



Machinery Investment

Benchmark levels and metrics

Ben White – Kondinin Group



Machinery investment levels?

- **Machinery purchases are big decisions**
 - **Value for money**
 - **Fit for purpose**
 - **Functionality**
 - **Efficiency**
 - **Reliability**
 - **Maintenance costs**
 - **Service and backup**
 - **Resale value**



Competing interests?



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Competing interests?



Competing interests?



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FARM STAFF:

**AIR-CONDITIONING
IS NOT A LUXURY!**

Competing interests?



Competing interests?



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FARMER:

Группа
КОНДИНИН

Competing interests?



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YOUR CLIENT:

Competing interests?



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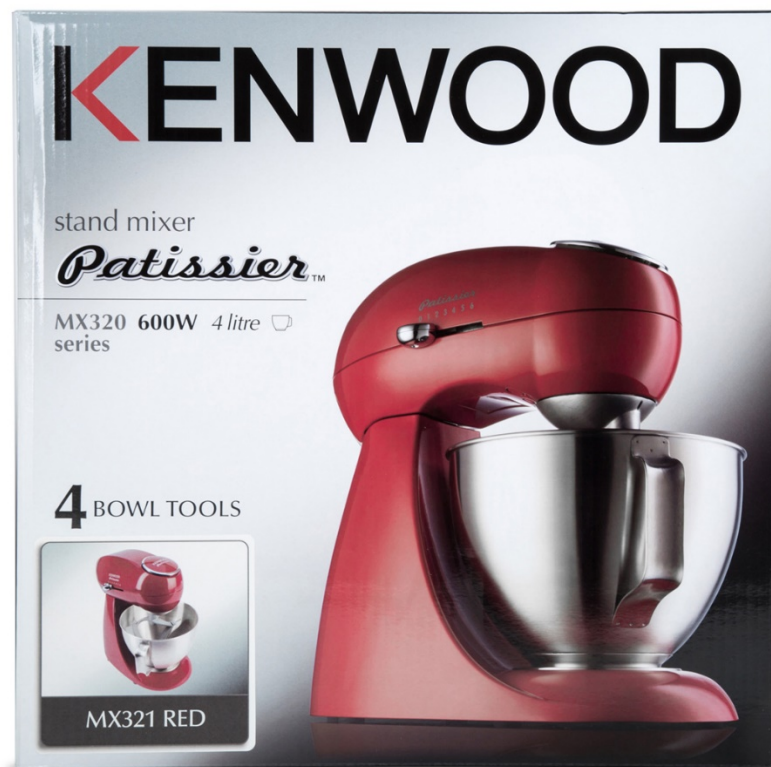
WIFE:

Competing interests?



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Benchmarks for machinery investment

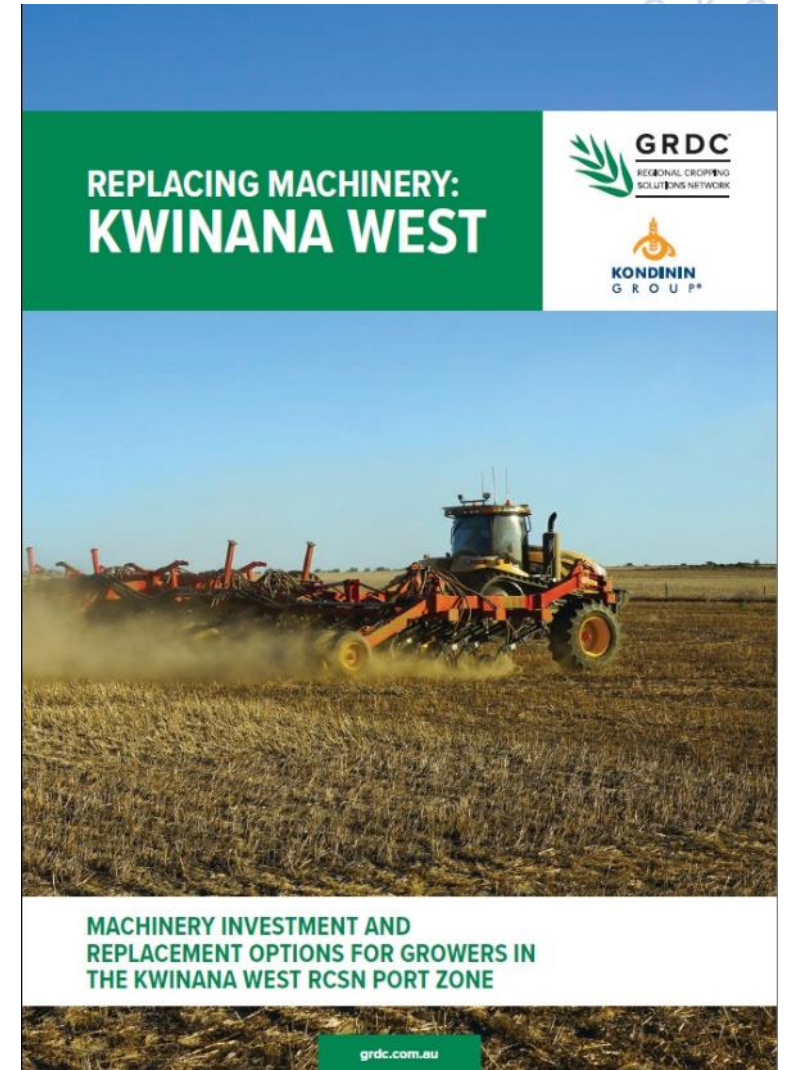
Machinery investment benchmarks can be helpful but need to find benchmarks that:

- **Have a sound basis**
- **Good correlation with peers**
- **Takes into account all aspects of machinery ownership**
- **Provide guidance and clarity**



Building on previous report data

- Collated grower data nationally
- National footprint via consultants
- Machinery investment levels
- Area
- Production
- Added:
 - Inclusion of R&M
 - Inclusion of labour
- Previous focus on investment v gross receipts
- **5 year** averaged figures collated



Machinery inventory benchmarks: Scale

Location	Average Effective Area Farmed	Average Cropped area (ha)	Average Long-term wheat yield for this area (t/ha)	Average Gross Farm Receipts (p.a.)	Average Cropping income (p.a.)	Average Total current investment in machinery	Average Dep_n Rate
NATIONAL (n=480)	4,077	3,146	2.41	\$ 2,430,955	\$ 2,078,752	\$ 1,853,142	10%
WESTERN (n=312)	4,865	3,767	2.20	\$ 2,725,127	\$ 2,371,867	\$ 2,132,077	10%
SOUTHERN (n=109)	2,300	1,781	3.08	\$ 1,727,481	\$ 1,398,989	\$ 1,517,489	10%
NORTHERN (n=59)	3,145	2,230	2.16	\$ 2,053,912	\$ 1,634,647	\$ 959,650	10%

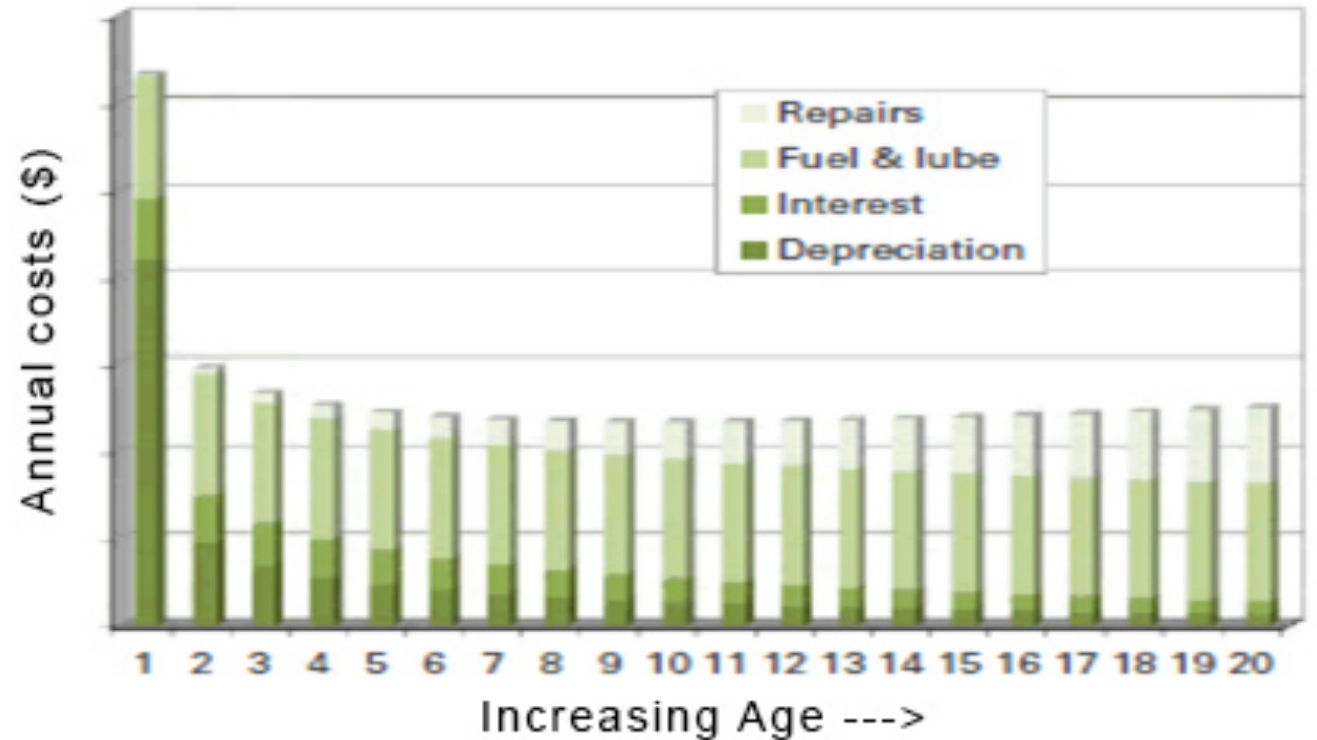
Machinery inventory benchmarks: Contractors and Labour (including family)

Location	Average Total annual spend on contractors (p.a.)	Average Total annual spend on maintenance (p.a.)	Average Total annual spend on labour (p.a.)	Average Total FTE labour units including Family Members and Casual Labour (p.a.)	Equivalent Wage for Family Members on Drawings (p.a.)
NATIONAL (n=480)	\$ 48,246	\$ 132,816	\$ 134,644	3.2	\$ 151,968
WESTERN (n=312)	\$ 46,784	\$ 157,249	\$ 139,973	3.2	\$ 149,544
SOUTHERN (n=109)	\$ 29,024	\$ 72,107	\$ 93,645	3.5	\$ 161,313
NORTHERN (n=59)	\$ 88,589	\$ 112,381	\$ 178,400	3.2	\$ 139,672

Depreciation rates applied

- An **average** fleet depreciation rate usually falls around **10%**
- Fleets with higher levels of technology may opt for **12%**

Figure 4: Relative equipment ownership costs



Depreciation rates applied

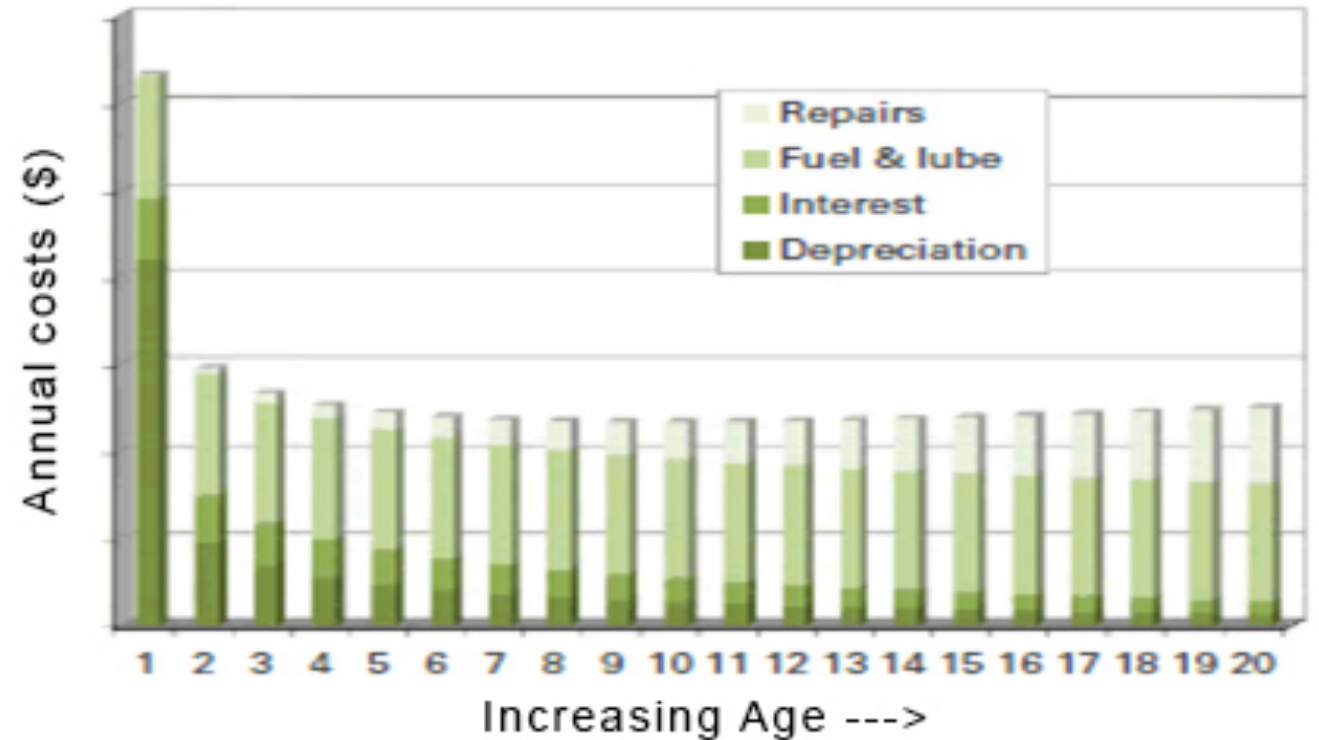


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- Referring to **capital depreciation**
- **Not depreciation for taxation purposes**

Figure 4: Relative equipment ownership costs

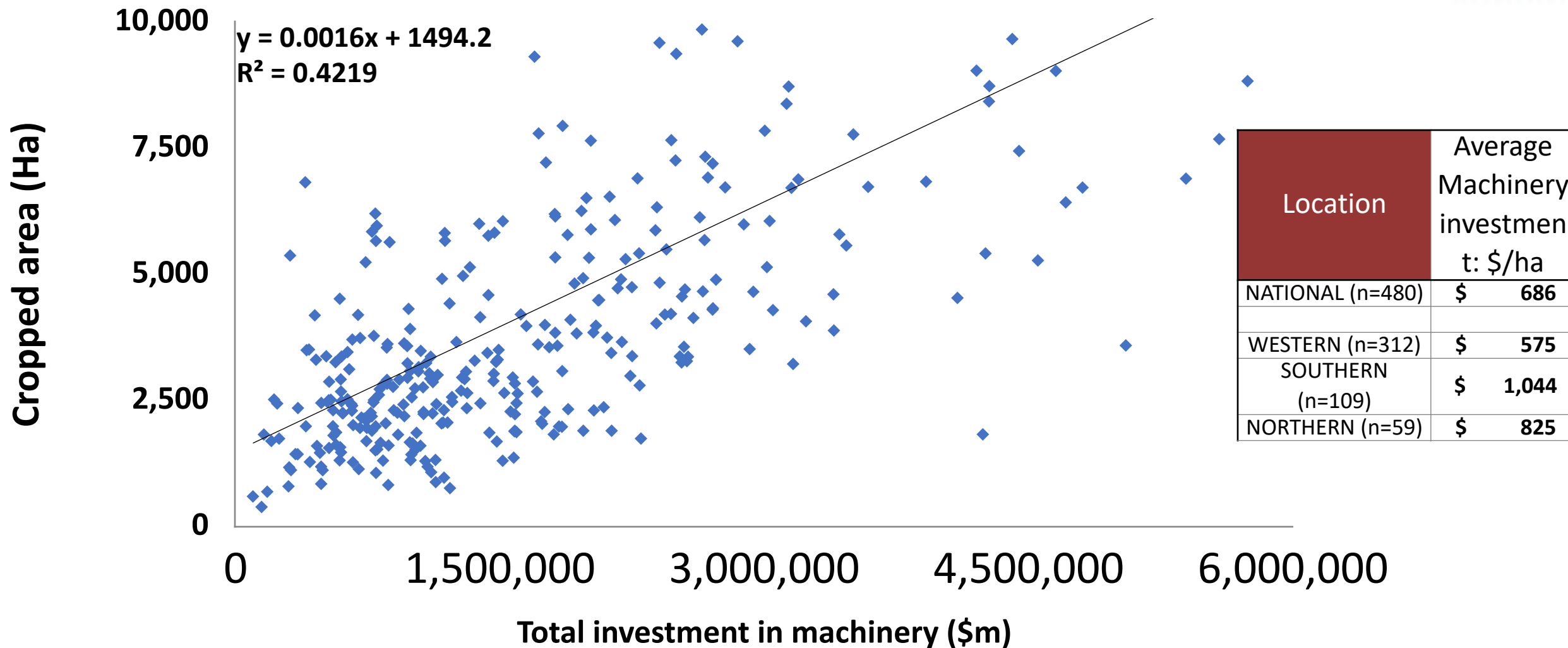




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Machinery inventory benchmarks: \$ v Ha (national) n=469



Machinery inventory benchmarks: \$/GFI

Table 1: Suggested machinery investment ratios – Australian published papers and literature

Researcher	Year	Location	Machinery investment ratio to total gross farm income
<i>Wilson et al</i>	2005	Australia	Weak >1.2 Average 0.8-1.2 Strong <0.8
Barry Mudge (Groundcover)	2013	South Australia	0.8-1.2
ORM (ORM00004)	2014	South Eastern Australia	1.0
Alexander and Hagan (DPIRD) – Utilising Planfarm / Bankwest data	2015	Western Australia	Suggested benchmark: 0.6
Planfarm (ORM00017)	2016	Western Region	0.6-1.1 (Average 0.7)
Hillcoat Rural Directions data (ORM000015)	2017	Southern region	0.8-1.2 Suggested benchmark 1.0

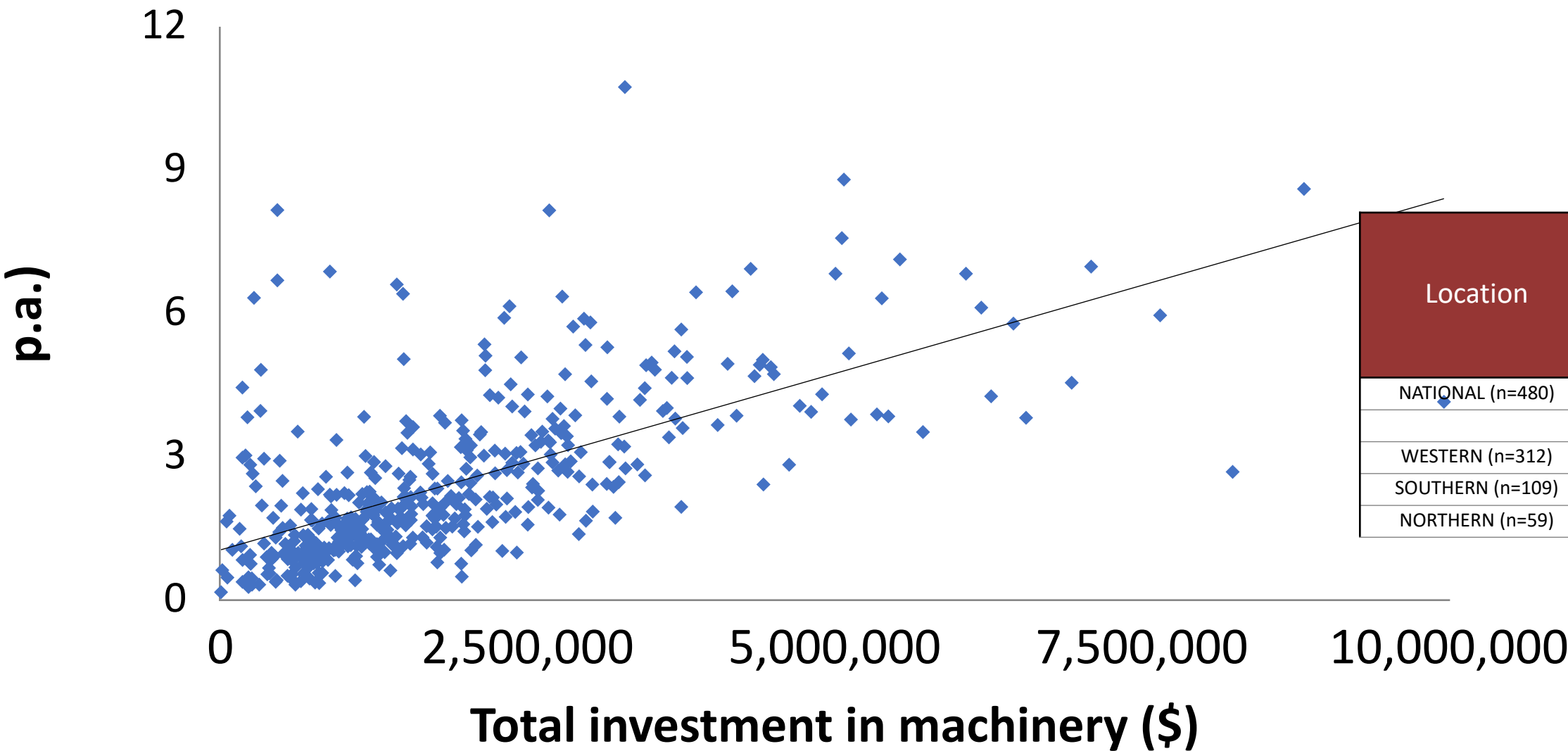
$$y = 0.7381x + 1.063e+6$$

$R^2 = 0.4284$

Total investment in machinery vs Gross farm income

Machinery inventory benchmarks: \$/GFI

(national) n=469



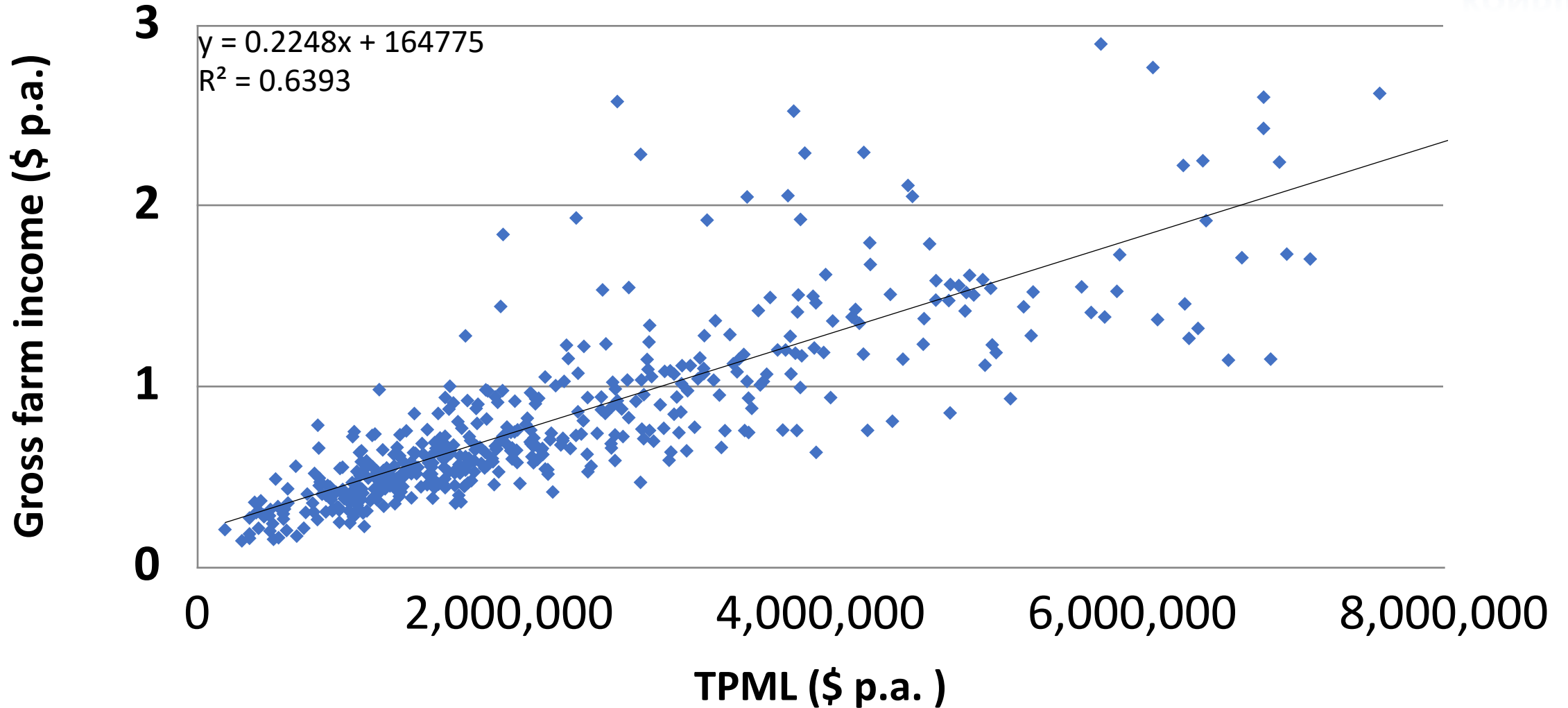


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Machinery inventory benchmarks: TPML vs GFI

Total Plant, Labour and Maintenance (TPML) vs
Gross farm income (national) n=462



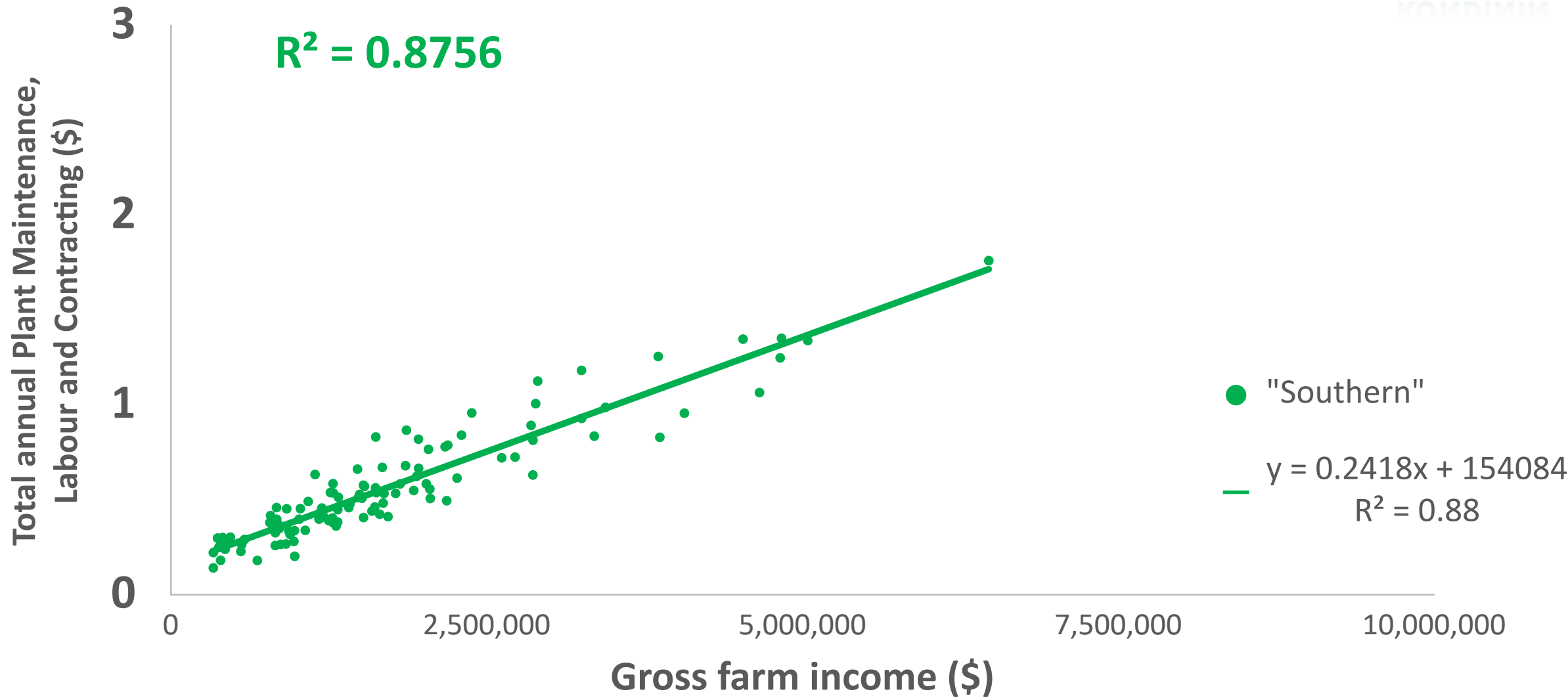


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Machinery Inventory benchmarks: TPLM+C v GFI

TPLM+C vs Gross farm income by GRDC region - SOUTH



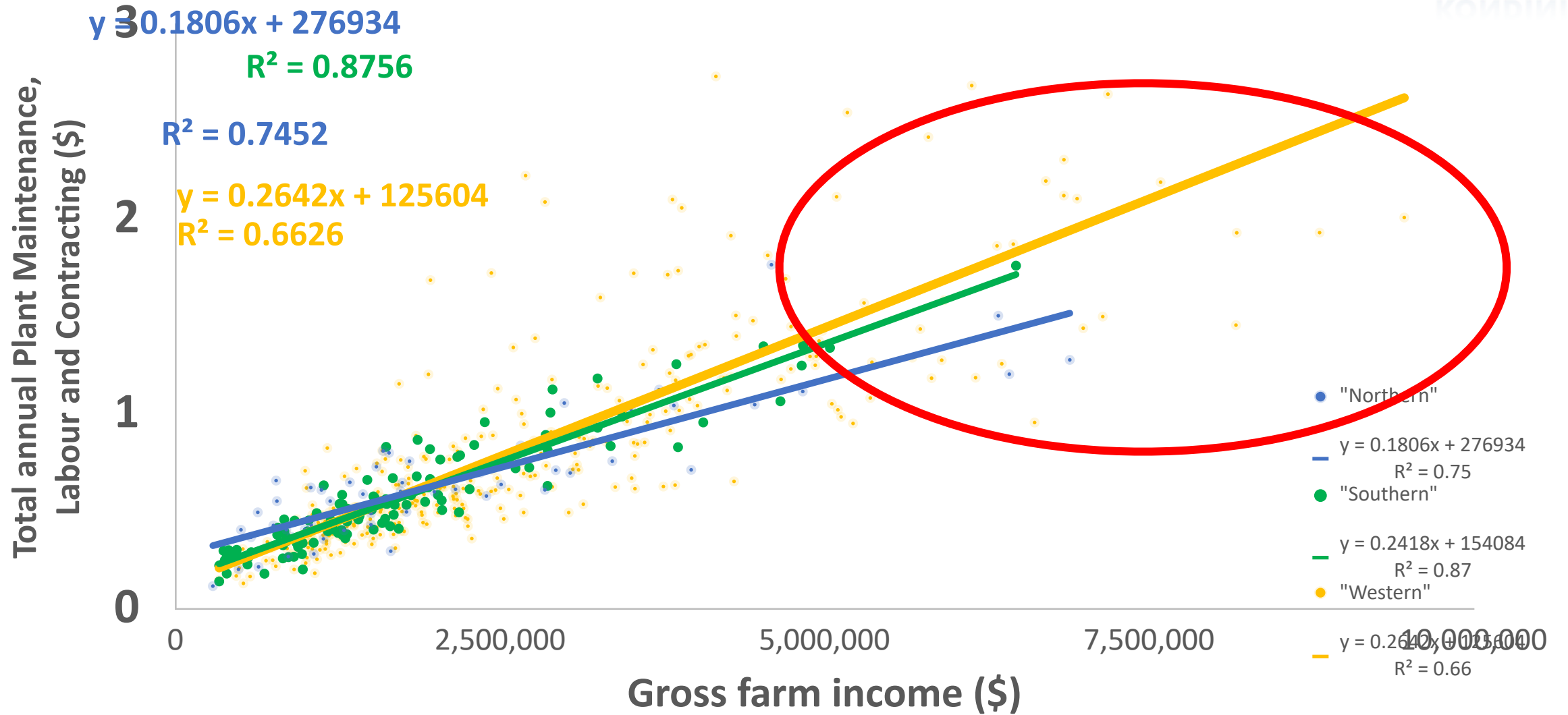


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Machinery inventory benchmarks: TPLM+C v GFI

TPLM+C vs Gross farm income by GRDC region



Calculating your TPLM+C : GFI

Total Plant

Plant value x depreciation @ 10 or 12%
Exclude portion used for animal production

+

Labour

Labour costs plus family calculated as follows:
Management Role =1, Operational Role =0.75.

Apply total Units X \$80,000 + 1% of Turnover

+

Maintenance

+

Contracting

-
-

Gross Farm Income

Calculating TPLM+C : GFI a WORKED EXAMPLE

Total Plant

Plant value (\$2,100,000 x depreciation @ 10%)
=\$210,000

+

Labour

\$95,000 Labour costs

plus family calculated as follows:

Management Role =1, Operational Role =0.75.

=1.75 X \$80,000 + 1% of Turnover (say \$1.8m)

=\$95,000+\$140,000+\$18,000

=

+

Maintenance

=\$95,000

Contracting

=\$15,000

TOTAL = \$573,000

-
-

Gross Farm Income

=\$1,800,000

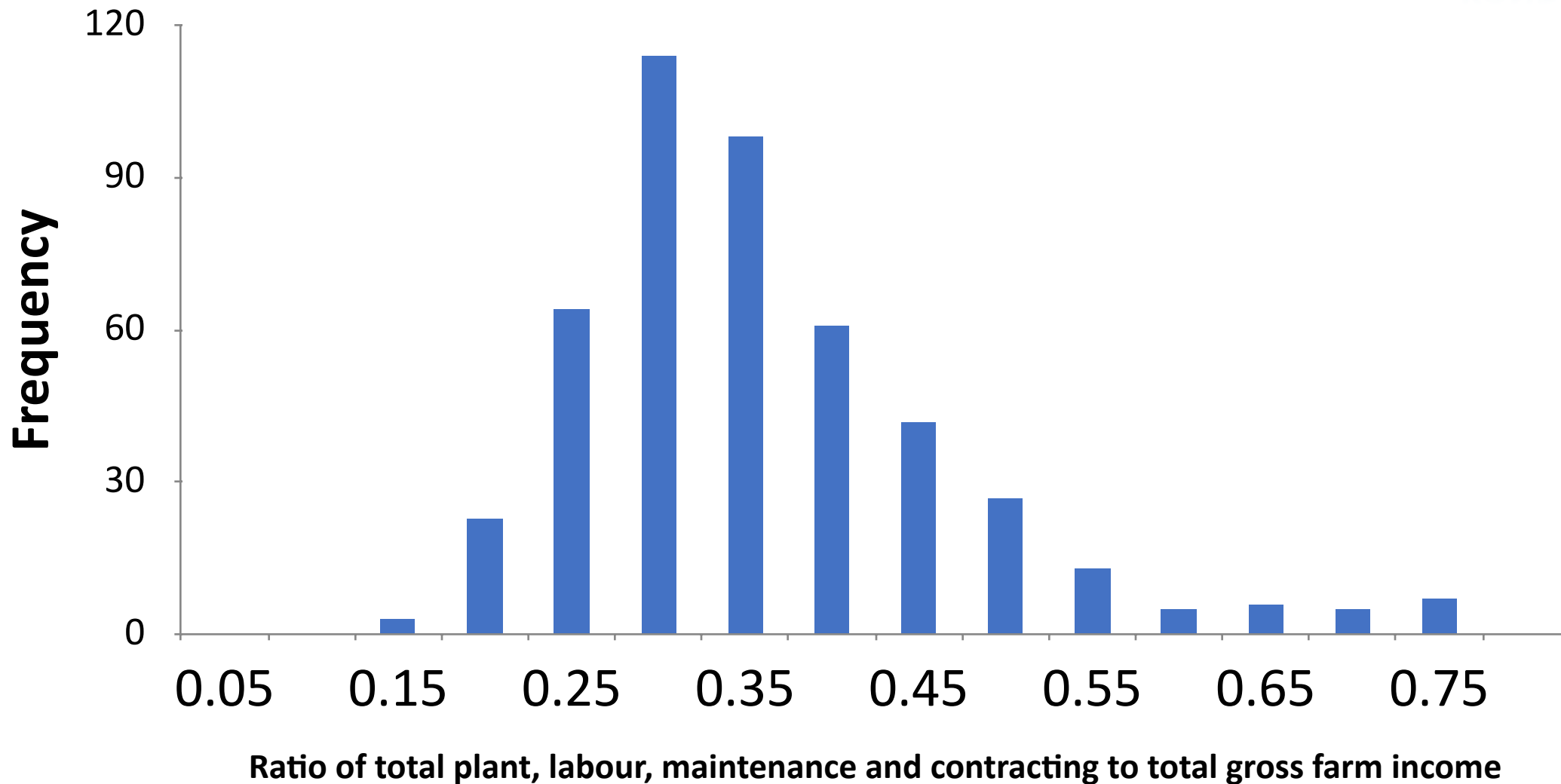
=1:0.318 or 31.8%

TPLM+C : GFI – Nationally and by region

Location	Average Ratio TPLM+C:Gross farm income
NATIONAL (n=480)	34.5%
WESTERN (n=312)	32.8%
SOUTHERN (n=109)	37.9%
NORTHERN (n=59)	35.2%

TPLM+C vs GFI

Figure 5: Frequency histogram; maintenance plant, labour, maintenance and contracting to total gross farm income (National: n=409)



What drives ratio variation?



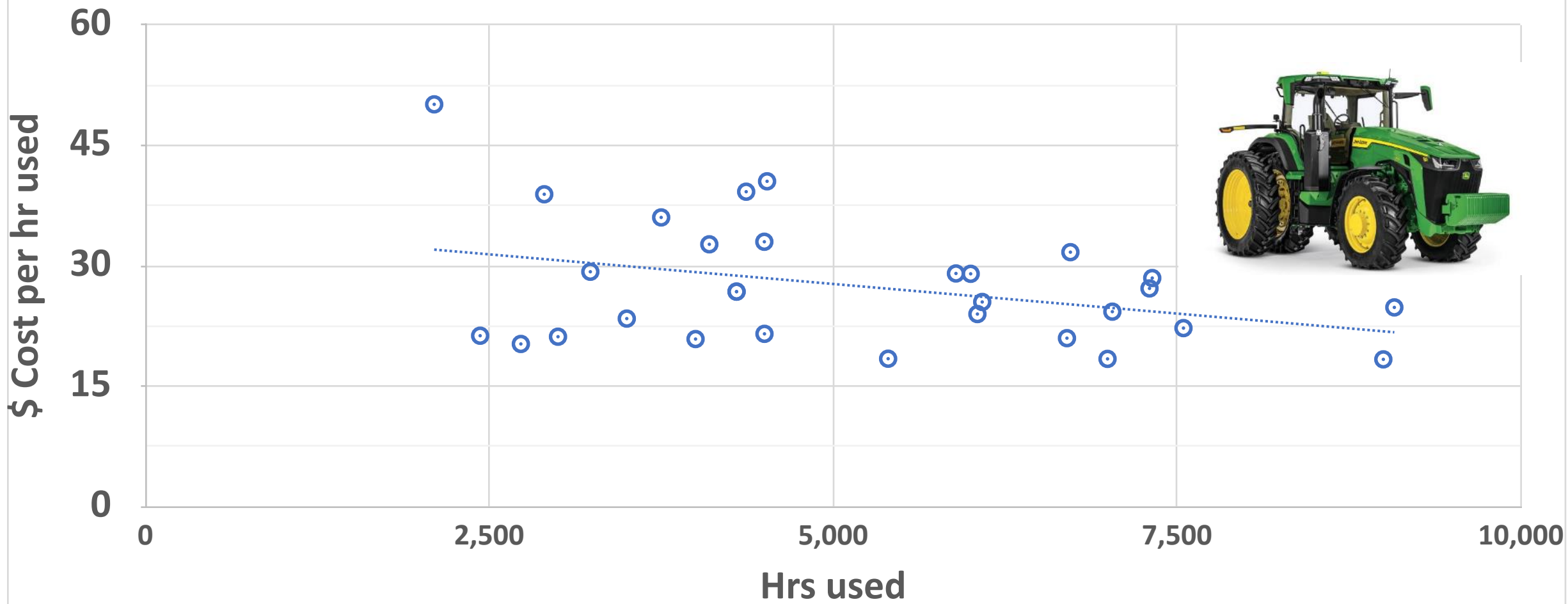
30 case studies nationally revealed main drivers were

- **Age driving attitudes to debt / risk / tech**
- **Mechanical ability or proximity to service and backup**
- **Attracting and retaining quality staff**
- **Preference for equipment specific to region**
- **Post COVID – Equipment availability.**

Selecting used equipment and changeover

- Machines of comparable specification can be graphed relative to depreciation:


Example: Depreciation cost of John Deere 8R series tractors on the market



Selecting used equipment and TCO


MACHINERY INVESTMENT AND REPLACEMENT FOR AUSTRALIAN GRAIN GROWERS







January 2022



GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

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LITERATURE REVIEW AND BENCHMARKING DATA ANALYSIS


EXAMPLE: Tractor costs

This example for purchasing a used tractor could also be used to evaluate the cost of a new tractor by making the market value (CMV) and new value (NV) the same.

Fixed costs include depreciation, opportunity cost, shedding and insurance which are calculated and annualised.

CONSTANT	TRACTOR TYPE	CONTRIBUTION	OPPORTUNITY COST RATE	CALCULATION
R	4WD Tractor		4%	
	Machine	Current		
A	Own Use (engine hrs/yr)	500		
B	Contract Use (Engine hrs/yr)	500		
	Total Hours Used/yr	500	A+B	
	Fixed Costs	Dep'n from New in \$/hr		NV-CMV/E
NV	Market Value When New	\$400,000		
CMV	Market Value	\$200,000		
E	Machine hours	3,000		
OP	Ownership Period (yrs)	10		
	Engine Hours at Resale (hrs)	8,000	E-(OP)(A+B)	
F	Litres of Fuel/hr	40		
TU	Total Use (Engine hrs/yr)	500	A+B	
H	Shed/Insurance/Registration	1,000	H/(CMV*(1/2))	
I	Resale Value	\$40,000		
ADC	Annual Ownership Cost	\$/yr		$\frac{CMV-(OP)(I)+H}{(E+TU)}$
				\$/hr
				\$44.00
Variable Costs				
M	Repairs and Maintenance (% of Fuel)	40%		
	(ex. for ownership period)	\$9,200	$M(F)(C)(A+TU)$	
FC	Fuel (net cost after rebates)	\$135	$FC(A+TU)$	
D	OIL (% of Fuel)	10%	$D(F)(C)(A+TU)$	
L	Labour Cost (\$/engine hr)	\$35.00	$L(A+TU)$	
	Timeliness/Efficiency Costs (loss of quality, loss of grain)			
AVC	Annual Variable Costs	\$/yr		$\frac{M(F)(C)(A+TU)+FC(A+TU)+D(F)(C)(A+TU)+L(A+TU)}{E}$
				\$/hr
				\$104.00
TAC	Total Annual Costs	\$/yr		$ADC+AVC$
				\$/hr
				\$148.00

Source: Farmanco 2021



MACHINERY INVESTMENT AND REPLACEMENT FOR AUSTRALIAN GRAIN GROWERS 15

LITERATURE REVIEW AND BENCHMARKING DATA ANALYSIS


EXAMPLE: SP sprayer costs

This worked example looks to compare a new self-propelled sprayer with a used machine. Variables including ownership period (OP), resale value (RV) and fuel consumption (F) are all arbitrary and can be adjusted to suit the machine under analysis.

As per this example, a careful analysis can sometimes yield unexpected results with the used sprayer in this instance having a higher total ownership cost in comparison to the new machine purchase.

Constant	Assumptions & Costs	Units	Booms	Machines		Calculation
				New SP sprayer (all options)	Used Basic SP Sprayer	
Sprayed Area & Use						
OAS	Own Area Sprayed (ha)	Hectares		14,574	14,574	
CAS	Contract Area	Hectares				
TAS	Total Area Sprayed	Hectares		14,574	14,574	OAS+CAS
A	Boom Age at Start	Boom Hours		36.00	36.00	
B	Hr per Boom hour	halfBoom Hour		36.00	36.00	
TU	Total Use	Boom hrs/yr		405	405	A+B
Fixed Costs						
CMV	Current Market Value	\$		\$65,000	\$340,000	
RV	Resale Value	Today's \$		\$200,000	\$80,000	
OP	Ownership Period	Years		10	4	
	Boom Hours at Resale	Hours		4048	4053	A*(TU/OP)
D	Depreciation	\$/yr		40,500	40,000	(CMV-RV)/OP
H	Shed/Insurance/Registration (% of Value)	\$/yr	0.80%	\$3,200	\$2,080	H*(CMV+RV)/2
R	Interest Rate			2.50%	2.50%	
IOC	Interest or Opportunity Cost (%/yr)	\$/yr		10,063	6,500	(CMV+RV)(R)-(FV)(R)
ADC	Annual Fixed Cost	\$/yr		\$63,763	\$48,580	D+H+(CMV+RV)/2+IOC
		\$/boom hr		\$152.86	\$120.00	ADC/TU
		\$/ha		\$3.69	\$3.33	ADC/TAS
Variable Costs						
F	Fuel	Litres/hr		20	25	
FC	Fuel (\$/ha net cost after rebates)	\$/yr	\$135	\$9,210	\$10,625	TU*(F+C)
O	OIL (% of Fuel)	\$/yr		\$100	\$100	
M	Repairs and Maintenance	Average \$/yr		\$10,000	\$14,000	
L	Labour Cost (\$/Spray hr)	\$/yr	\$40.00	\$16,193	\$16,193	TU*(L)
AVC	Annual Variable Cost	\$/yr		\$36,205	\$42,532	(TU*(F+C)+O+M+(TU*(L)))
		\$/boom hr		\$89.43	\$105.06	AVC/TU
		\$/ha		\$2.48	\$2.92	AVC/TAS
TOC	Total Ownership Cost	\$/yr		\$103,968	\$93,112	ADC+AVC
		\$/ha		\$6.17	\$6.25	TOC/TAS

Source: Farmanco 2021



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Selecting used equipment and TCO

EXAMPLE: SP sprayer costs

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	Sprayed Area & Use			New SP sprayer (all options)	Used Basic SP Sprayer	
OAS	Own Area Sprayed (ha)	Hectares		14,574	14,574	
CAS	Contract Area	Hectares				
TAS	Total Area Sprayed	Hectares		14,574	14,574	OAS+CAS
A	Boom Age at Start	Boom Hours			2394	
B	Ha per Boom hour	ha/Boom Hour		36.00	36.00	
TU	Total Use	Boom hrs/yr		405	405	TAS/B

Selecting used equipment and TCO

Fixed Costs						
CMV	Current Market Value	\$		\$605,000	\$340,000	
FV	Resale Value	Today's \$		\$200,000	\$180,000	
OP	Ownership Period	Years		10	4	
	Boom Hours at Resale	Hours		4048	4013	$A+(TU \times OP)$
D	Depreciation	\$/yr		40,500	40,000	$(CMV-FV)/OP$
H	Shelter/Insurance/Registration (% of Value)	\$/yr	0.80%	\$3,220	\$2,080	$H \times ((CMV+FV)/2)$
R	Interest Rate			2.50%	2.50%	
IOC	Interest or Opportunity Cost (%/Yr)	\$/yr		10,063	6,500	$(CMV-FV)/2 \times R + (FV \times R)$
AFC	Annual Fixed Cost	\$/yr		\$53,783	\$48,580	$D + (H \times ((CMV+FV)/2)) + IOC$
		\$/Boom hr		\$132.85	\$120.00	AFC/TU
		\$/ha		\$3.69	\$3.33	AFC/TAS

Selecting used equipment and TCO

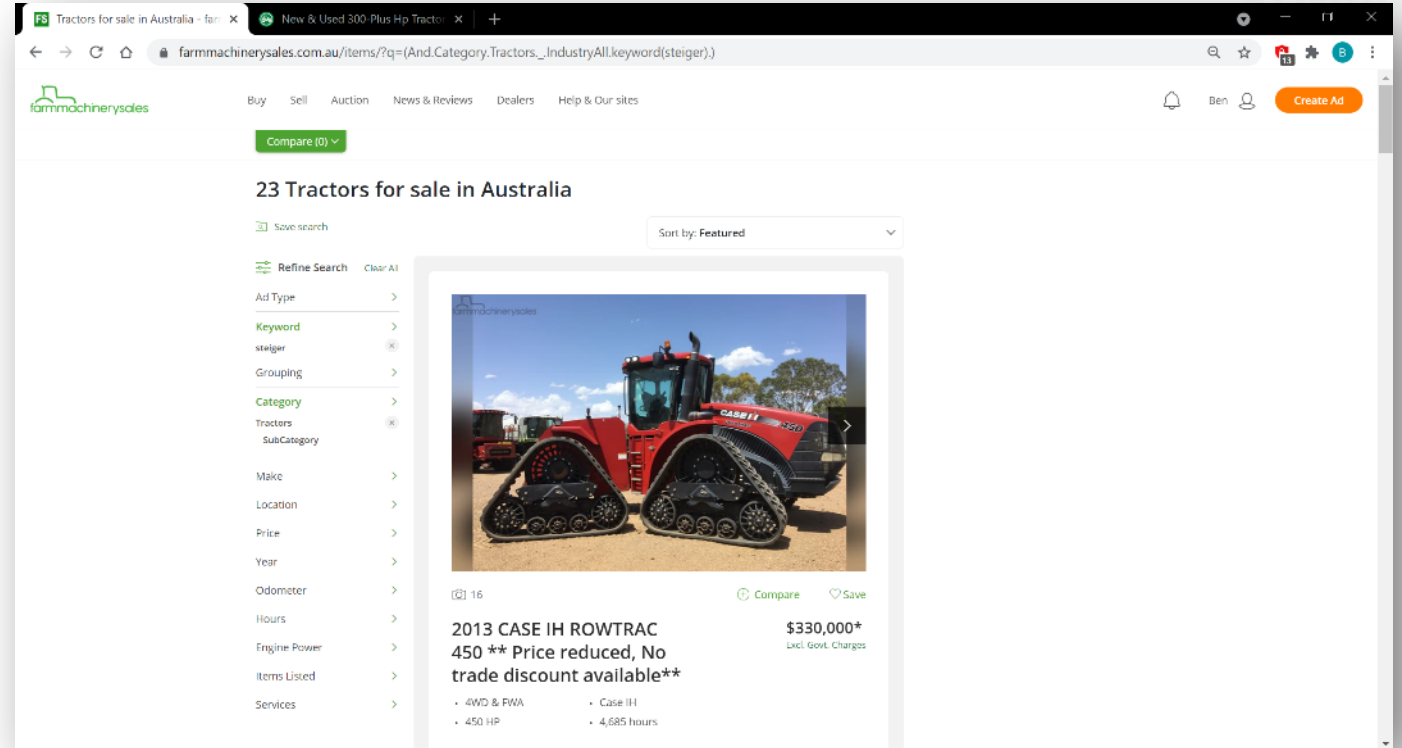
Variable Costs						
F	Fuel	Litres/hr		20	25	TUxFxFC
FC	Fuel (\$/litre net cost after rebates)	\$/yr	\$1.15	\$9,311	\$11,639	
O	Oil (% of Fuel)	\$/yr		\$700	\$700	
M	Repairs and Maintenance	Average \$/yr		\$10,000	\$14,000	TUxL
L	Labour Cost (\$/Spray hr)	\$/yr	\$40.00	\$16,193	\$16,193	
AVC	Annual Variable Cost	\$/yr		\$36,205	\$42,532	
		\$/Boom hr		\$89.43	\$105.06	AVC/TU
		\$/ha		\$2.48	\$2.92	AVC/TAS
TOC	Total Ownership Cost	\$/yr		\$89,987	\$91,112	AFC+AVC
		\$/ha		\$6.17	\$6.25	TOC/TAS

Source: Farmanco 2021

*Primary benefit of new machine comes from fuel efficiency and lower maintenance costs which outweigh additional opp cost.

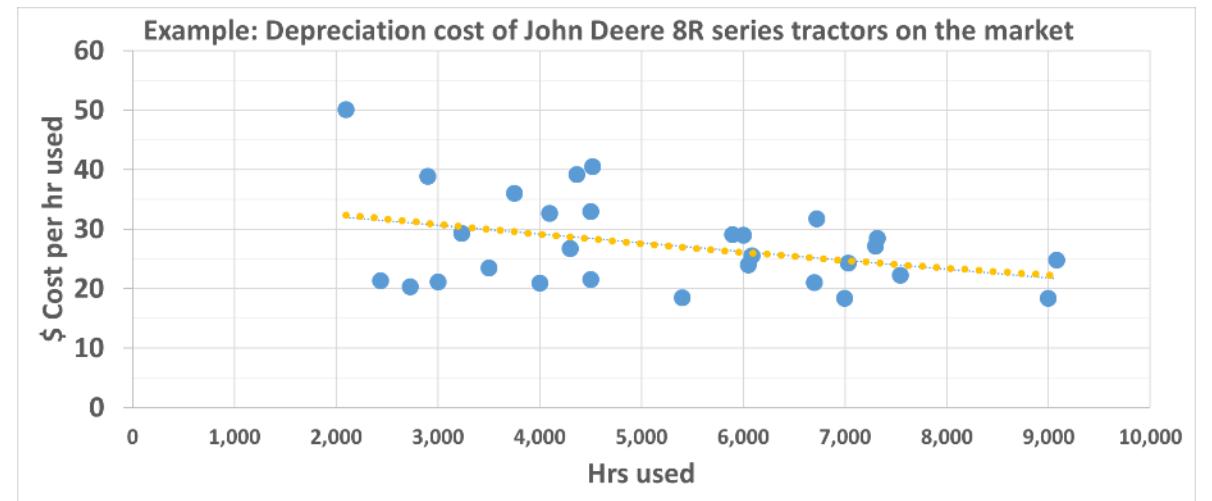
Monitor fleet values

- Online
- Auctions
- Rural papers
- **Speak to dealers**
- Get regular trade value updates



Turnover time: monitor pricing

- **Varies by machine, make and model**
- **Monitor and plot values of key equipment**
- **Let trusted dealers know turnover intentions**
- **Model updates and tech jumps can shift values lower**



New gear, less maintenance costs?

- After the honeymoon, the maintenance costs of new gear can be high:

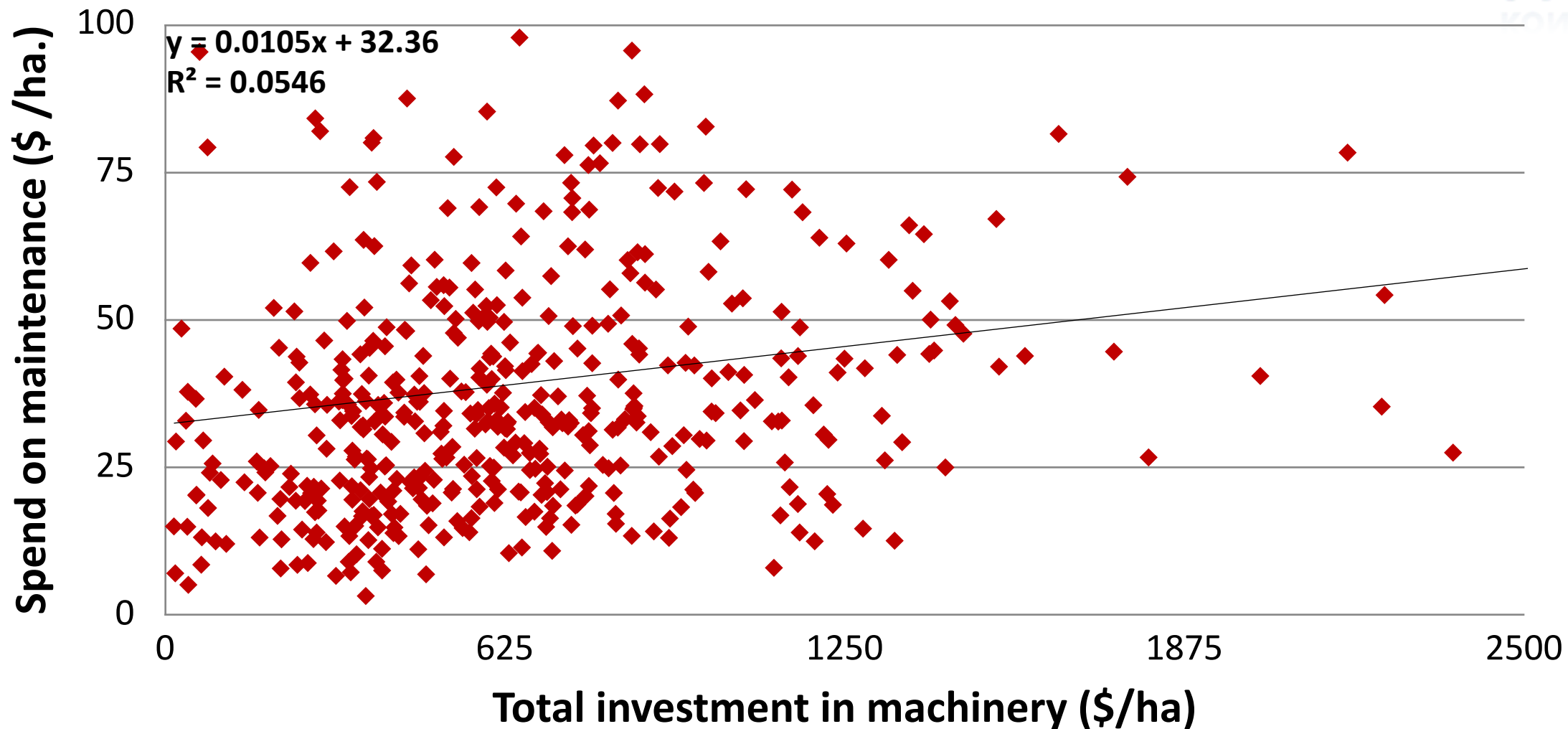
- *According to WA consultants ConsultAg:*

“Repairs and maintenance costs are driven by increasing call-out, parts and technology costs.

Higher plant values don't necessarily reduce R&M costs – in 2019 there was a 10% correlation between R&M and Plant Value (per ha)”

New gear, less maintenance costs?

Machinery investment total vs annual spend on maintenance



Truck ownership

- Evaluate truck ownership separately
- Refer to GRDC fact sheet on truck ownership

FARM BUSINESS FACT SHEET

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SEPTEMBER 2019



Should I own a truck?

KEY POINTS

- Careful analysis is recommended before committing to owning a truck
- When looking at a major plant purchase, such as a truck, review it in conjunction with the goals and objectives of the entire business
- Know the cost differential between owning a truck and using a contractor
- Owning a truck enables the delivery of commodities direct to an end user at a time that is mutually convenient to both parties
- Harvest logistics can improve when a grain-growing business owns a truck
- Owning a truck provides the opportunity for effective labour use in the farm's off-peak times
- Owning a truck and delivering grain can help cover labour costs by converting an existing cost (freight paid to others) into an income for the farm

INTRODUCTION

Grain growers are often tempted to own their own truck as a convenience. The question of whether to own a truck is complex and such a decision should be made with an understanding of the economics and other influencing factors. This fact sheet outlines a process to help make that decision.

MANAGING HARVESTED GRAIN

Grain growers have many options to manage grain as it is harvested. These include:

- sell in-paddock;
- store in the paddock for sale during the year;
- own your own truck and deliver direct to the local bulk-handling facility, and user or port;

ECONOMICS AND THE 'OTHER USE' OPTIONS

When contemplating the purchase of a truck the farm business needs to clearly identify what it will be used for and whether there are additional opportunities that arise through owning it. It helps to document the tasks you envisage the truck will be completing, for example, harvest cottages, shifting grain throughout the

TRUCKS TO PORTS

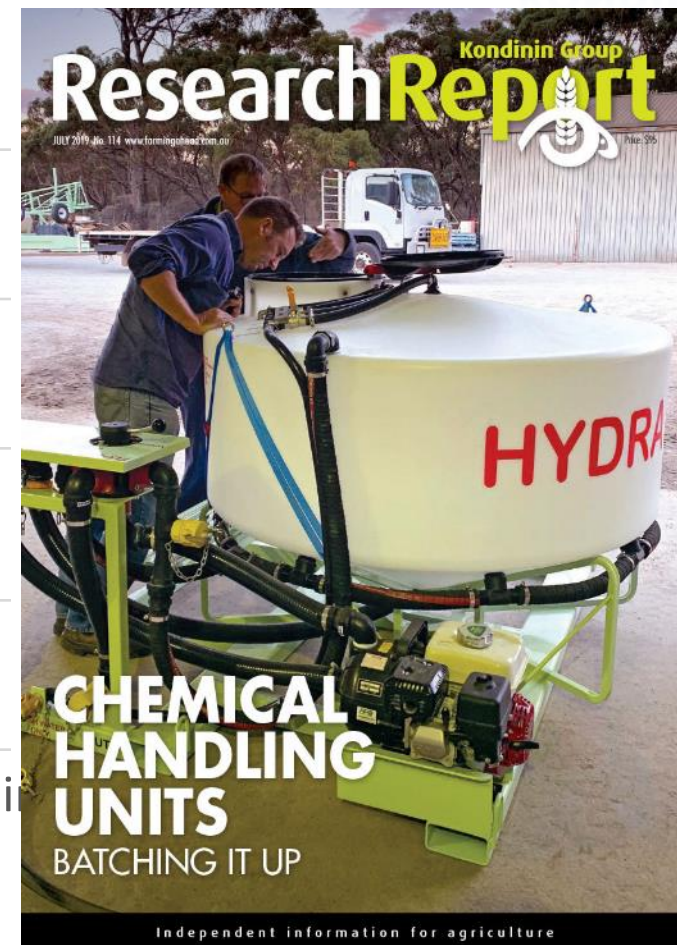
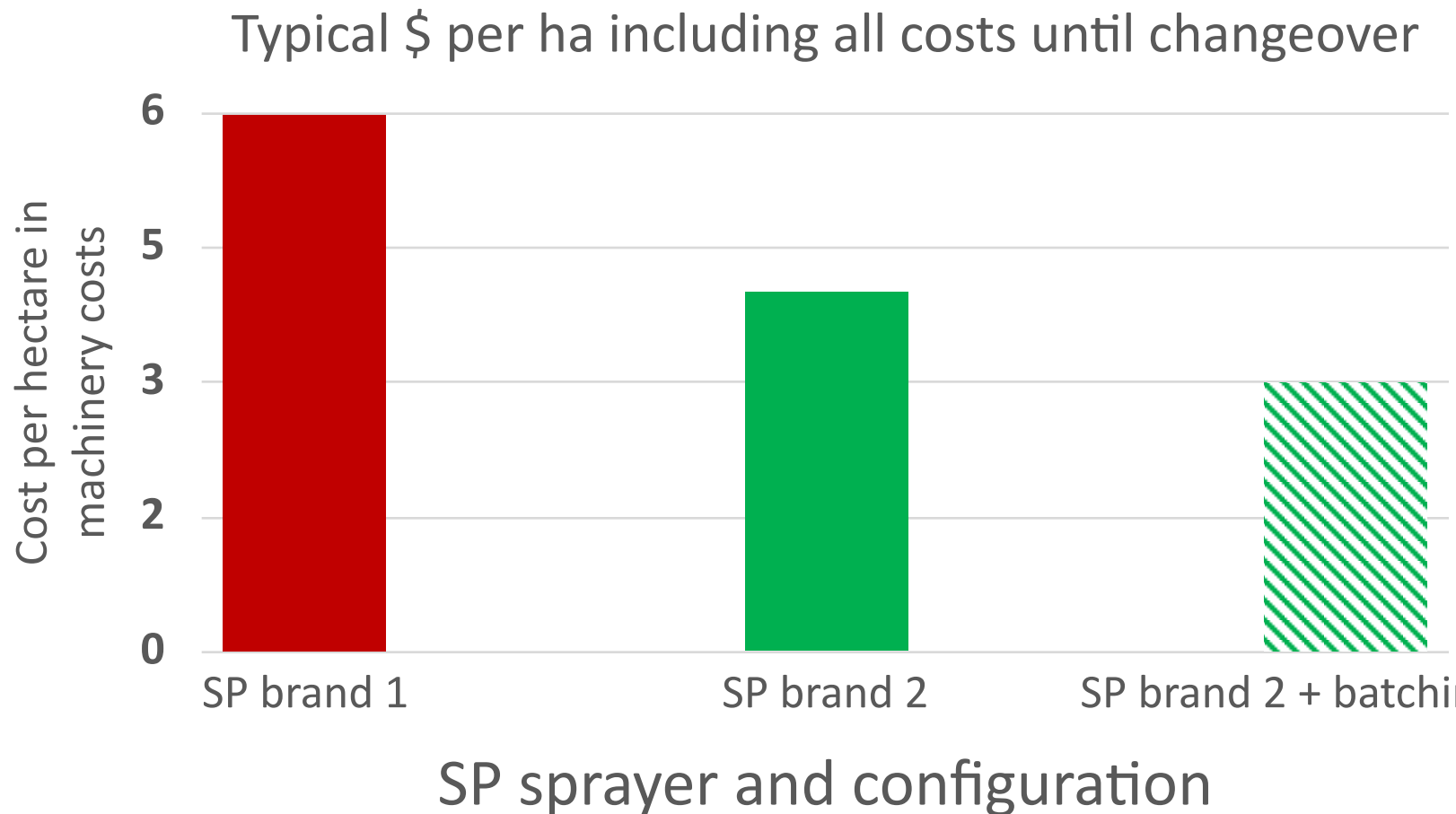
- own your own truck and deliver to central on-farm storage for sale offshore during the year;
- own your own truck and deliver to central on-farm storage for sale delivered direct to end user during the year;
- employ a contractor to pick up from the paddock and deliver direct to the local bulk-handling site, end user or port; and
- a combination of the options above.

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T +61 2 886 8800 F +61 2 886 8899 E grdc@grdc.com.au

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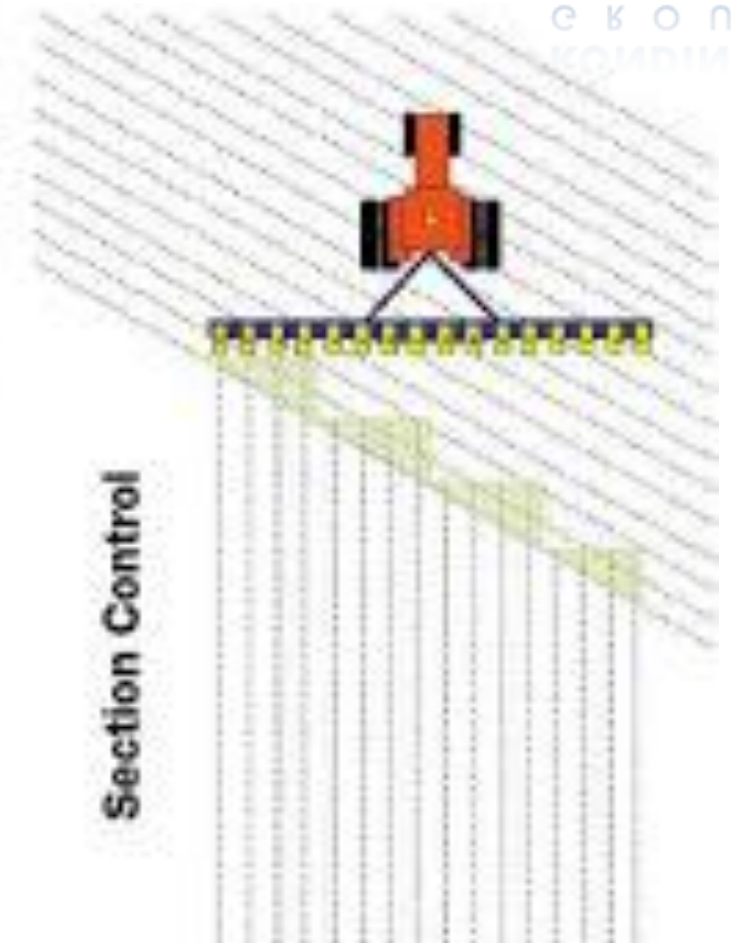
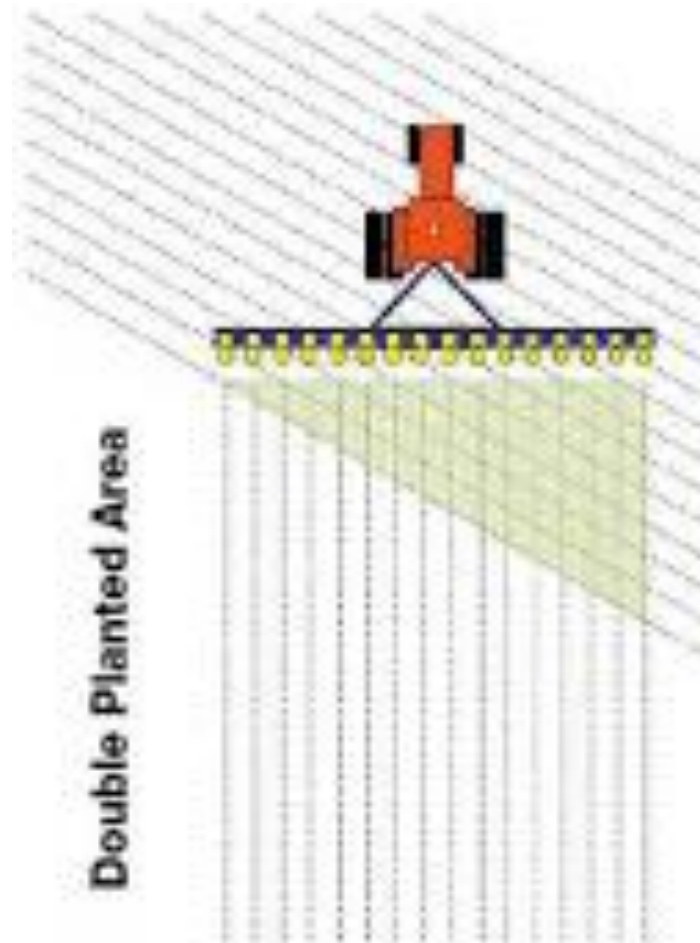
Buying smart and extracting value

- Knowing the running and maintenance costs can assist buying decisions



Technology

- Usually pays for itself
 - But do the sums to determine payback period
- Section control
 - How much overlap are you still getting?

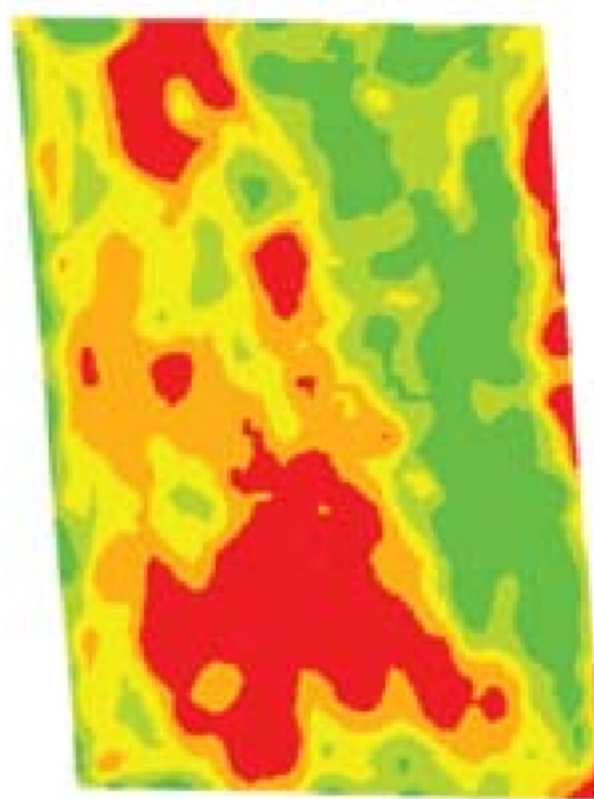


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Technology

- Usually pays for itself
 - But do the sums to determine payback period
- Variable rate crop inputs
 - Mostly N and P, seed also an option








	Average Yield t/ha	DAP applied kg/ha
	5.0	100
	4.0	80
	3.0	80
	2.0	50
	1.0	50

Figure 1. In 2007, targeting phosphorus to the more productive sandy loam flats, saved \$25/ha in some paddocks.

Source: SPAA

Technology

- Usually pays for itself
 - But do the sums to determine payback period
 - Green on Green
 - Example – radish in wheat in northern WA wheatbelt
- But... avoid being on the bleeding-edge!

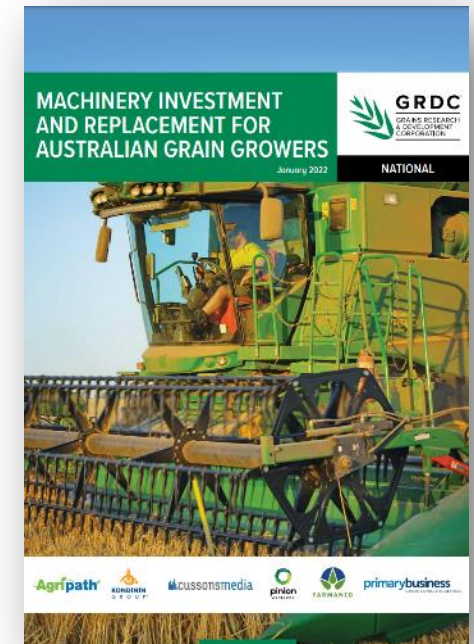


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Summary

- Machinery investment benchmarks vary
 - TPLM+C vs Gross Farm Income appears to be most consistent
 - Nationally this ratio is 0.34 on average
 - Southern region: 0.38
 - Variation of investment focus between zones
 - Variation in farming career stage / mechanical skills / service proximity
- Apply depreciation rate of 10-12%
- Maintain a record of current machinery values
- Chart depreciation if buying a specific used machine
- Regularly evaluate new technologies and payback periods
- Check out the GRDC booklet with 30 case studies



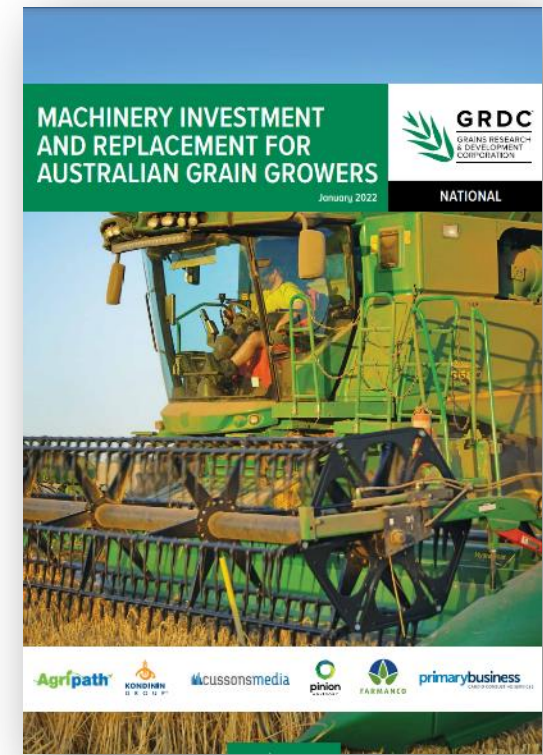
Thanks to:



Amery Drage
Andrew Todd
Evan Hall
Gary Lang
Geoff Cosgrove
Ash and Megan Reichstein
Jessie Davis
Peter Reid
Reece Curwen

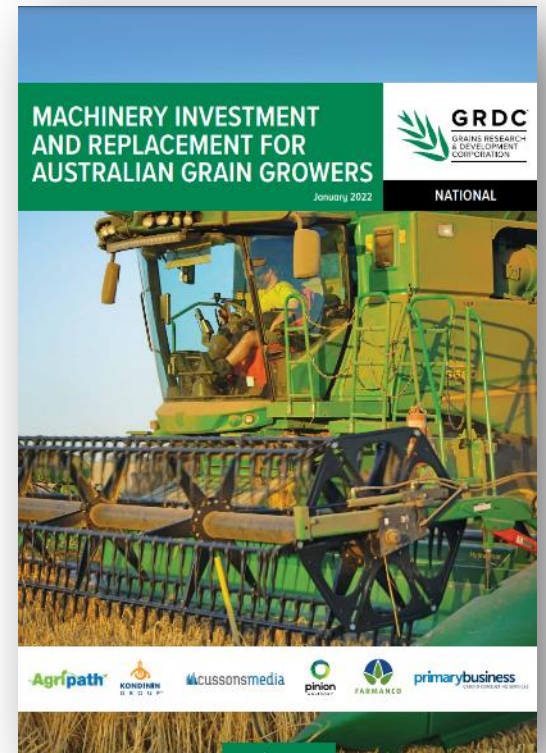
Gavin and Hayley Hill
AG Morrison
Andrew Polkinghorne
Jarred Tilley
Jason Marwood
Les Dunn
Marty Collins
Monty Hards
Simon Ballinger

Tasman Fitzgerald
Tim Hausler
Andrew Windsor
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Darryl Bartelen
James Coggan
Keith Logan
Lawson Grains
Lee Coleman





Questions?



Ben White

Phone: 0407 941 923

ben@kondinin.com.au



@1800weevil



Farming Ahead

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