



final report

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Pastoral Company Benchmarking Project 2012-2017

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Abstract

The financial and production performance of six large pastoral enterprises operating across northern Australia was analysed for the six-year period from 2012-2017. This is the most extensive analysis undertaken of pastoral company performance in Australia, the participants manage approximately 5% of the national herd across an area larger than Victoria. The analysis found that better performing business units (stations) generally had higher productivity, more targeted herd expenditure, better labour efficiency and adequate operating scale. These characteristics of better performers are consistent with family operators. Improved performance in the latter years was a function of a beef price increase, rather than improved productivity. The main driver of herd income is herd productivity, expressed as kilograms of beef produced per AE per year. An efficient and effective cost base is required for good profits to be achieved, but low expenses alone did not determine profitability. The value of the underlying land asset influences the profitability of the business unit. The data show that the inherent productivity of land is more than reflected in the land values, meaning more productive land is not necessarily more profitable, although it did achieve higher profits per AE.

Executive summary

Project Scope and Methodology

- This project is the most extensive analysis yet undertaken of pastoral company performance in Australia. The dataset, which belongs to participants, is the largest dataset of beef business performance in Australia, outside of the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)
- The project analysed 65 Northern pastoral company stations over six years. These were owned by six corporate entities who collectively manage 176 million hectares.
- Management accounting principles were used for the analysis with the unit of measurement being the Animal Equivalent (AE). Collectively, the performance of over one million AE were analysed.
- Herds were segregated into Breeding, Breeding and Growing, and Growing on an individual station (business unit) level for analysis.

Broad Findings

- Better performing businesses generally had higher productivity, more targeted herd expenditure, better labour efficiency and sufficient operating scale. These characteristics of better performers are consistent with the family operators.
- There was significant variation in the performance observed between (and within) companies, stations, regions, enterprises and years
- The findings of this project are consistent with analysis of the non-corporate sector in *The Australian Beef Report* (Holmes, McLean & Banks, 2017) which found that both operating scale and operating efficiency are required for good profits to be achieved.
- Operating Efficiency results from the key areas of the business being highly productive, that is more production resulting from each unit of input. As a general rule, the more productive a business becomes, the more efficient it will be, assuming it is done cost effectively. The key elements of beef business productivity are land, labour and livestock.
- Operating scale is primarily about having sufficient scale to achieve competitive overhead expenses on an AE basis.
- Once a business has sufficient operating scale, more scale is not necessarily a good thing as the incremental benefits of additional scale are not ongoing, bigger is not always better. On the other hand, operating efficiency should be a focus of continual improvement for all beef businesses, regardless of scale.
- Improved performance in the latter years (2014 – 2018) was a function of a beef price increase, rather than improved productivity.
- Performance per AE was the main driver of the profitability of business units, more so than the number of animal units.

Income

- The main driver of herd income is herd productivity, expressed as kilograms of beef produced per AE per year. The price received for the beef turned off is more important here than in other studies, but is still secondary to herd productivity.
- Breeding enterprises dominated the dataset. Nearly all of the productivity of breeding herds can be explained by reproductive rate, mortality rate and sale weight, with reproductive rate being the most important.
- Differences in herd income explained almost all herd profit differences, with total herd expense differences making only a minor contribution.

Expenses

- An efficient and effective cost base is required for good profits to be achieved, but low expenses alone did not determine profitability. Productive herds with a competitive cost base achieved reasonable profits per AE, whereas unproductive herds with a low-cost base did not.
- Better performing enterprises have lower direct herd expenditure (enterprise expenses) yet higher herd productivity. This finding is consistent with the characteristics of better performers generally and indicates that the herd expenditure is better targeted and more effective.
- Operating scale and labour efficiency are the main determinants of overhead expenses.
- Labour efficiency in the range of 1,500 to 2,500 AE/FTE is essential for stations to have a competitive overhead expense per animal unit.
- There is a minimum overhead cost of \$50/AE regardless of scale.

Profit and Profitability

- The value of the underlying land asset also influences the profitability of the business unit. The data show that the inherent productivity of land is more than reflected in the land values, meaning more productive land is not necessarily more profitable, although it did achieve higher profits per AE.
- There were locations where the low inherent productivity of the landscape prevented the achievement of profits, and locations where the high value of land conspired against reasonable profits translating into good profitability.
- The minimum operating scale required for large pastoral company enterprises is greater than that of private operators, at over 10,000AE compared to 3,000AE. There is a limit to the benefits of additional scale.
- Having good operating efficiency and sufficient operating scale is generally more important in achieving superior performance than enterprise type or region.

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1 Introduction

1.1 Background

The Pastoral Company Benchmarking Project was initiated by Meat & Livestock Australia (MLA) in 2014. The project followed the release of the Northern Beef Report by MLA in 2014, which provided a comprehensive analysis of the beef industry, but did not include the corporate sector. This project was seen as a way to fill that information gap for large pastoral companies.

The project included over 65 individual stations, managing 176 million hectares. This is the largest single data set of beef business performance in Australia outside that generated by ABARES.

Holmes & Co. and Bush AgriBusiness Pty Ltd were selected to undertake the project following a tender process undertaken by MLA.

The project commenced with the analysis of three historical years (2012, 2013 and 2014) to provide a baseline performance for analysis. Three subsequent years (2015, 2016 and 2017) were then analysed on an annual basis. This report summarises the findings from the six years of analysis.

1.2 Project objectives

The purpose of the project was to provide participants with a detailed analysis of their production and financial performance in their own right and relative to their peers.

This provided insight into performances achieved and why, and facilitated improved decision making for improved performance.

1.3 Methodology Approach

The analysis was undertaken using The Business Analyser®, a proprietary business analysis methodology developed by the authors to analyse and compare grazing businesses across Australia.

1.3.1 Whole Business

The analysis of each station or business unit was done at two levels;

- Whole Business Analysis - total dollar reporting of income statement, cashflow statement, balance sheet and whole business key performance indicators, and,
- Enterprise Analysis - herd level income statement and key performance indicators.

The majority of the analysis and interrogation of the data was conducted at the enterprise level. This provided the best basis for analysis of factors influencing overall group performance.

The primary unit of analysis at the enterprise level was the Animal Equivalent (AE). This provided a common basis for analysis across all enterprises and regions.

A summary of benchmarking metrics used and a description of their calculation is given in Appendix 7.2.

1.3.2 Enterprise

The enterprises analysed in the project are listed below. Stations were either single enterprise stations or multiple enterprise stations. Multiple enterprise stations either had their enterprises separated for analysis or were analysed as one (Breeding and Growing below).

- **Commercial Breeding:** Self replacing breeding herds growing own progeny through to point of sale with bulls being the main class purchased or transferred in
- **Growing:** Enterprises running dry stock transferred in for growing and subsequent sale (or transfer)
- **Breeding and Growing:** Breeding animals were run and dry stock were trucked in for weight gain. Companies were unable to accurately separate the livestock numbers, transfers and expenditure for each, so they were analysed as a single enterprise.

Pasture-based beef production enterprises were the basis of analysis and formed the basis of this report. The Commercial Breeding and Growing enterprises were the main enterprises analysed as their performance and performance indicators can be analysed in detail and related to the result. Analysis of the combined Breeding & Growing enterprise is limited as the contribution to the final result from the breeding component and the growing component is unknown.

Table 1 shows the breakdown of AE and number of enterprises by enterprise type and year in the analysis, excluding studs. Note that the number of enterprises is greater than the number of stations as some stations analysed multiple enterprises separately.

Table 1: Enterprises and AE in Analysis

		2012	2013	2014	2015	2016	2017
Breeding	AE	732,865	669,916	674,118	691,057	629,690	694,100
	Enterprise (n)	30	30	30	33	30	30
Breeding & Growing	AE	320,876	261,899	254,462	246,746	234,412	237,689
	Enterprise (n)	12	12	11	9	8	8
Growing	AE	237,248	209,496	179,269	214,281	197,420	203,446
	Enterprise (n)	22	22	23	25	25	26
Total	AE	1,290,989	1,141,311	1,107,849	1,152,084	1,061,522	1,135,235
	Enterprise (n)	64	64	64	67	63	64

1.3.3 Benchmarking

The station performance results were aggregated by year, enterprise, performance, and rainfall band. Aggregating by year provides insight into the drivers of whole group or whole industry performance across the period analysed. Aggregating by operating profit within enterprises allows elucidation of performance drivers within enterprises. The average of the Top 25% businesses in each enterprise has been presented adjacent to the enterprise average for this purpose.

The purpose of the benchmarking process was to report on the actual performance of each station (as a business unit) and company, on their actual production and financial performance on a comparable basis. It achieves this purpose but does have limitations.

By only analysing the pasture-based aspects of each company it did not capture the entirety of each company's operations. The accuracy of results was also subject to the accuracy of the information provided and assumptions applied, particularly for measures such as animal weights, animal values and animal unit ratings.

A standardised price was applied to internal transfers between stations.

The benchmarking process was primarily a diagnostic process. It is best used to diagnose the strengths of a business and where the areas for improvement lie. Comparison against the performance of peers demonstrate what performance is achievable for individual measures and overall performance.

1.3.4 Further Breeder Herd Analysis

Some analysis beyond the benchmarking was undertaken to provide further insight into the entire dataset. This related to the breeder herd productivity statistical analysis and the breeder herd survey.

Statistical analysis of factors driving breeder herd productivity was undertaken. Initially, four years (2012-2015) of benchmarking data was anonymously provided to a statistician at the University of Melbourne. It was determined that a multiple linear regression of reproductive rate, mortality rate, and sale weight produced the best prediction for kg beef/AE. The same regression was run on the complete dataset (6-year average) and the results are presented in Section 3.2.3.1.

A breeder herd survey was undertaken to determine management factors affecting herd fertility. The results of 25 respondents were analysed and the results have been presented in Section 3.2.3.2.

1.4 External Factors

Rainfall and cattle prices were the primary external factors affecting performance over the period analysed. A considerable area represented in the dataset experienced drought throughout 2013 (BoM, 2013). However, the geographic spread of stations in the dataset meant the seasonal variations were not uniform in their severity or duration. The drought had a big impact on some stations in both stock numbers and herd productivity.

Fig. 1 shows the long-term northern cattle market (based on QCMI data) expressed in real terms, with the 2012-17 period covered by this analysis shown as a dotted line and highlighted in orange. This shows that prices over the period of analysis spanned each decile of long term prices.

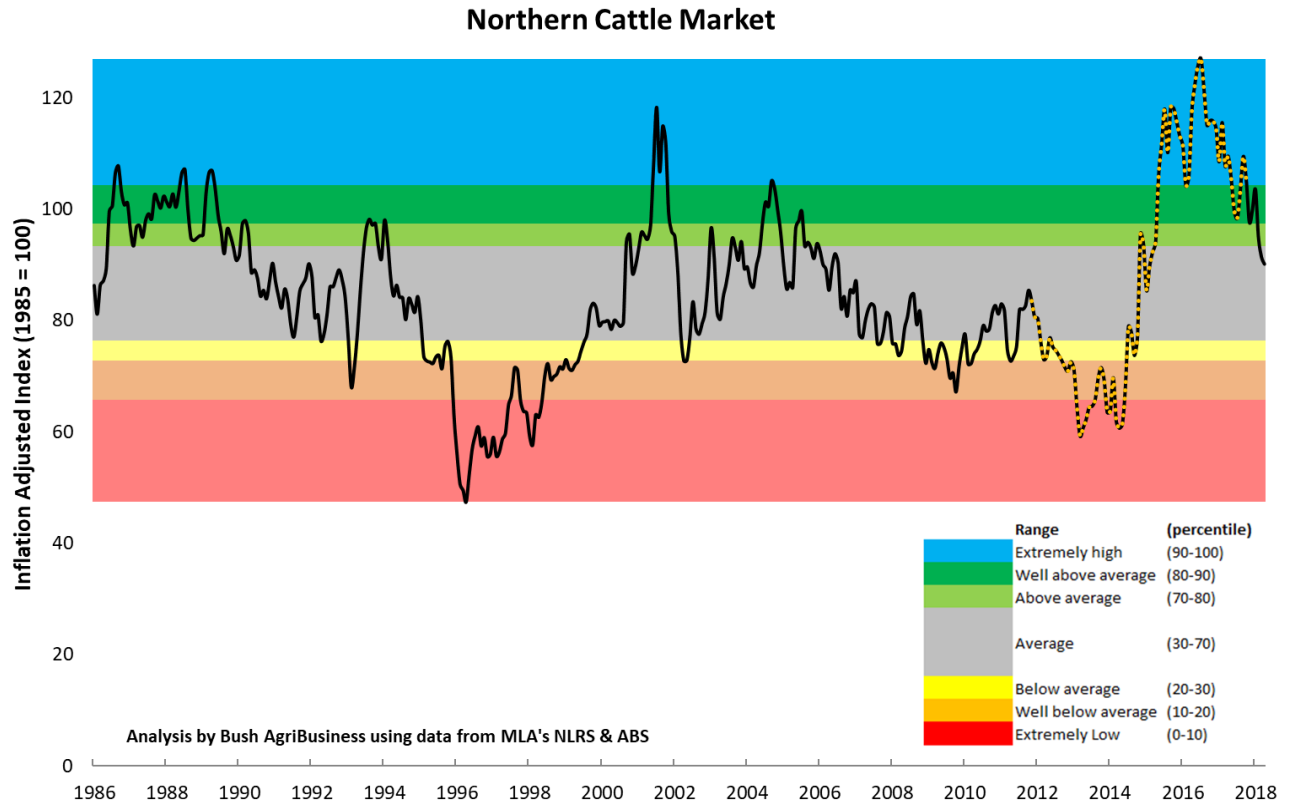


Fig. 1: Long Term Cattle Prices

2 Results

The summary results generated within this project are presented, the data are then analysed and interpreted in section 3.

The reports included are;

- All Companies Summary Data (Section 2.1)
 - Herd Performance by Year (all companies and all enterprises)
Herd income statement of the average annual performance of the entire data set, expressed on an AE basis.
- Enterprise Summary Data (Section 2.2)
 - Herd Performance by Enterprise
Herd income statement detailing the average and Top 25% performance across the three main enterprise types, and across all enterprises.
 - Breeding by Year
Breeding enterprise performance for each year along with the long-term average of all breeding enterprises and of the Top 25% of breeding stations.
 - Breeding and Growing by Year
The annual performance of those enterprises that have both breeding and (brought in) growing animals where the performance is unable to be separated, along with long-term average and Top 25%.
 - Growing by Year
The annual performance, long term average and Top 25% performance of growing enterprises.
- Region (Section 2.3)
 - Herd Performance by Rainfall Band
Long term average performance of all enterprises by rainfall band

2.1 All Companies Summary Data

2.1.1 Herd Performance by Year (all companies and all enterprises)

LONG TERM SUMMARY (ALL ENTERPRISES)

	2012	2013	2014	2015	2016	2017	Average
	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE
Sales	309.20	312.25	272.89	445.34	511.85	420.05	376.18
Purchases	(123.37)	(103.73)	(119.99)	(189.32)	(267.18)	(203.41)	(165.99)
Inventory Change	(6.43)	(66.86)	16.57	(53.68)	2.60	29.84	(13.26)
GROSS PROFIT	179.41	141.66	169.47	202.34	247.27	246.48	196.92
ENTERPRISE EXPENSES							
Agistment	1.84	2.49	0.93	0.33	0.48	0.19	1.07
Animal Health	4.41	3.79	4.35	3.69	4.08	4.36	4.12
Contracting & Mustering	11.54	10.88	10.29	10.61	10.58	10.45	10.75
Fodder	3.09	4.05	3.38	4.52	4.33	7.20	4.40
Insurance & Materials	0.28	0.20	0.29	0.21	0.18	0.26	0.24
Internal Enterprise Freight	1.63	1.24	1.32	3.99	6.43	2.65	2.82
Marketing & Promotion	0.05	0.00	0.00	0.00	0.00	0.00	0.01
Selling Costs	32.30	35.98	23.74	24.23	19.52	17.99	25.85
Supplementation	6.40	12.38	9.26	11.88	9.50	11.94	10.16
	61.58	71.06	53.58	59.45	55.11	55.05	59.43
GROSS MARGIN	117.83	70.60	115.89	142.89	192.16	191.43	137.49
OVERHEAD EXPENSES							
Administration	1.89	2.06	1.88	2.26	2.34	1.99	2.06
Depreciation	5.24	6.06	6.30	5.70	5.45	5.17	5.64
Electricity & Gas	1.78	2.31	2.21	1.77	1.61	1.84	1.92
Fuel & Lubricants	10.24	11.85	11.88	9.76	8.63	8.47	10.15
Insurance	1.03	1.70	1.76	0.64	0.58	0.75	1.08
Landcare	1.20	0.83	1.13	1.22	1.39	1.24	1.17
Materials	1.42	1.06	1.56	0.99	1.12	0.69	1.15
Motor Vehicle Expenses	5.37	6.31	6.67	5.45	5.17	5.70	5.77
Pasture	0.04	0.03	0.03	0.01	0.00	0.00	0.02
Rates & Rents	3.62	4.47	4.51	5.02	5.50	5.77	4.78
R & M General	8.12	8.66	9.49	10.33	10.01	10.71	9.52
Wages	30.21	34.59	35.35	34.56	34.73	36.87	34.29
	70.16	79.94	82.77	77.72	76.54	79.20	77.55
TOTAL OPERATING EXPENSES	131.74	151.01	136.35	137.18	131.65	134.25	136.98
EBIT (OPERATING PROFIT)	47.67	(9.34)	33.12	65.16	115.62	112.23	59.94
PRIMARY PERFORMANCE INDICATORS							
Avg price received (\$/kg LW sold)	\$1.75	\$1.53	\$1.79	\$2.43	\$2.95	\$2.85	\$2.17
Income (\$/kg LW prod)	\$1.67	\$1.45	\$1.80	\$2.34	\$2.88	\$2.54	\$2.07
Cost of Production (\$/kg LW prod)	\$1.23	\$1.55	\$1.45	\$1.59	\$1.53	\$1.38	\$1.44
Operating Margin (\$/kg LW prod)	\$0.44	(\$0.10)	\$0.35	\$0.76	\$1.35	\$1.16	\$0.63
Kg Beef/ AE	108	97	94	86	86	97	95
Labour Efficiency (AE/FTE)	1,630	1,519	1,562	1,663	1,666	1,667	1,616
SECONDARY PERFORMANCE INDICATORS							
Mortality Rate	4.5%	4.0%	4.7%	4.3%	6.3%	4.9%	4.7%
Turnoff weight (kg/hd LW)	337 kg	328 kg	316 kg	313 kg	310 kg	323 kg	322 kg
Turnoff value (\$/hd)	\$592	\$501	\$565	\$760	\$914	\$922	\$699
Stocking Rate (AE/100ha)	10.2	9.9	9.1	9.7	9.2	8.6	9.5
Enterprise Size (Annual Avg AE)	20,209	17,683	17,158	17,939	17,574	18,091	18,109

2.2 Enterprise Summary Data

2.2.1 Herd Performance By Enterprise

AVERAGE and TOP 25% ENTERPRISE SUMMARY: 2012-2017

	Breeding Average \$/AE	B&G Average \$/AE	Growing Average \$/AE	Average \$/AE	Breeding Top 25% \$/AE	B&G Top 25% \$/AE	Growing Top 25% \$/AE	Top 25% \$/AE
Sales	244.38	392.65	779.03	376.18	213.77	608.44	1,380.76	482.44
Purchases	(67.43)	(162.49)	(505.32)	(165.99)	(20.30)	(263.81)	(1,031.00)	(211.73)
Inventory Change	0.29	(22.85)	(26.11)	(13.26)	30.23	(55.43)	(21.44)	(10.29)
GROSS PROFIT	177.23	207.31	247.60	196.92	223.70	289.20	328.32	260.43
ENTERPRISE EXPENSES								
Agistment	0.44	2.70	0.66	1.07	0.75	12.10	0.00	5.45
Animal Health	3.94	4.63	4.19	4.12	3.69	4.66	6.27	4.33
Contracting & Mustering	11.75	11.28	7.31	10.75	8.77	10.23	3.41	8.91
Fodder	3.55	3.74	7.17	4.40	3.06	3.27	6.35	3.44
Insurance & Materials	0.23	0.05	0.32	0.24	0.14	0.18	0.18	0.16
Internal Enterprise Freight	2.86	1.83	2.50	2.82	1.01	1.32	0.89	1.13
Marketing & Promotion	0.00	0.00	0.05	0.01	0.00	0.00	0.01	0.00
Selling Costs	18.51	31.65	39.03	25.85	18.81	46.58	30.40	31.49
Supplementation	10.68	8.73	8.54	10.16	8.61	8.22	16.94	9.18
	51.95	64.60	69.76	59.43	44.85	86.56	64.44	64.08
GROSS MARGIN	125.28	142.71	177.84	137.49	178.85	202.64	263.88	196.34
OVERHEAD EXPENSES								
Administration	1.70	1.87	3.75	2.06	2.01	2.22	6.13	2.46
Depreciation	5.06	6.87	7.22	5.64	4.59	6.30	7.61	5.57
Electricity & Gas	2.11	1.09	2.61	1.92	2.18	2.25	2.93	2.28
Fuel & Lubricants	9.71	10.66	9.67	10.15	10.09	8.52	6.07	9.08
Insurance	1.17	0.23	1.37	1.08	0.77	0.46	1.32	0.69
Landcare	0.83	0.41	2.53	1.17	0.82	0.90	5.10	1.23
Materials	0.92	1.47	0.96	1.15	0.52	1.27	0.30	0.81
Motor Vehicle Expenses	5.45	4.78	7.31	5.77	5.69	4.88	3.62	5.17
Pasture	0.00	0.00	0.09	0.02	0.00	0.00	0.45	0.04
Rates & Rents	4.36	3.97	7.16	4.78	4.38	6.26	5.57	5.27
R & M General	9.94	8.71	12.94	9.52	9.94	10.83	18.49	11.07
Wages	32.13	33.45	41.51	34.29	33.58	36.54	36.19	35.05
	73.40	73.50	97.12	77.55	74.56	80.42	93.77	78.71
TOTAL OPERATING EXPENSES	125.35	138.10	166.88	136.98	119.41	166.97	158.21	142.80
EBIT (OPERATING PROFIT)	51.88	69.21	80.72	59.94	104.29	122.22	170.11	117.63
Return on Assets Managed	1.8%	2.6%	1.9%	2.0%	4.9%	5.2%	3.5%	4.9%

2.2.2 Breeding by Year

LONG TERM BREEDING SUMMARY

	2012	2013	2014	2015	2016	2017	Average	Top 25%
	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE
Sales	215.33	181.60	189.40	272.78	353.30	263.25	244.38	213.77
Purchases	(32.46)	(42.55)	(40.98)	(81.92)	(119.20)	(84.28)	(67.43)	(20.30)
Inventory Change	(31.12)	(11.00)	(2.79)	(20.41)	(36.37)	60.47	0.29	30.23
GROSS PROFIT	151.75	128.05	145.63	170.45	197.74	239.44	177.23	223.70
ENTERPRISE EXPENSES								
Agistment	0.51	1.16	0.59	0.22	0.27	0.13	0.44	0.75
Animal Health	3.82	3.48	3.90	3.64	4.01	4.32	3.94	3.69
Contracting & Mustering	12.95	12.08	11.20	12.06	11.88	11.13	11.75	8.77
Fodder	3.12	4.40	3.26	3.49	3.38	4.52	3.55	3.06
Insurance & Materials	0.30	0.18	0.27	0.21	0.18	0.20	0.23	0.14
Internal Enterprise Freight	1.34	1.01	1.02	5.22	7.02	2.69	2.86	1.01
Marketing & Promotion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selling Costs	23.76	26.62	18.47	16.14	15.17	12.77	18.51	18.81
Supplementation	7.67	13.17	10.99	12.97	9.73	12.21	10.68	8.61
	53.47	62.09	49.71	53.94	51.64	47.95	51.95	44.85
GROSS MARGIN	98.27	65.95	95.92	116.51	146.10	191.49	125.28	178.85
OVERHEAD EXPENSES								
Administration	1.73	1.98	1.78	1.86	1.65	1.43	1.70	2.01
Depreciation	5.04	5.61	5.66	5.07	4.85	4.45	5.06	4.59
Electricity & Gas	2.06	2.56	2.26	1.86	1.57	1.70	2.11	2.18
Fuel & Lubricants	10.11	11.83	11.37	9.51	8.54	8.04	9.71	10.09
Insurance	1.20	2.06	1.98	0.59	0.58	0.72	1.17	0.77
Landcare	0.83	0.55	0.65	0.74	0.95	1.17	0.83	0.82
Materials	1.22	1.05	1.13	0.78	1.11	0.73	0.92	0.52
Motor Vehicle Expenses	5.23	6.20	6.29	4.71	4.92	4.99	5.45	5.69
Pasture	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rates & Rents	3.29	3.78	4.18	4.64	5.16	4.79	4.36	4.38
R & M General	7.26	7.85	8.50	9.58	9.60	10.69	9.94	9.94
Wages	29.96	33.21	32.96	31.72	31.87	33.12	32.13	33.58
	67.93	76.69	76.75	71.06	70.80	71.83	73.40	74.56
TOTAL OPERATING EXPENSES	121.40	138.79	126.46	125.00	122.44	119.78	125.35	119.41
EBIT (OPERATING PROFIT)	30.34	(10.74)	19.17	45.45	75.30	119.66	51.88	104.29
PRIMARY PERFORMANCE INDICATORS								
Avg price received (\$/kg LW sold)	\$1.68	\$1.42	\$1.73	\$2.27	\$2.78	\$2.66	\$2.09	\$2.11
Income (\$/kg LW prod)	\$1.59	\$1.36	\$1.69	\$2.18	\$2.69	\$2.43	\$1.99	\$2.11
Cost of Production (\$/kg LW prod)	\$1.27	\$1.47	\$1.47	\$1.60	\$1.67	\$1.22	\$1.40	\$1.13
Operating Margin (\$/kg LW prod)	\$0.32	(\$0.11)	\$0.22	\$0.58	\$1.03	\$1.21	\$0.58	\$0.98
Kg Beef/ AE	95	94	86	78	73	99	89	106
Labour Efficiency (AE/FTE)	1,596	1,543	1,638	1,686	1,765	1,810	1,682	1,723
SECONDARY PERFORMANCE INDICATORS								
Reproductive Rate	69%	65%	63%	60%	61%	69%	65%	67%
Mortality Rate	5.1%	6.6%	5.4%	5.4%	6.3%	4.8%	5.2%	2.7%
Turnoff weight (kg/hd LW)	288 kg	312 kg	275 kg	274 kg	274 kg	263 kg	281 kg	283 kg
Turnoff value (\$/hd)	\$487	\$435	\$483	\$630	\$770	\$690	\$585	\$596
Stocking Rate (AE/100ha)	7.9	7.8	7.7	7.7	7.4	7.6	7.5	8.1
Enterprise Size (Annual Avg AE)	24,429	22,331	22,471	20,941	20,990	23,137	21,462	37,533
Enterprise Size (Avg breeders)	15,444	15,121	14,757	13,769	12,580	13,473	13,306	23,277
Turnover	48%	47%	41%	45%	51%	41%	45%	42%

2.2.3 Breeding and Growing by Year

LONG TERM BREEDING AND GROWING SUMMARY

	2012	2013	2014	2015	2016	2017	Average	Top 25%
	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE
Sales	314.12	394.42	254.07	549.21	464.34	336.06	392.65	608.44
Purchases	(106.91)	(85.28)	(132.41)	(182.51)	(200.11)	(198.01)	(162.49)	(263.81)
Inventory Change	(0.98)	(142.13)	80.82	(149.11)	(6.87)	98.93	(22.85)	(55.43)
GROSS PROFIT	206.23	167.01	202.49	217.59	257.36	236.98	207.31	289.20
ENTERPRISE EXPENSES								
Agistment	5.84	6.63	2.29	0.93	1.46	0.53	2.70	12.10
Animal Health	6.00	5.22	4.31	3.24	3.44	3.63	4.63	4.66
Contracting & Mustering	13.17	12.13	10.61	10.11	10.60	10.29	11.28	10.23
Fodder	2.38	2.95	2.36	4.52	4.43	7.89	3.74	3.27
Insurance & Materials	0.08	0.04	0.06	0.03	0.09	0.11	0.05	0.18
Internal Enterprise Freight	1.76	1.35	1.24	1.02	6.59	0.83	1.83	1.32
Marketing & Promotion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selling Costs	35.75	48.80	26.70	41.46	24.40	18.70	31.65	46.58
Supplementation	5.34	11.95	5.50	10.04	9.72	12.25	8.73	8.22
	70.34	89.06	53.08	71.34	60.73	54.23	64.60	86.56
GROSS MARGIN	135.89	77.95	149.40	146.25	196.64	182.76	142.71	202.64
OVERHEAD EXPENSES								
Administration	1.61	2.26	1.70	1.72	1.59	1.56	1.87	2.22
Depreciation	5.07	6.28	6.14	5.21	3.93	3.94	6.87	6.30
Electricity & Gas	1.00	1.23	1.22	0.82	0.76	0.73	1.09	2.25
Fuel & Lubricants	11.47	12.83	13.22	10.62	9.29	8.95	10.66	8.52
Insurance	0.24	0.23	0.24	0.41	0.20	0.30	0.23	0.46
Landcare	0.62	0.18	0.35	0.51	0.43	0.59	0.41	0.90
Materials	2.14	0.89	2.98	1.66	1.43	0.41	1.47	1.27
Motor Vehicle Expenses	5.55	5.68	5.94	5.07	3.70	4.14	4.78	4.88
Pasture	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rates & Rents	2.89	4.08	3.87	3.90	5.09	5.75	3.97	6.26
R & M General	8.25	6.62	9.21	8.32	7.49	7.06	8.71	10.83
Wages	29.74	34.57	34.52	35.06	32.82	33.64	33.45	36.54
	68.57	74.83	79.39	73.30	66.73	67.06	73.50	80.42
TOTAL OPERATING EXPENSES	138.91	163.89	132.47	144.65	127.46	121.29	138.10	166.97
EBIT (OPERATING PROFIT)	67.32	3.11	70.02	72.94	129.91	115.69	69.21	122.22
PRIMARY PERFORMANCE INDICATORS								
Avg price received (\$/kg LW sold)	\$1.74	\$1.57	\$1.81	\$2.48	\$2.95	\$2.81	\$2.10	\$2.08
Income (\$/kg LW prod)	\$1.64	\$1.51	\$1.85	\$2.39	\$3.00	\$2.53	\$2.01	\$2.06
Cost of Production (\$/kg LW prod)	\$1.10	\$1.48	\$1.21	\$1.59	\$1.48	\$1.29	\$1.34	\$1.19
Operating Margin (\$/kg LW prod)	\$0.54	\$0.03	\$0.64	\$0.80	\$1.51	\$1.23	\$0.67	\$0.87
Kg Beef/ AE	126	110	110	91	86	94	103	140
Labour Efficiency (AE/FTE)	1,689	1,481	1,546	1,796	1,814	1,894	1,668	1,532
SECONDARY PERFORMANCE INDICATORS								
Reproductive Rate	82%	72%	58%	59%	62%	60%	66%	73%
Mortality Rate	2.3%	1.8%	2.4%	2.3%	6.1%	9.0%	3.6%	1.7%
Turnoff weight (kg/hd LW)	384 kg	336 kg	357 kg	322 kg	316 kg	366 kg	341 kg	372 kg
Turnoff value (\$/hd)	\$668	\$529	\$644	\$800	\$934	\$1,029	\$717	\$784
Purchase weight (kg/hd LW)	257 kg	272 kg	240 kg	234 kg	251 kg	234 kg	237 kg	234 kg
Purchase value (\$/hd)	\$467	\$402	\$405	\$491	\$686	\$699	\$539	\$563
Stocking Rate (AE/100ha)	10.5	8.8	7.7	8.2	7.7	8.0	9.1	12.0
Enterprise Size (Annual Avg AE)	26,740	21,825	23,133	27,416	29,302	29,711	24,233	18,344
Enterprise Size (Avg breeders)	10,202	9,203	9,824	10,470	11,728	11,902	9,006	4,878
Turnover	50%	80%	42%	74%	54%	35%	59%	78%

2.2.4 Growing by Year

LONG TERM GROWING SUMMARY

	2012	2013	2014	2015	2016	2017	Average	Top 25%
	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE	\$/AE
Sales	596.88	607.13	609.47	873.19	1,067.65	1,036.41	779.03	1,380.76
Purchases	(429.49)	(316.93)	(399.56)	(543.46)	(822.28)	(610.04)	(505.32)	(1,031.00)
Inventory Change	58.16	(151.31)	(1.32)	(62.98)	129.12	(148.08)	(26.11)	(21.44)
GROSS PROFIT	225.56	138.89	208.60	266.75	374.50	278.29	247.60	328.32
ENTERPRISE EXPENSES								
Agistment	0.65	1.70	0.32	0.00	0.00	0.00	0.66	0.00
Animal Health	4.03	2.94	5.94	4.14	4.86	4.78	4.19	6.27
Contracting & Mustering	5.45	5.90	6.32	6.89	6.92	8.80	7.31	3.41
Fodder	3.26	3.53	5.17	7.95	7.28	15.81	7.17	6.35
Insurance & Materials	0.34	0.33	0.51	0.24	0.11	0.39	0.32	0.18
Internal Enterprise Freight	2.24	1.39	2.41	3.42	3.95	3.89	2.50	0.89
Marketing & Promotion	0.30	0.00	0.00	0.02	0.00	0.00	0.05	0.01
Selling Costs	55.04	51.27	38.86	31.79	28.79	36.16	39.03	30.40
Supplementation	3.68	7.35	7.62	10.77	8.26	10.95	8.54	16.94
	75.00	74.42	67.15	65.23	60.18	80.77	69.76	64.44
GROSS MARGIN	150.56	64.47	141.46	201.52	314.32	197.51	177.84	263.88
OVERHEAD EXPENSES								
Administration	2.73	1.86	2.48	4.04	5.44	4.37	3.75	6.13
Depreciation	5.96	7.04	8.74	7.70	8.62	8.36	7.22	7.61
Electricity & Gas	1.86	2.68	3.30	2.09	2.44	3.23	2.61	2.93
Fuel & Lubricants	8.97	10.49	11.91	9.67	8.29	9.31	9.67	6.07
Insurance	1.57	1.69	2.77	0.98	0.91	1.30	1.37	1.32
Landcare	3.07	2.50	4.09	3.38	3.49	2.00	2.53	5.10
Materials	1.06	1.32	1.14	0.88	0.76	0.79	0.96	0.30
Motor Vehicle Expenses	5.39	6.93	8.79	7.90	7.63	9.50	7.31	3.62
Pasture	0.24	0.19	0.22	0.06	0.00	0.00	0.09	0.45
Rates & Rents	5.42	6.96	6.33	7.22	6.89	8.90	7.16	5.57
R & M General	9.91	13.19	12.94	14.67	13.60	14.22	12.94	18.49
Wages	29.63	36.74	43.90	40.17	43.78	50.35	41.51	36.19
	75.81	91.58	106.62	98.77	101.87	112.34	97.12	93.77
TOTAL OPERATING EXPENSES	150.81	166.00	173.77	164.00	162.05	193.11	166.88	158.21
EBIT (OPERATING PROFIT)	74.75	(27.11)	34.84	102.75	212.45	85.17	80.72	170.11
PRIMARY PERFORMANCE INDICATORS								
Avg price received (\$/kg LW sold)	\$1.86	\$1.61	\$1.85	\$2.59	\$3.15	\$3.05	\$2.38	\$2.70
Income (\$/kg LW prod)	\$1.85	\$1.53	\$1.99	\$2.52	\$2.99	\$2.89	\$2.37	\$2.68
Cost of Production (\$/kg LW prod)	\$1.24	\$1.82	\$1.66	\$1.55	\$1.29	\$2.01	\$1.60	\$1.29
Operating Margin (\$/kg LW prod)	\$0.61	(\$0.30)	\$0.33	\$0.97	\$1.69	\$0.89	\$0.77	\$1.39
Kg Beef/ AE	122	91	105	106	125	96	104	123
Labour Efficiency (AE/FTE)	1,736	1,545	1,364	1,552	1,342	1,240	1,431	1,719
SECONDARY PERFORMANCE INDICATORS								
Mortality Rate	3.2%	3.0%	3.1%	3.9%	4.8%	3.0%	3.7%	2.9%
Turnoff weight (kg/hd LW)	393 kg	374 kg	348 kg	352 kg	377 kg	384 kg	364 kg	365 kg
Turnoff value (\$/hd)	\$731	\$602	\$643	\$911	\$1,188	\$1,172	\$867	\$928
Purchase weight (kg/hd LW)	254 kg	241 kg	247 kg	237 kg	241 kg	232 kg	238 kg	276 kg
Purchase value (\$/hd)	\$471	\$405	\$438	\$608	\$776	\$725	\$573	\$680
Stocking Rate (AE/100ha)	17.0	18.4	16.4	17.9	16.4	12.8	14.3	34.0
Enterprise Size (Annual Avg AE)	10,784	9,523	7,794	8,571	7,897	7,825	9,244	7,696
Turnover	88%	108%	101%	106%	96%	92%	96%	172%
Tonnes Beef/FTE	211	141	143	164	168	119	149	211

2.3 Region

2.3.1 Herd Performance by Rainfall Band (mm pa)

LONG TERM SUMMARY BY AVERAGE RAINFALL: ALL ENTERPRISES	n=	11	32	30	73
		<400mm	400-599mm	>600mm	ALL
		\$/AE	\$/AE	\$/AE	\$/AE
Sales		379.40	454.95	316.43	376.18
Purchases		(135.32)	(239.34)	(134.55)	(165.99)
Inventory Change		(13.61)	(5.67)	(24.62)	(13.26)
GROSS PROFIT		230.47	209.94	157.26	196.92
ENTERPRISE EXPENSES					
Agistment		0.77	1.60	0.47	1.07
Animal Health		2.50	4.77	4.37	4.12
Contracting & Mustering		7.47	10.26	13.17	10.75
Fodder		4.89	3.57	5.19	4.40
Insurance & Materials		0.15	0.13	0.29	0.24
Internal Enterprise Freight		1.15	1.70	4.54	2.82
Marketing & Promotion		0.00	0.02	0.00	0.01
Selling Costs		37.82	27.92	17.18	25.85
Supplementation		5.83	8.94	13.91	10.16
		60.58	58.91	59.12	59.43
GROSS MARGIN		169.89	151.03	98.14	137.49
OVERHEAD EXPENSES					
Administration		2.46	2.61	1.55	2.06
Depreciation		6.57	5.53	5.25	5.64
Electricity & Gas		1.33	1.94	2.18	1.92
Fuel & Lubricants		13.14	10.40	7.92	10.15
Insurance		1.00	0.50	1.63	1.08
Landcare		0.24	0.67	2.02	1.17
Materials		1.23	1.20	0.94	1.15
Motor Vehicle Expenses		8.23	4.62	5.40	5.77
Pasture		0.00	0.00	0.05	0.02
Rates & Rents		5.61	5.36	3.52	4.78
R & M General		10.53	9.86	8.96	9.52
Wages		37.78	33.90	32.25	34.29
		88.13	76.59	71.68	77.55
TOTAL OPERATING EXPENSES		148.70	135.49	130.80	136.98
EBIT (OPERATING PROFIT)		81.76	74.45	26.46	59.94
PRIMARY PERFORMANCE INDICATORS					
Avg price received (\$/kg LW sold)		\$2.16	\$2.21	\$2.17	\$2.17
Income (\$/kg LW produced)		\$2.15	\$2.05	\$1.96	\$2.07
Cost of Production (\$/kg LW produced)		\$1.39	\$1.32	\$1.63	\$1.44
Operating Margin (\$/kg LW produced)		\$0.76	\$0.73	\$0.33	\$0.63
Kg Beef/ AE		107	102	80	95
Labour Efficiency (AE/FTE)		1,578	1,667	1,584	1,616
SECONDARY PERFORMANCE INDICATORS					
Mortality Rate		3.2%	3.6%	6.8%	4.7%
Stocking Rate (AE/100ha)		4.7	10.1	10.7	9.5
Enterprise Size (Annual Avg AE)		20,672	17,575	14,899	18,109
Return On Assets Managed		3.3%	3.8%	0.9%	2.7%

3 Analysis and Discussion

3.1 Whole Business

3.1.1 Whole Business Profitability

Whole business profitability has two components, the operating performance of the station and the capital gains of the land asset. The operating profitability is of primary interest here as it is a function of the management of the business, whereas capital return is a function of the general rural property market and therefore not generally a function of management. As capital return is (across the whole industry in the long-term) the main source of wealth over time, it is included.

There are two measures of operating profitability, return on assets managed and operating return. Return on assets managed (ROAM) is the operating profit of the business, before land lease payments divided by total assets which includes the value of leased land. This measure allows comparison of the operating profitability of owned and leased stations. The operating return figure is the operating profit after land lease payments divided by owned assets only.

The average Total Business Return for all stations was 5.0% over the six years analysed. This was comprised of an operating return of 2.7% and a capital return of 2.3%. The ROAM of the top 25% of stations was 5.4% (Fig. 2).

Fig. 2 shows the annual operating and capital return across all stations over the six years analysed in the solid lines, and the long-term average for each in the dotted lines. This shows that the returns, particularly the operating return, followed a similar pattern to the prices in Fig. 1 above and that the majority of the capital return was seen in the final year of analysis.

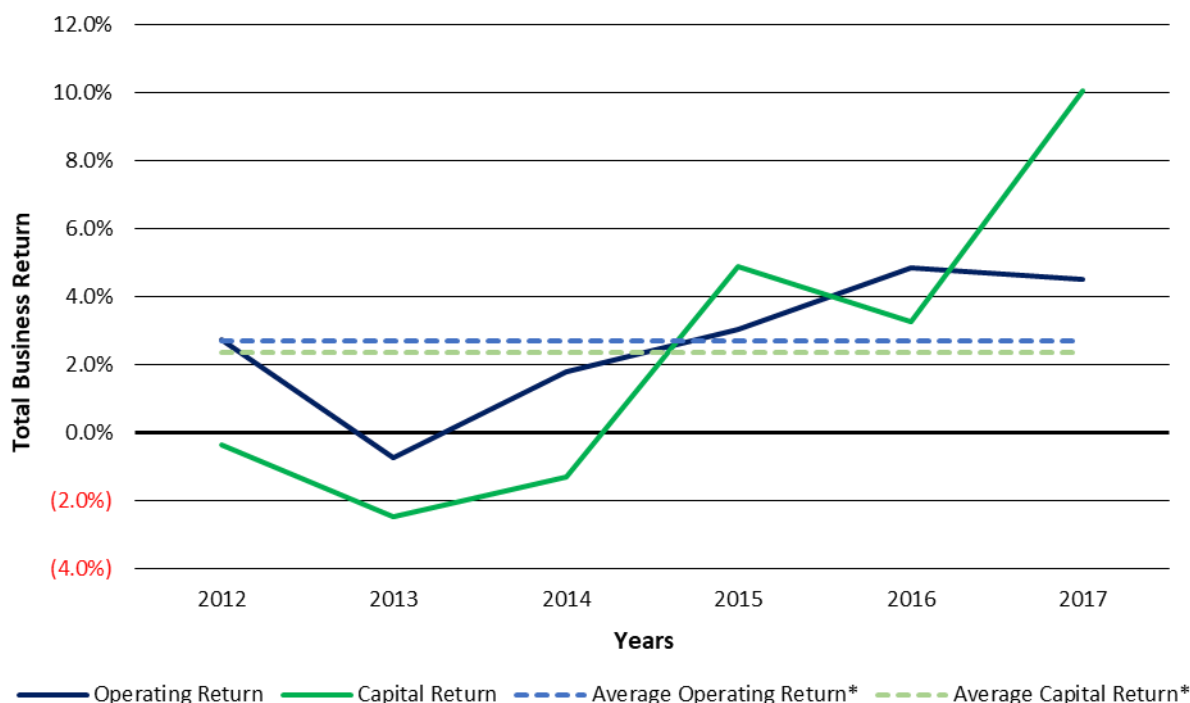


Fig. 2: Operating and Capital Returns Over Period (*Average over all years for all stations)

3.2 Enterprise (Herd) Performance

3.2.1 Drivers of Enterprise Performance

Fig. 3 and Fig. 4 graph the long-term average EBIT per AE and ROAM of each station against their average herd size. This shows that while the larger herds (>40,000AE) mostly had an EBIT per AE in the \$50-\$100 range, there were smaller enterprises with higher EBIT/AE. In graphs depicting scale, stations larger than 50,000 AE are displayed as 50,000 AE to ensure they cannot be identified. There would be a regional influence, with smaller stations being in more productive regions than the large extensive stations. Fig. 4 shows that smaller herds had similar or lower profitability than the larger herds (a function of higher land value for smaller herds).

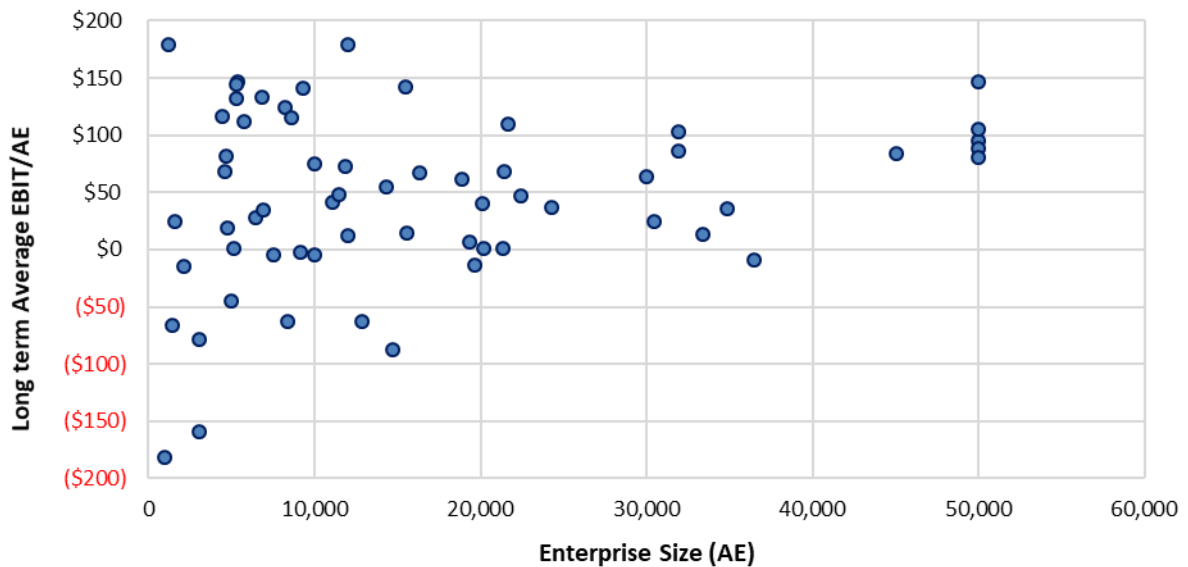


Fig. 3: Relationship Between Enterprise Size and EBIT/AE

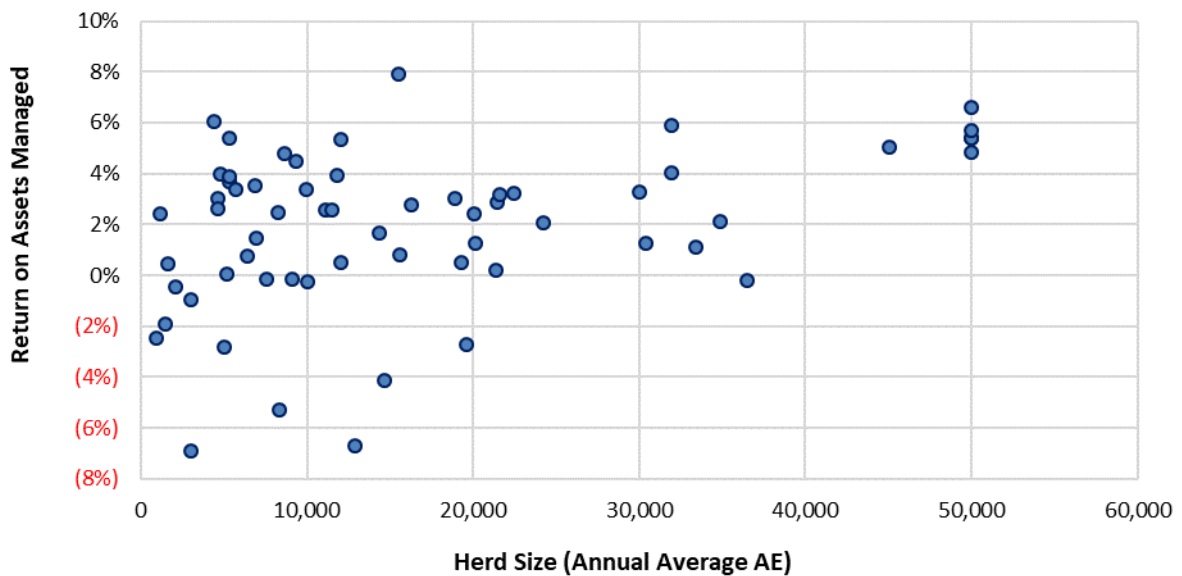


Fig. 4: Relationship Between Herd Size and Return on Assets Managed

There is no positive correlation between herd size and station profits or profitability. Smaller stations can achieve higher profits per AE and equivalent profitability of the larger stations.

Analysis of the differences in company and enterprise performance has identified that expenses were not a key factor in relative company performance. This is confirmed at station level (Fig. 5). Despite the very high cost operations having the lowest profits, there was no general relationship between operating expenses per AE and EBIT per AE.

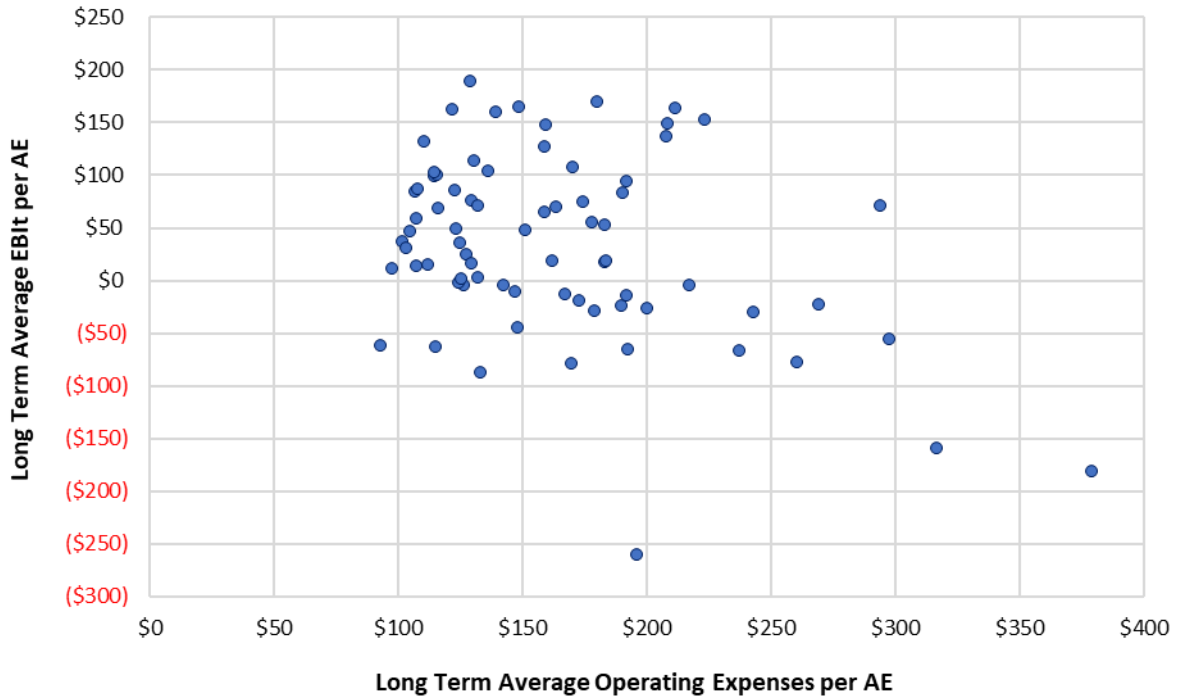


Fig. 5: Relationship Between EBIT/AE and Operating Expenses/AE

Fig. 6 shows the relationship between gross profit or income per AE and EBIT per AE. The breeding and growing enterprises are separated here as the enterprise types have different cost structures, which influences the relationship. This shows that 74% of the variation in profit per AE in breeding herds can be explained by income per AE and 60% in growing herds. Contrasted with expenses, this shows that income per animal unit is the major driver of herd profits.

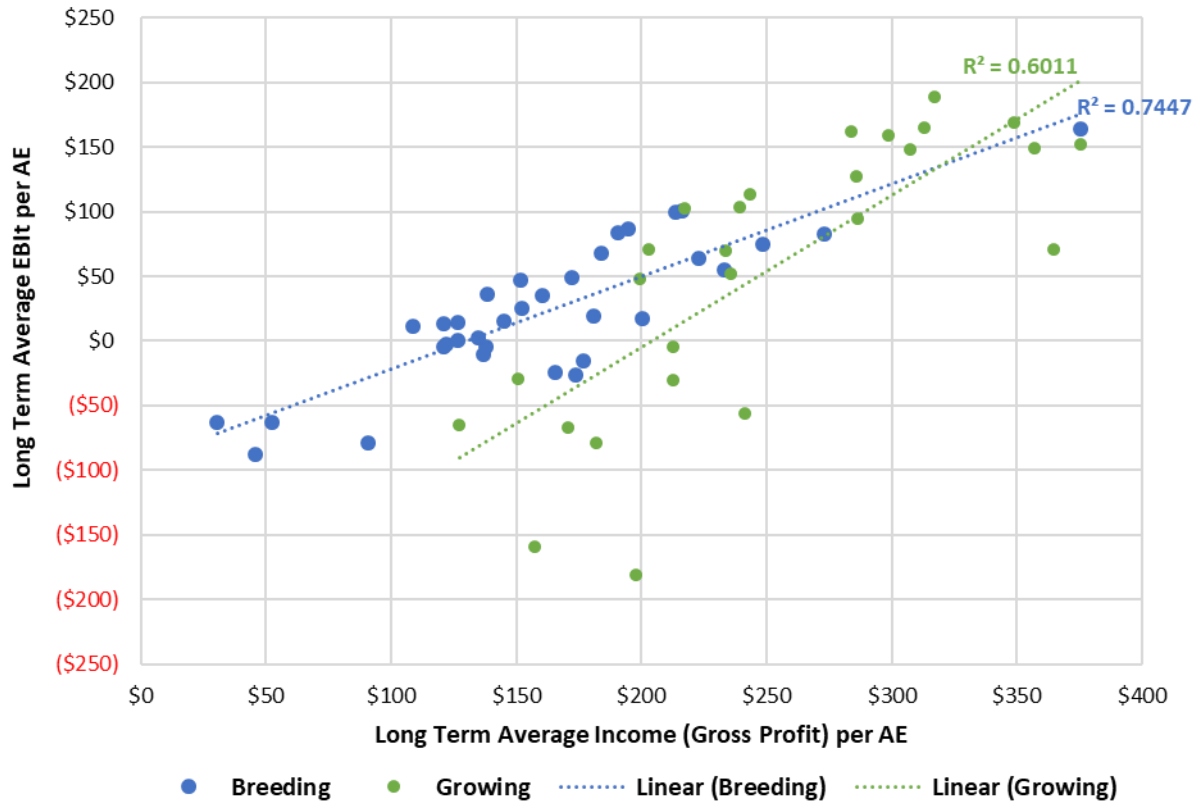


Fig. 6: Relationship Between EBIT/AE and Income/AE

Income per AE is a function of kg Beef produced per AE per year and income per kg produced. Income per kg produced is different to average price received, although the two will usually be similar. Income per kg produced is the gross profit per kilogram produced for the year, whereas average price received is the average sale price of all kilograms sold. Where there is poor productivity or high inventory volatility, these two measures can be quite different.

Herd productivity (kg beef/AE) alone accounted for 70% of the variation in income/AE between herds (Fig. 7). The greater the amount of output (kg of beef) per animal unit, the greater the income per animal unit. The amount received (price received) for this output also had some influence, but not as much as productivity. Price received accounted for 18% of the variation in income/AE (Fig. 8).

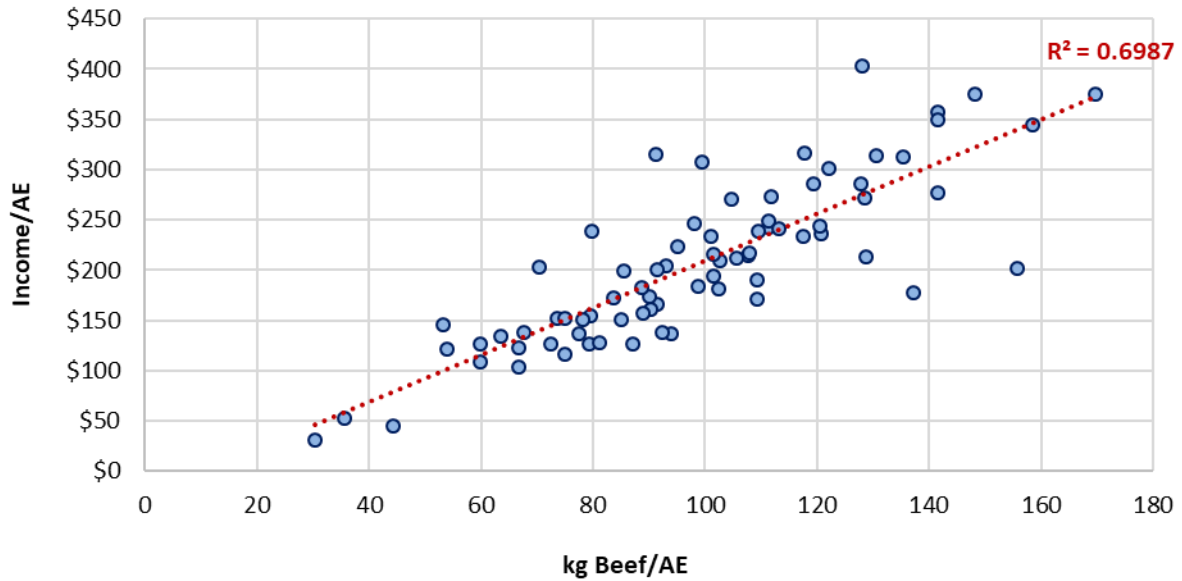


Fig. 7: Relationship Between Average Herd Productivity and Income

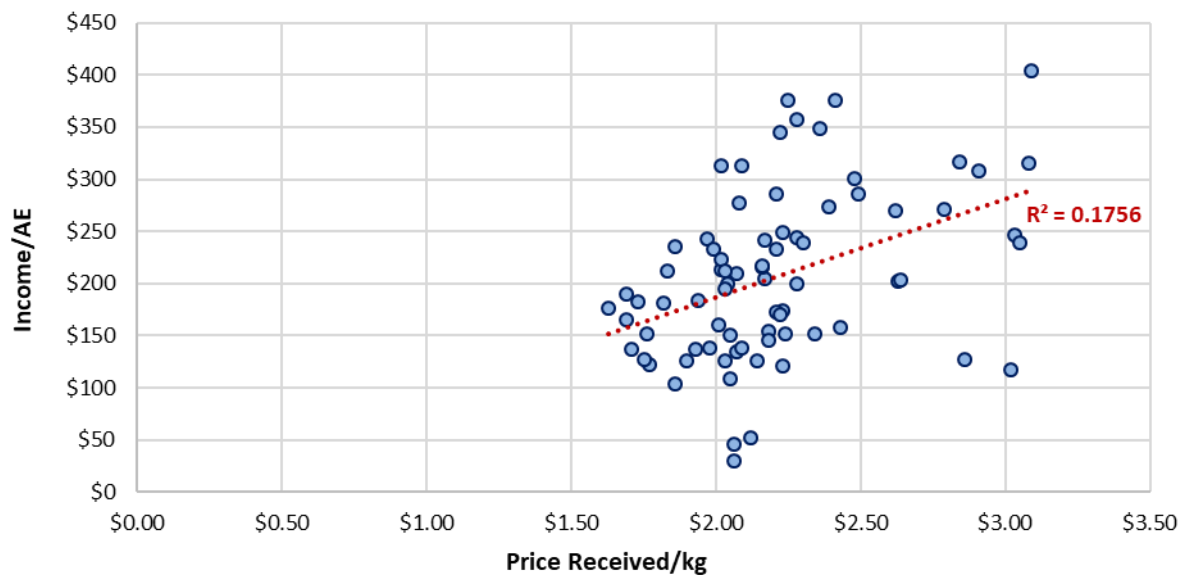


Fig. 8: Relationship Between Annual Price Received and Income

The influence of price received on income per AE was higher here than in previous analyses (Holmes et al., 2017, McLean et al., 2014). Whether this was a function of the considerable variability in prices over the analysis period (Fig. 1) or the different production systems in the analysis is not known. In any case, the influence of productivity on income was more than three times that of price and there is more that can be done to influence productivity than price.

A key measure of herd performance which encompasses both herd productivity and the operating expenses is cost of production. The relationship between cost of production and herd profits was less here than in some other analyses, nonetheless the measure still explains at least 50% of the variability in profit between herds. Fig. 9 and Fig. 10 show the relationship between Cost of Production and EBIT/AE for breeding and growing herds.

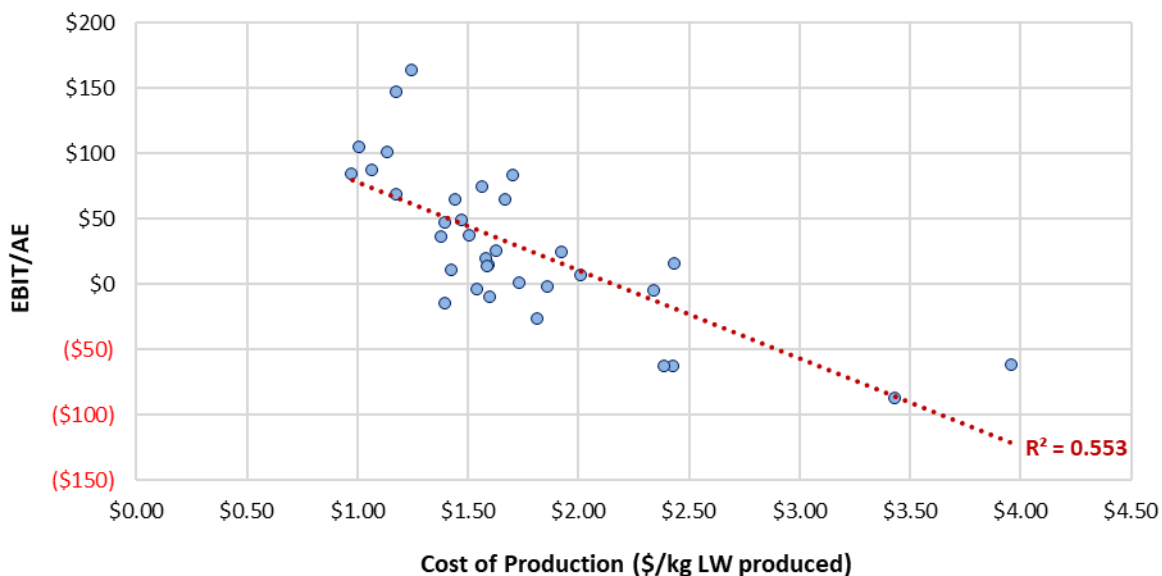


Fig. 9: Relationship Between Cost of Production and EBIT/AE for Breeding Herds

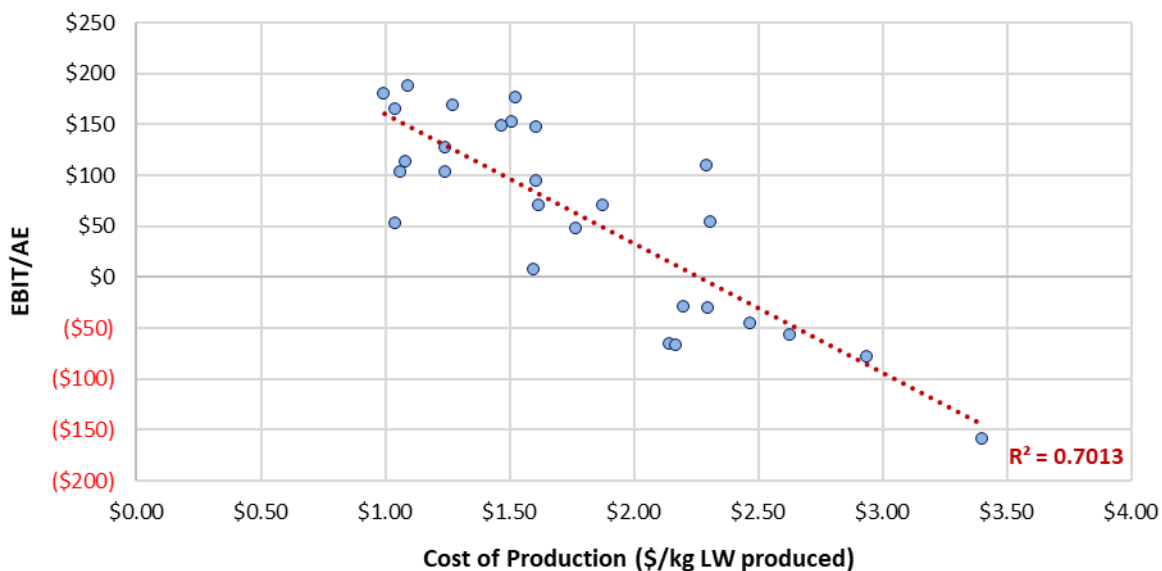


Fig. 10: Relationship Between Cost of Production and EBIT/AE for Growing Herds

Fig. 11 shows the relationship between EBIT per AE and ROAM across all stations. Over three quarters of the variability in profitability between herds can be explained by EBIT per AE. This means that the profitability of extensive northern herds is maximised when the profit per animal unit is maximised. The number of animal units is not a major driver of profitability, beyond sustainably utilising available scale and ensuring the business unit has sufficient economies of scale.

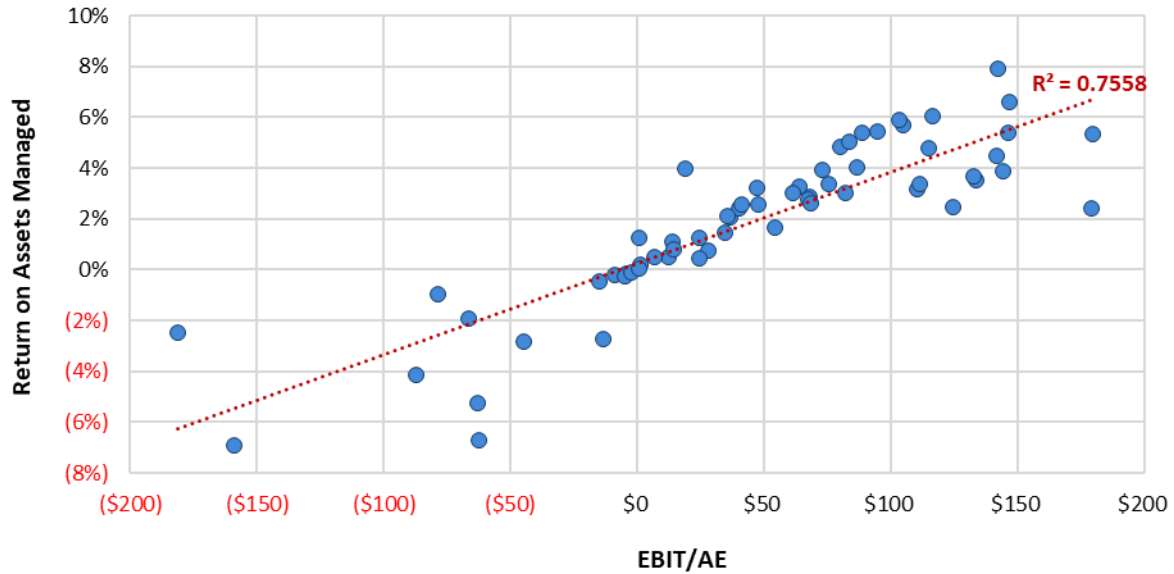


Fig. 11: Relationship Between EBIT/AE and Return on Assets Managed

To maximise profitability, the focus needs to be on maximising the profit per animal unit. This can be achieved by having excellent productivity and a competitive, effective cost base. Increasing herd size or having a low-cost focus, without a primary focus on per animal unit productivity, will not maximise profitability.

3.2.2 Performance by Enterprise Type

As detailed above the enterprises analysed were;

- Commercial Breeding (self-replacing breeding enterprises including all own progeny through to sale)
- Growing (enterprises with dry animals brought in for weight gain and subsequent sale)
- Breeding and Growing (enterprises that had breeding animals and dry stock brought in that were not able to be separated for analysis)

Fig. 12 shows the long-term average and Top 25% performance by enterprise. This relationship shows two key findings;

1. EBIT per AE appeared to increase with the proportion of growing that is undertaken.
2. The Top 25% performers within any enterprise group outperformed the average of all others (i.e. even though growing had a higher profit per AE than breeding, the top performing breeding enterprises generated higher profits than the average growing enterprises).

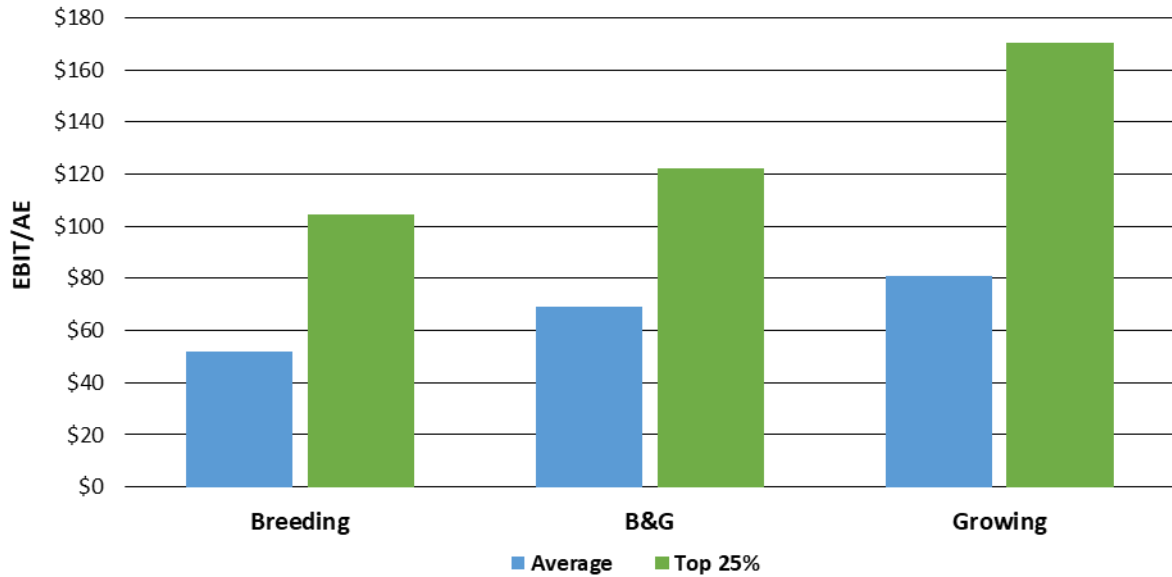


Fig. 12: Average and Top 25% EBIT/AE by Enterprise

Fig. 12 illustrates the profit per animal unit by enterprise. The average and Top 25% EBIT/AE progressively increases from Breeding, Breeding and Growing, to Growing. However, there is greater variability within enterprises than there is between, demonstrating the importance of operating efficiency.

Fig. 13 shows the same grouping as Fig. 12 but instead shows profitability (ROAM) rather than profit per AE. The profit trend (of increasing as proportion of growing increases) was not as apparent here, the top performers all had a ROAM between 3.5-5.2% and the average performers all between 2-2.5%, although breeding was the lowest.

This indicates that the productive capacity of the land was more than reflected in the value of the underlying land asset.

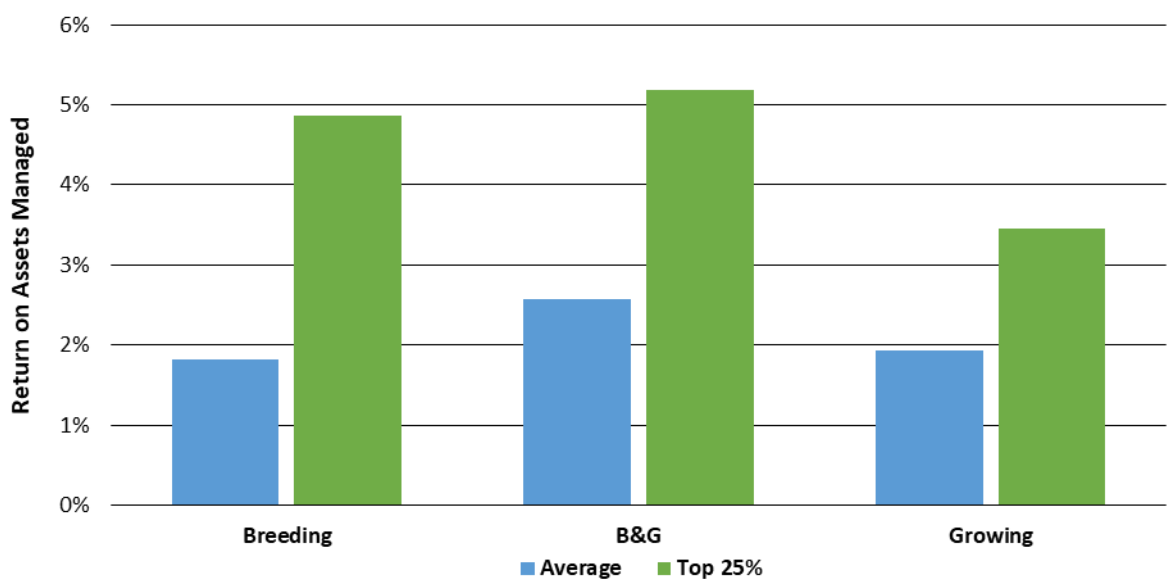


Fig. 13: Average and Top 25% Return on Assets Managed by Enterprise

The trend displayed in Fig. 13 capture the averages over the 6 years of the analysis, however the relative performance of the enterprise types was not consistent over that time frame. Fig. 14 graphs the EBIT per AE of all AE in the dataset, as well as the breeding herds and growing herds. Whilst all AE were affected by the failed season in 2013, the impact was greatest for growing herds. Section 2.2.4 shows that this was a function of reduced prices and low productivity for growing herds in that period. The performance of breeding herds exceeded growing herds in 2017 also, this was another poor productivity period for the growing enterprises due to seasonal conditions. In the two years that breeding performance exceeded growing performance, the breeding herd productivity was slightly higher than growing productivity.

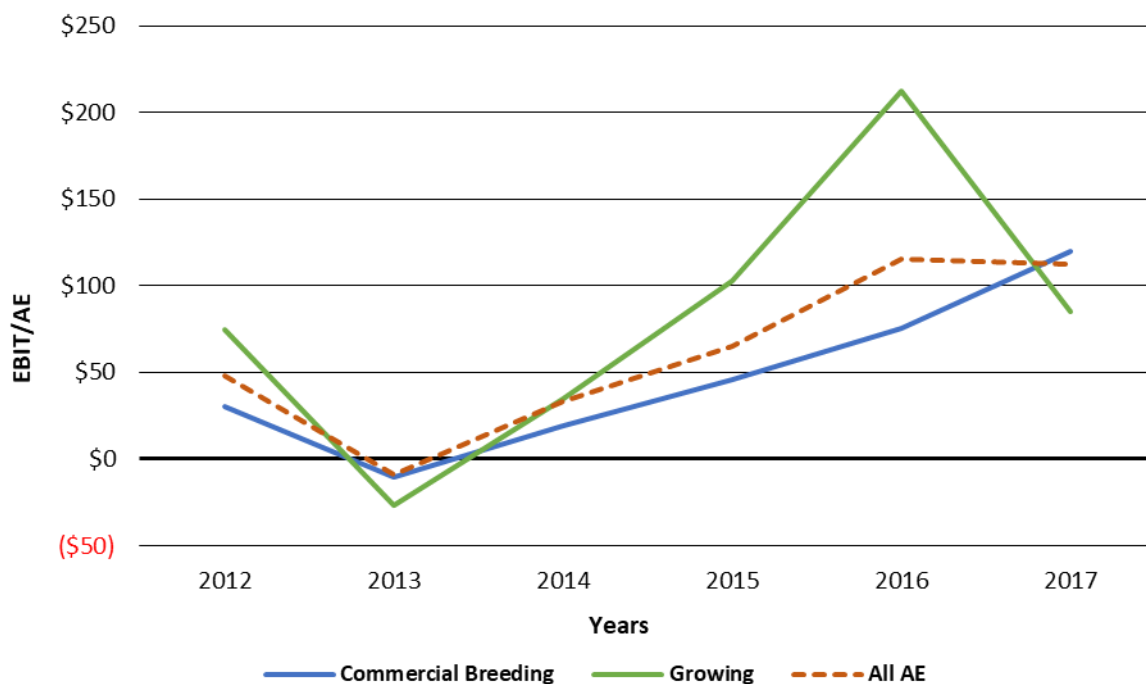


Fig. 14: Changes in Enterprise Performance Over Time

3.2.3 Breeding

The majority of the AE in the data set were from commercial breeding enterprises, therefore the overall group performance was heavily influenced by breeding performance. There was significant variation in breeder herd performance (Section 2.2.2). The Top 25% had an average profit per AE of \$104 whereas the average was \$52- a \$52 or 100% difference per AE.

Comparisons between the Top 25% and the average (Section 2.2.2) highlight some key determinants in business performance.

Better performers had lower sales (per AE) than the average which also reflected in them having a lower turnover. The top performers had fewer purchases and positive inventory change over the period. All of which combine for the top performers to have a significantly higher gross profit. This shows that a feature of the better performers is that they had less movement of cattle or transactions in their businesses, the kilograms turned off are only the kilograms produced, rather than brought in kilograms turned over. This was also reflected in a more stable herd inventory.

The higher gross profit was primarily a function of higher productivity, however income per kg produced was also slightly higher for the top performers. There was a small difference in price received, but this was not enough to account for the income difference. The income (or gross profit) per kilogram produced for the top performers was the same as the price received. For the average, there was a reasonable difference between the two (with income/kg less than price received). This was a function of poorer productivity and higher turnover.

Section 3.2.3.1 examines herd productivity drivers in more detail. The difference in productivity for the Top 25% producers (around 20% higher than average) was a function of slightly higher reproductive rate, significantly lower mortality rate and equivalent turnoff weight. These differences in productivity drivers explained over half the difference in productivity, using the model described in Section 3.2.3.1 but did not explain all of the difference. The remainder of the difference is attributable to the reduced turnover or churn of the better producers being associated with higher productivity.

The top performers also had lower enterprise expenses, which when examined in conjunction with their better productivity, indicated that their discretionary herd expenditure was better targeted and more effective.

There was no advantage for the top performers in terms of overhead expenses per AE, in fact the top performers had slightly higher overhead expenses than the average despite having slightly better labour efficiency. Their cost base was competitive however, and more effective than the average. There was a considerable difference in cost of production though, with it costing the top performers \$0.29 less to produce a kilogram of beef than the average.

All of this results in the top performers achieving over twice the profit per AE of the average. The features separating the top from the rest are consistent with the factors identified by McLean, Holmes and Counsell, (2014) and Holmes et al. (2017). Top performers had;

- Higher income per animal unit, through better herd productivity
- Lower enterprise expenses through more targeted herd expenditure
- Better labour efficiency, which contributed to having competitive overhead expenses

3.2.3.1 Productivity Drivers

Previous analysis of northern breeder herd productivity by McLean et al. (2014) and Holmes et al. (2017) has shown that nearly all of the differences in herd productivity between businesses can be explained by differences in the three main productivity drivers;

- Reproductive rate (calves weaned as percentage of breeding age females)
- Mortality rate (deaths as percentage of average annual herd numbers)
- Sale weight (average liveweight of all sales)

The initial external statistical analysis, referred to in Section 1.3.4, was undertaken on four years of data to assess the preliminary relationships identified by the project team and to identify further relationships. Ultimately the analysis was designed to help inform the project participants to understand and prioritise where to make changes in their production system to cost effectively increase productivity.

The dataset consisted of 129 business years of analysis from 35 business units. All of the business units were commercial breeding enterprises. The main relation for analysis was the relationship between herd productivity (kg Beef/AE) and the three main productivity drivers (reproduction rate, mortality rate and sale weight).

The initial statistical analysis identified that over 70% of the variation in productivity between businesses can be explained by variations in the three main productivity drivers, with all three productivity drivers being significant ($p < 0.001$).

The variable which explains most of the difference in productivity is reproductive rate at 44%, mortality and sale weight both explain 28% each. Reproductive rate was the most important driver; however, the data set consisted primarily of weaner producing businesses, which would influence the relationships (sale weight is limited as a variable by the integrated production system).

Further analysis was conducted with the inclusion of other variables that may influence productivity, but a reliable model which explained productivity better than the three main drivers could not be identified. This meant that analysis of the relationship between the identified variables could be performed as more years were added to the dataset.

Upon completion of the benchmarking period, analysis was performed using both annual and annual average herd performance data from six years (2012-2017) of analysis. While there were more data points ($n=184$) in the annual dataset, the long-term average dataset ($n=32$) produced a better fit and was used. The longer-term averages are most representative of long term performance and relationships.

Using the annual average data, the three productivity drivers explained 82% of the variation in productivity. This is greater than the value of 70% for the model based on 2012-2015 data. For commercial breeding herds, 82% of variation in annual average kg beef/AE is explained by variation in reproductive rate, mortality rate, and sale weight. On their own, reproductive rate, mortality rate, and sale weight explain 60%, 54%, and 33% of variation in productivity, respectively. Sale weight was less important relative to the other variables in the final data model than it was in the original model, mainly due to the other two variables becoming proportionally more important, but the effect is significant ($p=0.01$). Reproductive rate and mortality rate are of almost equal significance ($p < 0.001$). The model derived was:

$$\text{Kg Beef/AE} = (86.6 * \text{Reproductive Rate}) + (-397.9 * \text{Mortality Rate}) + (0.15 * \text{Sale Weight}) + 8.3$$

These results, and similar models derived from data from McLean et al. (2014) and Holmes et al., (2017) indicate that breeding herds in the north can, on average, expect an increase of:

- 0.7-1.5kg beef/AE for a 1% increase in reproductive rate
- 2-4kg beef/AE for a 1% decrease in mortality rate
- 1.5-2.2kg beef/AE for a 10kg increase in sale weight

The model is based on the units of measurement for each driver; reproductive and mortality are expressed as a percentage and sale weight in kilograms live weight and the incremental changes above are not proportional. Increasing reproductive rate by 1% (e.g. 60% to 61%) will be easier than reducing mortality rate by 1% (e.g. 6% to 5%). The current performance of individual breeding enterprises against each of these measures, with reference to regional peers, will help prioritise which to focus on and identify scope for improvement.

The effects of reproductive rate and mortality rate on herd productivity are compounding. Higher productivity will be achieved through maximising animals produced through reproduction and minimising animals lost through mortality. Conversely, sale weight acts as an indicator for other factors, namely growth rate and herd structure. Growing animals more efficiently convert consumed

energy into body weight than a cow supporting a growing calf through gestation or lactation. A higher sale weight indicates a greater number of growing animals as a proportion of total AE and is therefore associated with higher productivity.

Although modelling differed slightly across datasets, the main finding was that breeding herd productivity per animal unit was driven by reproductive rate, mortality rate, and sale weight. The high coefficient of determination (82%) for the final dataset indicated that the productivity drivers explain a greater proportion of variability in productivity as more data was added.

The finding demonstrates that a management focus on cost effective improvement of the three productivity drivers is the most reliable path to improve herd productivity.

3.2.3.2 Breeder Herd Survey (main findings)

The statistical analysis of breeder herds (Section 3.2.3.1) indicated that productivity of breeding herds was primarily governed by reproductive rate, with mortality rate and sale weight also having a significant influence ($p < 0.05$). A survey was conducted in order to seek an understanding of management practices influencing productivity, and ultimately provide insights into what could be done at station level to profitably improve productivity. Analysis was undertaken on 25 respondent stations.

The variable of interest was reproductive rate. The distribution of reproductive rate between stations ranged between 38% and 85%, with a median of 66% and 50% of the data between reproductive rates of approximately 58% and 70% (Fig. 15). The calculation of reproductive rate in the benchmarking process is discussed in Appendix 7.2. This distribution is similar to that reported by Holmes et al. (2017) and McGowan et al. (2014).

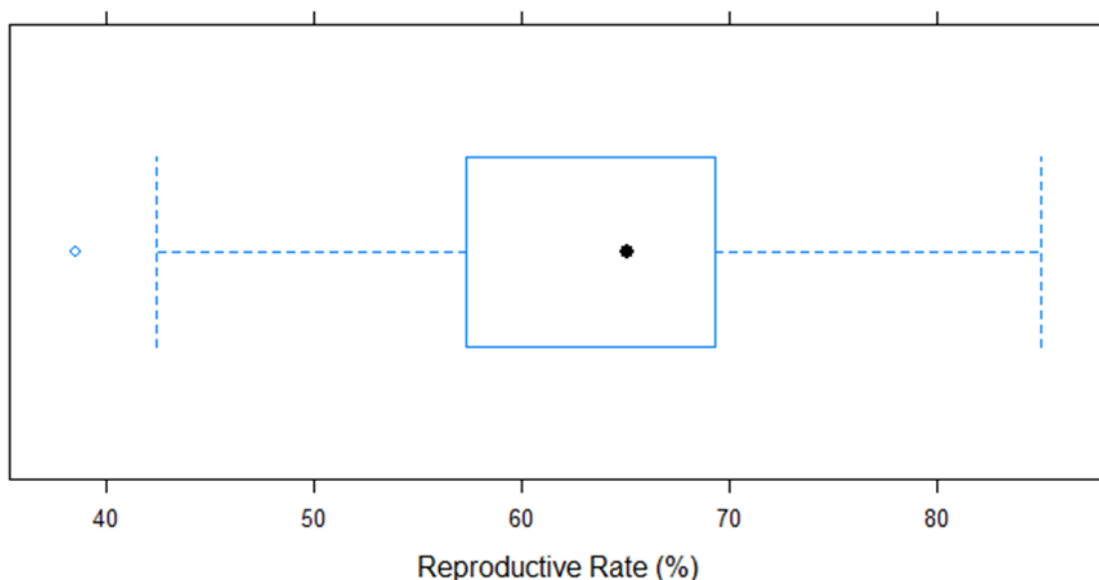


Fig. 15: Box and Whisker Plot of Reproductive Rate for 25 Stations derived from Herd Fertility Questionnaire

Herds with higher *Bos indicus* content generally had lower fertility. A declining linear trend was observed as *Bos indicus* content increases from 0-25% to 75-100% (Fig. 16). It can also be observed that the 75-100% *Bos indicus* cohort is the only cohort that had more than half of reproductive rate observations below 60%. There were a limited number of stations in this cohort performing above the

pastoral company median of 66%, with a maximum observation of approximately 70%. Conversely, all stations with 0-25% *Bos indicus* content performed approximately at or above the pastoral company median. There was some regional influence in these trends as those herds with higher *Bos indicus* content are likely to be situated in less productive regions. However, there was more variation in reproductive rate accounted for by *Bos indicus* content than region in this dataset. Overall, it was shown that achieving high reproductive rates is more difficult, but not impossible in high *Bos indicus* content Breeding herds.

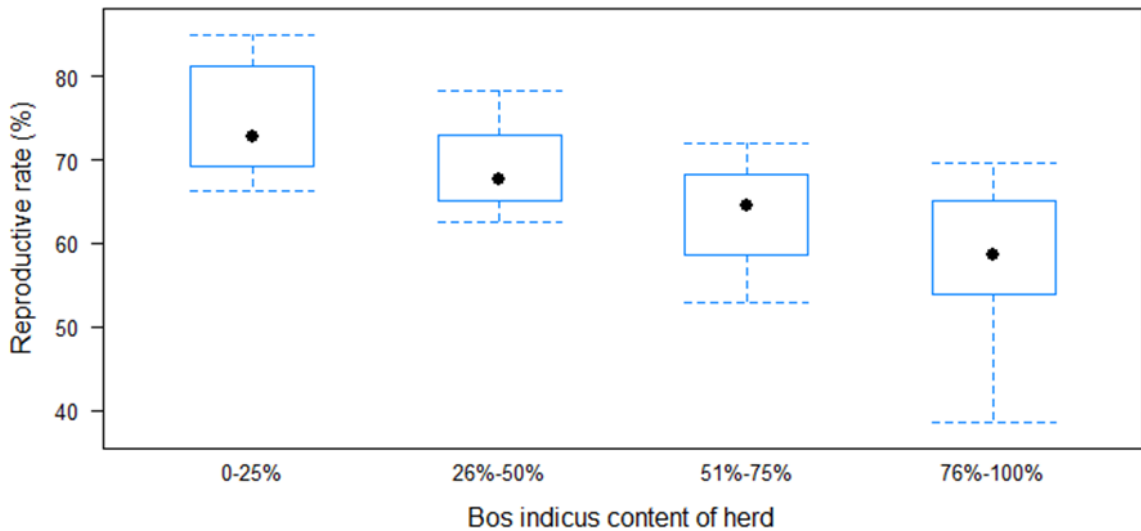


Fig. 16: Box and Whisker Plots of Reproductive Rate Distribution by *Bos Indicus* Content of Herd

A statistically significant ($p=0.04$) effect of whether bulls were sourced internally or externally on reproductive rate was identified (Fig. 17). Those stations using 100% company bulls had greater reproductive rates on average than those stations sourcing at least some of their bulls externally. The finding demonstrates that companies were breeding better bulls than could be bought or selected in terms of fertility.

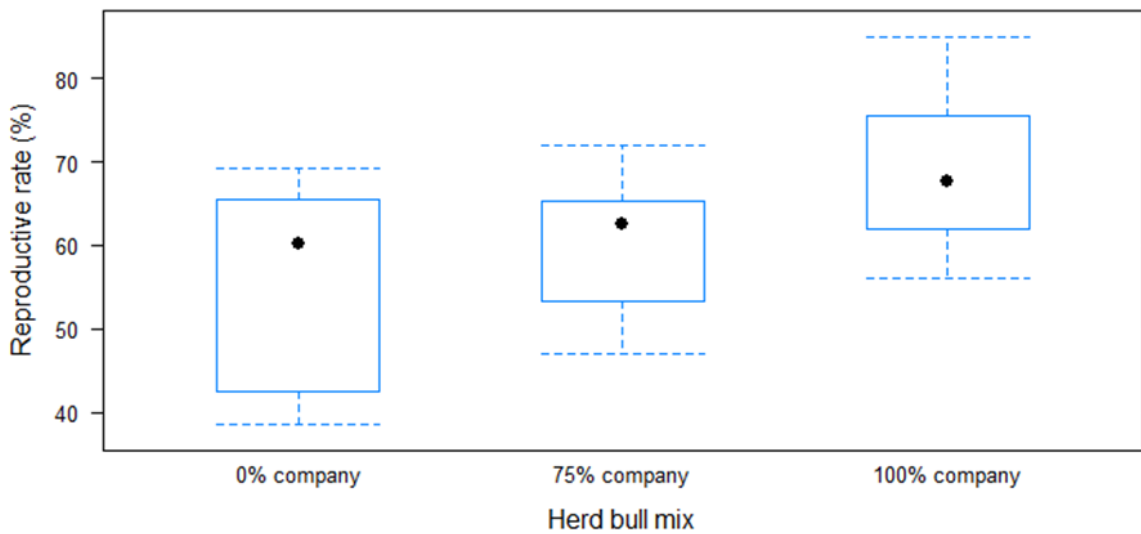


Fig. 17: Box and Whisker Plot Distribution of Reproductive Rate by Herd Bull Mix

Most relationships detected in the analysis relate to bull management, and indicated that bull selection is critical to herd fertility. There were no obvious relationships detected between female management and reproductive rate. This may be because there was not much difference in female management practices among respondents, particularly within regional and herd *Bos indicus* content groups. Sound female management practices have the potential to accelerate genetic gain in terms of fertility, although this effect was not able to be quantified.

3.2.4 Breeding and Growing

The Breeding and Growing enterprise is a combination of two enterprise types, breeding females with progeny through to sale and dry animals brought in for growing and sale. This limits the level of interpretation that can be conducted as it is unknown whether the performance is a function of the breeding component, growing component, or both.

There were 12 long term breeding and growing stations in the dataset so the Top 25% were the top three stations. The top performers had considerably higher gross profit than the average, although unlike the breeding stations they also had higher sales. This better performance associated with higher turnover was consistent with the top growing stations.

The top performers had considerably higher productivity than the average (35%+), which was a result of higher reproductive rate, lower mortality rate and higher sale weight.

The top performers had significantly higher enterprise expenses than the average, however this was partly a function of the smaller dataset, as it was one station with good performance that affected this relationship. If this station was removed there was little difference in enterprise expenses between the top performers and the average.

The overhead expenses were higher for the top performers and labour efficiency lower, which is contrary to the usual characteristics of top performers. Again, this was the same high cost top performer that was influencing the data and if it was removed, the top performers had lower overheads and better labour efficiency.

Again, the top performers were achieving superior performance through better income, which is a function of better productivity, rather than lower expenses.

3.2.5 Growing

Similar to breeding and breeding and growing, the difference between the average and Top 25% of growing enterprises was mostly accounted for in gross profit (productivity), with small gains made in expenses through lower enterprise expenditure and higher labour efficiency (Section 2.2.4).

Productivity (kg beef/AE) in growing herds was primarily driven by average daily gain. It was not possible to calculate this figure because time spent on property for an individual animal or groups of animals is unknown. The most likely indicators of productivity presented in the analysis were the difference between sale weight and purchase weight, mortality rate, and turnover (stock turns). However, modelling these figures showed that less than 20% of the variance in kg beef/AE is accounted for, although mortality rate is significantly associated with productivity ($P=0.01$).

The top performing growing enterprises had considerably higher sales, turnover and gross profit than the average. This was a function of higher productivity (kg Beef/AE), as there was minimal difference in sale weight and only a small difference in mortality. The better productivity was attributable to higher average daily gain (ADG), which cannot be quantified from the data.

The top performers also had lower enterprise expenses, lower overhead expenses and better labour efficiency, consistent with the typical features of top performers. The labour efficiency measure of AE managed per FTE of labour used in the business is a relevant measure for growing herds and the 1,500 AE/FTE minimum is applicable. However growing businesses, particularly high turnover businesses, will not be able to achieve the labour efficiency of extensive breeding herds, due to activity associated with turnover. Therefore, a measure of tonnes of beef produced per FTE of labour is an alternative way to assess the labour efficiency of growing businesses. The Top 25% of growing businesses had considerably higher tonnes beef/FTE than the remaining businesses, demonstrating a more efficient and productive use of labour on farm.

3.3 Performance by Rainfall

Business performance has been presented by rainfall band, which arguably provides a more solid platform for analysis and discussion than dividing performance by geographic regions. The rainfall zones (Fig. 18) are derived from Bureau of Meteorology (BoM) long-term data, rather than rainfall data from the project period.

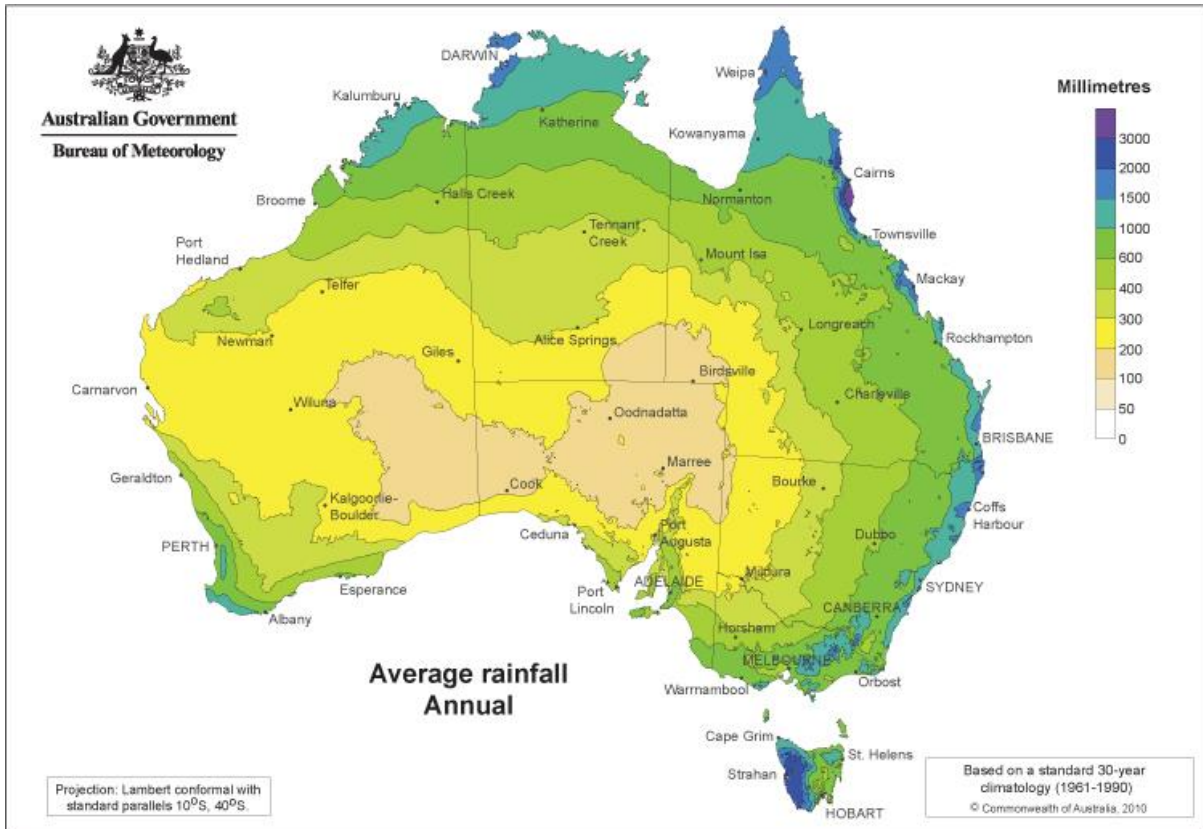


Fig. 18: Rainfall Zones – Bureau of Meteorology (1961 – 1990)

Fig. 18 illustrates the long-term annual average rainfall results. Whilst they are important, it is also important to consider rainfall reliability.

Rainfall reliability has a direct impact on longer term operating performance and asset value. It may be beneficial to be located in the 600mm rainfall zone, but if this is only received over three years in ten, it is not favourable to sustainable business productivity.

There is a tipping point on rainfall in terms of business productivity, which is driven by the following considerations:

- As rainfall increases, pasture and herd productivity increases within biological limits.
- At the tipping point, the following come into play:
 - Much of any additional rainfall beyond water holding capacity of the soil results in run off.
 - C4 pastures dominate the tropical, high-rainfall regions and are less digestible than C3 pastures.
 - The higher humidity, temperatures, and parasite loads associated with sub-tropical and tropical regions results in cattle breeds selected for adaptability rather than productive potential.

The above are background phenomena to consider against the following rainfall zone performance data. Section 2.3.1 reported individual business unit performance in the <400mm, 400-599mm and >600mm zones (station allocation to rainfall zone is based on long term average rainfall provided):

The data in Section 2.3.1 included all business units which either breed and grow, or a combination of both on an AE basis. In summary:

- Gross profit, at \$230/AE, is highest in the <400 mm rainfall zone compared with \$210/AE in the 400-599mm zone and \$157/AE in the >600mm zone.
- In enterprise expenses, the following stand out:
 - There is a direct relationship between rainfall and contracting and mustering costs. The higher the rainfall, the more is spent on mustering and contracting, it is not clear why this is.
 - Selling expenses decrease with rainfall. This is probably a function of distance to market as freight costs are part of selling expenses.
 - Supplementation expenses rise with rainfall.
- In overhead expenses the following are apparent:
 - Electricity and gas rise with rainfall, albeit minimally. We don't know why this is, it may be just a function of diesel generators being more common in lower rainfall regions.
 - Fuel and lubricants fall as rainfall rises. It is unclear whether this is a function of diesel generators, distance or both.
 - Repairs and maintenance falls with rainfall.

Overall, properties in the <400mm rainfall zone generate the highest EBIT/AE. Operating expenses rise with rainfall, and EBIT/AE declines. Not much different to the south. This may be explained by the productivity of the northern pasture base and seasonality of pasture production.

Of interest though was the finding that the reproductive rate fell with rainfall, being 68% for <400mm, 66% for 400-599mm, and 62% for >600mm.

3.4 Expense Drivers

Herd income was driven by kilograms of beef produced per AE, for both breeding and growing enterprises. The drivers of expenses were complex. Overall there was little variation in expenses/AE between businesses. There was more variation in overhead expenses/AE than in enterprise expenses/AE. This is illustrated by the broader distribution of overhead expenses/AE across the dataset compared with the narrower distribution of enterprise expenses/AE (Fig. 19). Therefore, if a business was constrained by high expenses, generally it was the overhead expenses/AE that had the greatest scope for reduction.

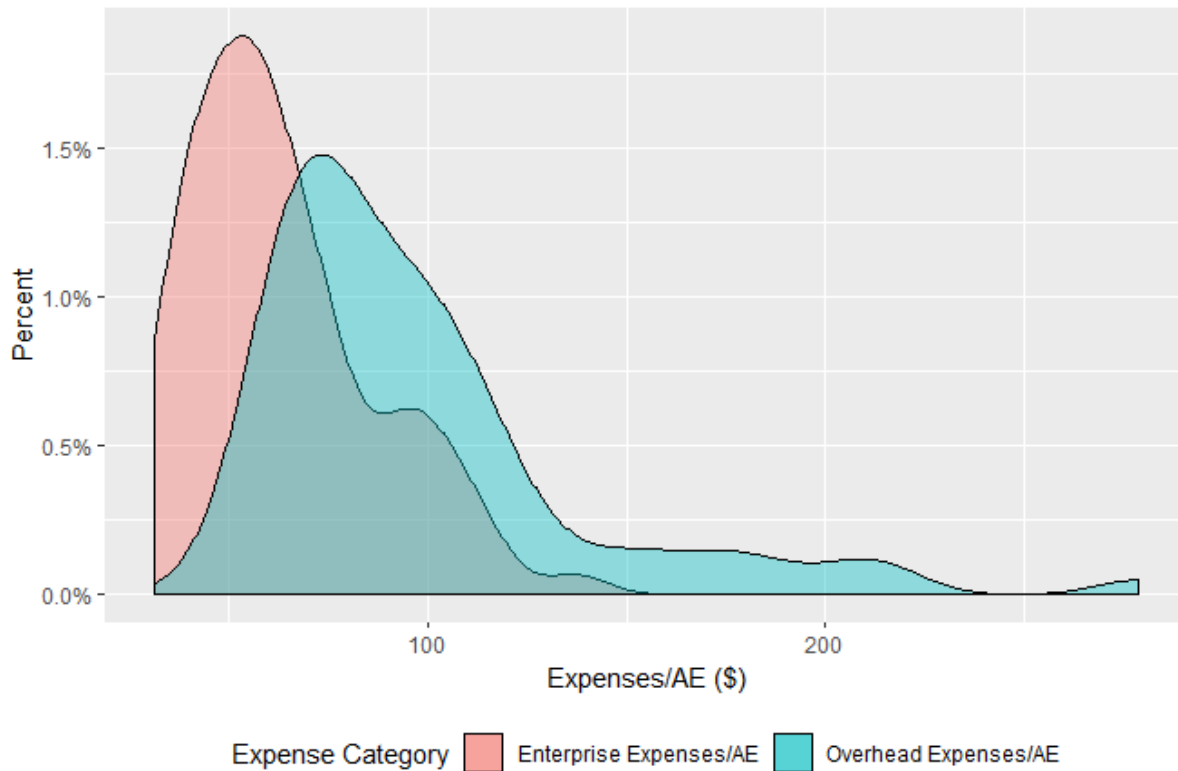


Fig. 19: Density plot of Enterprise and Overhead Expenses/AE for 77 breeding and growing enterprises.

3.4.1 Enterprise Expenses

Enterprise expenses were likely to be a function of many factors such as the level of supplementation or contractors used, or activity undertaken in a given year due to either herd build-up or sell-down, location, and/or distance to market. Growing herds had more variable and often higher enterprise expenses/AE than breeding herds, and the better performing stations had lower than average enterprise expenses/AE for these enterprise types. Overall, findings throughout the project indicated that lower enterprise expenditure, which is targeted to support productivity, produces best results, particularly for breeding enterprises.

3.4.2 Overhead Expenses

Statistical analysis of the pastoral company benchmarking data showed that productivity and income could be predicted with reasonable accuracy. Analysis was also undertaken to determine whether similar predictions could occur for expenses. Preliminary analysis showed that overhead expenses had a negative exponential relationship with both labour efficiency and enterprise size. That is, increasing enterprise size was initially associated with a rapid decline in overhead expenses/AE before reaching approximately 20,000AE and \$50-100/AE after which increasing enterprise size had minimal, if any, reducing effect on overhead expenses/AE (Fig. 20). The relationship between overhead expenses/AE and labour efficiency was similar in nature, with minimal reductions in overhead expenses/AE after labour efficiency exceeded approximately 1,500AE/FTE (Fig. 21). These relationships are consistent with the economies of scale concept. That is, expenses per unit carried decline as scale increases until constant economies of scale are reached.

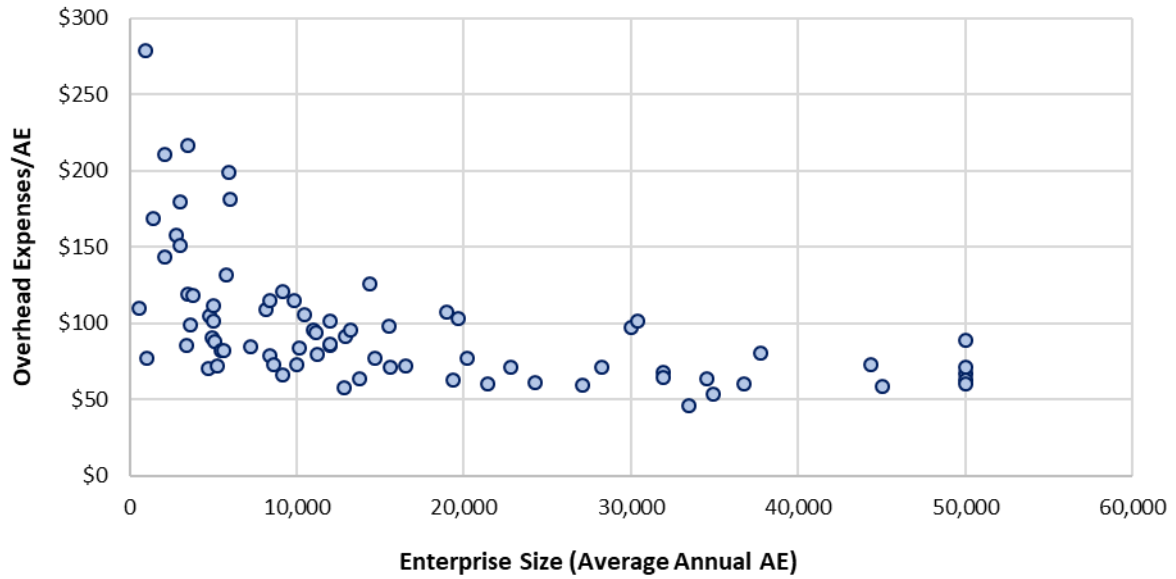


Fig. 20: Relationship Between Annual Average Overhead Expenses/AE and Annual Average Enterprise Size (AE) for 77 Participant Stations



Fig. 21: Relationship Between Annual Average Overhead Expenses/AE and Annual Average Labour Efficiency (AE/FTE) for 77 Participating Stations

Overheads of less than \$100 per AE were identified as necessary for a beef business to have a competitive cost base. This, and other analysis, has shown that there is a ‘floor’ in overheads per AE of \$50, that is regardless of how large or labour efficient the business is, each AE will incur at least \$50 in overhead expenses.

Fig. 21 shows that no businesses with labour efficiency of less than 1,000 AE/FTE had overhead expenses under \$100/AE and it is not until labour efficiencies of between 1,500 and 2,000 AE/FTE are achieved that all businesses could report overheads of less than \$100/AE.

There is an upper limit for labour efficiency, and a business that is ‘too’ efficient runs the risk of negatively impacting business performance. This is through not investing sufficient time in necessary

husbandry activities and/or impacting future performance through not undertaking sufficient maintenance and other necessary tasks.

Growing businesses, particularly those with high stock turnover, were found to require more labour per average AE carried than breeding enterprises. In this case the measure of beef produced per FTE is a better indicator of labour efficiency in growing herds.

The suggested labour efficiency target range was 1,500 to 2,500 AE/FTE for all businesses, regardless of size, enterprise type or location. The target for intensive growing businesses with higher turnover and for extensive breeding operations was identified as 1,500 and 2,500 AE/FTE, respectively.

Overhead expenses/AE were modelled on enterprise size and labour efficiency, accounting for the exponential nature of the relationships. The model combining labour efficiency and enterprise size accounted for 70% of the variation in overhead expenses. When modelled as single variables, enterprise size accounted for 38% and labour efficiency for 67% of variability in overhead expenses/AE.

The effect of enterprise size is captured in labour efficiency. When the effect of scale and labour efficiency is combined in a single graph, it is shown that smaller businesses tend to have lower labour efficiency (Fig. 22). It is unclear whether scale itself is causing overheads to be high, or whether scale limits labour efficiency leading to high overheads. It is clear that small businesses were challenged by high overhead expenses and any gains made in labour efficiency were beneficial.

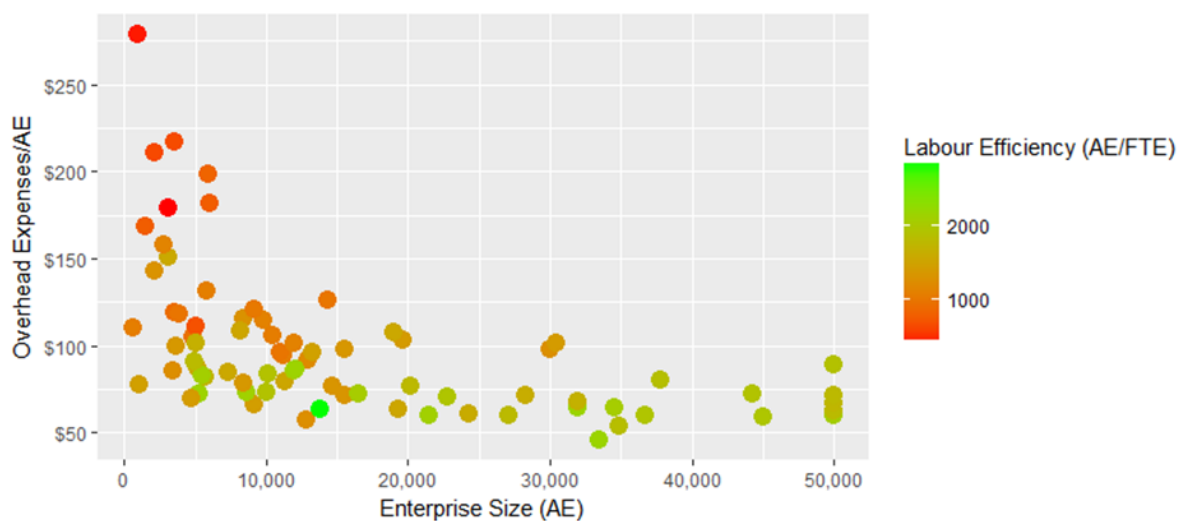


Fig. 22: Relationship Between Annual Average Overhead Expenses/AE and Annual Average Enterprise Size (AE) for 77 Participant Stations, with a Colour Overlay for Labour Efficiency

The modelling exercise indicated that the primary drivers of overhead expenses were labour efficiency and enterprise size. These two drivers followed an economies of scale relationship with overhead expenses/AE. Labour efficiency above 1,500 AE/FTE was required to reliably achieve competitive overheads. However, the benefits of increasing either of these factors are exhausted at certain points, after which overhead expenses/AE reaches a floor.

Analysis of private beef producer data by Holmes et al. (2017) has shown that the effective 'critical' scale where constant economies of scale are reached is around 3,000AE, whereas for herds in this data set it is in the range of 10,000-20,000AE (Fig. 20). Large pastoral company operations clearly had a greater minimum scale requirement to adequately cover overheads. The overhead expense figures reported only included those incurred at the herd level (i.e. do not include any apportionment of head

office expenses). Therefore, large pastoral company operations incur greater overhead expenses than private operations. The reasons for this are unclear at this stage and the difference in fixed cost requirements between pastoral company and family business needs further exploration.

3.5 Comparisons to Wider Industry

The data reported by Holmes et al. (2017) in the Australian Beef Report (ABR) provides a good basis to compare the performance of pastoral companies within this project to the performance of the wider industry. Those family producers with greater than 1,600 head from are the most valid comparison to the pastoral company data.

Table 2 compares the Top 25% performance of producers with greater than 1,600 head as reported by Holmes et al. (2017) against the Top 25% breeding enterprises and growing enterprises from this data set. The pastoral company data here are slightly different to that above as it is for the 2012-16 calendar years, so as best to match the data from Holmes et al. (2017), which in this case is the 2012-16 financial years.

Table 2: Comparison of Top 25% performance

	<i>ABR</i>	Breeding	Growing
Income/AE	\$191.15	\$203.87	\$321.49
Enterprise Expenses/AE	\$32.82	\$49.74	\$85.19
Gross Margin/AE	\$158.32	\$154.13	\$236.30
Overheads/AE	\$74.32	\$74.53	\$79.69
EBIT/AE	\$84.01	\$79.60	\$156.61
Operating Return	3.4%	4.9%	5.0%

Table 2 shows that the top pastoral company breeders achieved similar performance to the top private operators, and the top growing enterprises achieved better performance. The data reported by Holmes et al. (2017) does not separate producers by enterprise type (breeding and growing) but are generally breeding enterprises, so a valid comparison.

The top pastoral company breeding enterprises achieved higher income per AE than the top private operators through higher productivity (Appendix 7.1), however this income advantage was eroded completely by the higher enterprise expenses, meaning the private operators had slightly higher gross margins. The main difference is higher selling expenses, with also slightly higher fodder and supplements, mustering and contracting and animal health costs.

The total overheads were identical, although there were some differences in the cost structure. The bottom line was slightly higher for the private operators, in terms of EBIT per animal unit, however profitability is higher for the top pastoral company stations, due to differences in land values.

This indicates that the top pastoral company performers can achieve performance equivalent to the top private operators. However, it should be noted that the private operator's performance usually represents their entire business, whereas the top pastoral company performers are single business units within the company, not the entire company.

4 Key findings

- Whole group performance was affected by price and season over the analysis period, which saw a cumulative loss made in 2013.
- Growing businesses generated better profits per animal unit (EBIT/AE) than breeding businesses. Breeding was usually undertaken on land of lesser value than growing, as a result, return on assets managed was similar across enterprise types for both the average and Top 25% cohorts.
- The profitability of the growing enterprises was slightly lower than the breeding, which was consistent with other analyses which indicated that the greater the inherent productivity of the land, the more overvalued it was.
- EBIT/AE was mostly explained by kg Beef/AE. Productivity gains were the most likely means to increase profitability. Price received and expenses played a role but were much less important than productivity.
- For breeding enterprises, productivity was determined by reproductive rate, mortality rate, and sale weight. Growing productivity was significantly affected by mortality rate, and was largely determined by daily gains.
- Overhead expenses/AE were negatively associated with labour efficiency and scale. Businesses limited by high expenses, rather than low productivity, were likely to be constrained by lack of operating scale.
- The findings in this analysis were consistent with Holmes et al. (2017), which found that the barriers to profit in the beef industry were operating scale and operating efficiency. If a business has both of these, then it will generate reasonable profits.
- Operating Efficiency resulted from the key areas of the business being highly productive, that is more production resulting from each unit of input. The more productive a business becomes, the more efficient it will be, assuming it is done cost effectively. The key elements of beef business productivity are land, labour and livestock.
- Labour and livestock productivity were expressed in this analysis (labour efficiency AE/FTE and herd productivity kg Beef/AE). Land productivity, which is a function of both land condition and stocking rate, is not quantified here, but is a critical issue for station performance.
- Operating scale was primarily about having sufficient scale to achieve competitive overhead expenses on an AE basis. This analysis identified that the scale requirement for pastoral company stations is larger than for private operators, 3,000 AE compared to 10,000 AE, the reasons for which are not yet fully understood.
- Once a business has sufficient operating scale, the incremental benefits of additional scale are not ongoing, bigger is not always better. On the other hand, operating efficiency should be a focus of continual improvement for all beef businesses, regardless of scale.
- The top performing pastoral enterprises participating in this study had the potential to achieve performance equivalent to the top performing family operators.

5 Conclusions

This project has provided the most comprehensive analysis of large pastoral company performance in northern Australia to date. The analysis methodology used allowed comparisons to be drawn between several factors influencing enterprise viability.

There was considerable variation in performance and the top performing business units generated returns around double the average. Whole group performance was influenced by season and price, illustrating the vagaries of pastoralism and supporting the observation that the majority of profits are made in the minority of years. External factors explained little variance in performance between average station performance over the entire period.

While growing enterprises generated consistently higher profits per animal unit than breeding enterprises, return on assets managed were similar between enterprises, due to the more productive land being more expensive.

The variation in station performance could be mostly attributed to productivity per animal unit. For breeding enterprises, productivity is driven by reproductive rate, mortality rate, and sale weight. For growing enterprises, growth rates and mortality rate are most important. The greatest scope for improving profits is lifting productivity through these factors.

Expenses do not explain much of the variation in station performance. A competitive and well directed expense structure is required for optimal performance. Expenses may also limit performance in a small number of businesses constrained by lack of scale and low labour efficiency.

The cyclical nature of pastoralism illustrated in the whole group performance findings demonstrates that while the analysis is accurate for the period analysed, performance is sensitive to a range of factors which vary over time. The characteristics which separate the top performers are consistent, within this dataset and across the general industry.

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7 Appendices

7.1 Comparison with Holmes et al. (2017)

BEEF ENTERPRISE INCOME STATEMENT

Australian Beef Report: Northern >1,600hd Top 25% (2012-16FY), compared to Pastoral Company: Breeding Top 25% and Growing Top 25% (2012-2016CY)

	ABR \$/AE	Corporate Breeding \$/AE	Corporate Growing \$/AE
Sales	191.36	222.77	1,366.96
Purchases	(22.45)	(20.04)	(1,075.37)
Inventory Change	22.23	1.14	29.90
GROSS PROFIT	191.15	203.87	321.49
ENTERPRISE EXPENSES			
Agistment	0.00	0.96	21.17
Animal Health	0.47	3.74	7.21
Contracting & Mustering	4.39	9.05	4.47
Fodder & Supplements	12.22	14.03	15.90
Insurance & Materials	3.53	0.10	0.26
Selling Costs & Freight	12.22	21.85	36.18
	32.82	49.74	85.19
GROSS MARGIN	158.32	154.13	236.30
OVERHEAD EXPENSES			
Administration	4.00	2.48	3.13
Depreciation	11.49	7.48	5.61
Electricity & Gas	1.03	2.04	3.00
Fuel & Lubricants	7.41	10.76	4.94
Insurance	2.45	0.77	1.84
Landcare	0.00	0.93	6.22
Materials	0.73	0.70	0.68
Motor Vehicle Expenses	1.49	5.39	3.55
Rates & Rents	5.96	4.09	5.04
R & M General	12.30	6.55	12.89
Wages	10.24	33.33	32.11
Wages (Owner)	17.23	0.00	0.00
	74.32	74.53	79.69
TOTAL OPERATING EXPENSES	107.14	124.27	164.87
EARNINGS BEFORE INTEREST & TAX	84.01	79.60	156.61
PRIMARY PERFORMANCE INDICATORS			
Income (\$/kg LW)	\$1.93	\$1.90	\$2.22
Cost of Production (\$/kg LW)	\$1.08	\$1.16	\$1.14
Operating Margin (\$/kg LW)	\$0.85	\$0.74	\$1.08
Kg Beef/ AE	99.2	107.4	144.6
Labour Efficiency (AE/FTE)	2,151	1,658	1,887
Enterprise Size (Annual Avg AE)	12,276	33,284	7,136
Operating Return	3.4%	4.9%	5.0%

7.2 Overview of Key Business Analysis Measures

The below is a brief explanation of some of the key measures used in the analysis of a beef business to assist in interpretation

Income Statement

Inventory Change	Change in value of herd on hand from start to end of year. It is determined by change in herd size and structure and not changes in market value, a constant value is used across the year.
Land Lease Payments	This is effectively treated as a finance cost of the business, as opposed to an operating cost. This allows the operating performance of the business units with leases to be directly compared to ones without leases.

Business Unit Key Performance Indicators

Return on assets managed	This is the percentage profitability achieved across all assets under management, which is operating profit (before land lease payments) as a percentage of all assets under management (leased land is capitalised for the purposes of this calculation).
Operating return	This is the percentage profitability achieved on assets owned which is profit after land lease payments as a percentage of all owned assets (leased land is not included).
Capital Return	Change in owned land value as a percent of opening total assets.
Wages expense/ Full time Equivalent Employee	Total wages expense divided by number of FTE's nominated as being employees.

Enterprise Income Statement

All figures presented in the enterprise income statement are expressed per average annual AE run for the year, i.e. sales and selling cost are the totals for each per AE run for the period and are not the figures per AE sold.

Average price received (\$/kg LW sold)	Average price received per kilogram liveweight across all sales in the year.
Income (\$/kg LW produced)	The enterprise gross profit (sales – purchases +/- inventory change) divided by the total number of kilograms produced in the year. This figure differs to price received as not all kilograms produced are sold and because the gross profit figure is affected by changes in herd size, composition and the overall productivity for the period.
Cost of Production (\$/kg LW produced)	The operating costs of the enterprise for the year, divided by the kilograms of beef produced for the year.
Kg Beef/ AE	The kilograms of beef produced for the year (accounting for changes in inventory, as well as sales and purchases) divided by the annual average Adult Equivalents (AE) run that year.
Labour Efficiency (AE/FTE)	The number of full time equivalents assigned to the enterprise divided by the annual average AE run that year.
Enterprise Size (Annual Avg AE).	The grazing load of the enterprise for the year calculated from opening and closing herd size and composition, the AE ratings per class and the timing of sales and purchases through the year.
Reproductive Rate	Calves weaned/average breeding age females (inc 50% of joiners as not all are reproductive in all regions). This isn't perfect but gives a reasonable figure and consistent methodology across all regions. However it can result in inaccurate results, particularly when there are large movements of females within a year.