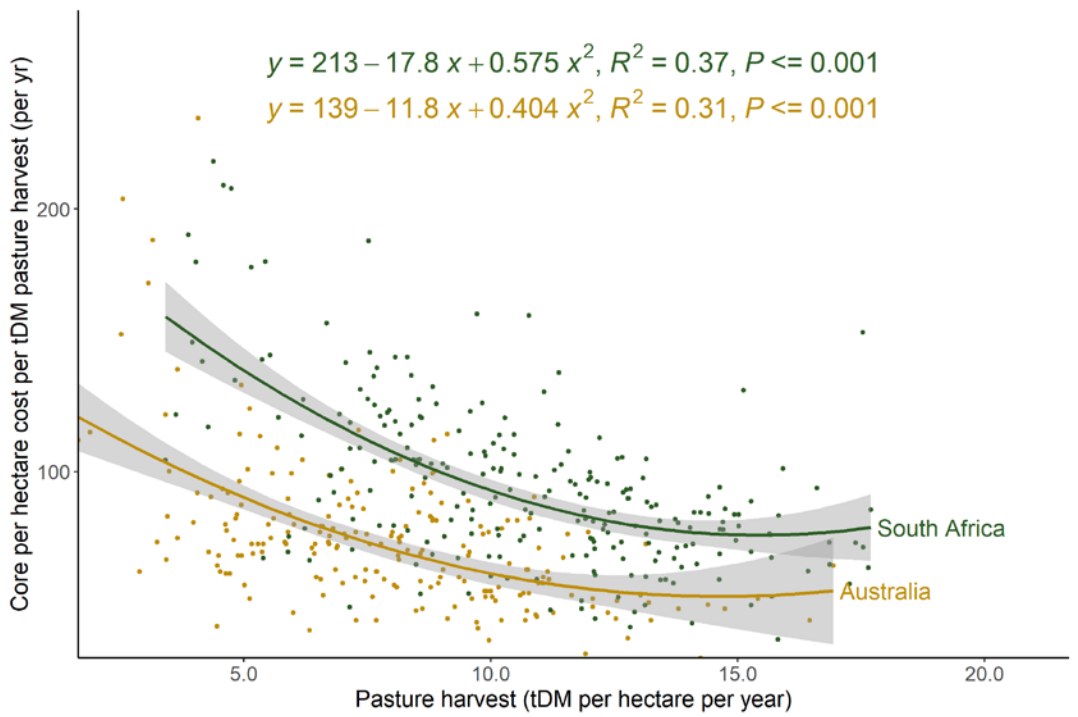
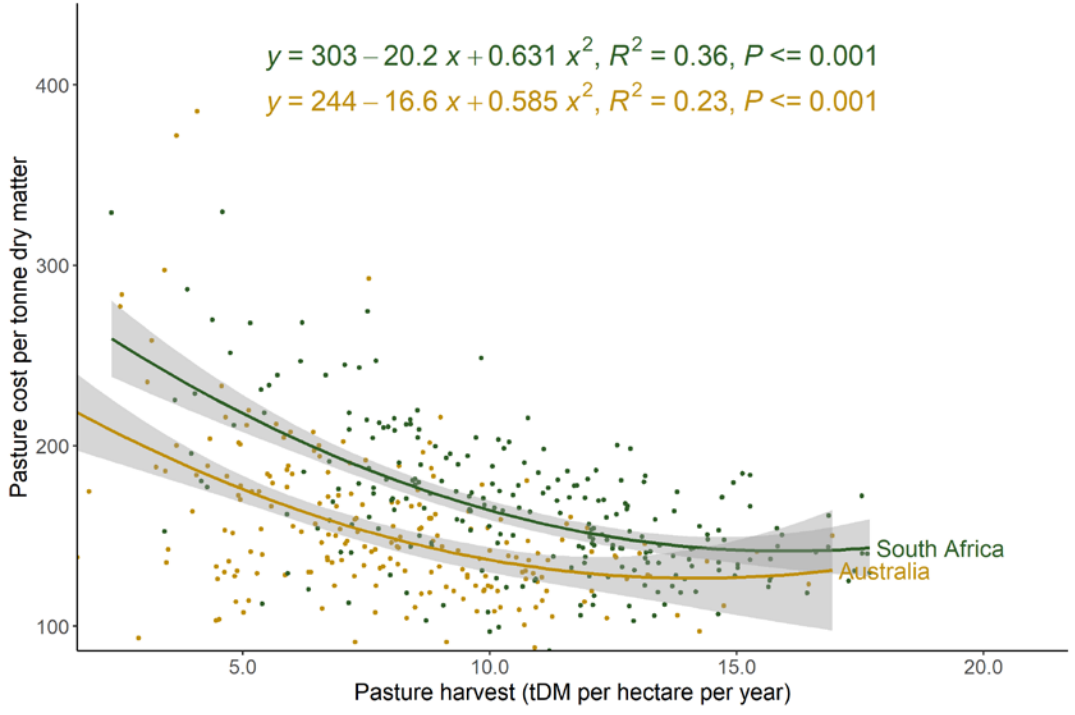
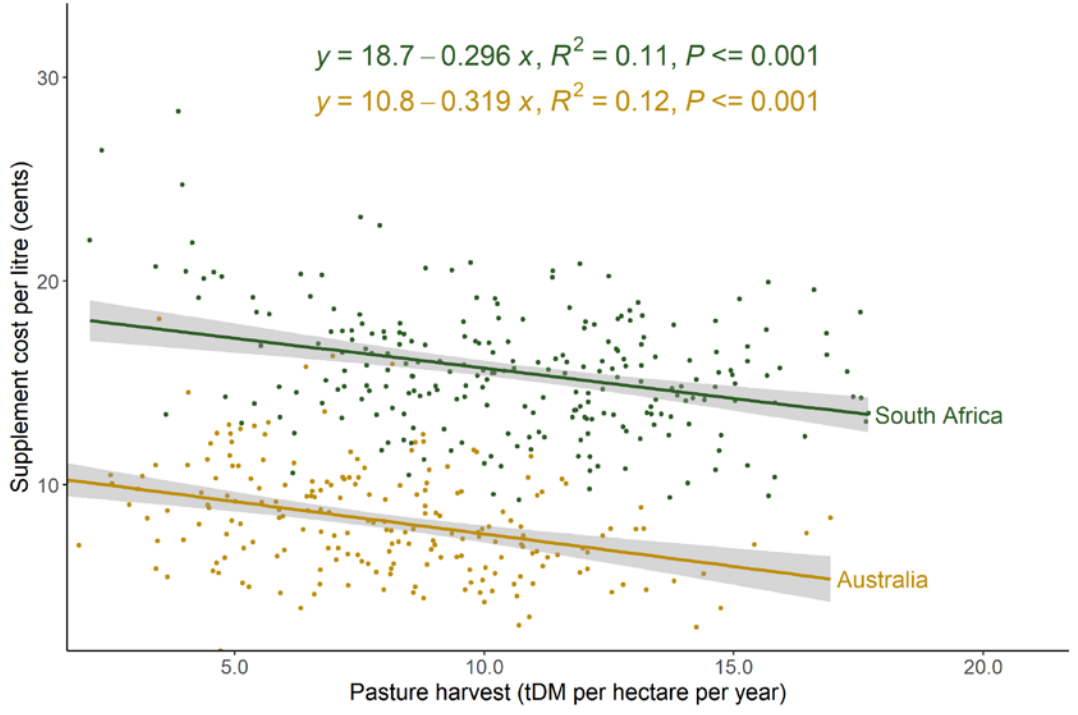
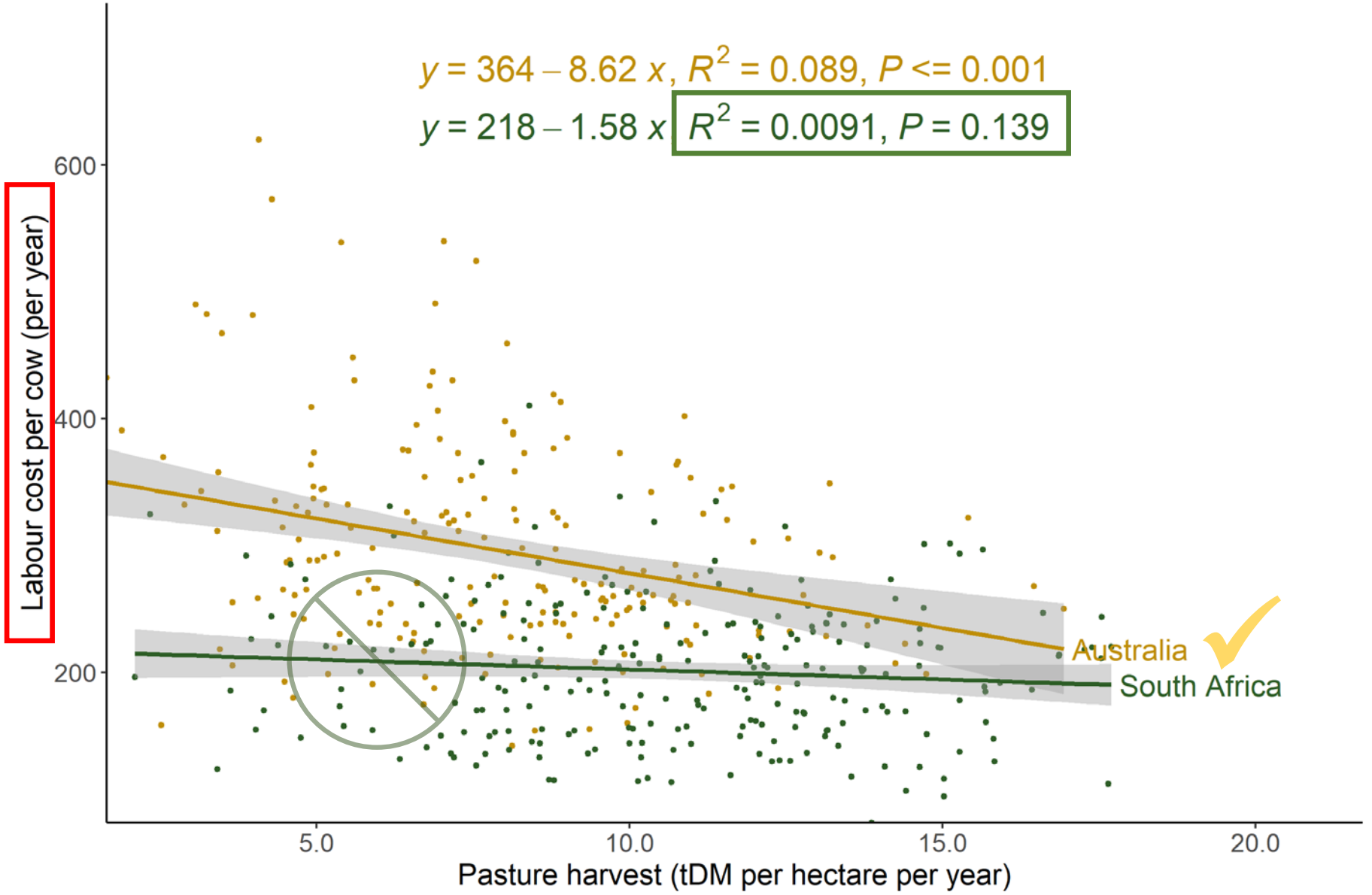




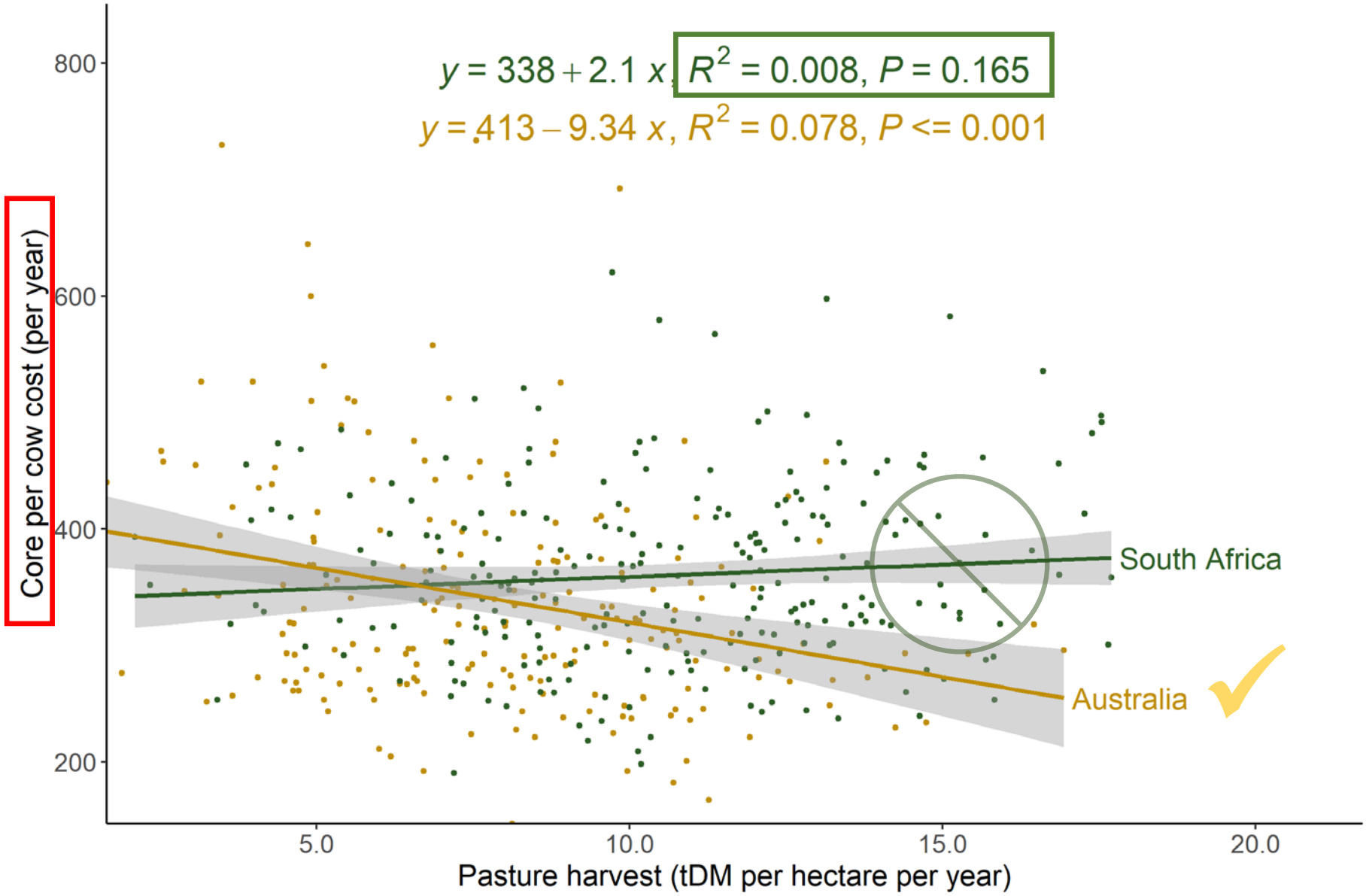




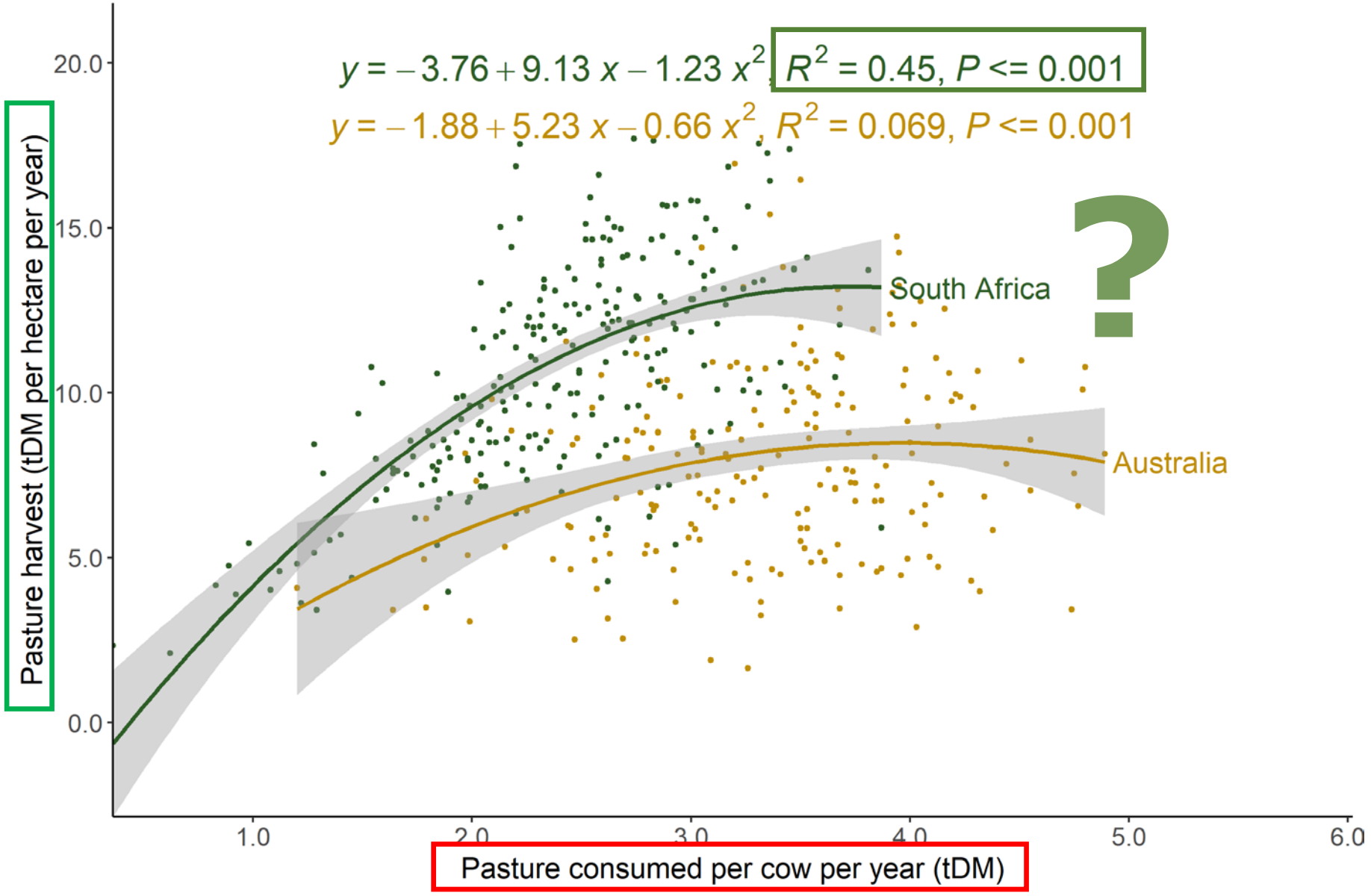
Primary factors impacted by pasture harvest



Primary factors impacted by pasture harvest



Primary factors impacted by pasture harvest



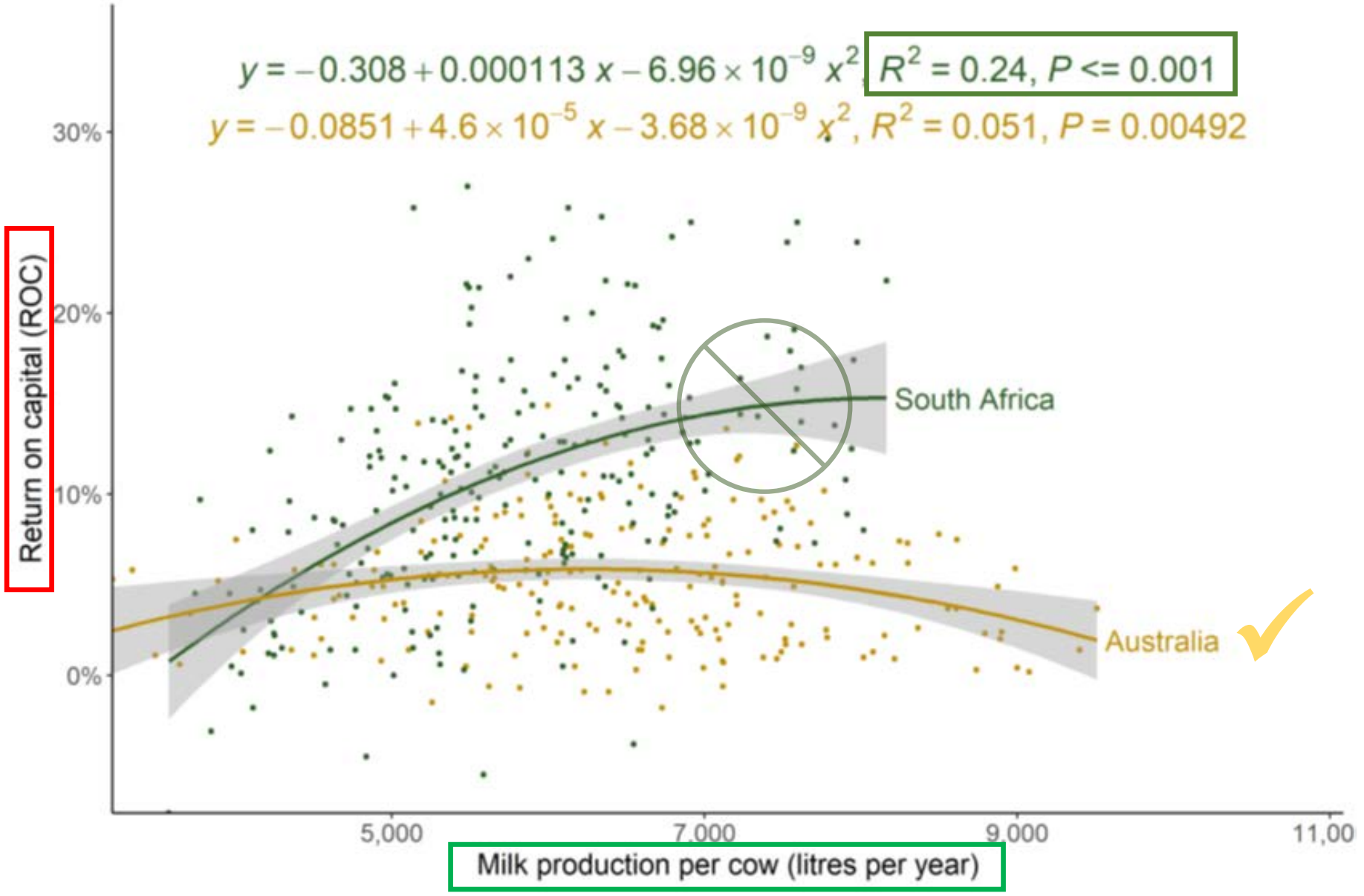
Primary factors impacted by pasture harvest

Primary factors being impacted by pasture harvest	As 	R^2	P
Cost of production per litre		0,14	<= 0,001
Core per hectare cost per tonne dry matter of pasture harvest		0,31	<= 0,001
Pasture cost per tonne dry matter		0,23	<= 0,001
Supplement cost per litre		0,12	<= 0,001
Labour cost per cow		0,09	<= 0,001
Core per cow cost		0,08	<= 0,001
Other factors			
Stocking rate impact on pasture harvest		0,63	<= 0,001
Pasture consumed per cow impact on pasture harvest		0,07	<= 0,001

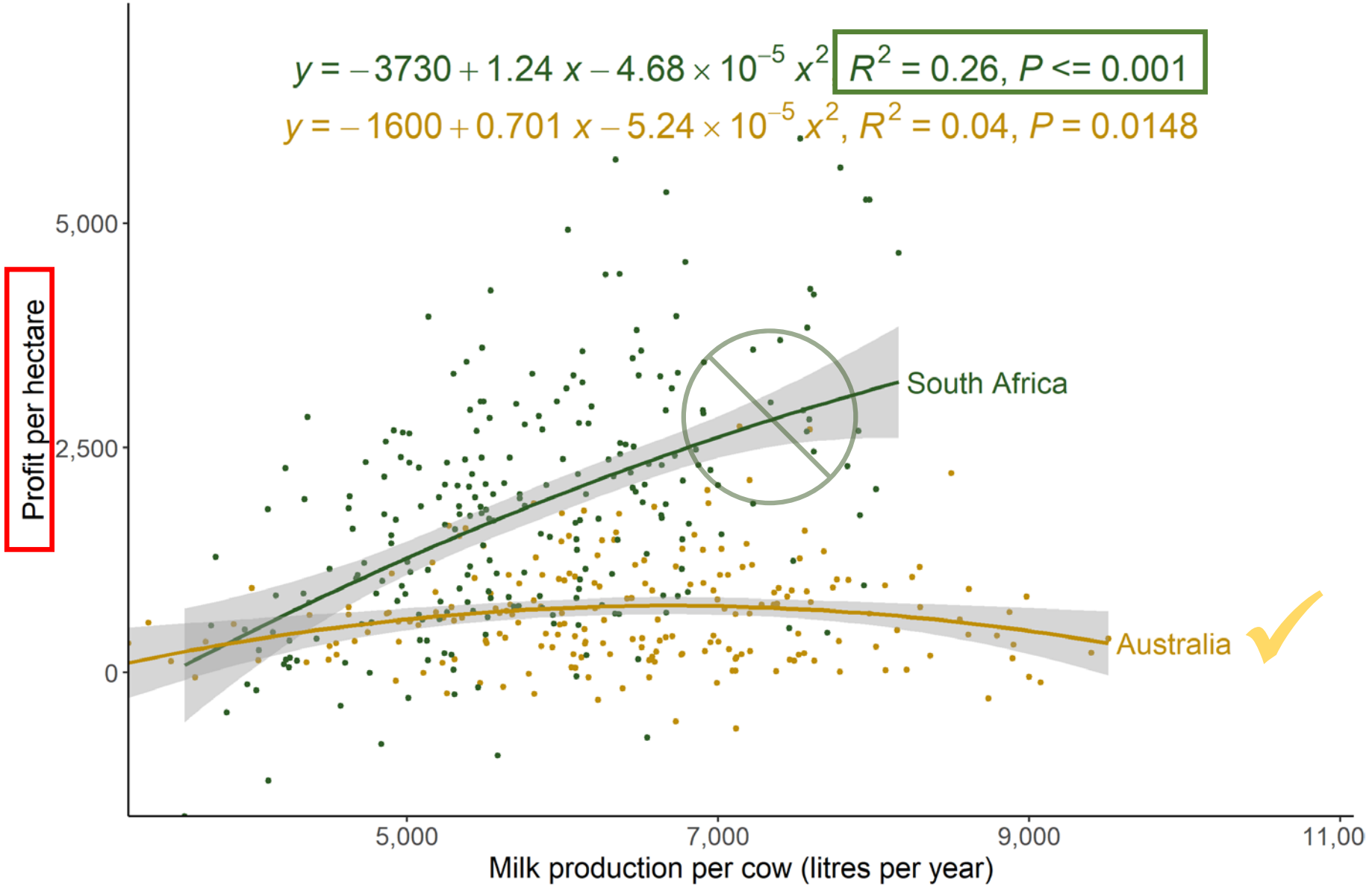
Primary factors impacted by pasture harvest

Primary factors being impacted by pasture harvest	As 	AU R^2	SA R^2
Cost of production per litre		0,14	0,14
Core per hectare cost per tonne dry matter of pasture harvest		0,31	0,37
Pasture cost per tonne dry matter		0,23	0,36
Supplement cost per litre		0,12	0,11
Labour cost per cow		0,09	*0,01*
Core per cow cost		0,08	*0,01*
Other factors			
Stocking rate impact on pasture harvest		0,63	0,40
Pasture consumed per cow impact on pasture harvest		0,07	*0,45*

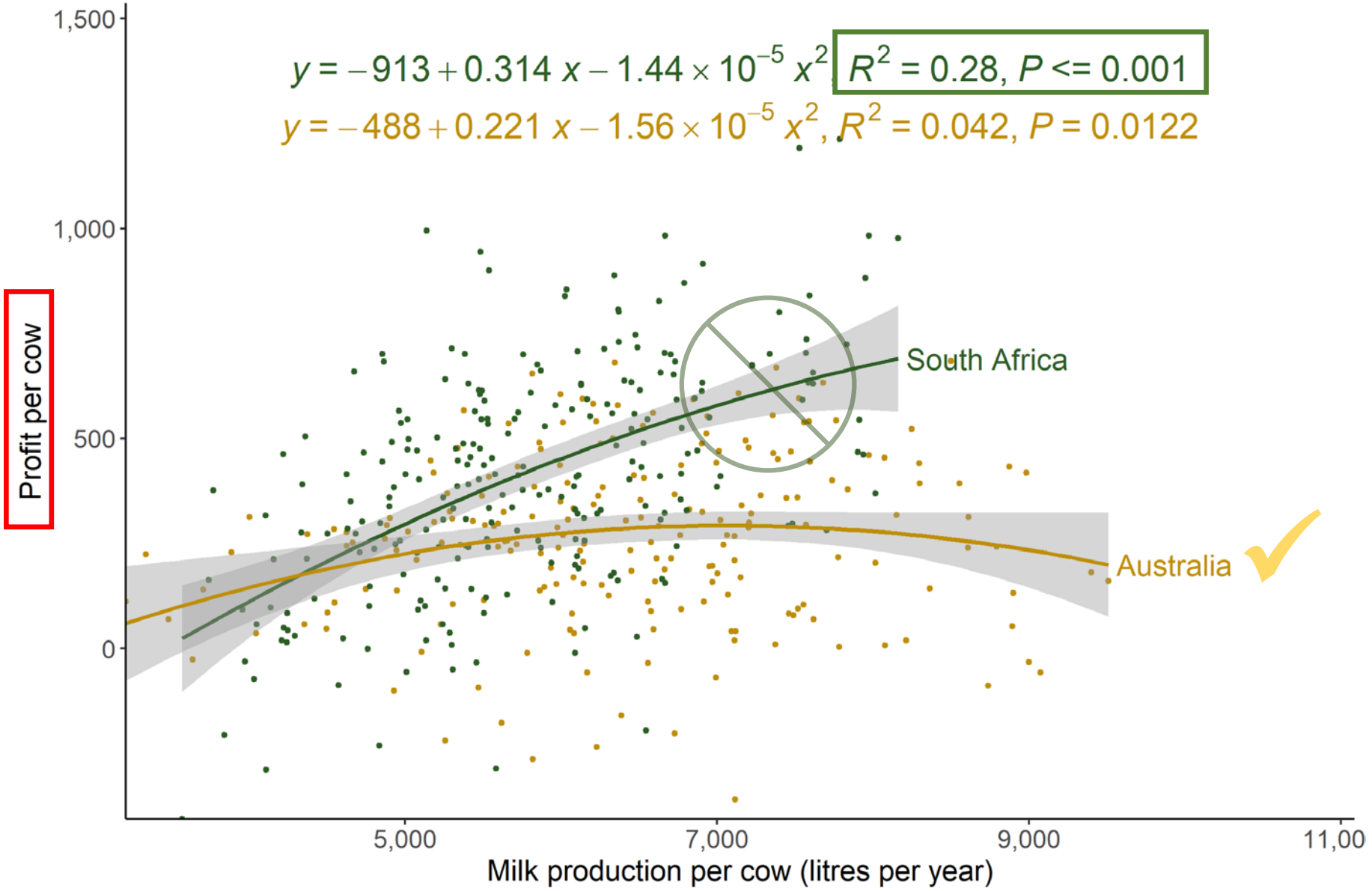
Primary factors impacted by milk production per cow



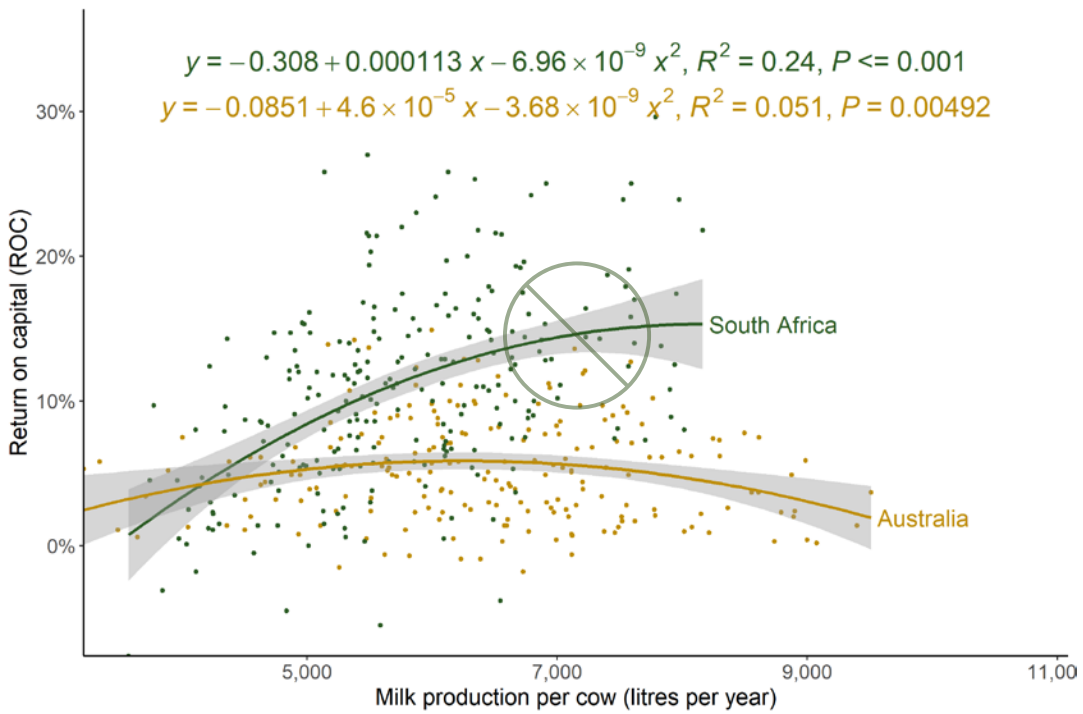
Primary factors impacted by milk production per cow

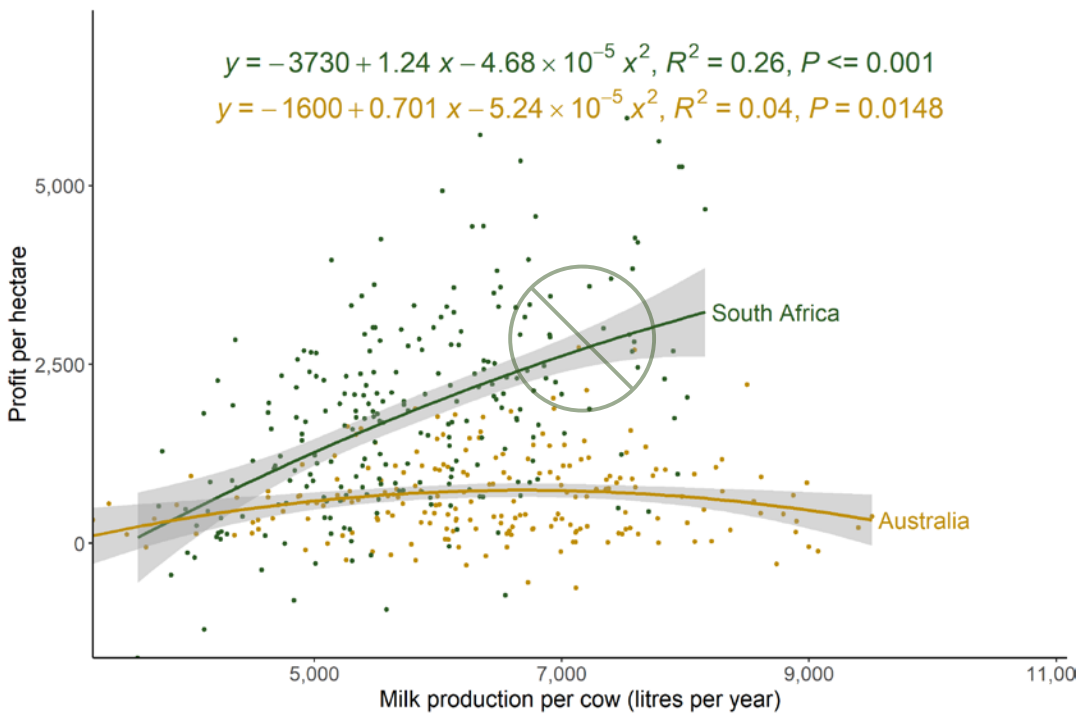


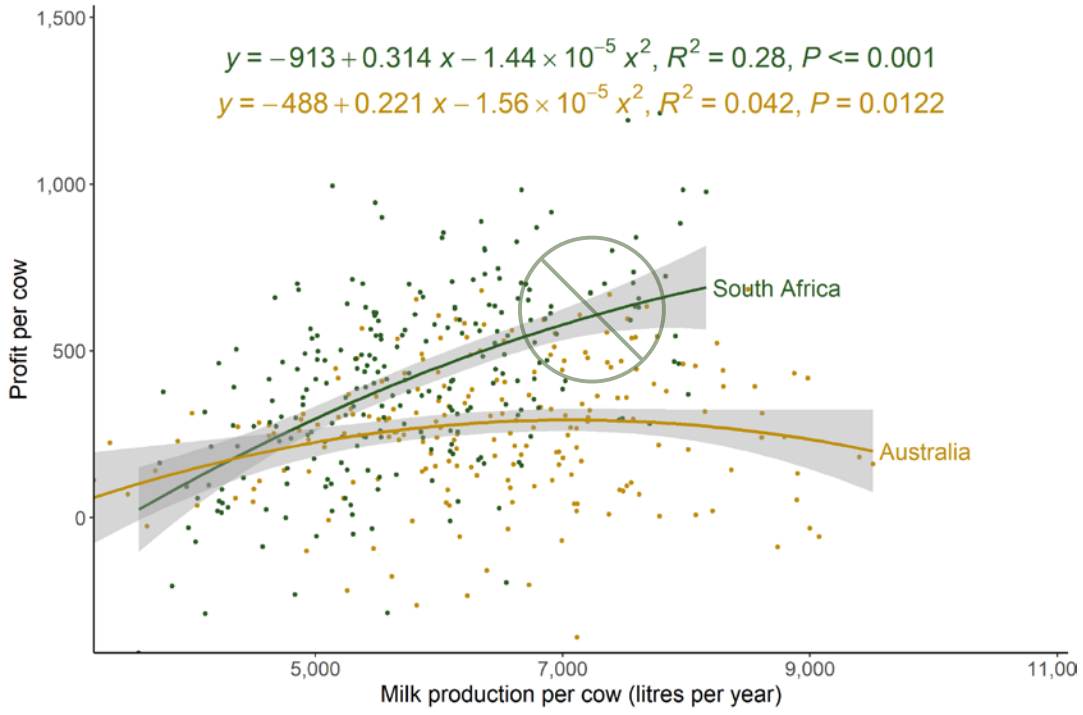
Primary factors impacted by milk production per cow



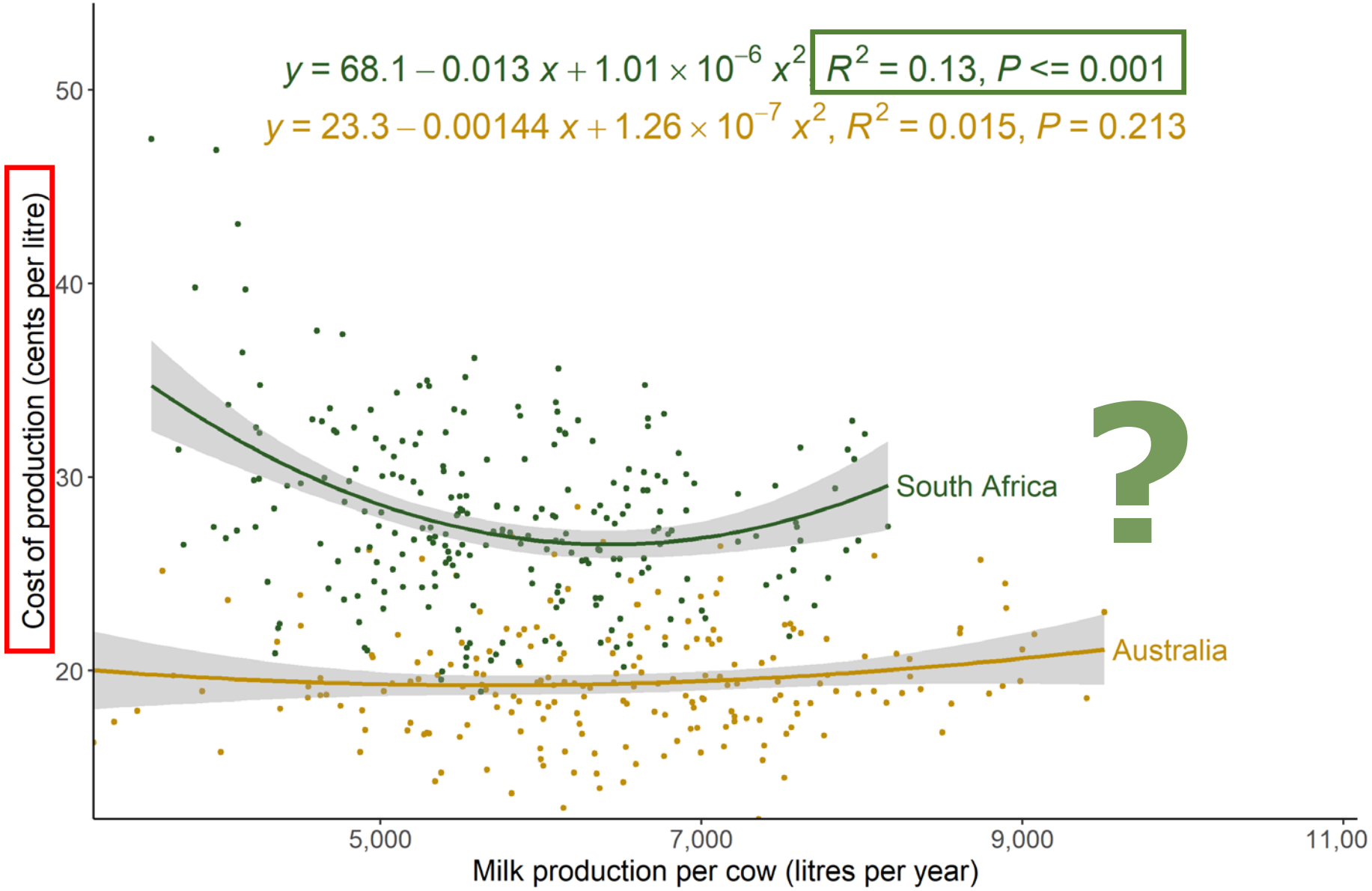
Primary factors impacted by milk production per cow



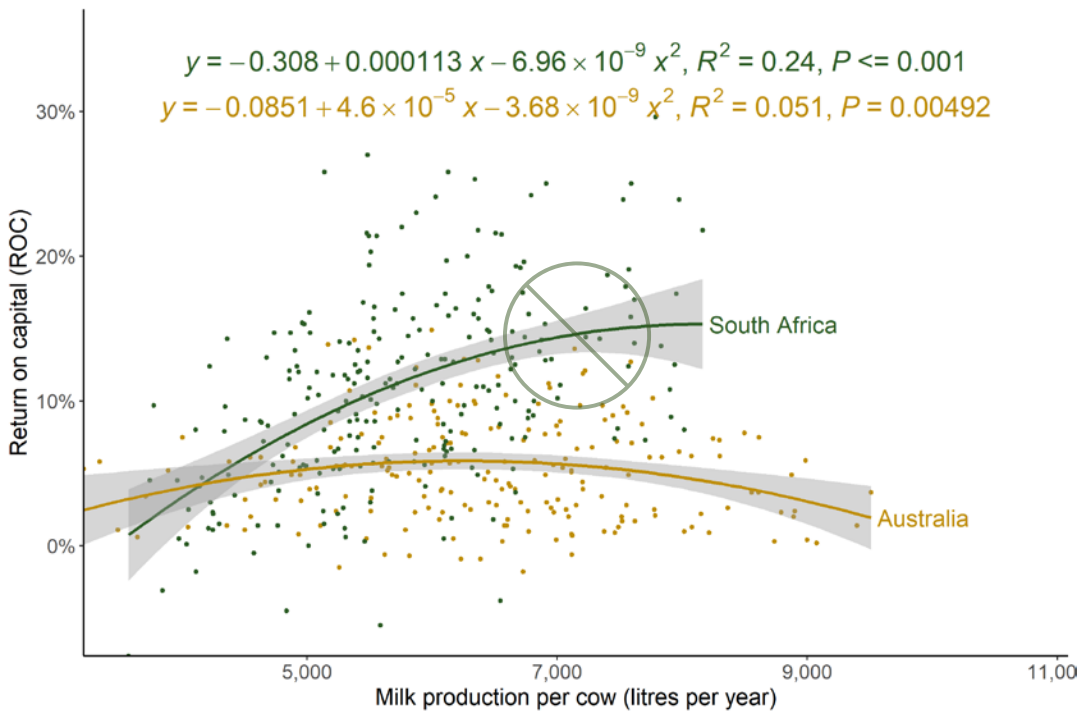


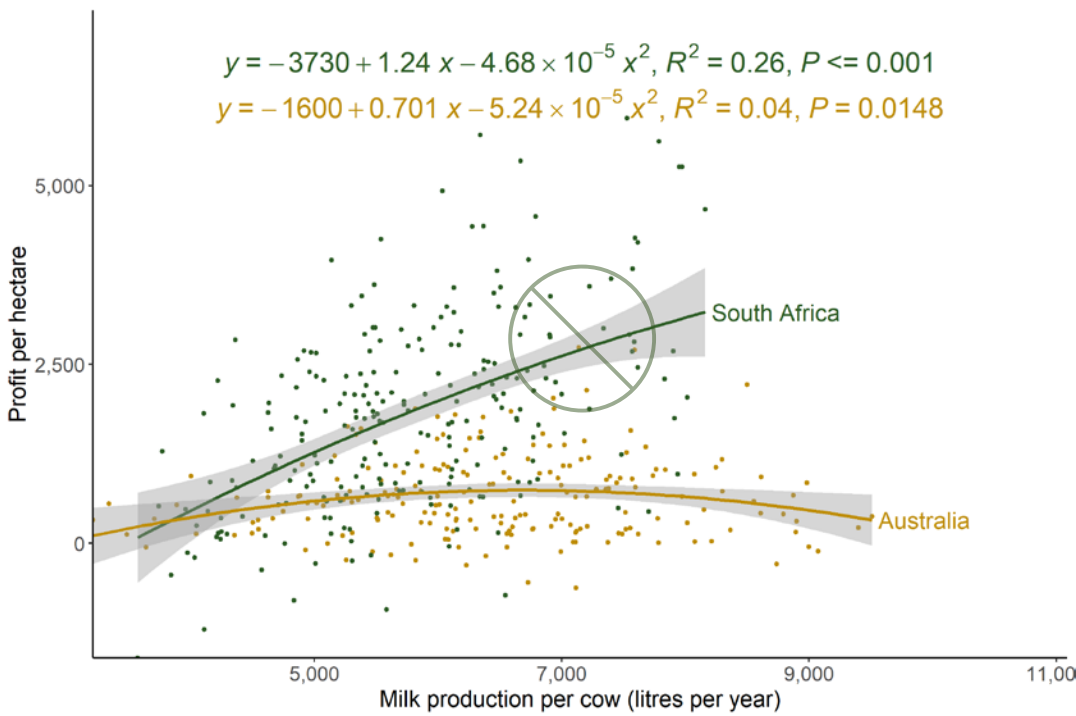


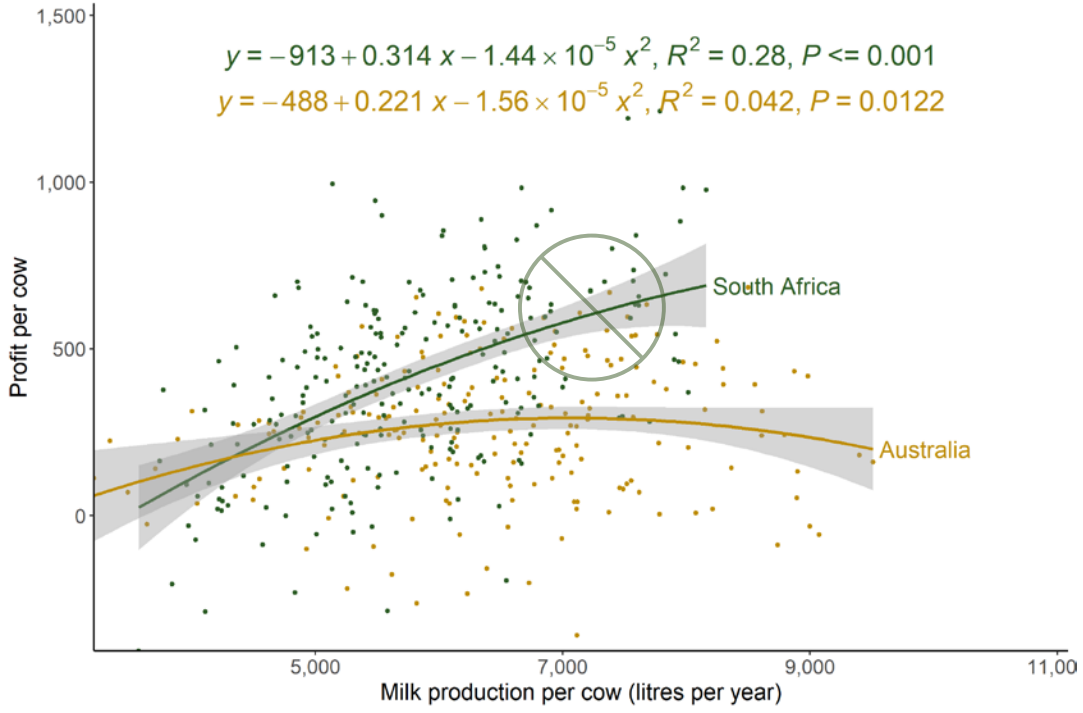
Primary factors impacted by milk production per cow

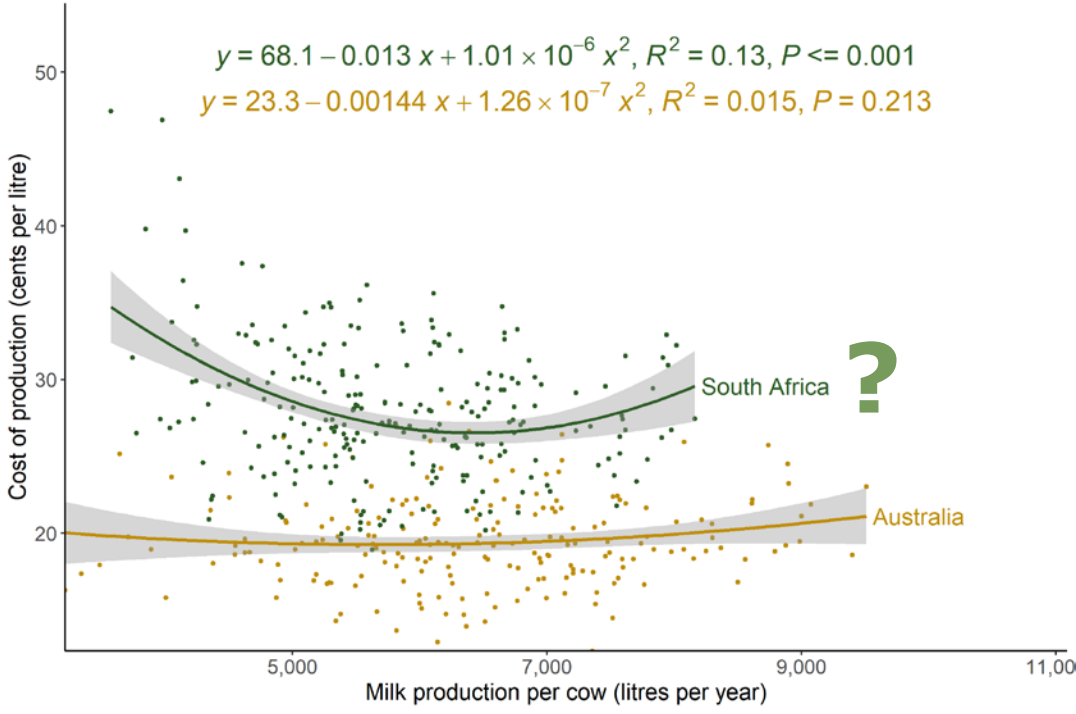


Primary factors impacted by milk production per cow

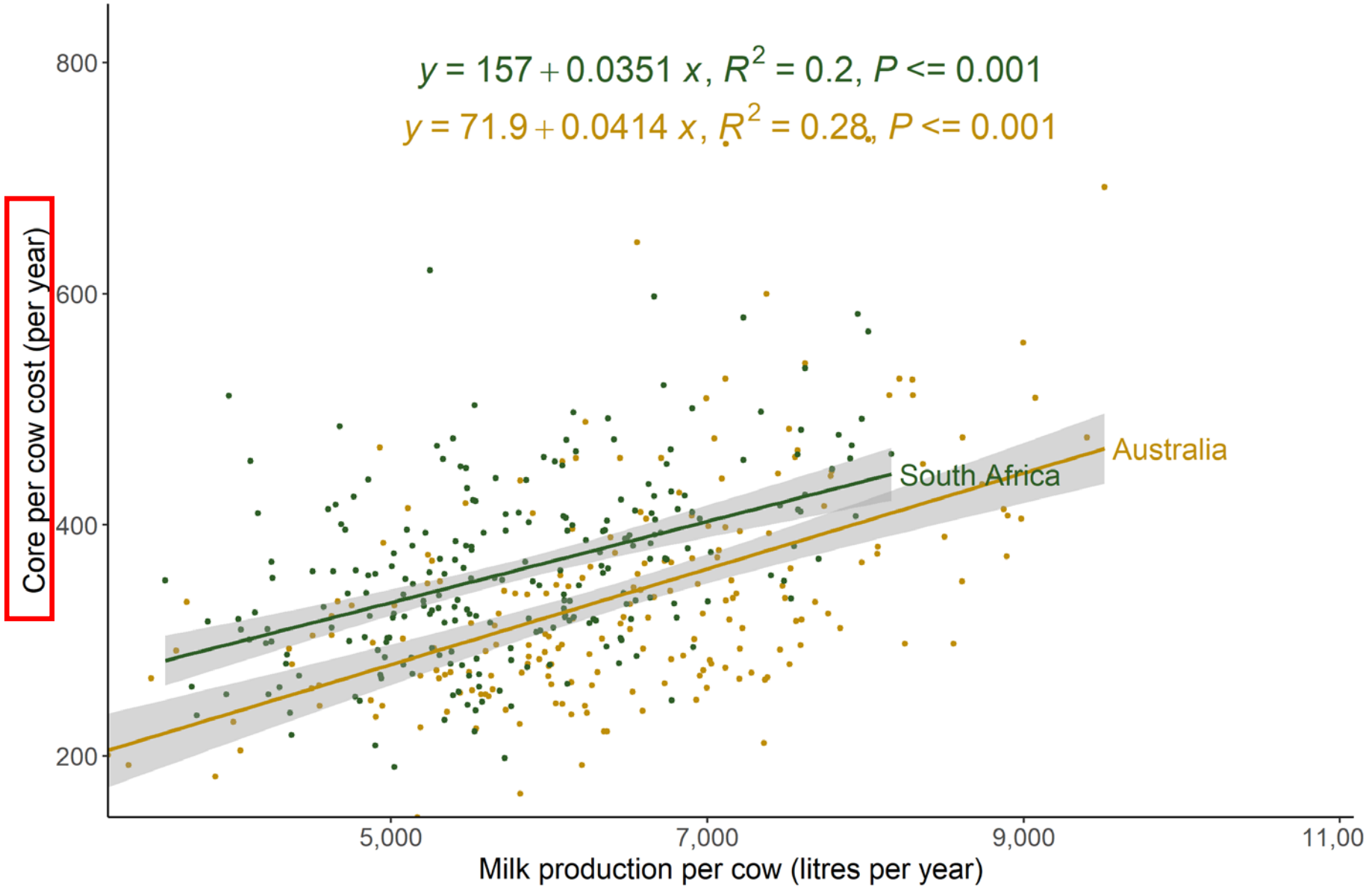




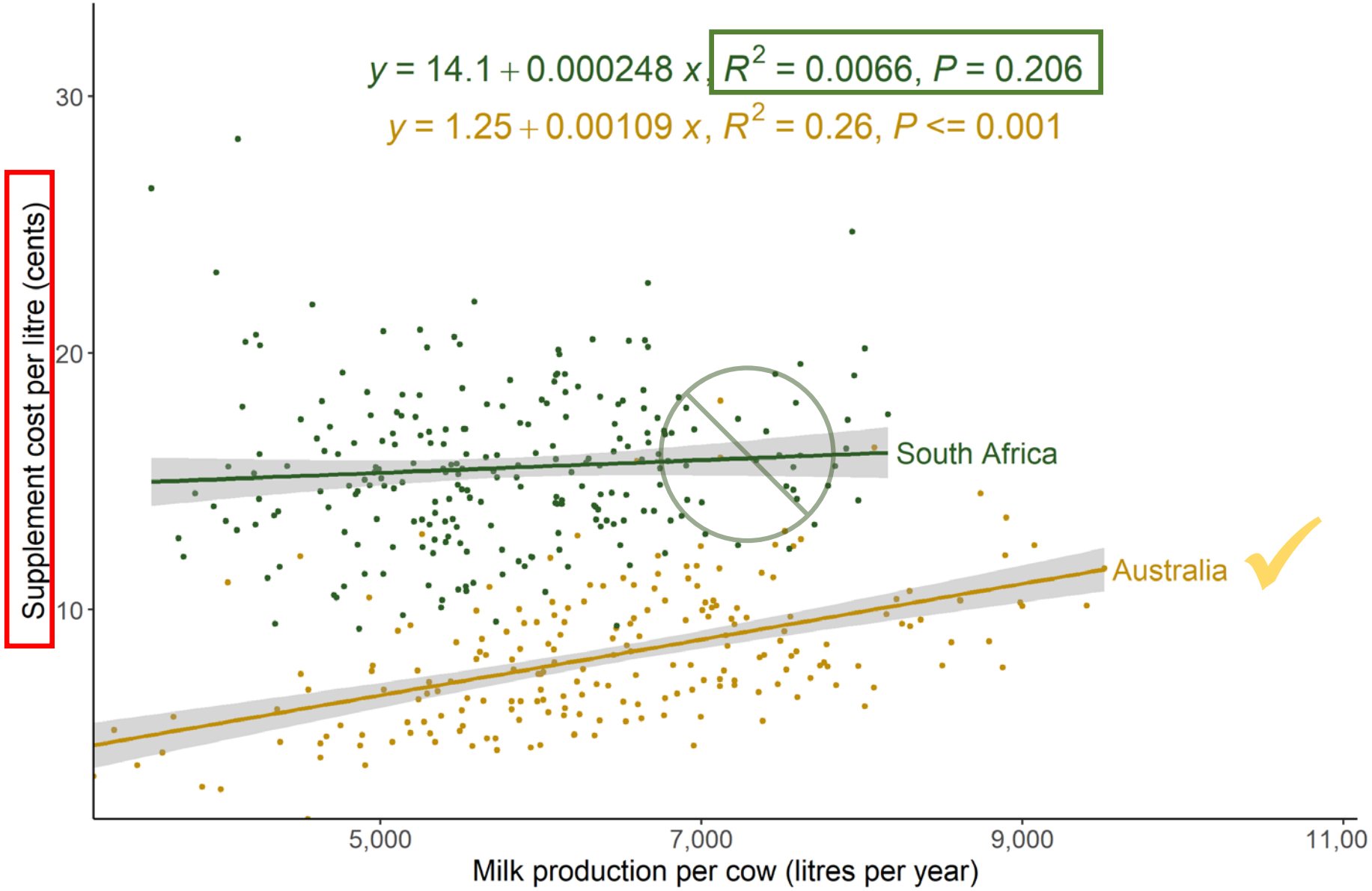




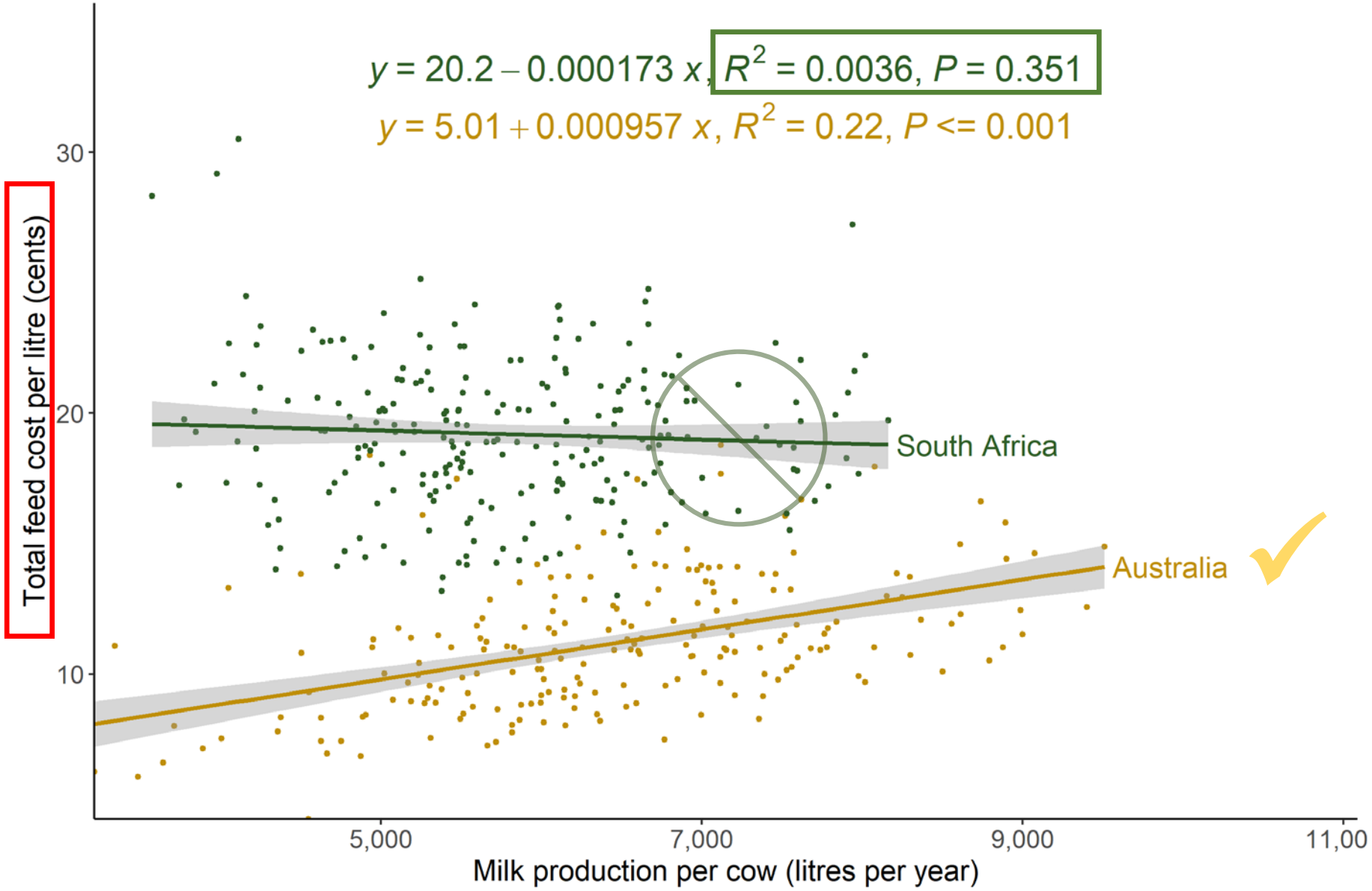
Primary factors impacted by milk production per cow



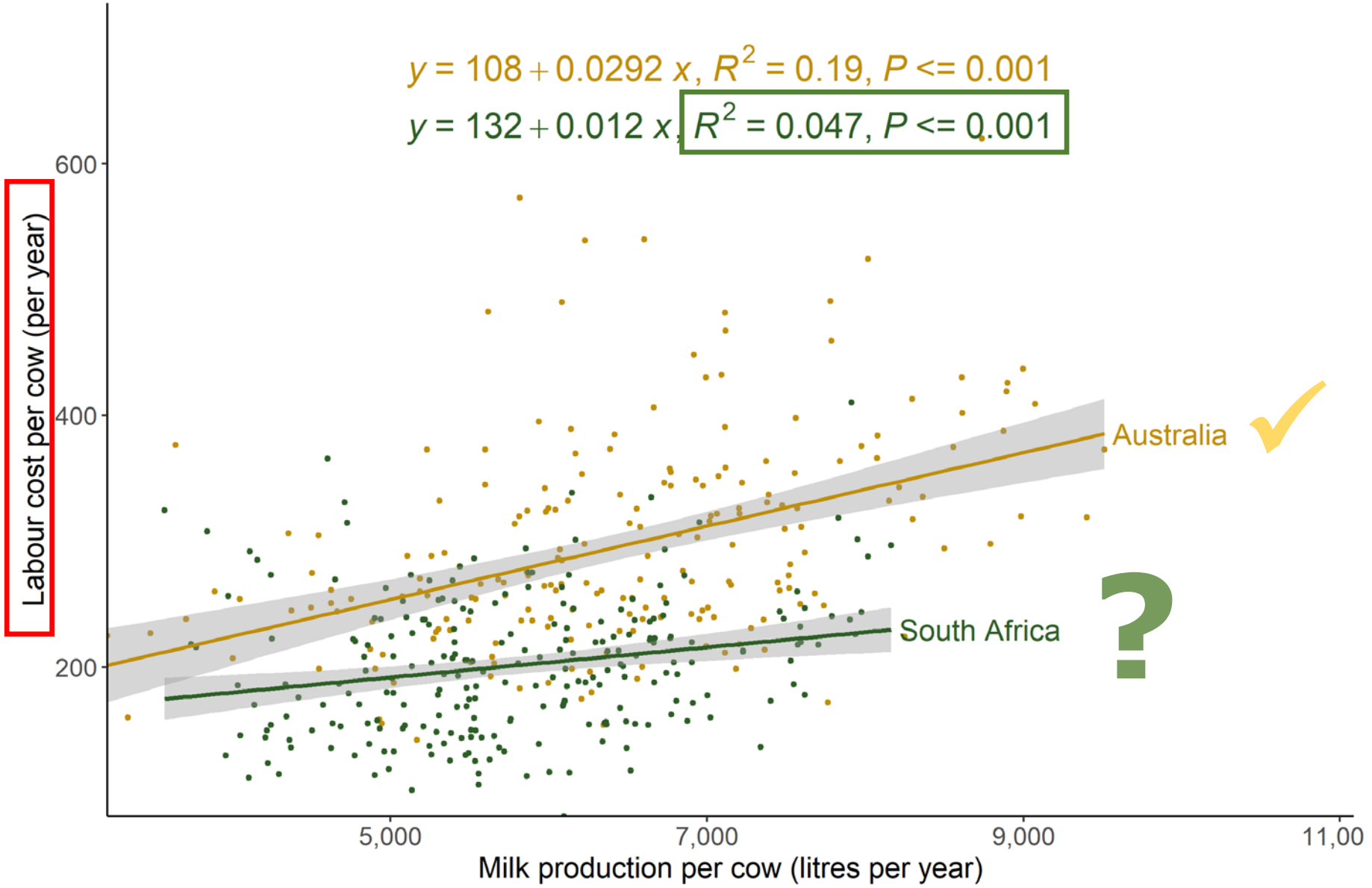
Primary factors impacted by milk production per cow



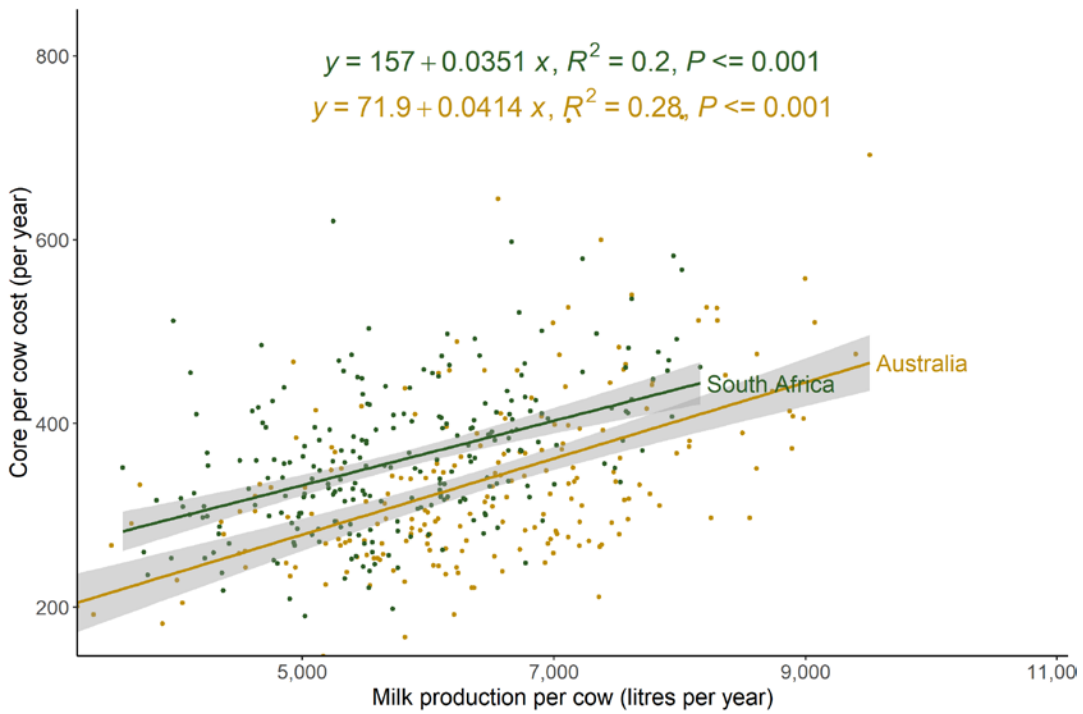
Primary factors impacted by milk production per cow

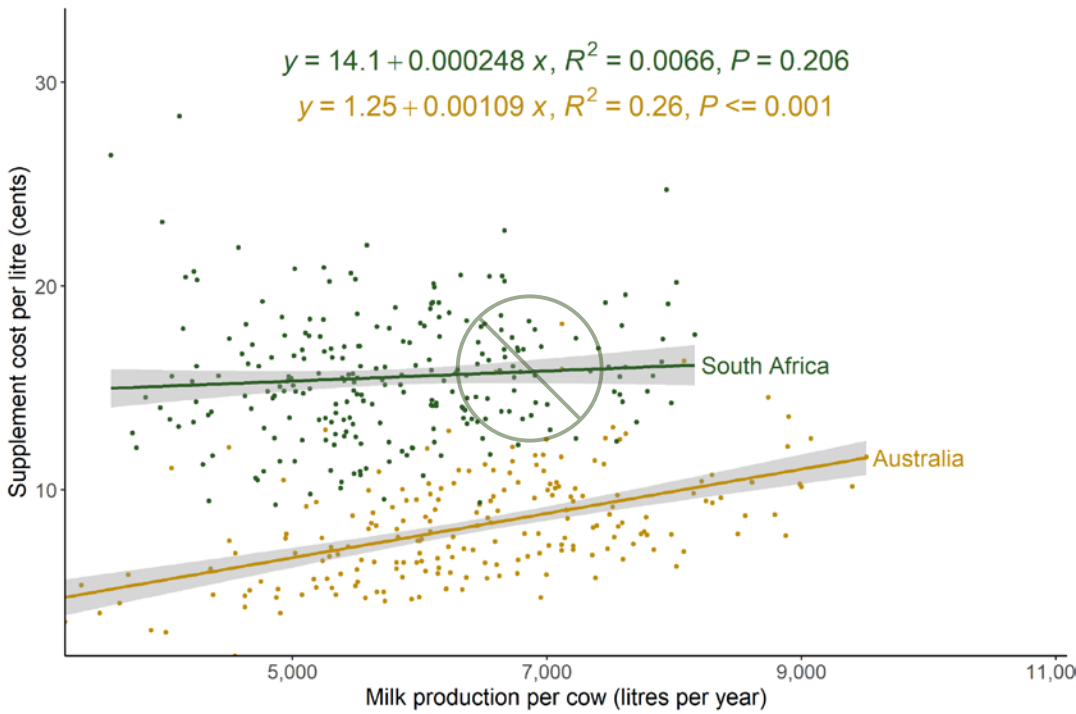


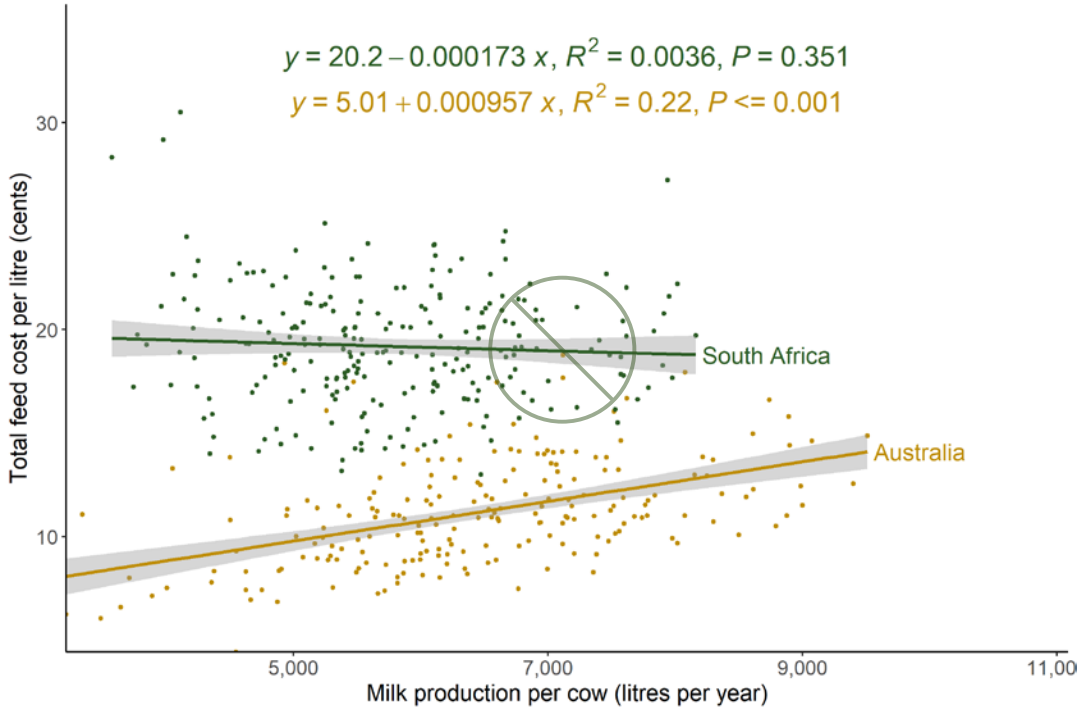
Primary factors impacted by milk production per cow

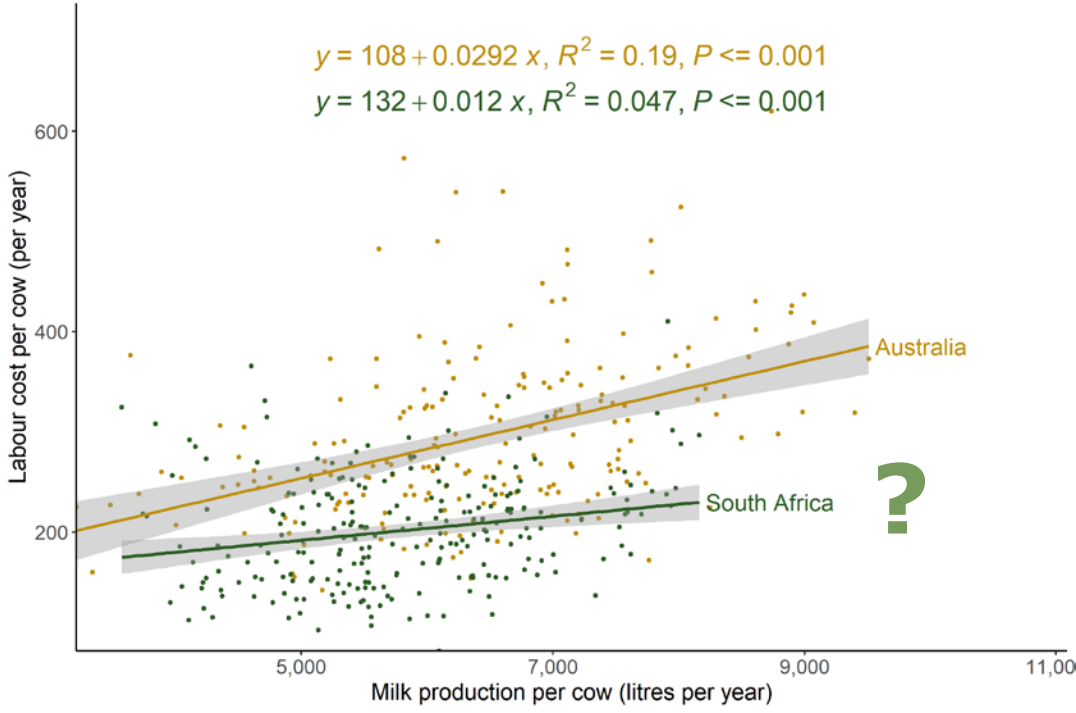


Primary factors impacted by milk production per cow

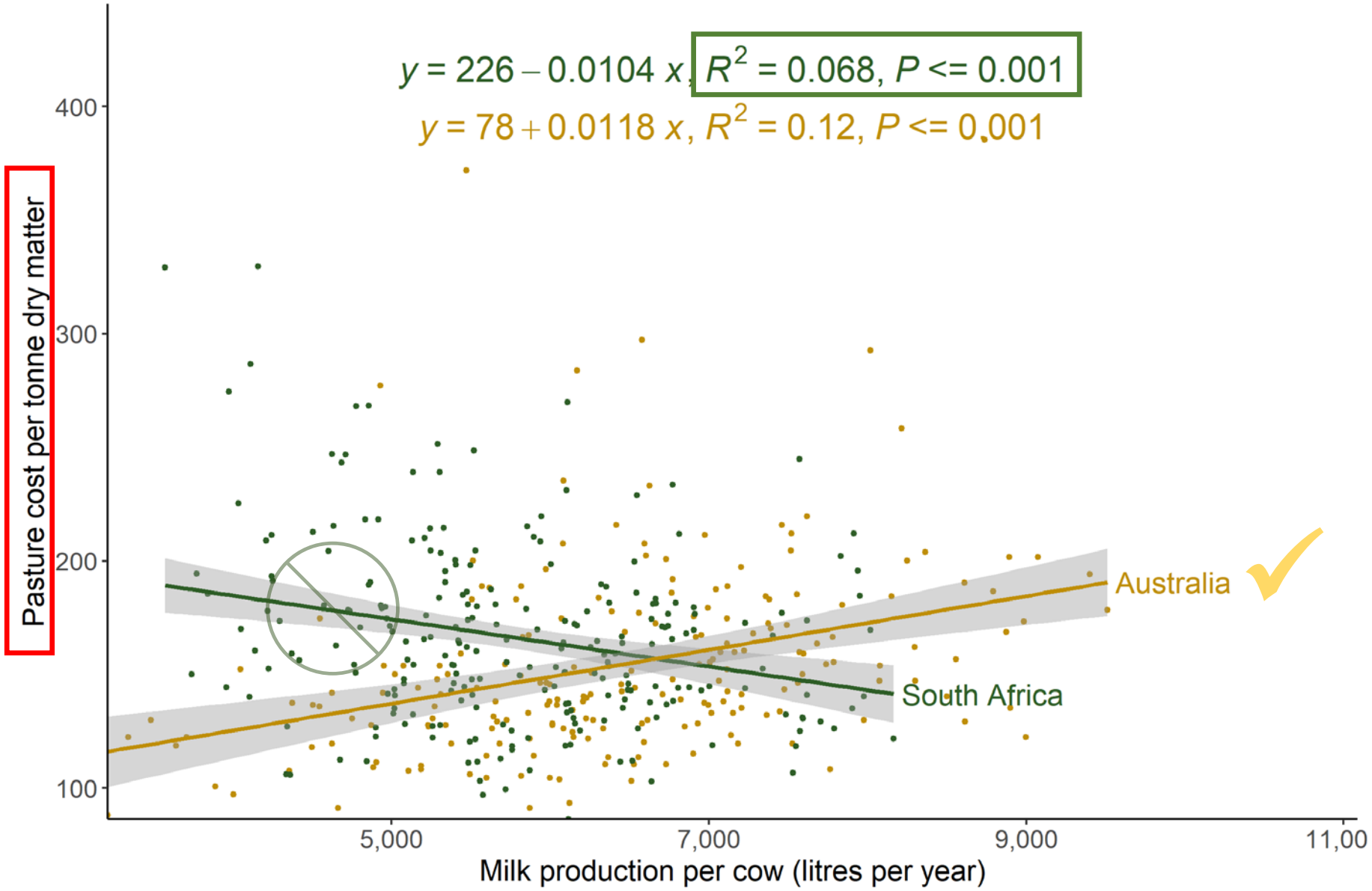




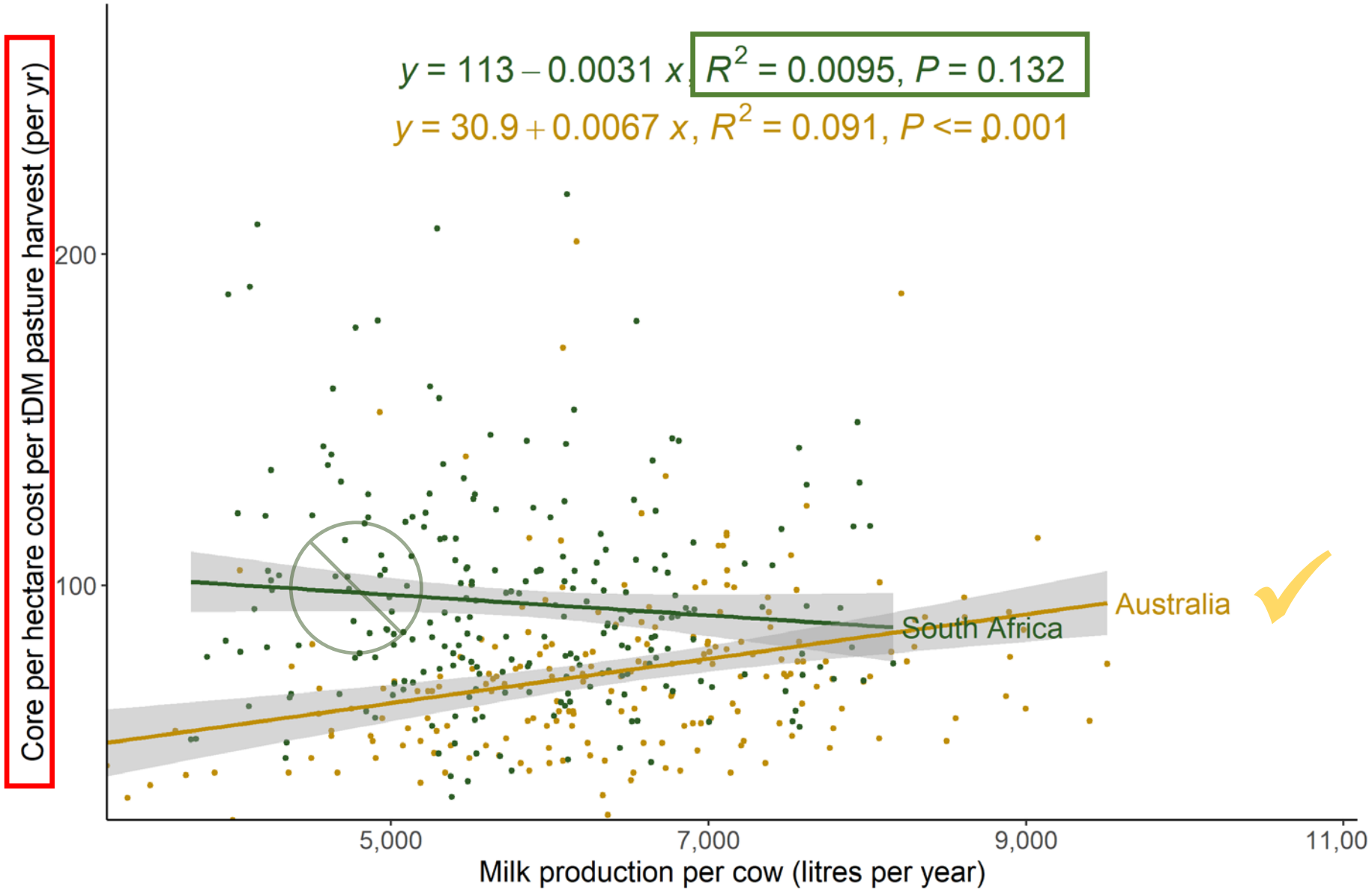




Primary factors impacted by milk production per cow



Primary factors impacted by milk production per cow



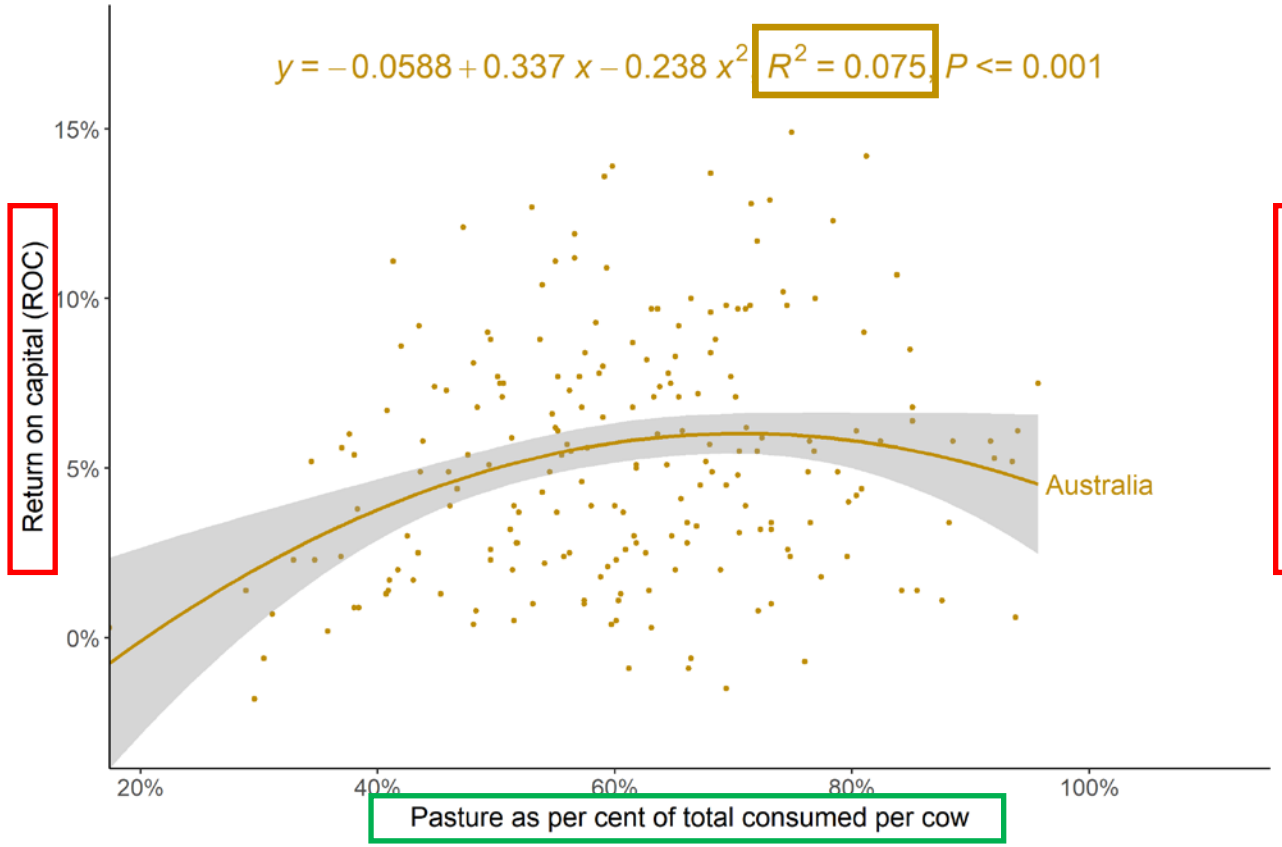
Primary factors impacted by milk production per cow

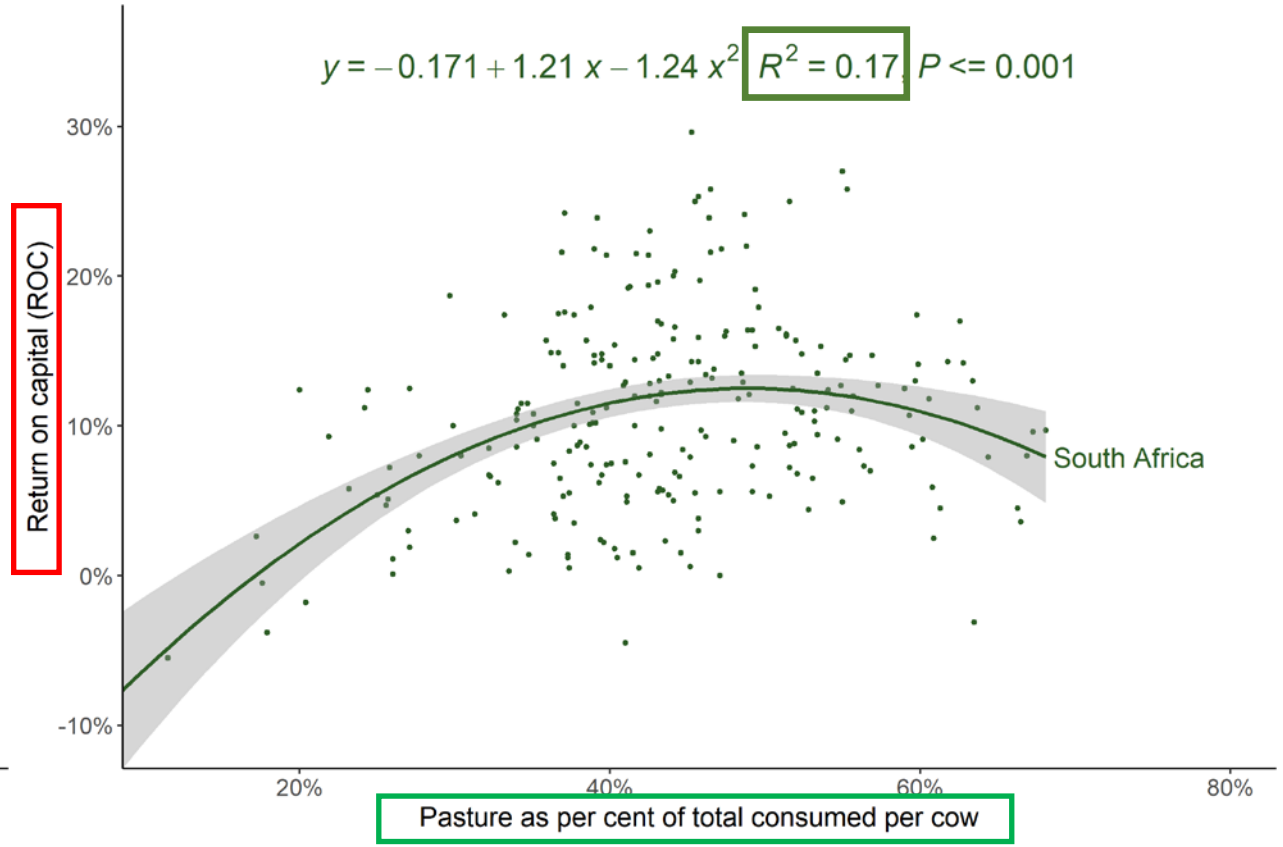
Primary factors being impacted by milk production per cow	As 	R^2	P
Core per cow cost		0,28	<= 0,001
Supplement cost per litre		0,26	<= 0,001
Total feed cost per litre		0,22	<= 0,001
Labour cost per cow		0,19	<= 0,001
Pasture cost per tonne dry matter		0,12	<= 0,001
Core per hectare cost per tonne dry matter of pasture harvest		0,09	<= 0,001

Primary factors impacted by milk production per cow

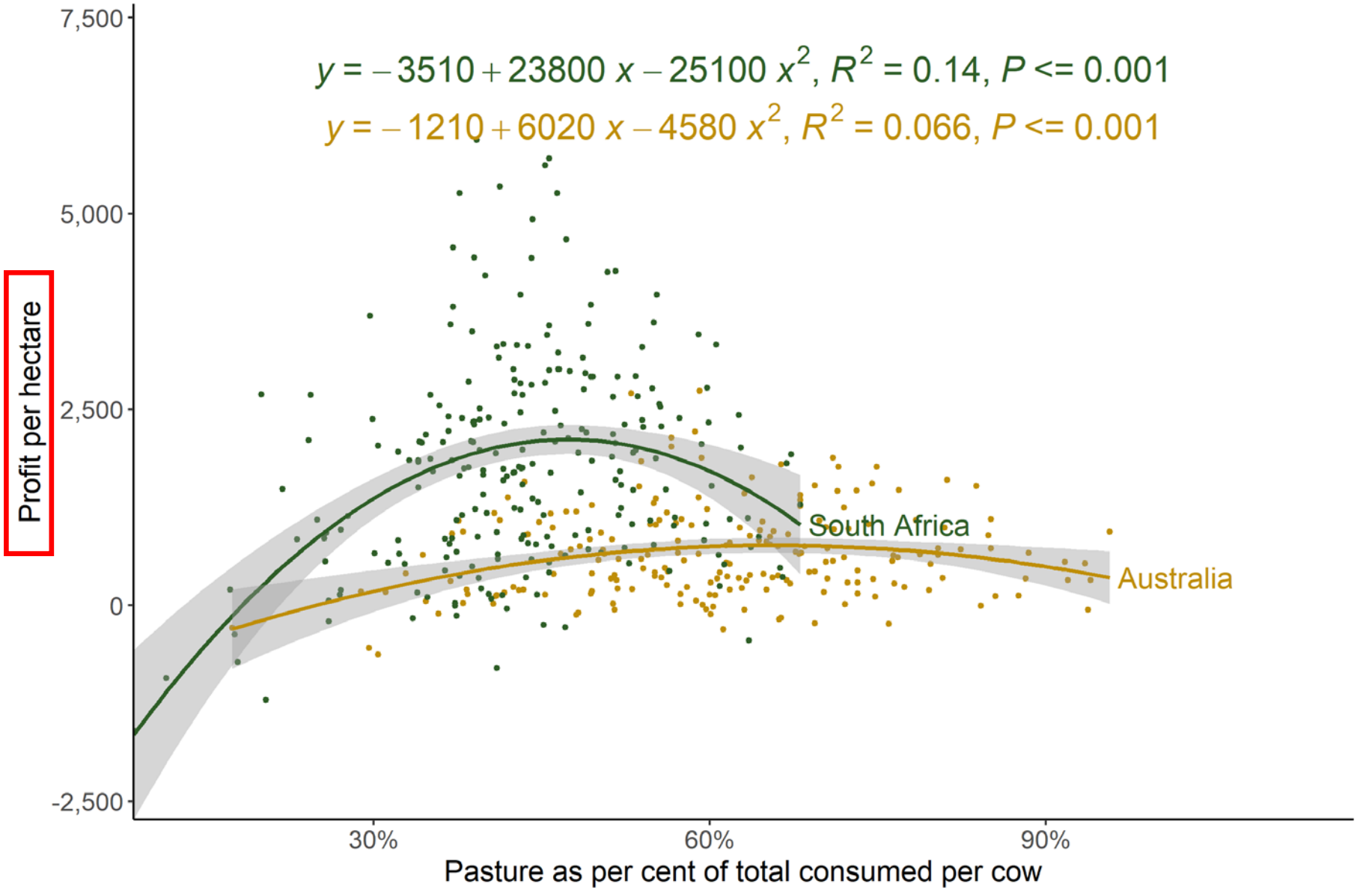
Primary factors being impacted by milk production per cow	As 	AU R^2	SA R^2
Core per cow cost		0,28	0,20
Supplement cost per litre		0,26	*0,01*
Total feed cost per litre		0,22	*0,00*
Labour cost per cow		0,19	*0,05*
Pasture cost per tonne dry matter		0,12	*0,07*
Core per hectare cost per tonne dry matter of pasture harvest		0,09	*0,01*

Primary factors impacted by pasture as % of cows diet

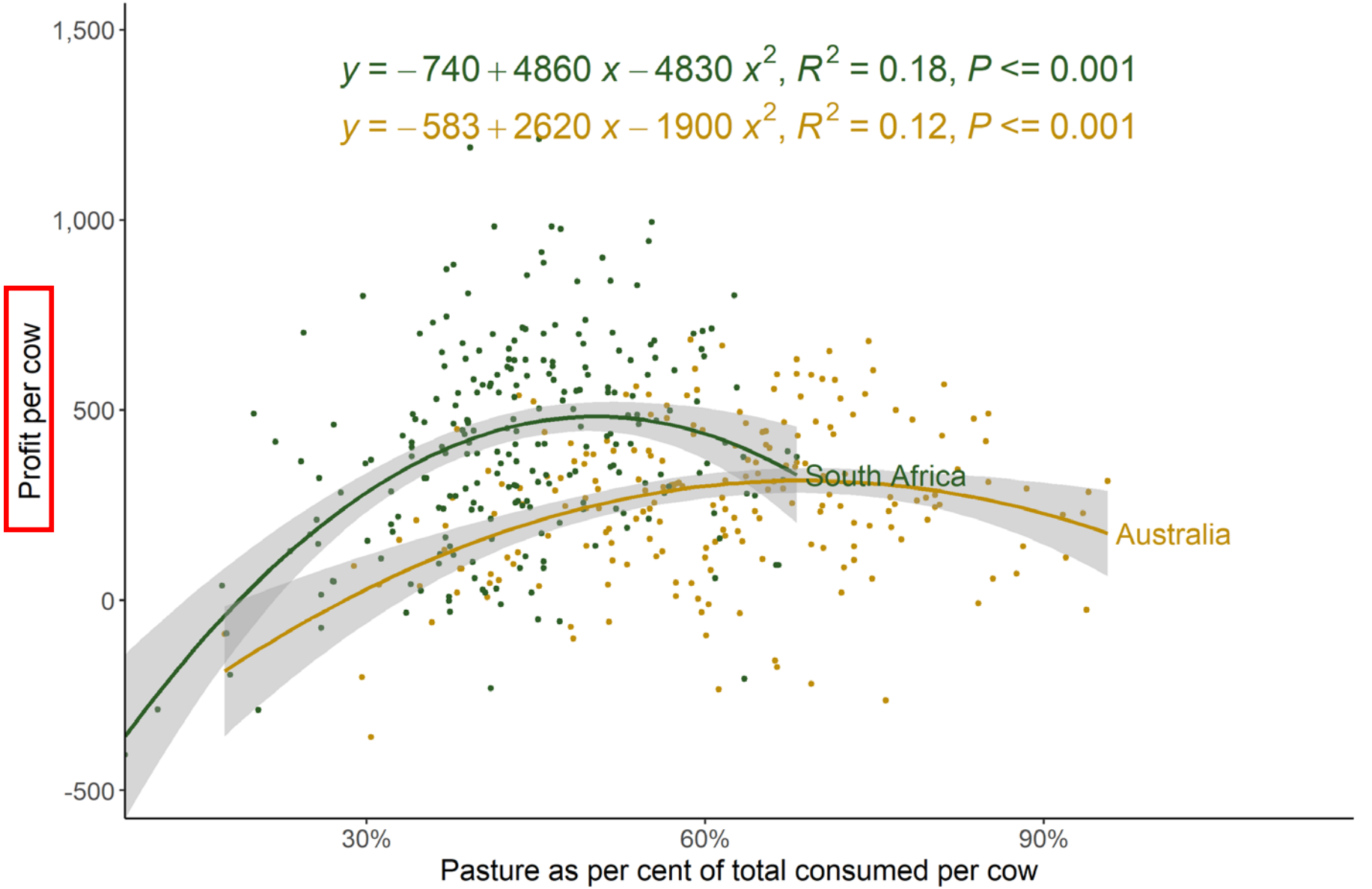




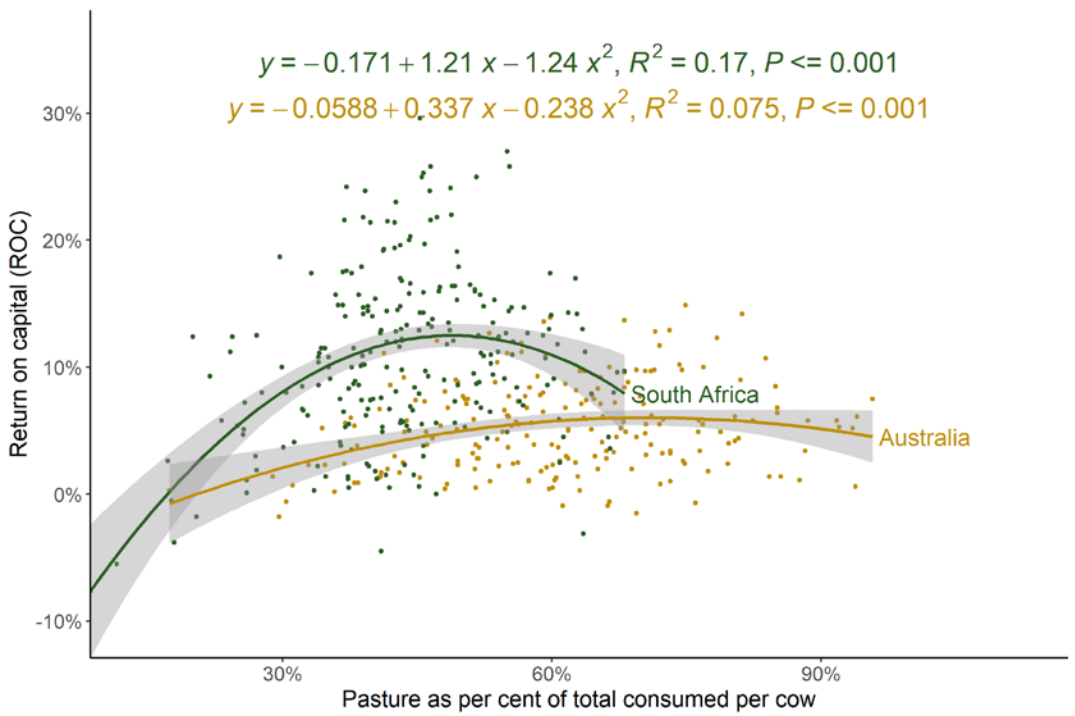
Primary factors impacted by pasture as % of cows diet

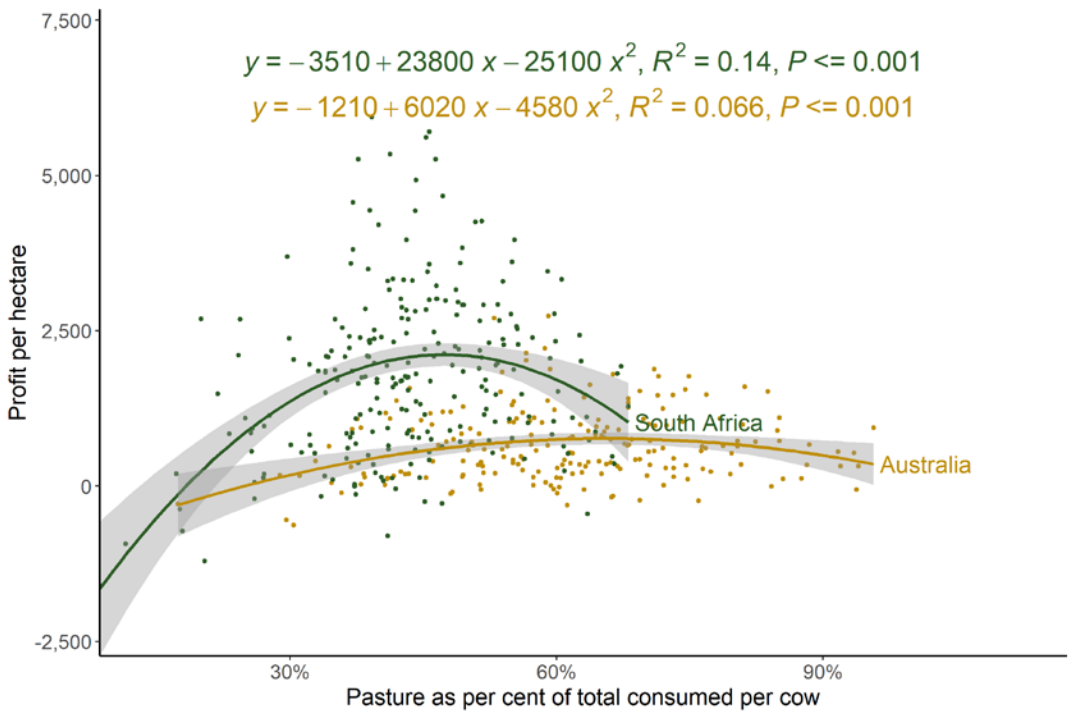


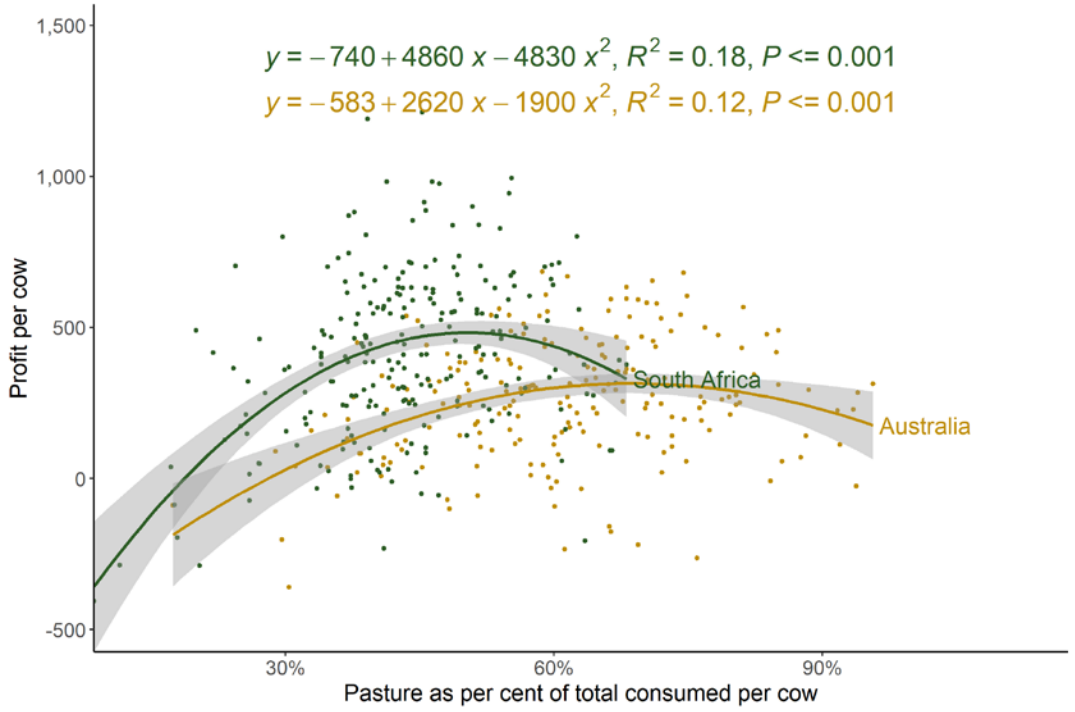
Primary factors impacted by pasture as % of cows diet



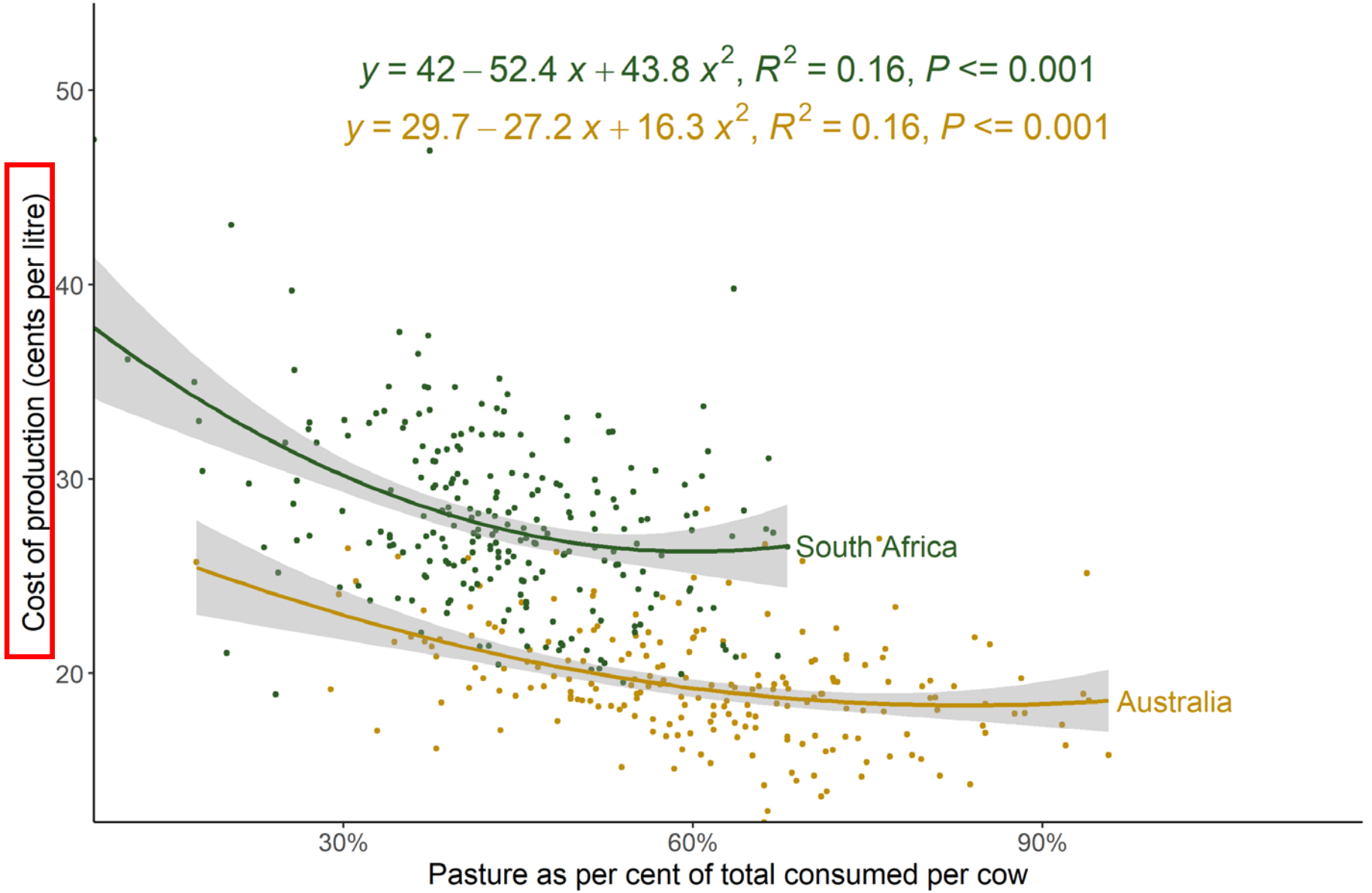
Primary factors impacted by pasture as % of cows diet



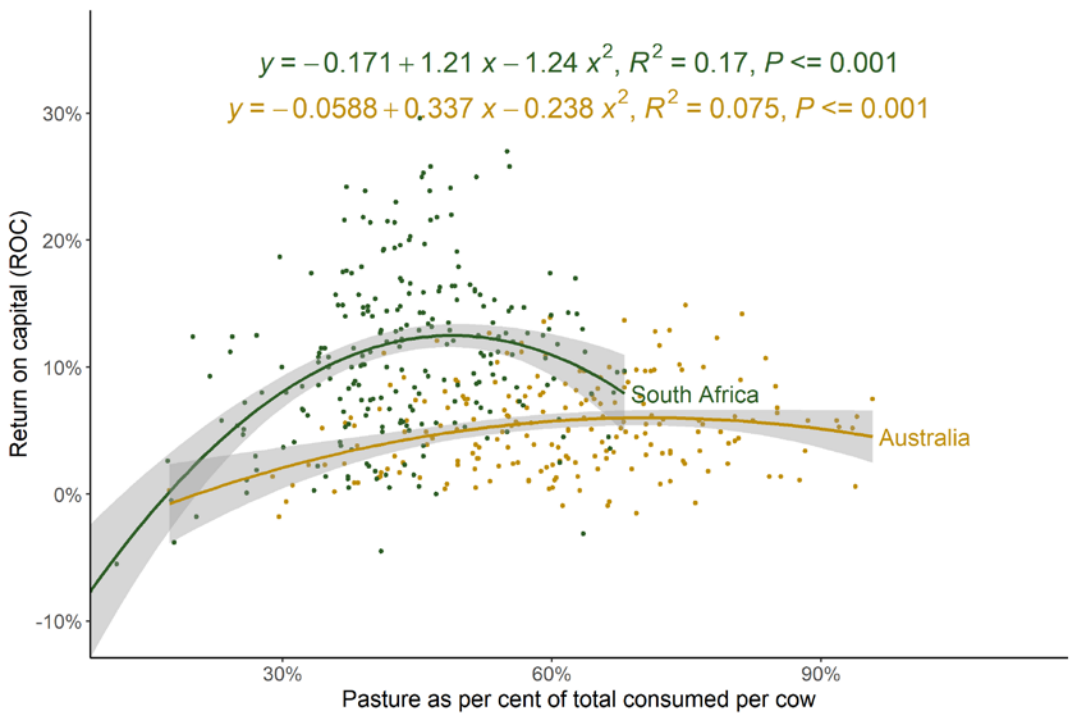


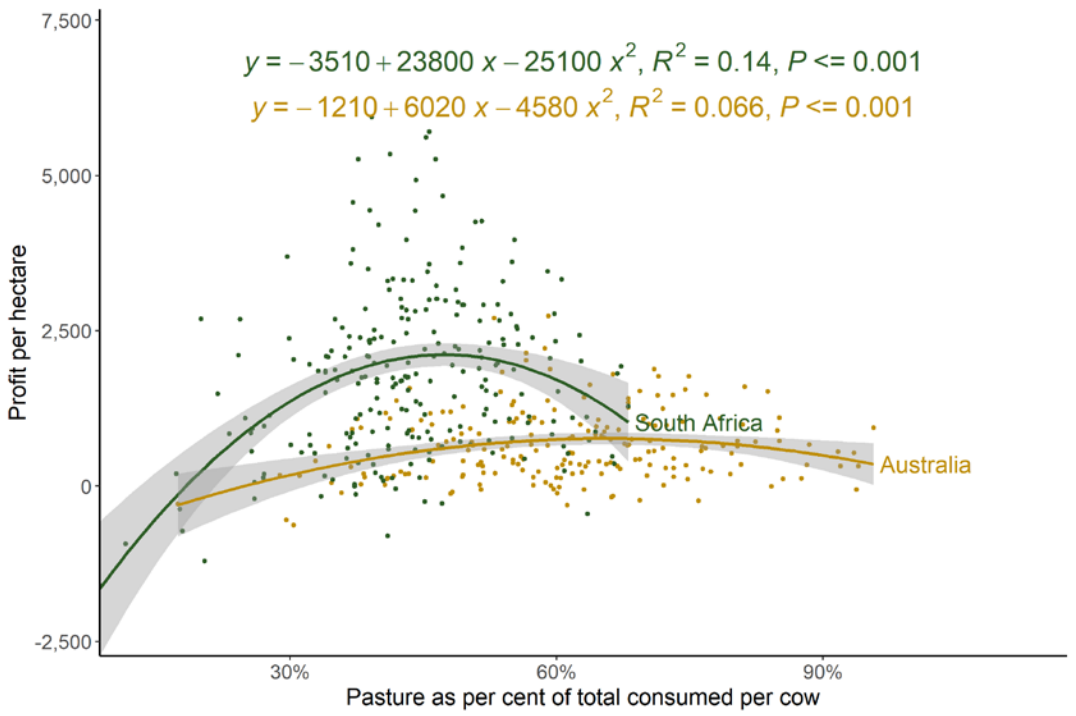


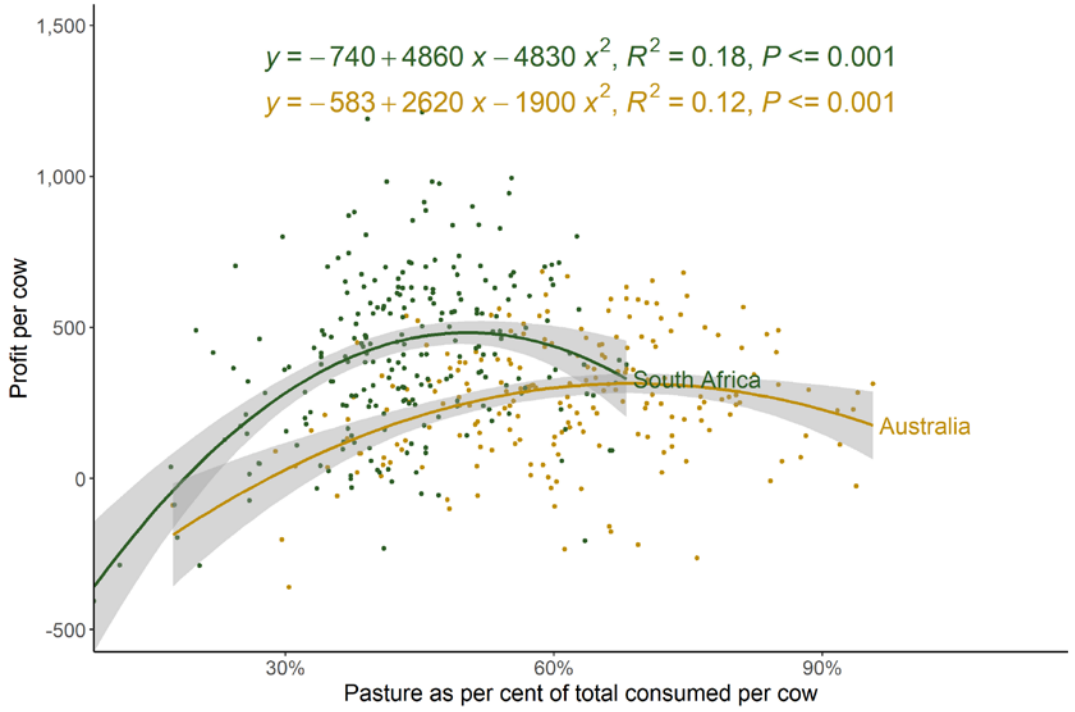
Primary factors impacted by pasture as % of cows diet

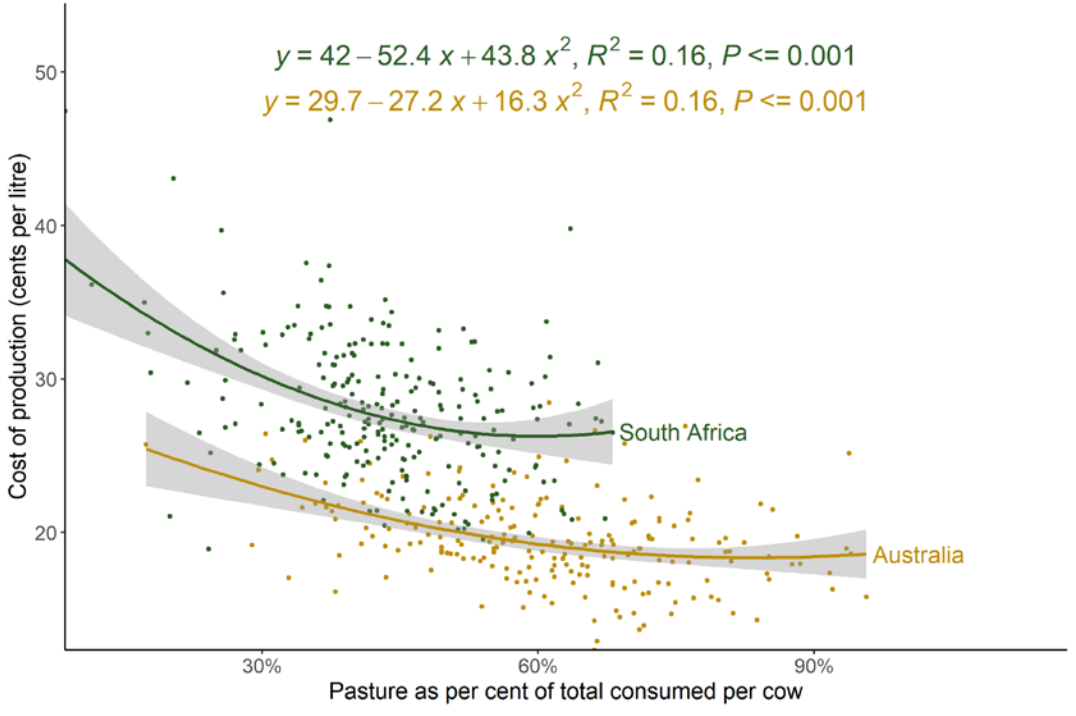


Primary factors impacted by pasture as % of cows diet

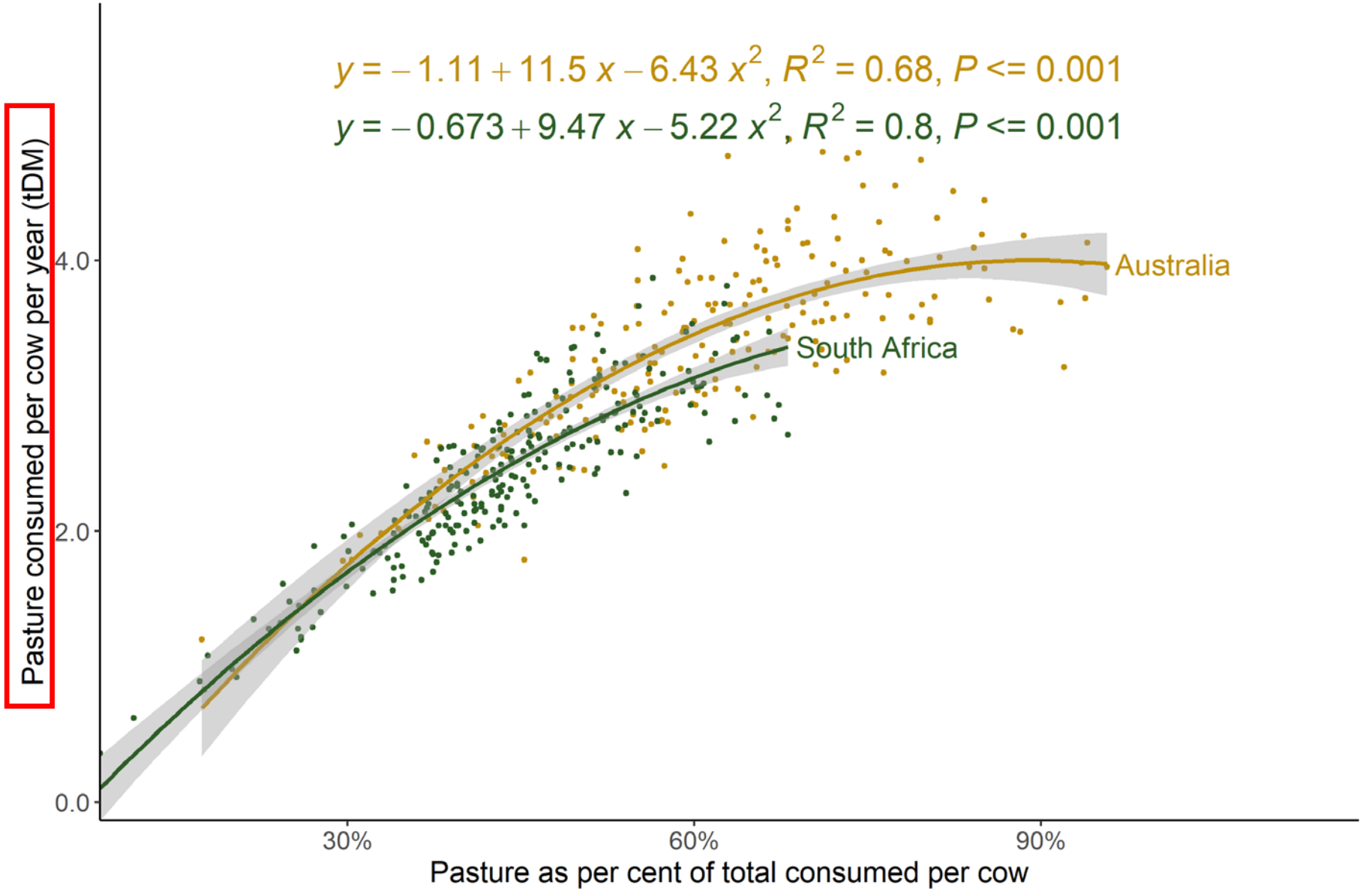




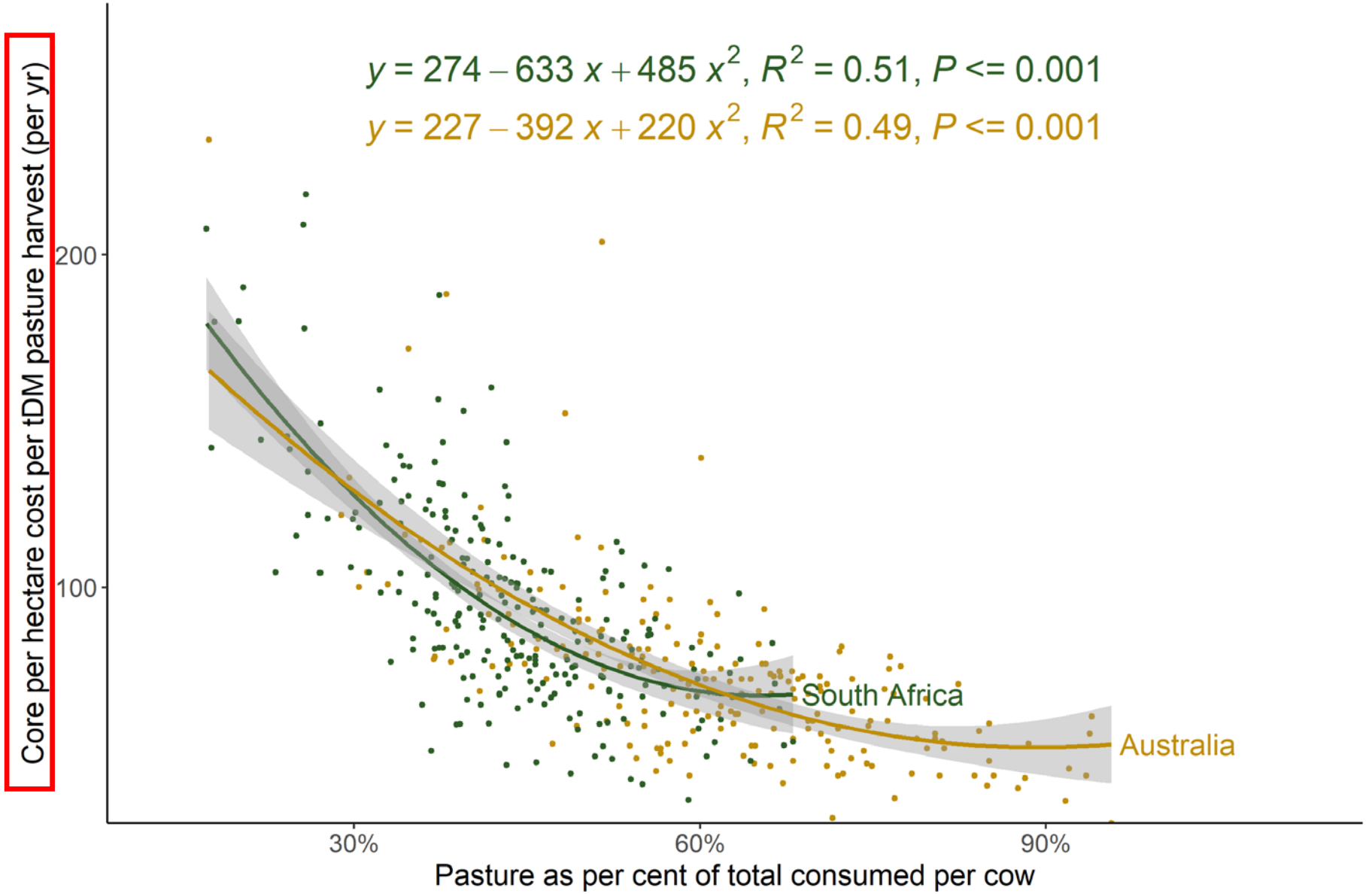




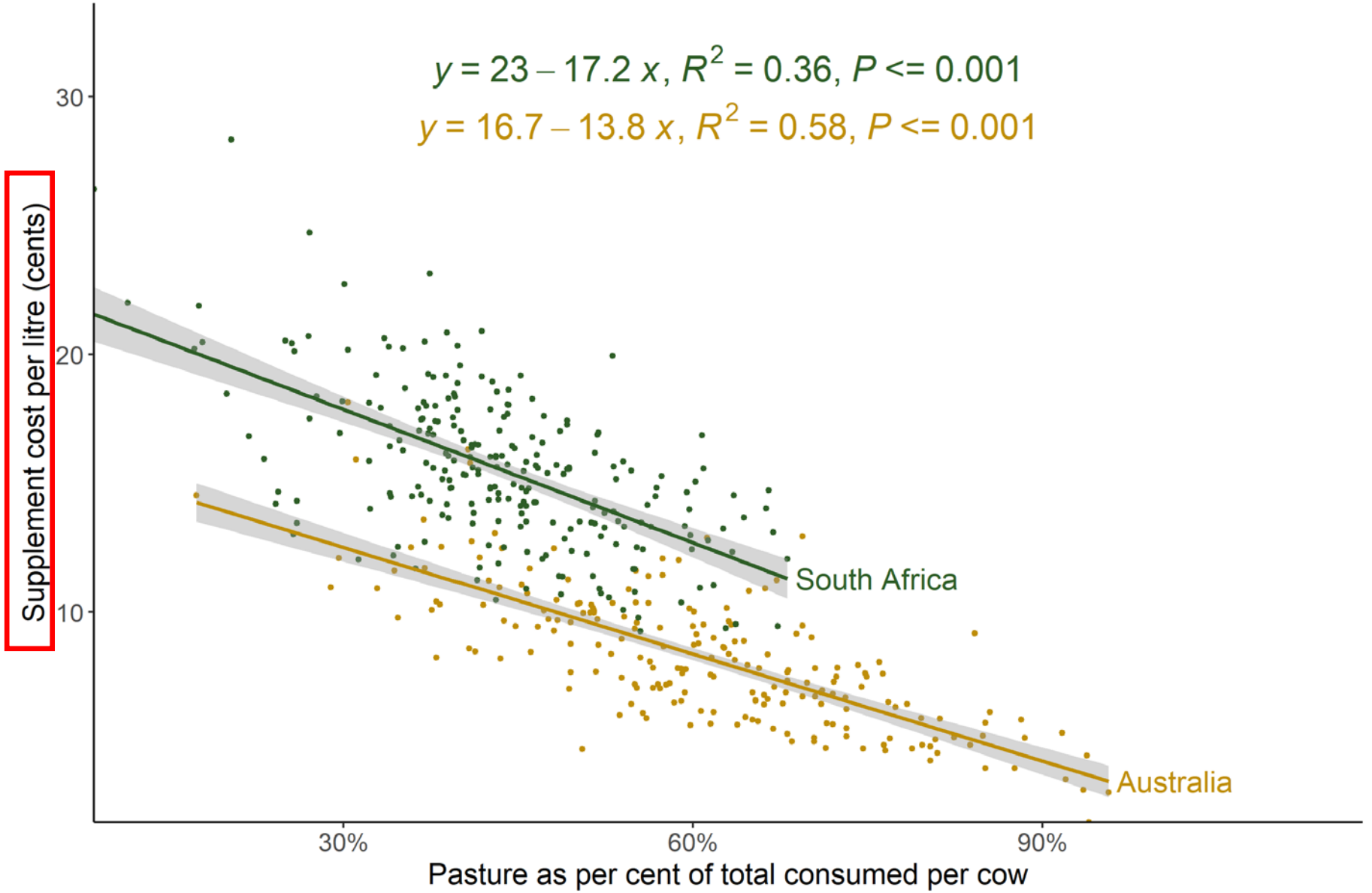
Primary factors impacted by pasture as % of cows diet



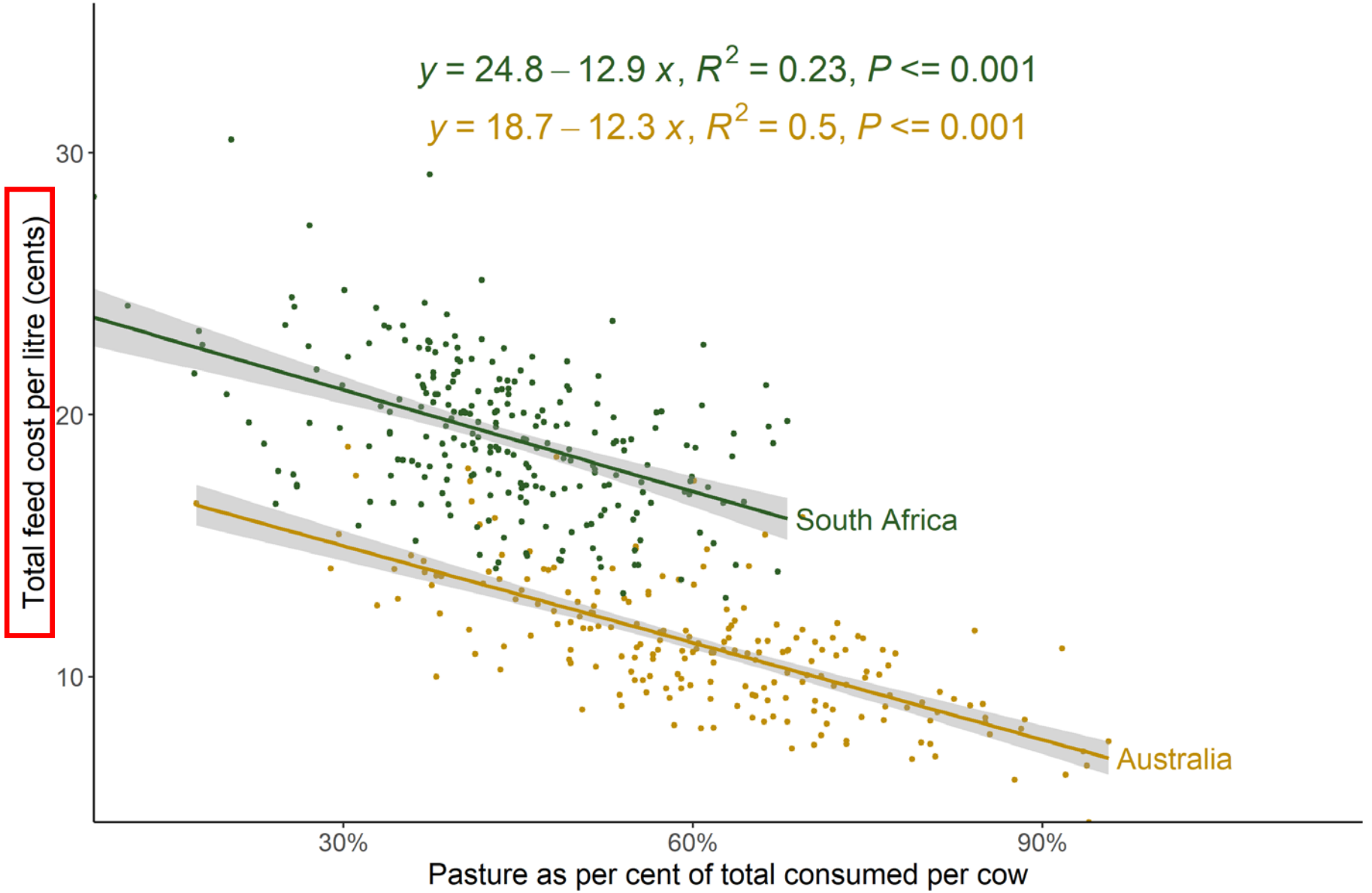
Primary factors impacted by pasture as % of cows diet



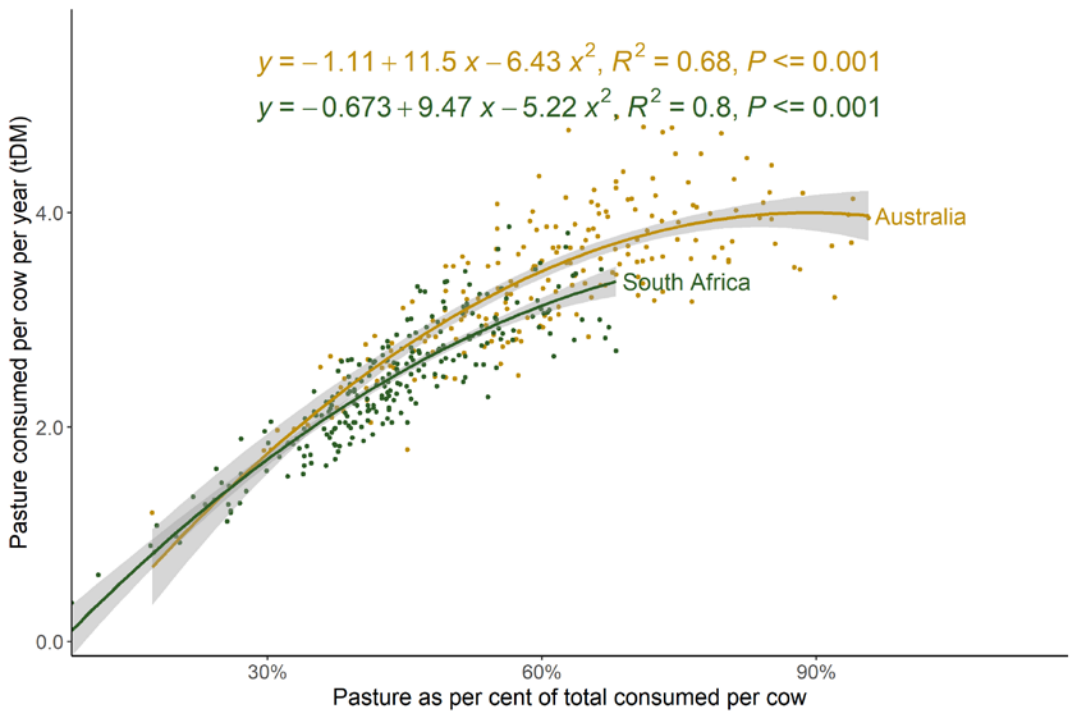
Primary factors impacted by pasture as % of cows diet

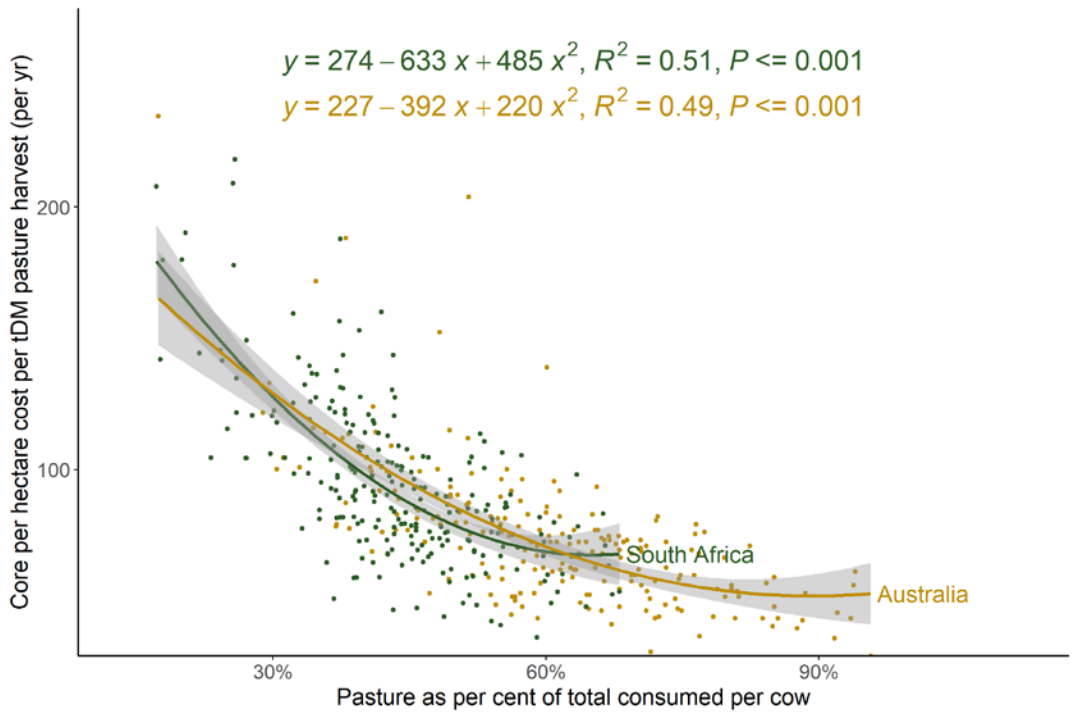


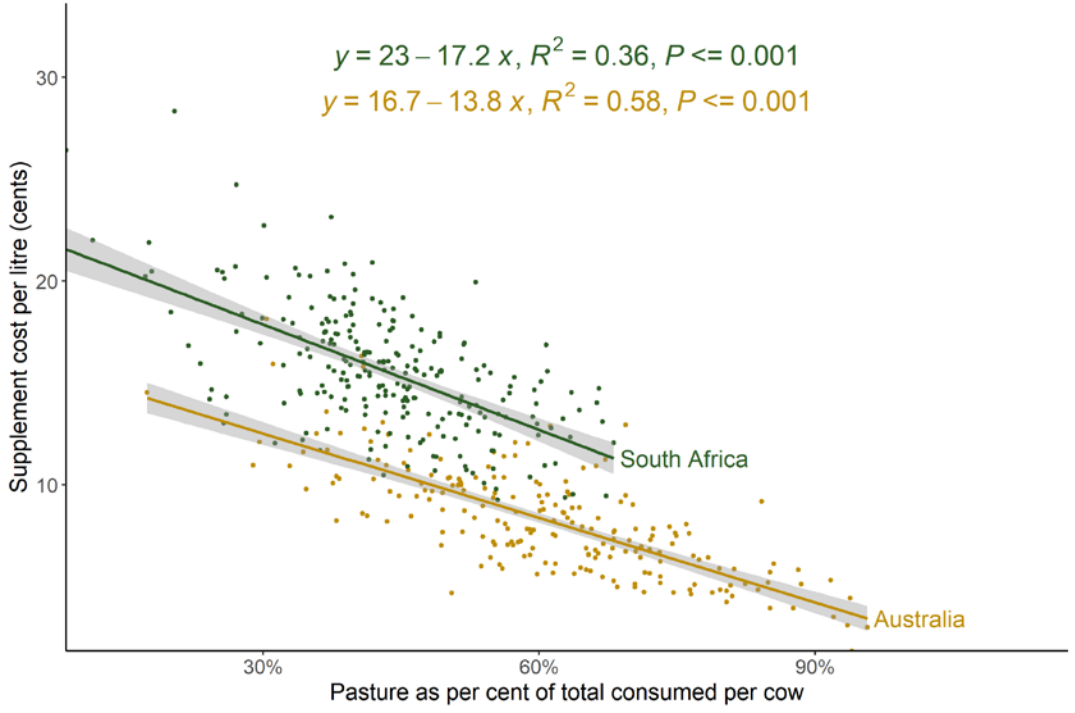
Primary factors impacted by pasture as % of cows diet

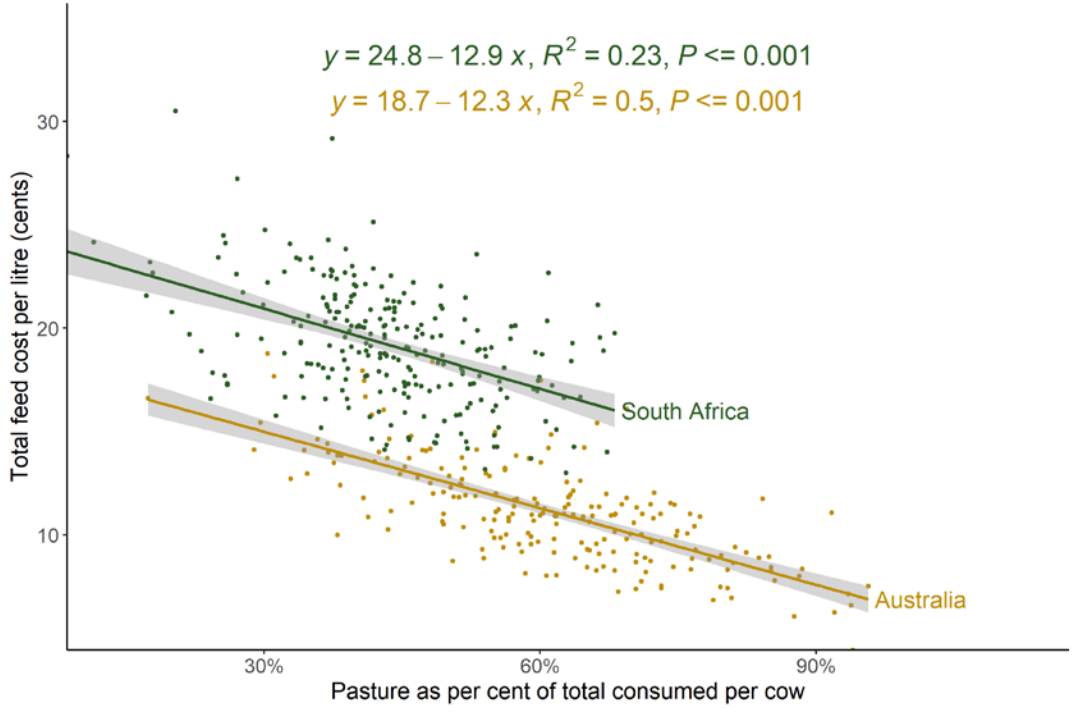


Primary factors impacted by pasture as % of cows diet

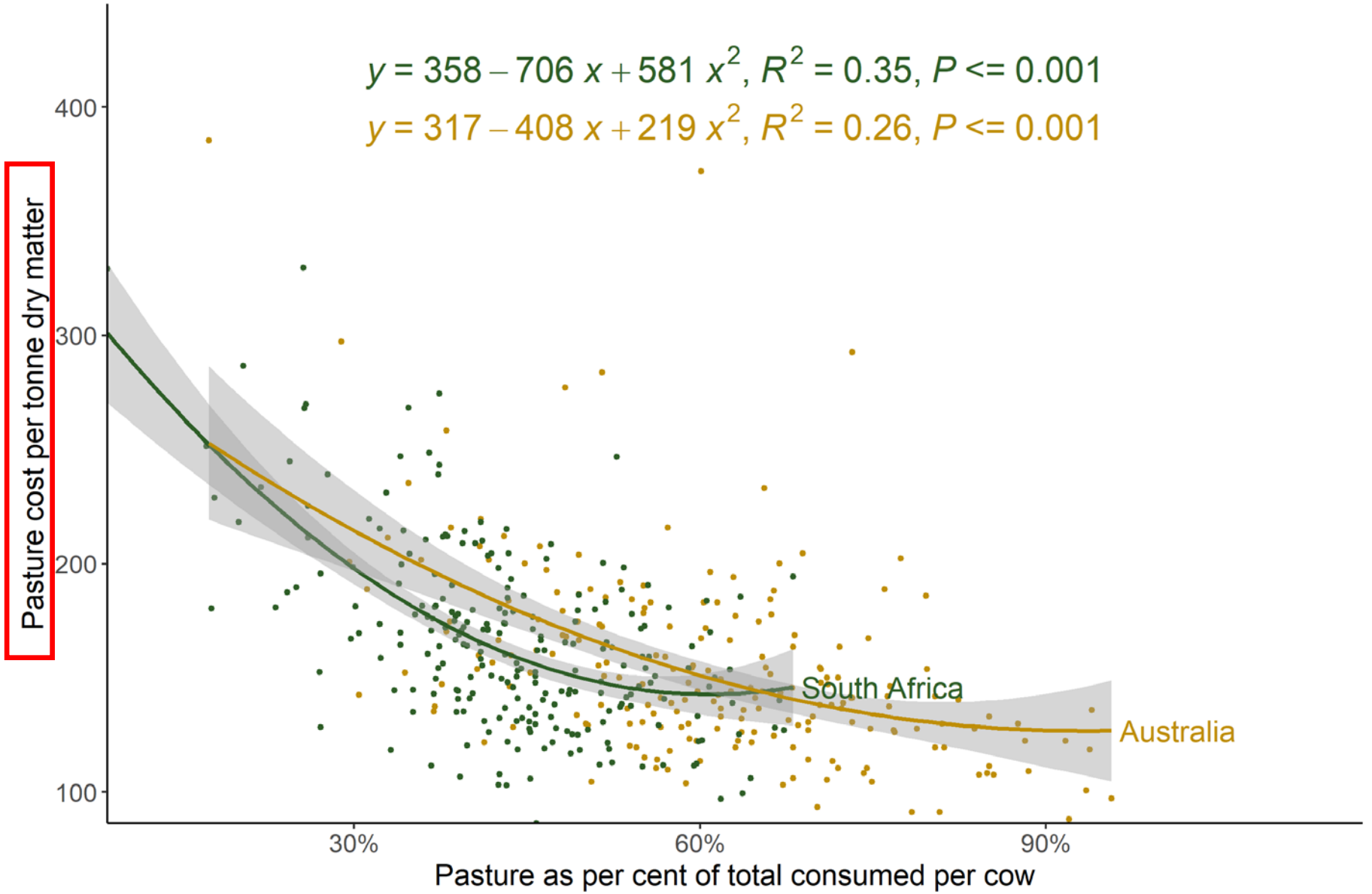




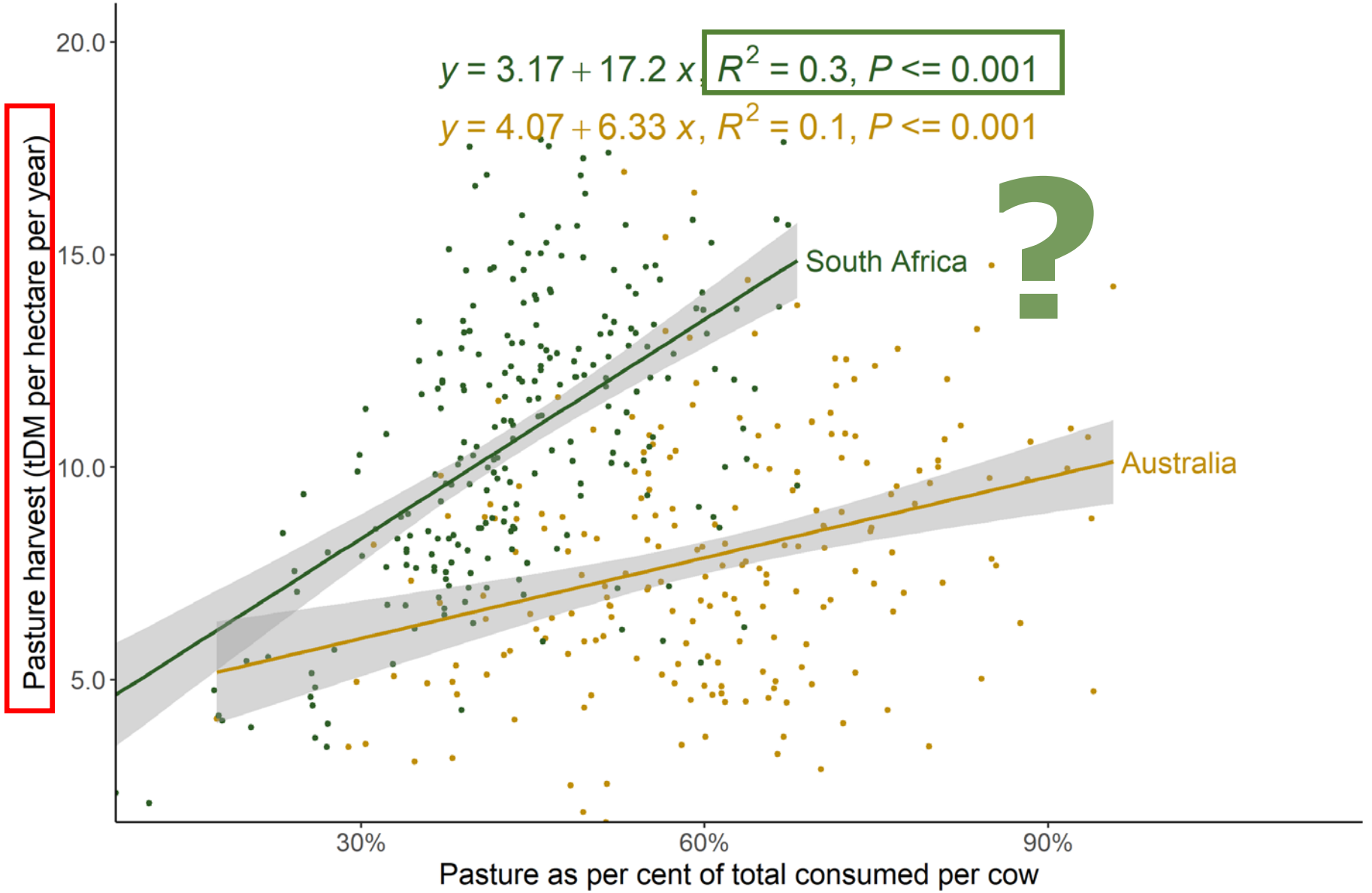




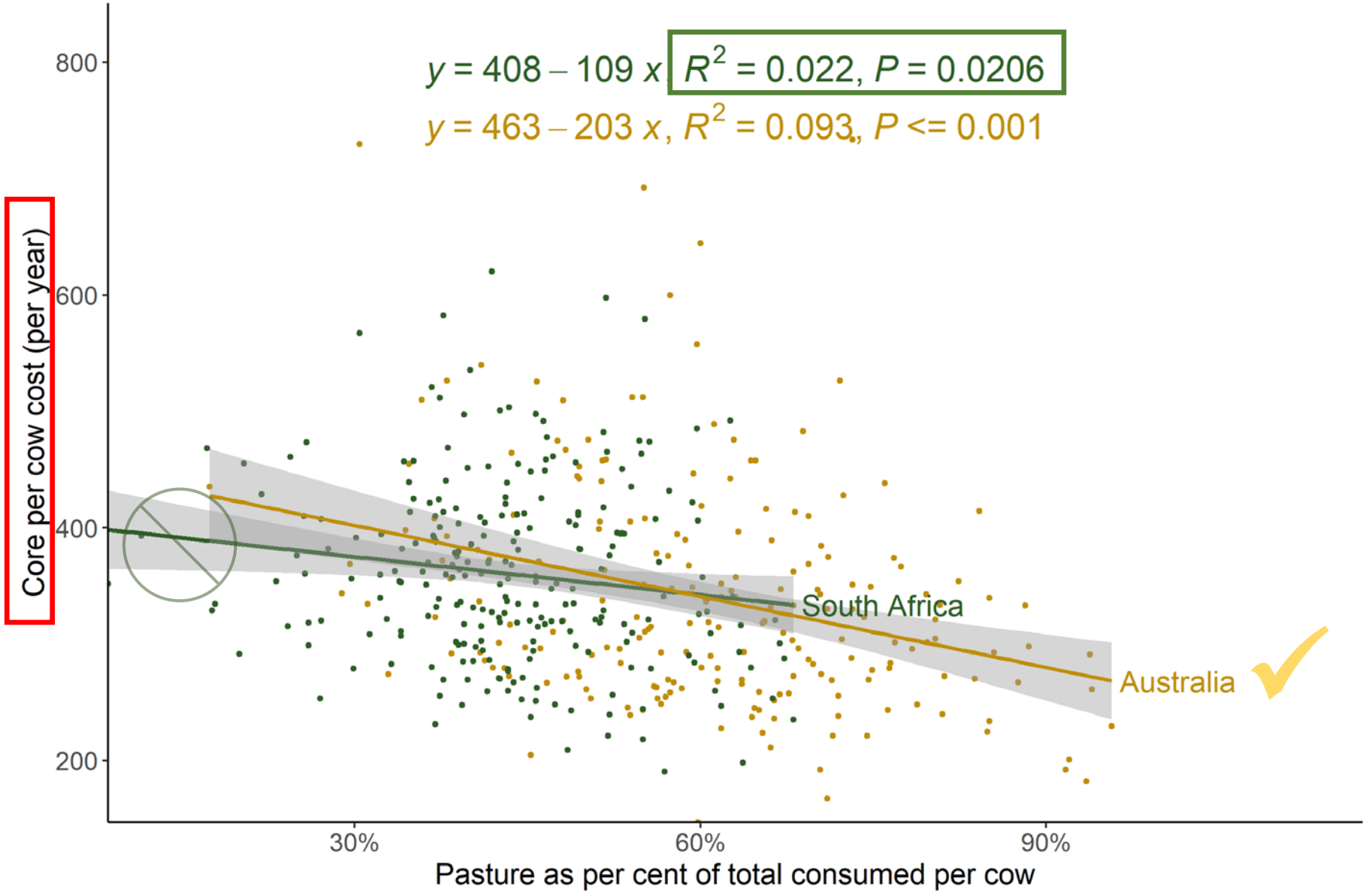
Primary factors impacted by pasture as % of cows diet



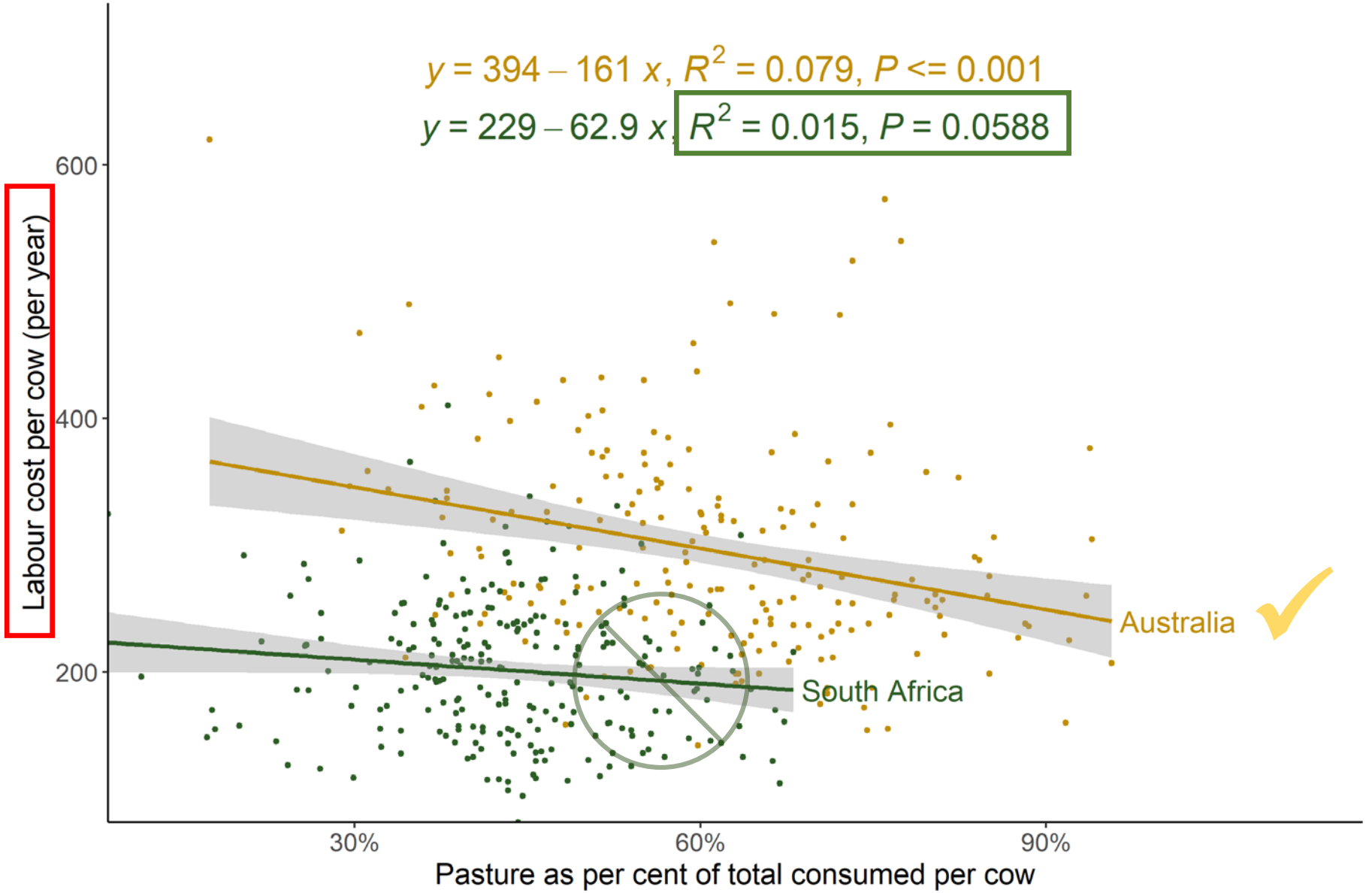
Primary factors impacted by pasture as % of cows diet



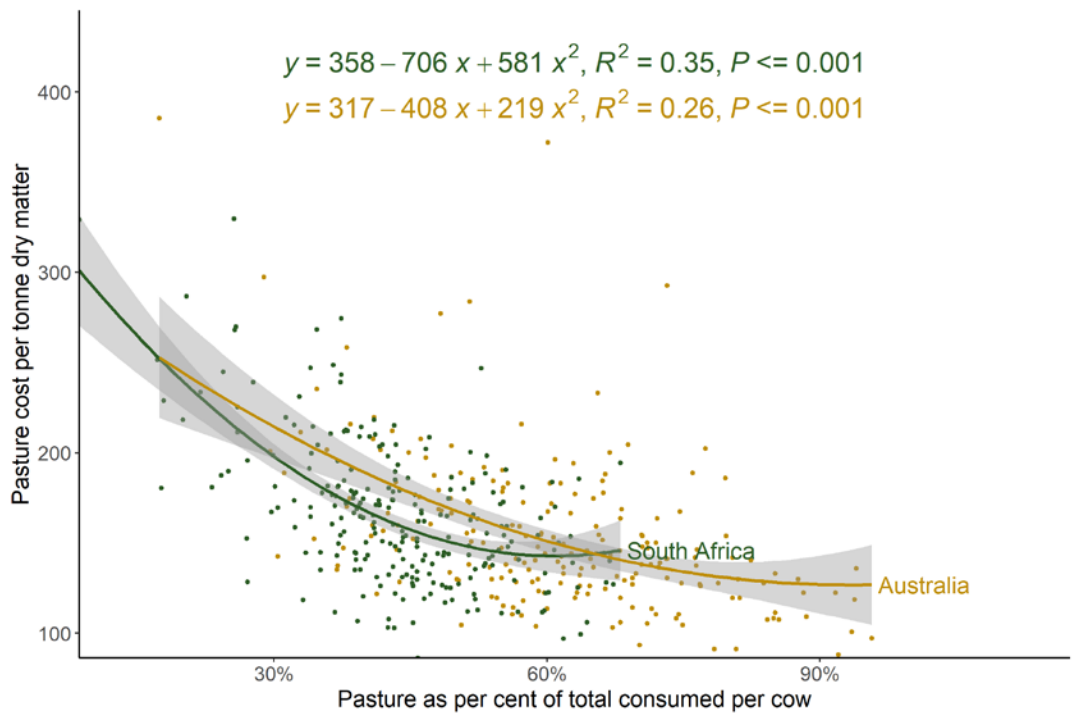
Primary factors impacted by pasture as % of cows diet

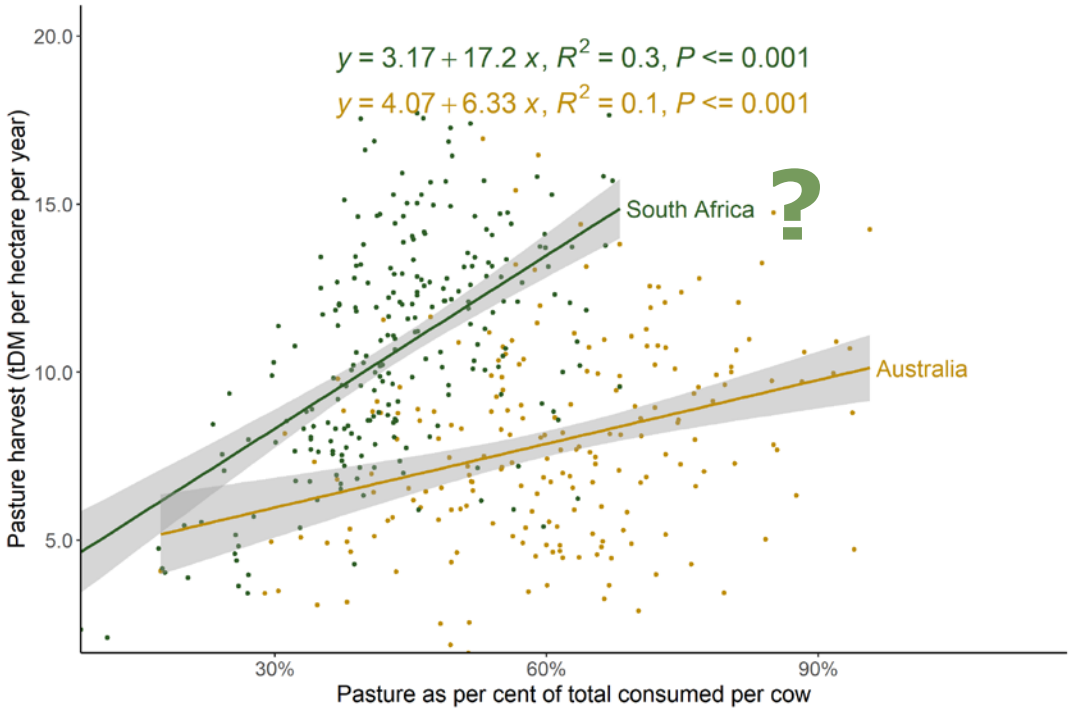


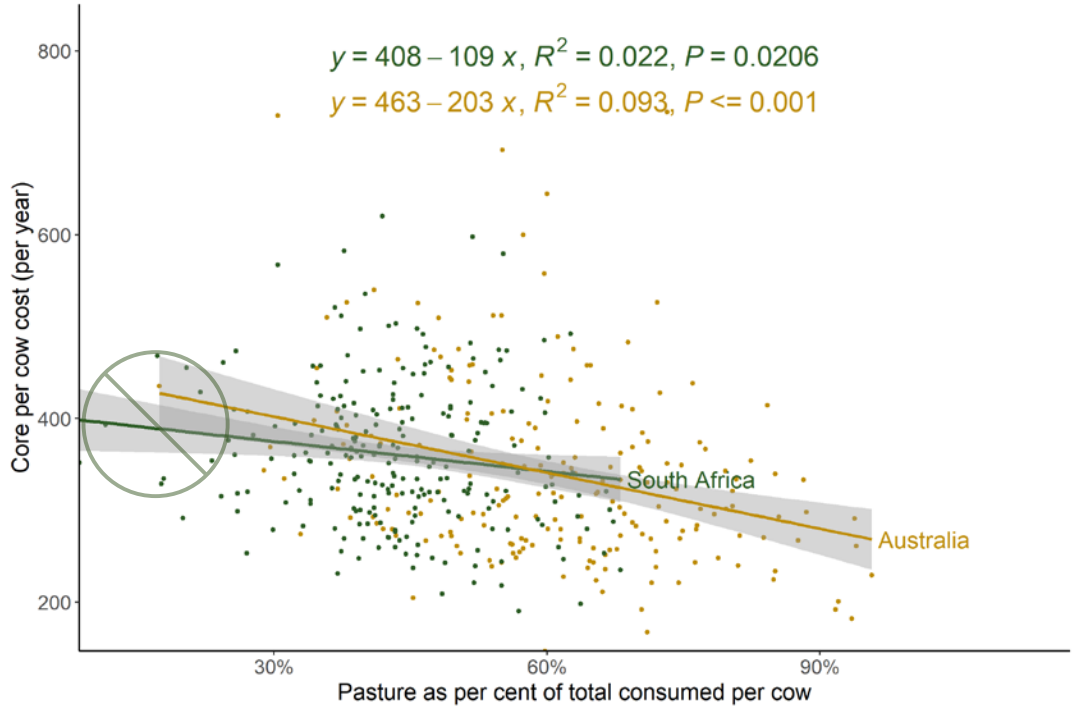
Primary factors impacted by pasture as % of cows diet

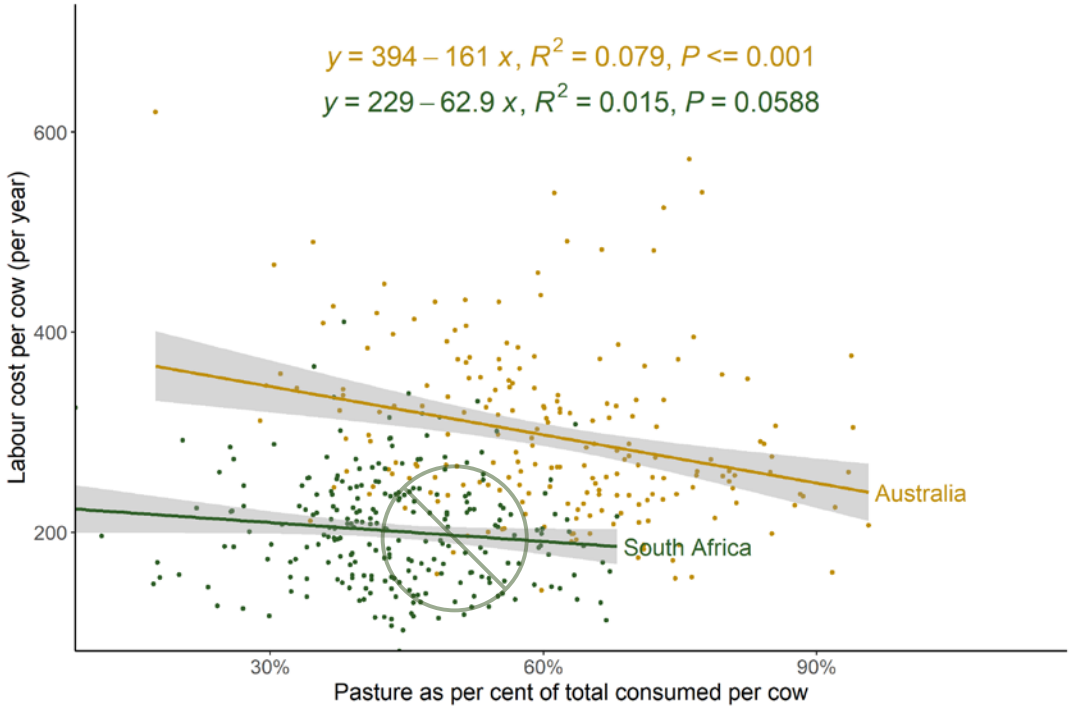


Primary factors impacted by pasture as % of cows diet

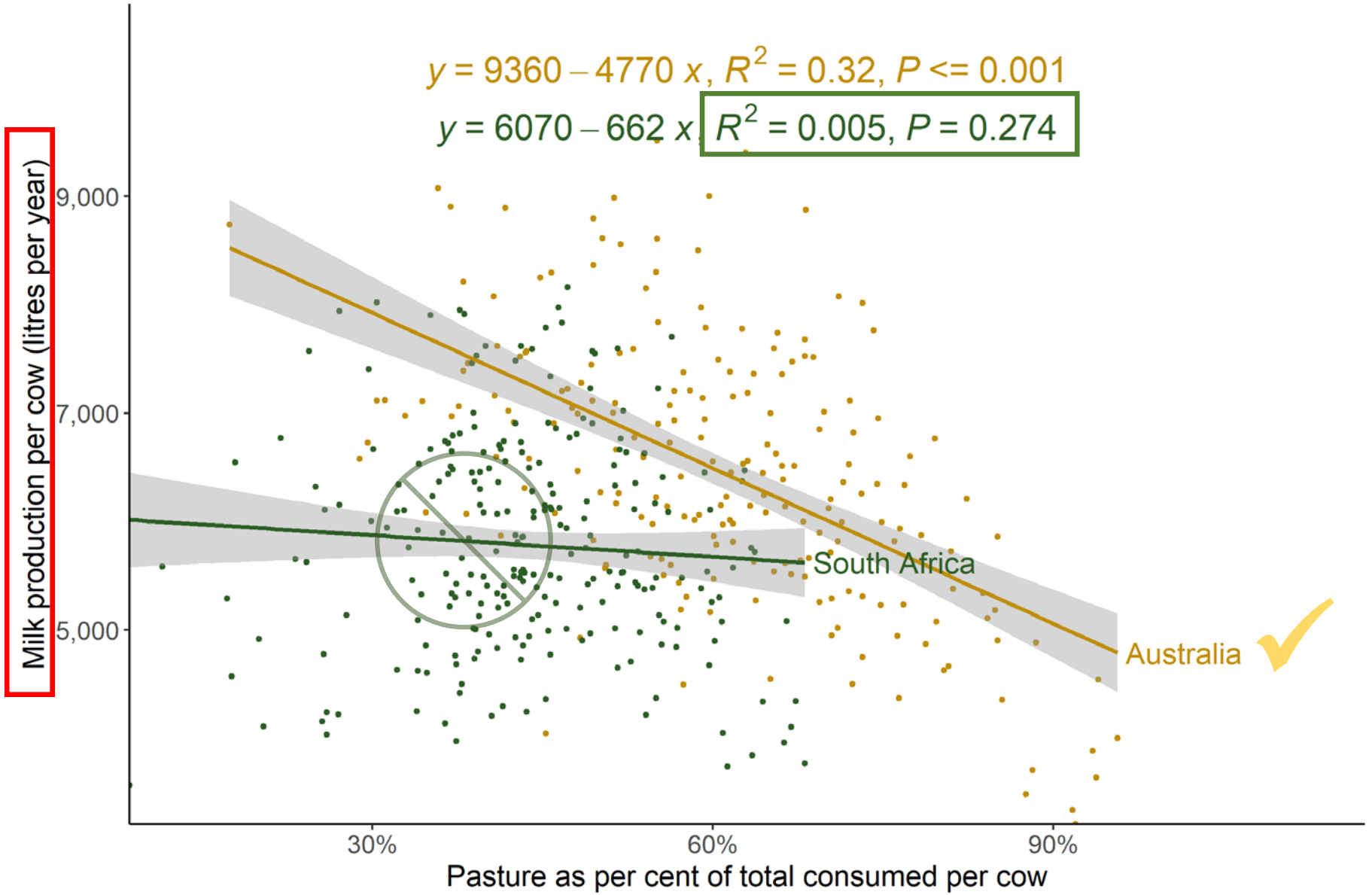




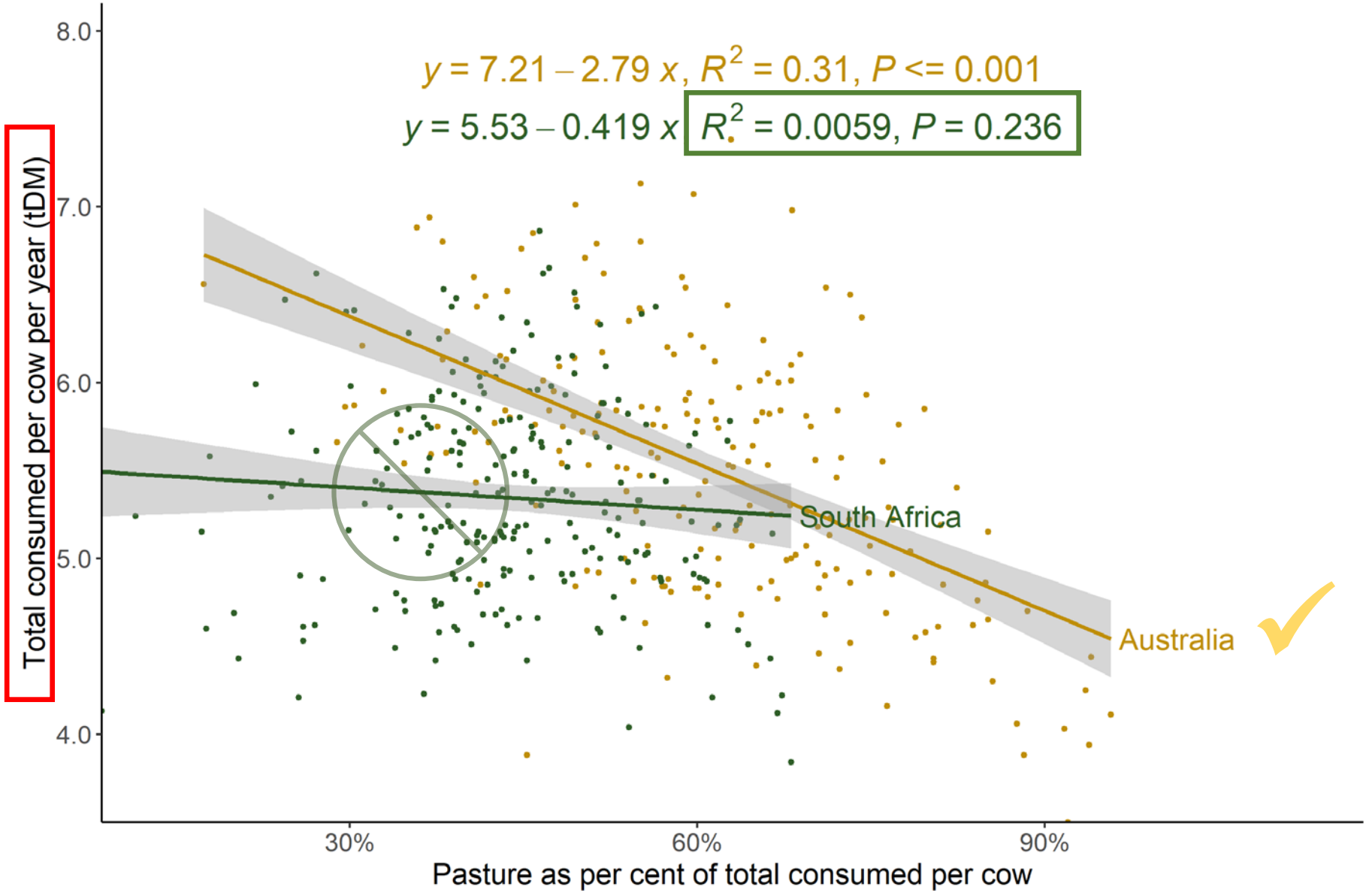




Primary factors impacted by pasture as % of cows diet



Primary factors impacted by pasture as % of cows diet



Primary factors impacted by pasture as % of cows diet

Primary factors being impacted by pasture as % of cow's diet	As 	R^2	P
Cost of production per litre		0,16	<= 0,001
Pasture consumed per cow		0,68	<= 0,001
Supplement cost per litre		0,58	<= 0,001
Total feed cost per litre		0,50	<= 0,001
Core per hectare cost per tonne dry matter of pasture harvest		0,49	<= 0,001
Milk production per cow		0,32	<= 0,001
Total consumed per cow		0,31	<= 0,001
Pasture cost per tonne dry matter		0,26	<= 0,001
Pasture harvest	 	0,10	<= 0,001
Core per cow cost		0,09	<= 0,001
Labour cost per cow		0,08	<= 0,001

Primary factors impacted by pasture as % of cows diet

Primary factors being impacted by pasture as % of cow's diet	As 	AU R^2	SA R^2
Cost of production per litre		0,16	0,16
Pasture consumed per cow		0,68	0,80
Supplement cost per litre		0,58	0,36
Total feed cost per litre		0,50	0,23
Core per hectare cost per tonne dry matter of pasture harvest		0,49	0,51
Milk production per cow		0,32	*0,01*
Total consumed per cow		0,31	*0,01*
Pasture cost per tonne dry matter		0,26	0,35
Pasture harvest	 	0,10	**0,30**
Core per cow cost		0,09	*0,02*
Labour cost per cow		0,08	*0,02*

So… the three dominant factors to focus on

1. Maximise pasture harvest
2. Optimise the farm production system
   - High per cent of pasture in the diet
3. Optimise management in executing the operational plan
   - "Right action, first time, on time" with physical management
   - Minimising every cost centre wherever possible
   - Minimising depreciation…of machinery and the HERD

Cow production is a result of focusing on these three factors…

…and the question for many farmers is "Do you have a cow that is suitable for optimising profitability?"

Thank you

Standard Bank

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