2015 Australian beef eating quality audit

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OBJECTIVE

The objective of the Australian Beef Eating Quality Audit is to establish, for the first time in Australian history, the baseline for beef eating quality, based on Meat Standards Australia (MSA) grading results for over 3.2 million cattle from the 2014-15 financial year. The report aims to identify the key drivers of beef eating quality, using the MSA Index as the measure of eating quality outcomes, allowing Australian cattle producers to optimise the eating quality potential of their cattle through management and on-farm interventions.

The results of this study confirm with confidence that MSA beef producers have the opportunity to improve eating quality potential of their herd, therefore creating potential for increased profitability and enhanced farm productivity. This report is the first in a planned series of benchmarking activities to 2020 to continue to evaluate the performance of Australian beef eating quality as identified in MISP 2020 and identify opportunities for continuous improvement.

INTRODUCTION

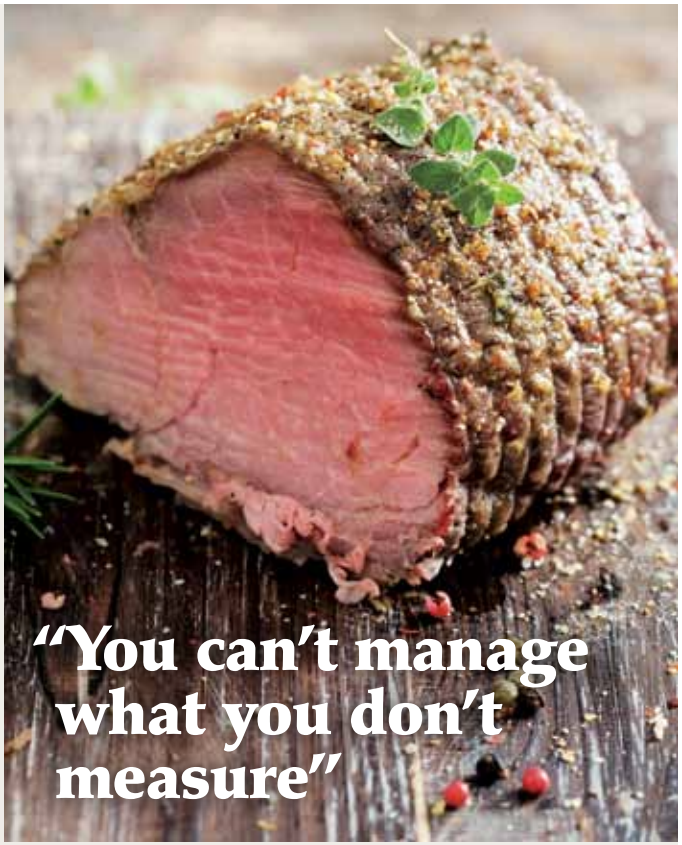
The 2015 Australian Beef Eating Quality Audit has been generated from the analysis of MSA grading results for over 3.2 million cattle, processed and graded through 42 licenced processors across the country during the 2014-15 fiscal year.

MSA is Australia's eating quality grading system and is a global leader in its ability to predict the eating quality of cuts within a carcase, for the end consumer.

Understanding what drives the eating quality of beef is important in being able to implement continuous improvement strategies and create opportunities for improved returns to flow through the value chain to the farm gate.

This report will form an important platform for establishing new benchmarks and identifying opportunities for improvement. These benchmarks will also be a useful tool in informing educational and resource development efforts from industry service providers, including Meat & Livestock Australia.

This is the first time this benchmarking exercise has been conducted in Australia and has been made possible through the introduction of the MSA Index in 2014. The MSA Index is a valuable tool in providing feedback on the potential eating quality of an animal, influenced only by on-farm genetic and management factors.



The improvement of the MSA Index and subsequent eating quality potential of carcases is largely then under the control of the producer.

With subsequent Eating Quality Audit reports to occur biennially, the Australian beef industry will be able to continue to measure its improvements and identify any shortfalls in a timely manner.

Why is benchmarking important

Benchmarking, as an industry or as an individual enterprise, provides the ability to identify strengths and weaknesses of a business. The greatest value obtained from using benchmarking tools is providing the basis for good decision making to achieve additional profits.

Benchmarking allows for:

- measuring current performance
- identifying areas of performance where improvement can be made
- identifying the key drivers and therefore changes which can be made to current animal and business management processes and practices in order to improve enterprise performance.

Methodology

The Beef Eating Quality Audit was generated through data analysis of all MSA graded cattle in 2014-15. The report uses quantitative objective and subjective data collected by MSA accredited graders, and submitted to MLA, during this time period.

All data analysis related to the MSA index outcomes are based on the location of the MSA registered property from which the cattle were consigned, rather than the location of the processor. This method was chosen in order to give a more accurate indication of state-based production opportunities and challenges.

In 2014-15, **3,224,198 cattle** were graded using MSA Standards. Carcases that were compliant to MSA minimum requirements (meat colour, pH and fat coverage) were eligible to receive a MSA Index score. The following report utilises the MSA Index scores for **3,005,544** cattle.

The value of MSA compliance

In many instances, there is financial incentive for improving MSA compliance and meeting eating quality specifications of individual processors and brand owners.

In 2014-15, young cattle (typically grassfed and 0-2 tooth categories) which met MSA and company requirements received an additional $0.33/kg over-the-hooks (OTH) compared to their non-MSA counterparts. With an average carcase weight of 277kg (2014-15 average weight of MSA grassfed carcases), this has the potential to provide an additional $91.41 per head.

Carcases that met MSA specifications and requirements for grainfed categories received on average an additional $0.10/kg OTH compared to their non-MSA counterparts. With an average grainfed carcase weight of 294kg, this has the potential to return an additional $29.40 per head.

Understanding the drivers of MSA compliance and factors impacting on eating quality performance holds a significant value in potentially increasing farm gate returns.

Source of OTH prices: MLA's National Livestock Reporting Service

CURRENT SITUATION (to 30 June 2015)

41,973 producers

42 MSA licensed beef processors

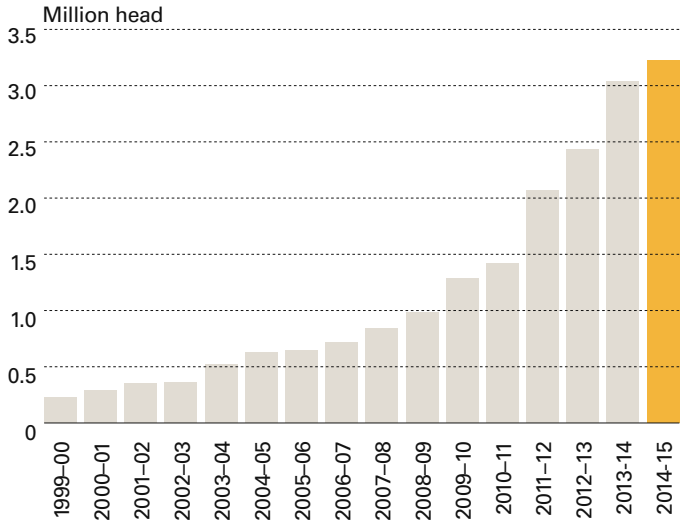
3,676 end users
(foodservice, supermarkets, butchers, wholesalers)

120 MSA licensed beef brands

Since its commercial implementation in 1999, the MSA program has experienced significant growth with 3.22 million cattle presented for MSA grading in 2014-15 as shown in Figure 1. This represented 34% of all adult cattle slaughter in 2014-15 (Figure 2).

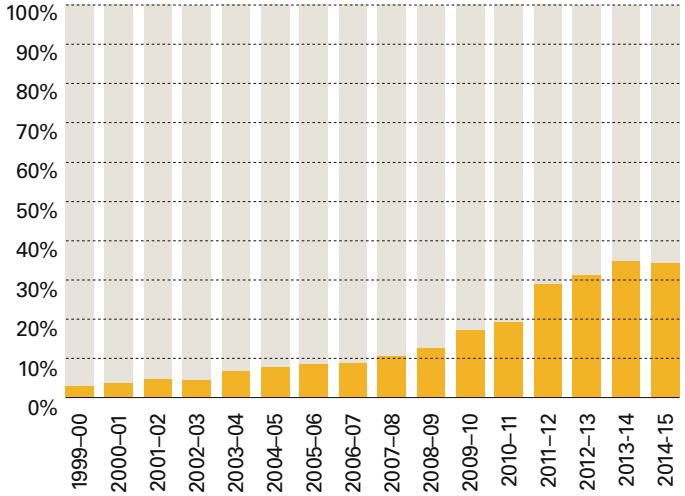
Meat & Livestock Australia acknowledge the 176 MSA accredited graders across 42 MSA licensed processors who have collected the carcase measurements used in this report.

Figure 1. Growth in national MSA beef grading



Source: Meat & Livestock Australia

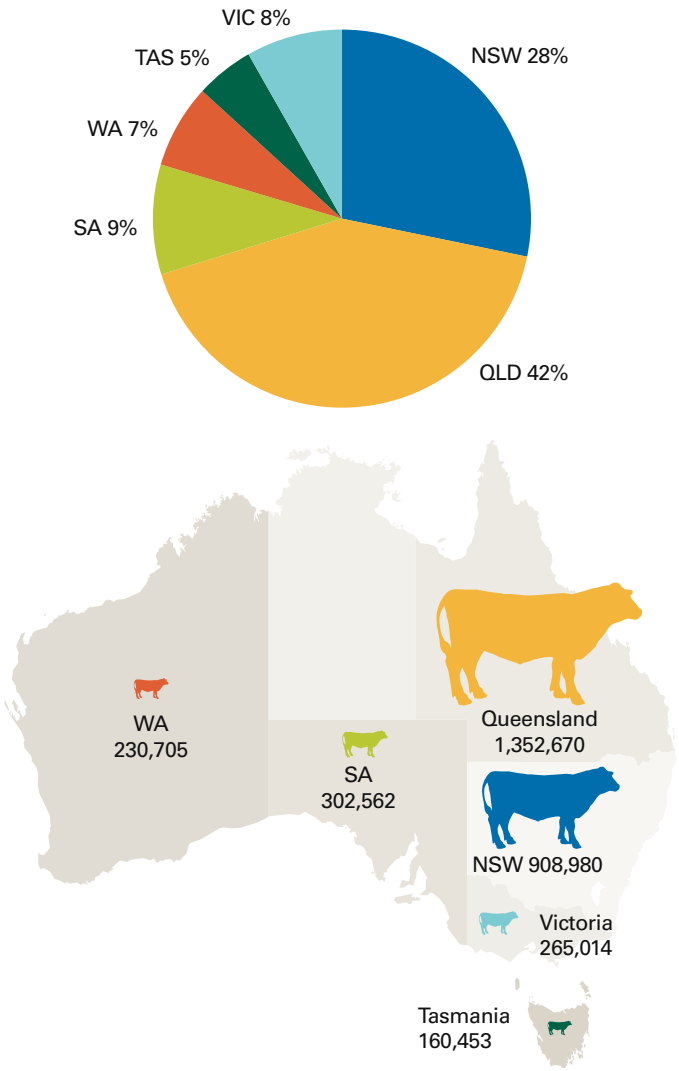
Figure 2. Proportion of Australian adult cattle slaughter presented for MSA grading



Source: ABS

Note that total adult cattle includes all adult cattle and selling pathways. Some of these animals would not be eligible for MSA grading.

Figure 3. MSA graded cattle in 2014-15 by state of production

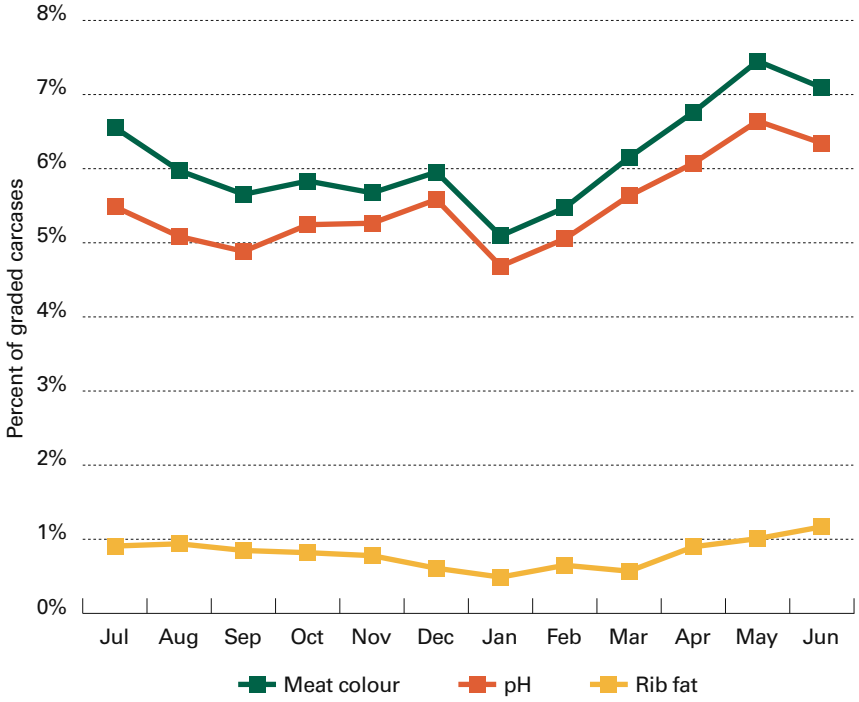


In 2014-15, 93% of carcases met MSA minimum requirements. The main reasons for non-compliance were associated with dark meat colour and high pH levels, a condition better known as 'dark-cutting'. A smaller incidence of non-compliance to fat coverage requirements was reported. Figure 4 illustrates reasons for non-compliance throughout the year, identifying that the months April, May and June in 2015 had the greatest rates of non-compliance nationally.

Company specifications, are additional specifications to the MSA minimum requirements and can be based on eating quality levels represented by the MSA Index or other carcase attributes such as weight. These are determined by the processor or brandowner and are not included in this report.

Critical times of the year for non-compliance vary by state and by region based on a number of factors. State based compliance is available in Section 7. State snapshots.

Figure 4. National non-compliance 2014-15



Note – Carcases can be recorded as not meeting specifications for multiple attributes.

Source: Meat & Livestock Australia

MSA MINIMUM REQUIREMENTS

To be eligible for a MSA Index score, MSA graded carcases must have had:

- Met MSA pre-slaughter requirements
- pH less than 5.71
- Meat colour between and including 1B – 3
- Minimum rib fat of 3mm
- Adequate fat coverage over all major primals

SETTING EATING QUALITY BENCHMARKS WITH THE MSA INDEX

What is the MSA Index?

The MSA Index is a single number and standard national measure of the predicted eating quality potential of a carcase. The MSA Index is a number between 30 to 80, expressed to 2 decimal places (ie 54.62), to represent the eating quality potential of a whole carcase.

The MSA Index is independent of any processing inputs and is calculated using only attributes influenced by pre-slaughter production. It reflects the impact on eating quality of management, environmental and genetic differences between cattle at the point of slaughter.

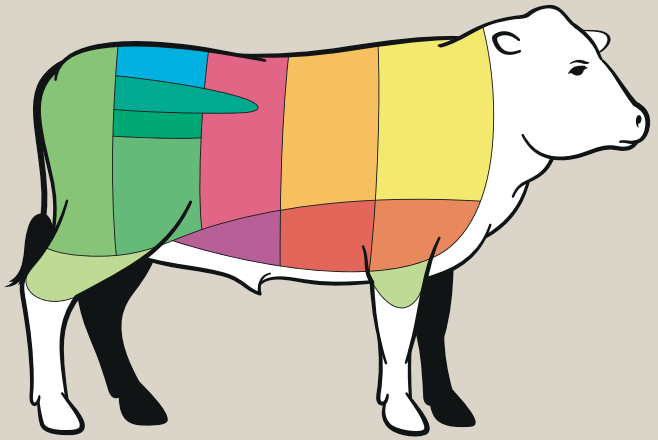
It is a consistent benchmark which can be used across all processors, geographic regions and over time.

KEY FACTORS IMPACTING ON THE MSA INDEX

- Hormonal Growth Promotant status
- Milk-fed vealer category
- Saleyard status
- Tropical Breed Content (verified or determined by hump height)
- Ossification score
- MSA marbling score
- Subcutaneous rib fat

All of these factors are interactive and have varying impacts on the eating quality of 39 different muscles in the body.

MSA Index = weighted average of the predicted MSA eating quality scores of all MSA cuts in a carcase



The key factors impacting on eating quality and that will have the biggest influence on MSA Index performance are shown as attributes having 'Very high' or 'High' importance in Table 1.

This trait importance indicates the size of effect of changing that trait. Change can occur through genetic or management interventions and this will impact on the MSA Index within a herd, if all other traits remained the same.

As shown in Table 1, The effect of carcase attributes on the MSA Index, separate to on-farm management interventions or treatments, there are several key traits identified having high importance in changing the MSA Index.

These include marbling, and ossification score. These will be investigated further within each section of this report.

Table 1. The effect of carcase attributes on the MSA Index

Carcase input	Size of effect on the MSA Index (units)	Clarification of effect	Relative importance of these traits in changing the MSA Index*
HGP status	5	The MSA Index of carcases with no HGP implant is around 5 Index units higher	**Very High**
Milk-fed vealer	4	The MSA Index of milk fed vealer carcases is around 4 index units higher	**Very High**
Saleyard	5	Carcases which were consigned directly to slaughter and NOT processed through a saleyard have an MSA Index around 5 index units higher	**Very High**
MSA marbling	0.15	As MSA marbling score increases by 10, the MSA Index increases by around 0.15 index units	**High**
Hump height (for cattle greater than 0% TBC)**	-0.7	As hump height increases by 10mm, the MSA Index decreases by around 0.7 units In carcases which have no TBC, hump height has no impact on MSA Index	**High**
Tropical Breed Content (TBC)**	0% = 0.0 12% = -1.6 18% = -3.2 25% = -3.9 38% = -4.7 50% = -5.2 75% = -5.5 100% = -6.3	As declared TBC content increases from 0 to 100%, the MSA Index decreases by up to 6.3 units	**High**
Ossification score	0.6	As ossification score decreases by 10, the MSA Index increases by 0.6 index units	**High**
Rib fat	0.1	As rib fat increases by 1 mm, the MSA Index increases by 0.1 index units	Medium
Hot standard carcase weight (HSCW)	0.01	As HSCW increases by 1kg, the MSA Index increases by <0.01 index units	Low
Sex	0.3	With low ossification values, females have a higher index value than steers by around 0.3 index units	Low

The values presented in Table 1 are the average effect calculated for 2.8 million carcases across all states of Australia.

* Relative importance indicates the size of effect changing that trait will have on the MSA Index within a herd, if all other traits remained the same. Some traits may have a large impact but are difficult for a producer to alter.

** Hump height can be used in conjunction with carcase weight as the determinant or verification of TBC during MSA grading.

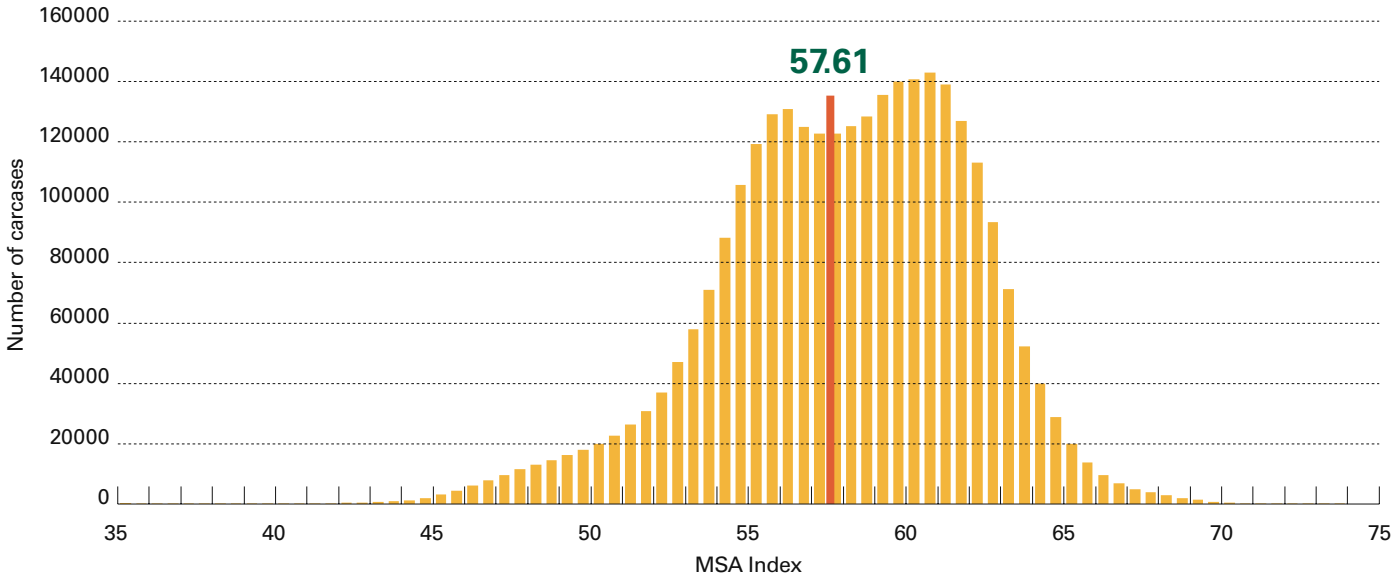
Current Australian eating quality performance

The average MSA Index in 2014-15 was 57.61. Figure 5 shows the national distribution of the MSA Index for MSA graded carcases throughout the year. MSA Index values of the 3,005,544 MSA compliant carcases ranged from 33 through to 73.5.

The distribution of the MSA index, as shown on the graph, indicates two distinct 'populations', or know scientifically as the bimodal peaks, on the graph. This is attributed to a range of fixed and variable on-farm management interventions including, but not limited to, the impact of hormonal growth promotants, marbling, ossification and tropical breed content on the MSA Index.

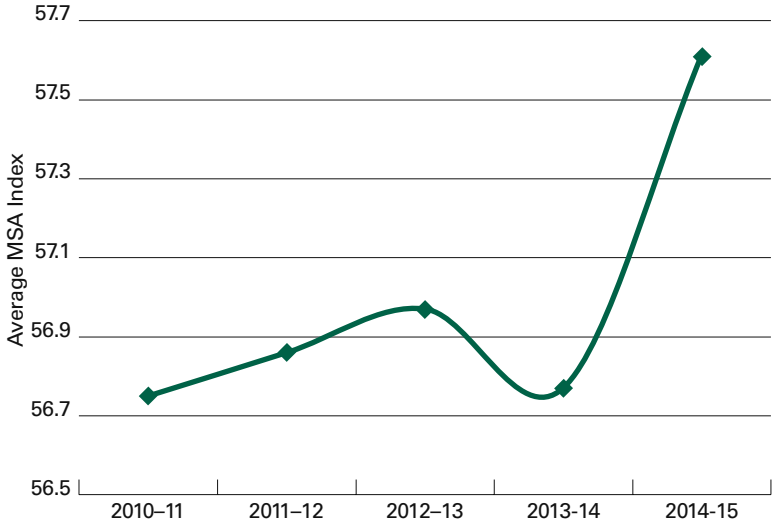
Figure 6 illustrates the change in the MSA index of the national herd when calculated for all MSA compliant carcases since July 2010. On the MSA Index scale of 30 -80, the MSA Index has improved by 0.86 points or 1.7% since 2010-11, likely to be reflective of changes in on-farm management interventions.

Figure 5. National MSA Index distribution for 2014-15



Source: Meat & Livestock Australia

Figure 6. Change in MSA Index since 2010-11



Source: Meat & Livestock Australia

WHAT WAS THE EATING QUALITY* OF THE CUTS MSA CARCASES PRODUCED IN 2014-15?

- 52% of MSA compliant cattle had MSA 5 star tenderloins
- 80% of cube rolls and 76% of oyster blades were MSA 4 star quality
- 94% of rumps met MSA 3 star standards.

** Grill cook method and 35 days ageing.*

Benchmarking individual MSA Index performance

This report has utilised a ranking system throughout to provide the ability to benchmark performance against the rest of the carcase population within a particular category.

What are the MSA index percentile bands?

A MSA Index percentile band provides an indication of an individual's average MSA index performance relative to the performance of others where Band 1 represents the top 1% of MSA graded cattle and Band 99 represents the bottom 1%.

Table 2 provides the MSA index percentile bands for the MSA Index distribution for all MSA carcases in Australia. The table allows you to benchmark index performance to the current range in the industry.

This can also be visualised in Figure 7. For example, this tells us that to have cattle that are in the top 10% of eating quality in Australia, an average MSA Index of greater than 62.37 is required.

Understanding the specific carcase attributes that determine a percentile band, allows producers to consider what production areas to target in order improve their performance.

Table 2. National MSA Index percentile bands for 2014-15

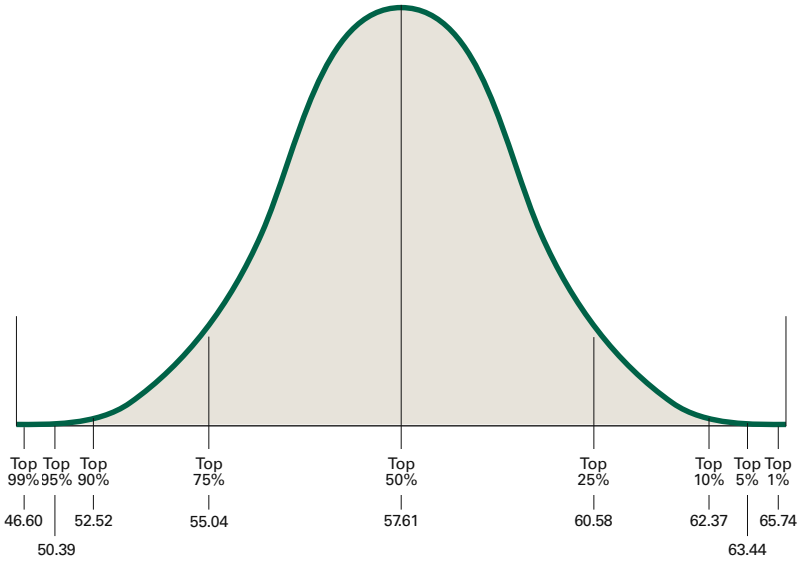
Band	Index
1	65.74
5	63.44
10	62.37
25	60.58
50	57.61
75	55.04
90	52.52
95	50.39
99	46.60

If my average MSA index is 60.61, I fit here.

How do I use percentile bands?

If your average MSA Index results were 60.61, your cattle have eating quality results between Band 10 and 25, indicating they are in the top 25% of MSA graded cattle in Australia.

Figure 7. Visualising MSA Index rankings



For example, if you have an average MSA Index of 60.61, your performance is in the top 25% of the Australian cattle herd and have eating quality results better than 75% of other MSA graded cattle in Australia.

Percentile bands are commonly used in a range of industries. You may be familiar with the use of them in livestock genetic evaluation, describing weather patterns and even in education systems to rank performance.

myMSA is the home for MSA grading feedback. myMSA was released in mid-2014 and during 2014-15 over 1,000 producers used the system 5,450 times to access carcase grading feedback.

myMSA OFFERS PRODUCERS THE ABILITY TO:

- Create full sets of carcase feedback, as soon as the grader has uploaded the information
- Look at trends in compliance, both MSA and company specifications, over time
- Create customised data sets to determine the impact on compliance by various attributes
- Download data to import into farm software
- Use the MSA index calculator to determine the potential change in eating quality with on-farm management changes.

www.mymsa.com.au

The following sections of the report will investigate further the difference between animal management practices including feed type, hormonal growth promotant treatment and gender on the MSA index as well as insights into the impact of individual carcase attributes on eating quality performance.

Throughout the report MSA index percentile bands will be provided to allow individuals to benchmark themselves within the appropriate category that suits their enterprise and identify key drivers in improving eating quality performance.

FEED TYPE EFFECTS ON MSA PERFORMANCE

In 2014-15, 55% of MSA graded cattle were classified as grassfed, whilst the remaining 45% met requirements for grainfed categories as shown in Figure 8. Figure 9 shows the proportion of each feed type produced for the MSA program in each state.

Queensland has the largest proportion of grain fed cattle supplied to MSA, with 68% whilst Tasmania shows close to 100% of MSA cattle being supplied from grassfed or non-feedlot production systems.

2.8 million cattle were turned off Australian feedlots during 2014-15. *(Source: ALFA)*

Of these it is estimated that 52% were MSA graded and categorised as grainfed.

Figure 8. Proportion of MSA grass and grainfed carcases in 2014-15

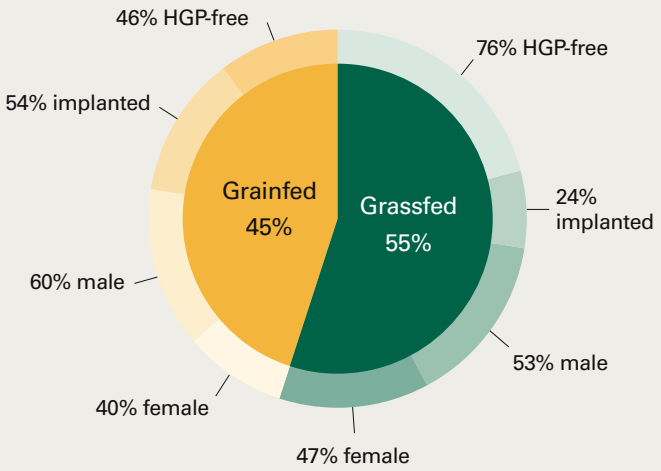
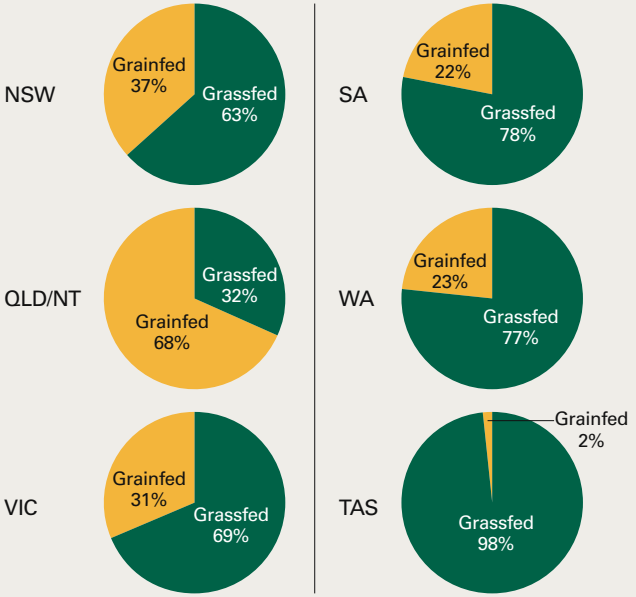


Figure 9. Proportion of grain and grassfed MSA graded cattle by state during 2014-15



MSA compliance by feed type

Compliance to MSA minimum requirements does tend to differ between feed type groups.

In 2014-15, 10.7% of MSA graded grassfed carcases did not meet MSA requirements compared to 2.3% of grainfed cattle. Figure 10 shows the difference in compliance by month for each feed type group. A distinct observation is the differences in monthly variation in compliance, with grainfed cattle maintaining a consistent rate throughout the year.

Grassfed cattle, whilst having consistently higher rates of non-compliance also demonstrate fluctuations in compliance throughout the year. This is not surprising given the seasonal challenges and fluctuations in the nutritional environment of a grassfed production system.

Figure 10. 2014-15 MSA non-compliance by feed type

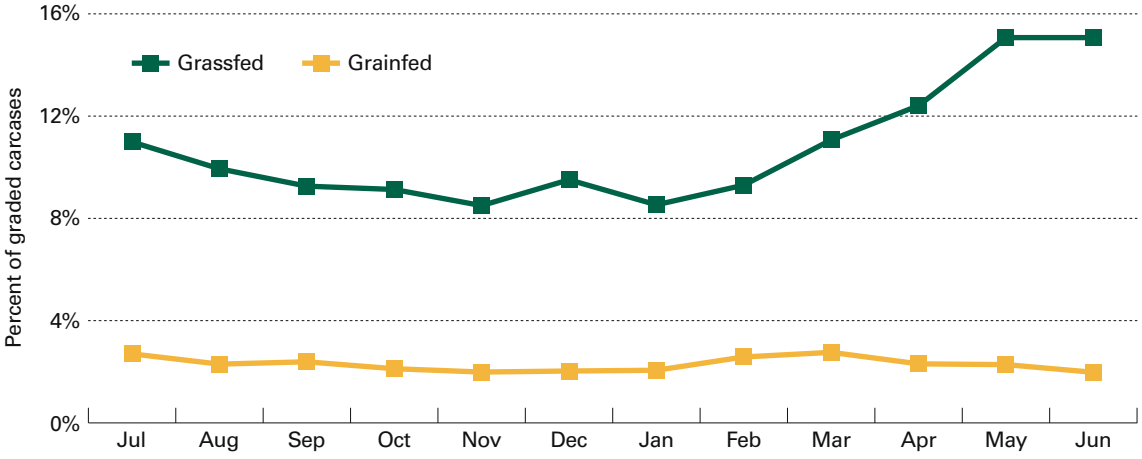
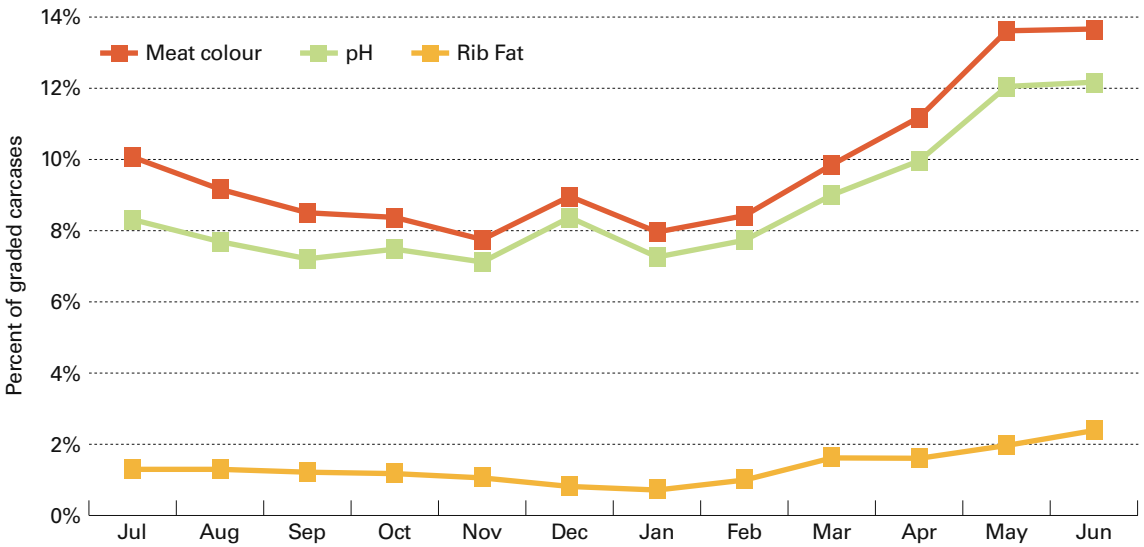


Figure 11 and 12 show the reasons for non-compliance for each the groups. Both share high pH and dark meat colour as the key reasons for non-compliance.

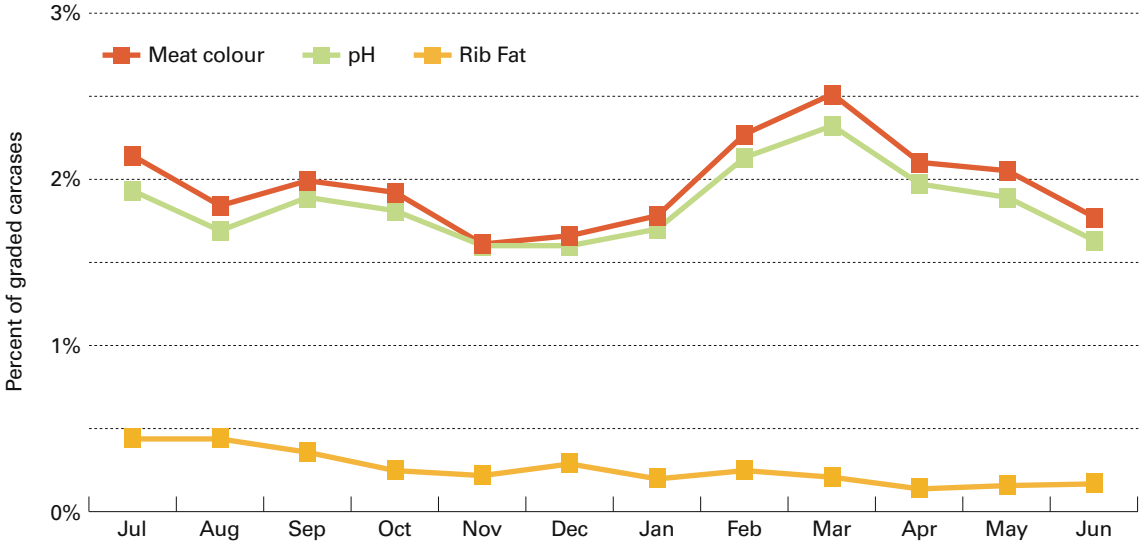
Note there is a difference in scale used for these two groups to best demonstrate compliance trends throughout the year.

Figure 11. Reasons for non-compliance for grassfed cattle in 2014-15



Whilst each state will experience differences in seasonal conditions, on average, there was an increasing incidence of 'dark cutting' in grassfed cattle from March 2015 onwards.

Figure 12. Reasons for non-compliance for grainfed cattle in 2014-15



Grainfed cattle are less impacted by seasonal variation due to the consistency in nutrition levels provided through a grain ration. However, grainfed cattle did experience an increased incidence of dark cutting in late summer and early Autumn of 2015.

Cattle for both feed types produced similar MSA marbling scores on average.

However grainfed cattle were 17kg heavier on average with similar ossification scores to grassfed cattle indicating quicker weight gain for maturity. Weight for maturity has a large impact on eating quality associated with decreasing extent of connective tissue development in muscles.

FACT:

Increasing carcase weight and minimising maturity or ossification development is a key factor in optimising eating quality performance.

Feed type and the MSA Index

Table 3 provides an indication of the average and ranges of carcase attributes for both grain and grassfed MSA carcases. This information shows that on average, grainfed carcases were almost 17kg heavier than grassfed carcases with similar average marbling, ossification and fat coverage measurements.

However the average MSA Index was 3% higher for grassfed cattle, given the MSA index scale of 30–80. This is likely to be attributed to the difference in HGP treatments between the groups. The grainfed group had 54% use of hormonal growth promotants compared to 46% within the grassfed group.

Both feed types follow a similar distribution pattern as the national distribution, with both groups having two peaks. These peaks may be attributed to:

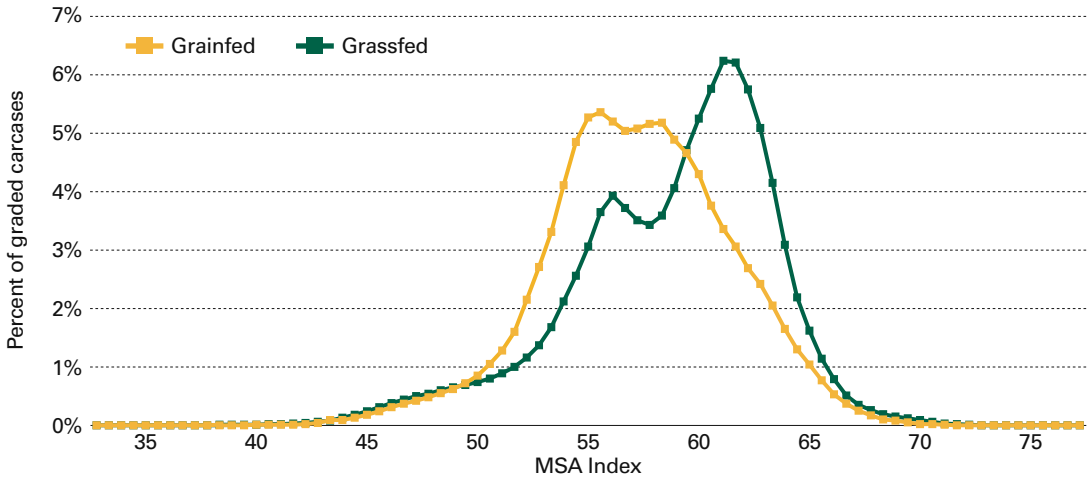
- HGP usage, and to a lesser extent;
- populations of animals with higher ossification and;
- populations of animals with lower marbling.

This analysis identifies that there is a higher percentage of grassfed cattle with MSA index values over 60.

Table 3. Average traits for MSA compliant carcases for each feed type

		Carcase weight (kg)	Hump height (mm)	Ossification	MSA marbling	Rib fat (mm)	MSA Index
Grass	Minimum	74.8	15	100	100	3	33.64
	Maximum	590.0	350	590	1190	60	73.22
	Average	277.3	60	160	330	8	58.31
Grain	Minimum	103.0	15	100	100	3	35.72
	Maximum	616.0	350	590	1190	60	71.02
	Average	294.3	70	160	330	8	56.83

Figure 13. MSA Index distribution by feed type in 2014-15



Grassfed cattle had an average MSA Index of 58.31.
Grainfed cattle had an average MSA Index of 56.83

Carcase traits impacting on the MSA Index

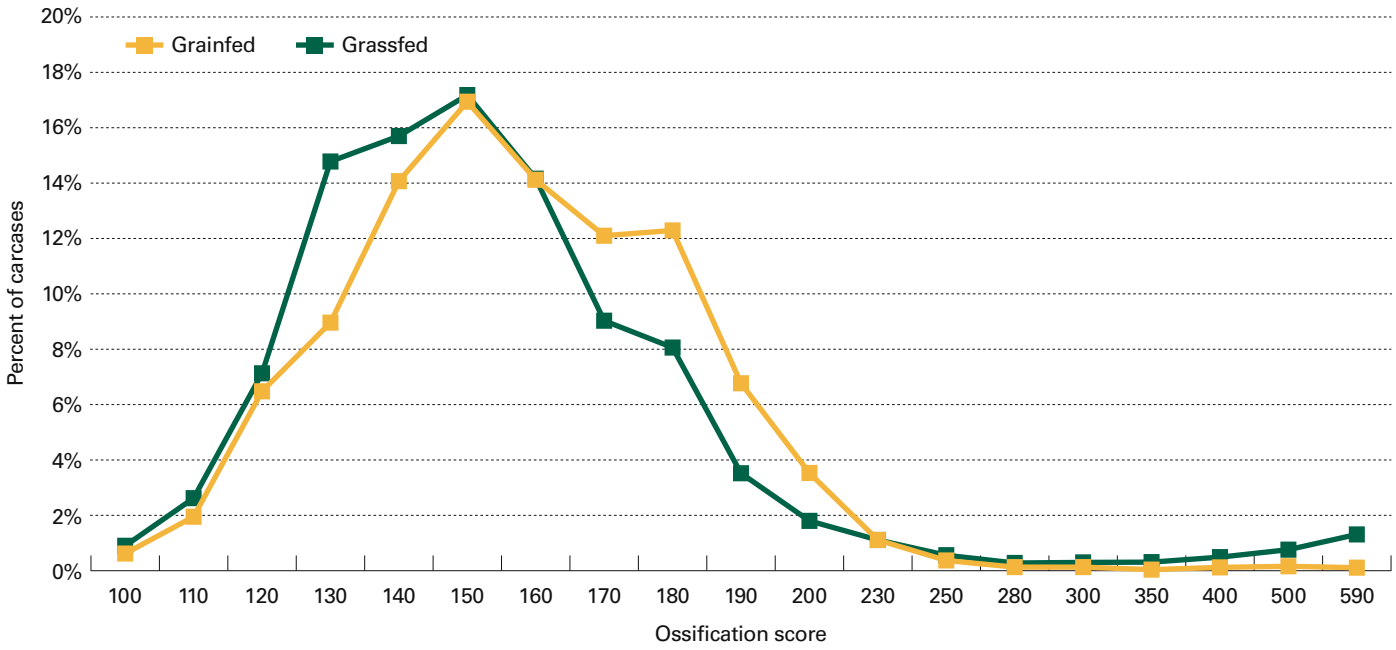
The following figures show ranges and distribution of various carcase traits that have an impact on the MSA Index.

KEY POINTS

- Grassfed cattle had a larger proportion of carcases with ossification scores 150 or less at 58% of the population compared to 49% of grainfed carcases.
- Differences in marbling distribution were small with a slightly larger proportion of grassfed cattle having marbling scores under MSAMB400.
- There is a noticeably larger proportion of grassfed cattle at lighter carcase weights than grainfed cattle.

Ossification

Figure 14. Ossification distribution by feed type



Note that Figure 15 focuses on MSA marbling scores to 590. 0.86% of grainfed and 1.07% of grassfed cattle produced MSA Marbling scores 600 or greater.

Marbling

Figure 15. Marbling distribution by feed type

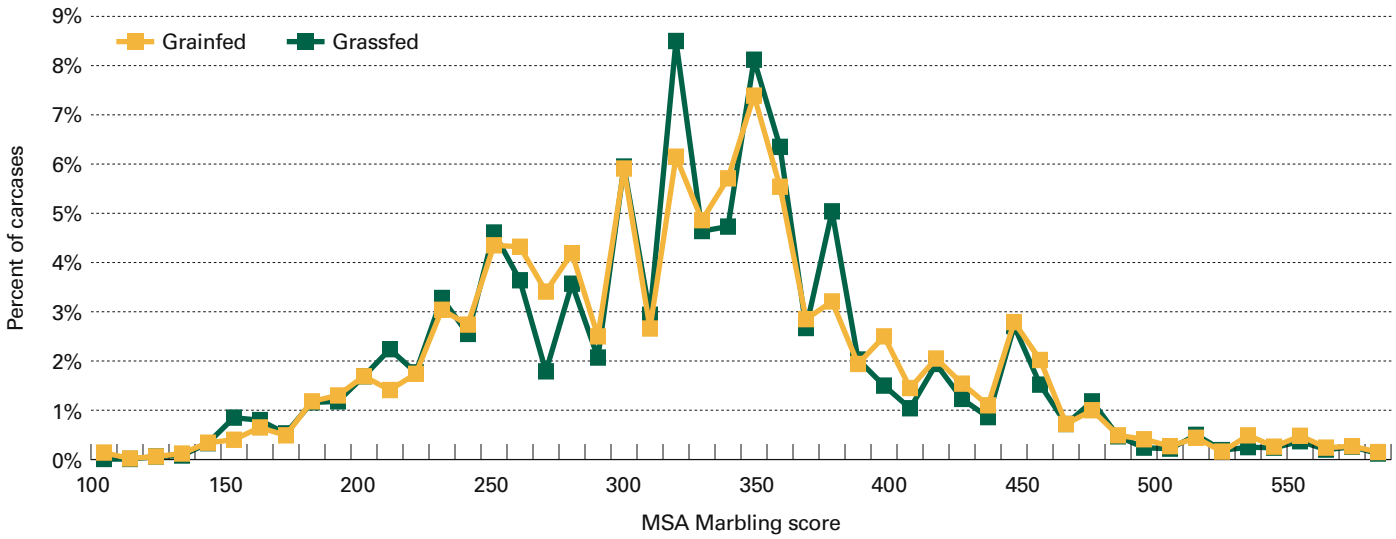


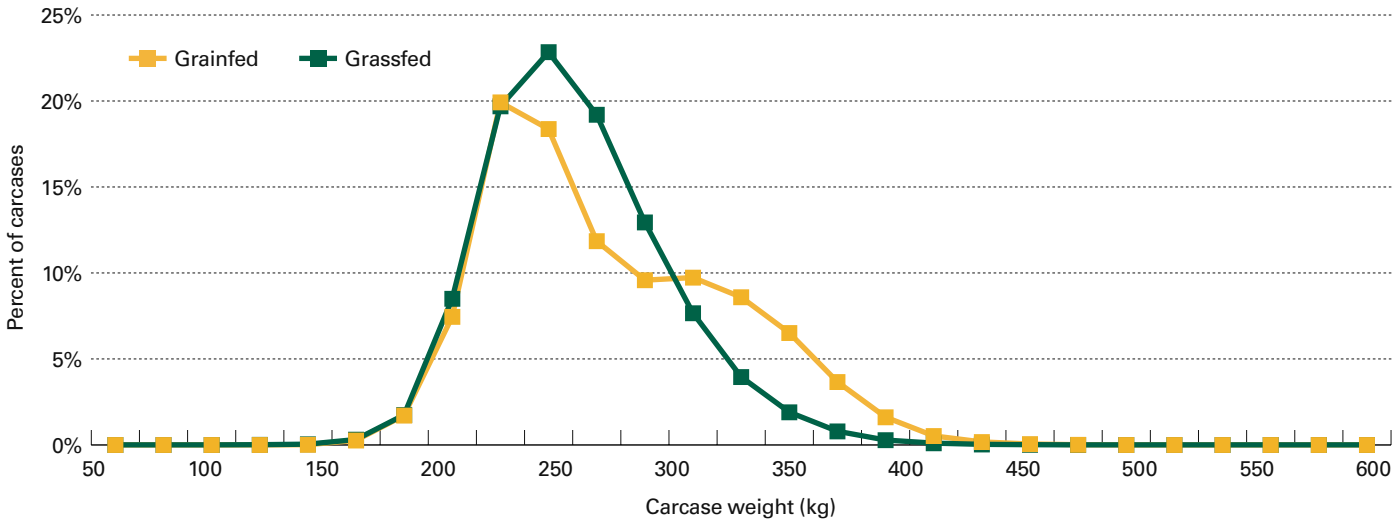
Table 4. MSA Marbling score ranges by feed type

MSA Marbling score range	% of grassfed cattle	% of grainfed cattle
100–200	6.71	6.39
210–300	31.47	33.61
310–400	46.51	42.80
410–500	11.90	13.58
510–600	2.39	2.83
610–700	0.6	0.5
710–800	0.24	0.16
810–900	0.12	0.07
910–1000	0.05	0.03
1000–1090	0.02	0.01
1100–1190	0.02	0.01

85% of grassfed cattle had MSA marbling scores between 100–400. Similarly, 83% of grainfed cattle had MSA marbling scores in the same range.

Carcase weight

Figure 16. Carcase weight distribution by feed type



Looking at the grassfed cattle population, a MSA Index greater than 59.08 places then in the top 50% of grassfed cattle.

Similarly, grainfed cattle with MSA Index values greater than 56.82 were in the top 50% of the grainfed population.

Table 5. MSA Index percentile bands by feed type

Band	Grassfed	Grainfed
1	66.21	65.09
5	63.73	62.92
10	62.69	61.68
25	61.15	59.37
50	59.08	56.82
75	55.77	54.43
90	52.87	52.30
95	50.27	50.50
99	46.38	46.87

HORMONAL GROWTH PROMOTANT EFFECTS ON THE MSA INDEX

In 2014-15, 38% of MSA graded cattle had received an implanted growth promotant.

IMPACT OF HORMONAL GROWTH PROMOTANTS ON THE MSA INDEX

Hormonal growth promotants are well-proven to assist increase productivity through weight gain and feed conversion efficiency.

However ossification is increased by HGP use which is variable depending on the timing if the implant and there is a reduction in marbling at a constant carcase weight, which decreases eating quality.

Above the impact on individual traits, there is a HGP effect directly on eating quality attributes of beef.

Figure 17. Proportion of hormonal growth promotant treatment of MSA graded cattle in 2014-15

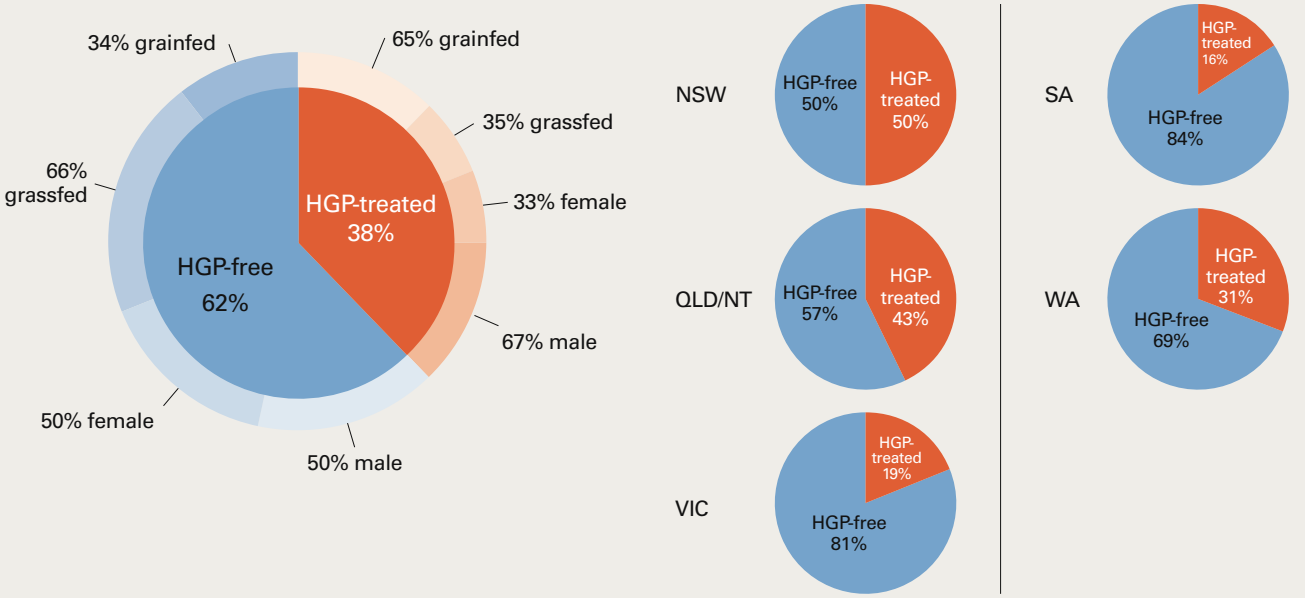
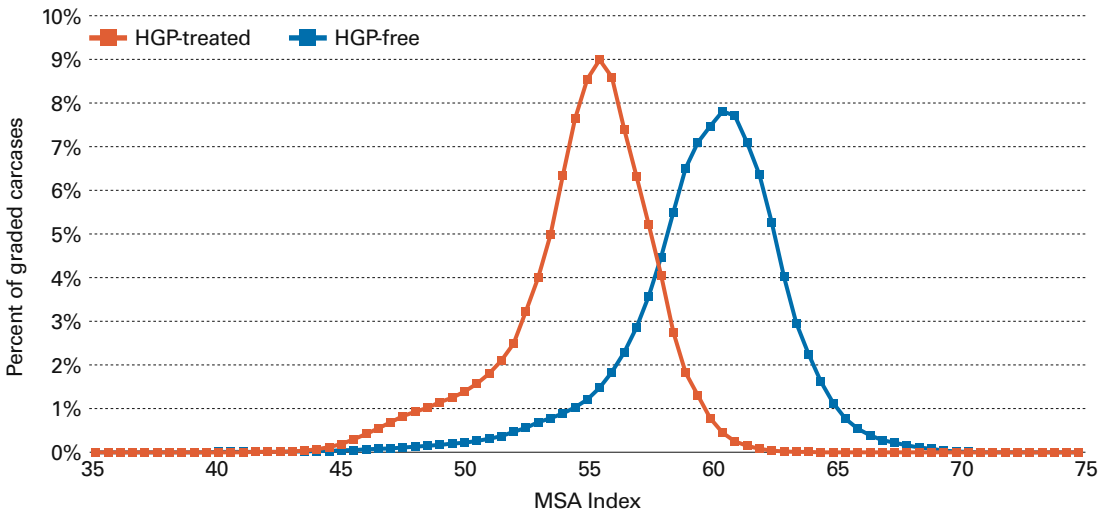


Figure 18. MSA Index distribution by HGP treatment in 2014-15



HGP treated cattle had an average MSA Index of 54.48.

HGP-free cattle had an average MSA Index of 59.60.

Figure 18 shows the distribution of the MSA Index for hormonal growth promotant status. In this example and different to the other categories of feed type and gender, each group, free or implanted only has 1 peak. These peaks are approximately 5 index points apart, reflective of the varying but combined impact of hormonal growth promotants on each cut in the carcase.

TIP:

HGP status has a 'Very High' importance rating in its ability to change the MSA Index. Optimising other carcase traits of implanted cattle such as marbling and ossification is important when aiming to increase MSA Index results.

Table 6. Average carcase traits by HGP status

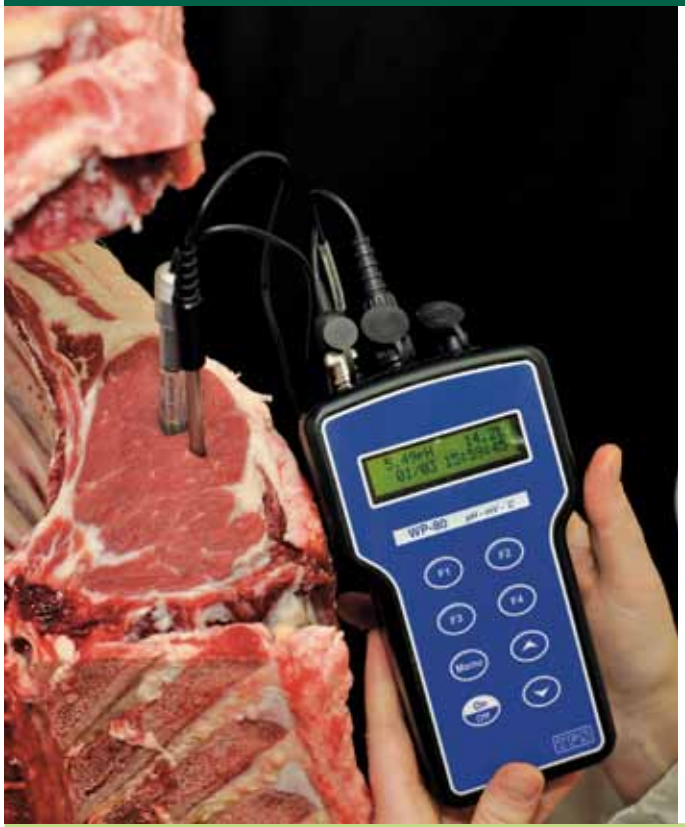
		Carcase weight (kg)	Hump height (mm)	Ossification	MSA marbling	Rib fat (mm)	MSA Index
HGP-treated	Minimum	108	15	100	100	3	33.64
	Maximum	616	350	590	1190	60	66.67
	Average	306.4	70	170	340	8	54.48
HGP-free	Minimum	74.8	15	100	100	3	35.72
	Maximum	600	350	590	1190	60	73.22
	Average	272	60	160	320	7	59.60

Carcase traits impacting on the MSA Index

The following figures show ranges and distribution of various carcase traits between HGP treatment groups that have an impact on the MSA Index.

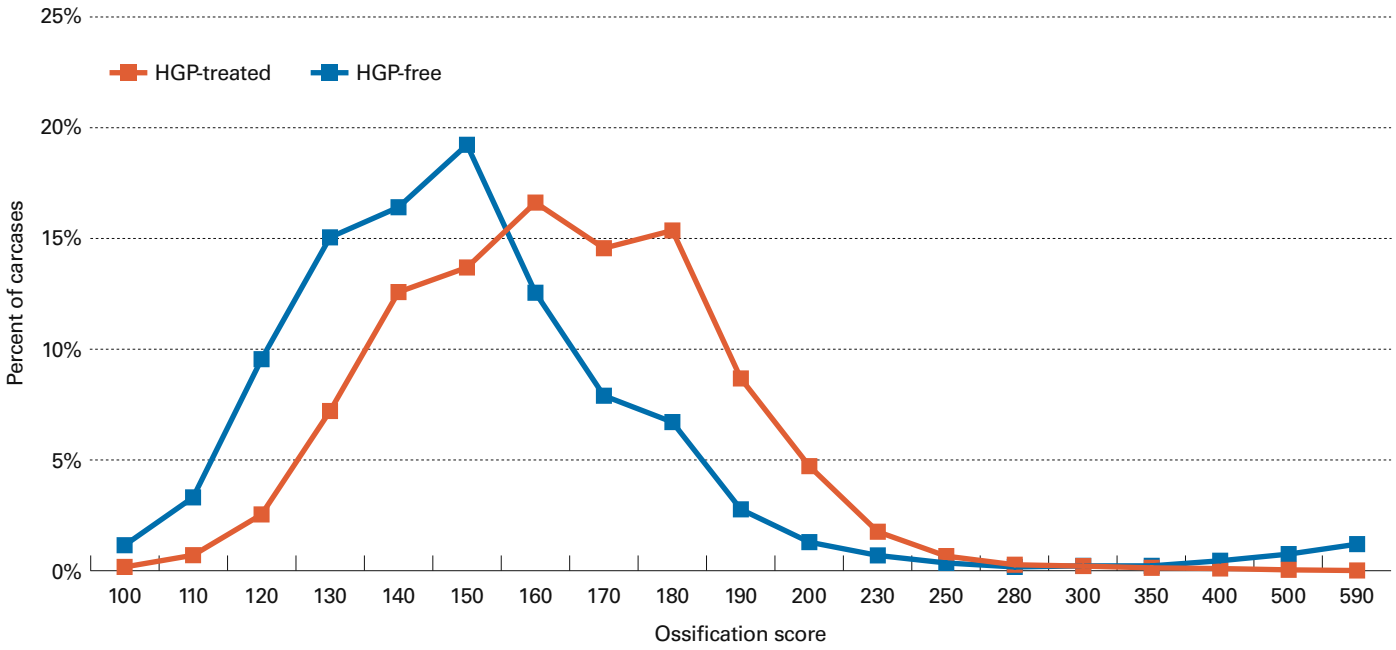
KEY POINTS

- HGP-treated cattle had a larger proportion of animals with heavier carcase weights, reflected in the average 54kg difference between the 2 groups.
- HGP-free group had a larger proportion of cattle with lower ossification scores with the average score being 160.
- Marbling differences were slight and showed as much variation within groups as between them.

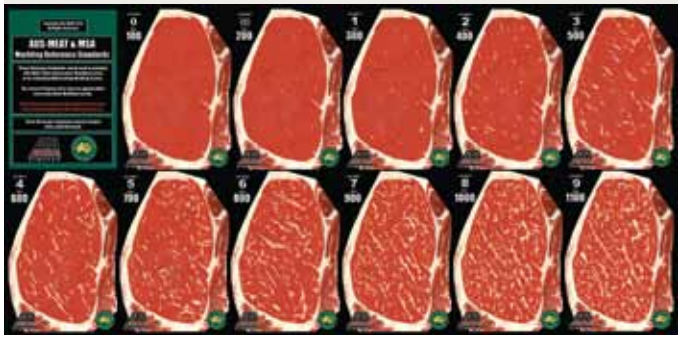


Ossification

Figure 19. Ossification distribution by HGP status



Note that Figure 20 focuses on MSA marbling scores to 590. 0.67% of HGP treated and 1.16% of HGP-free cattle produced MSA Marbling scores 600 or greater.



Marbling

Figure 20. Marbling distribution by HGP status

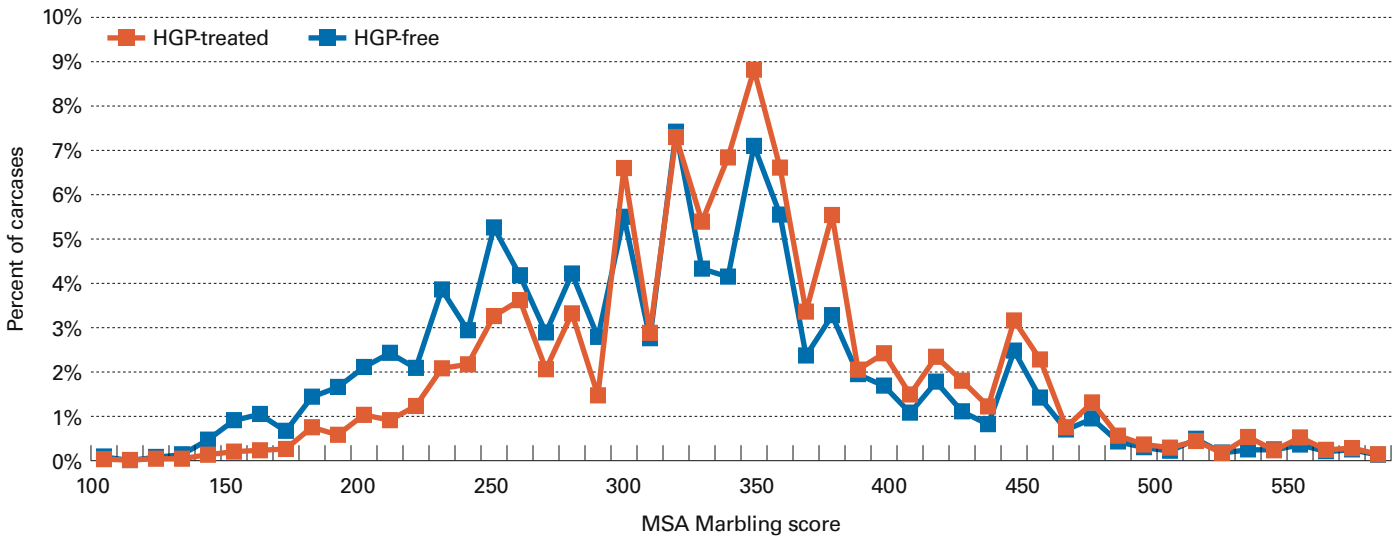


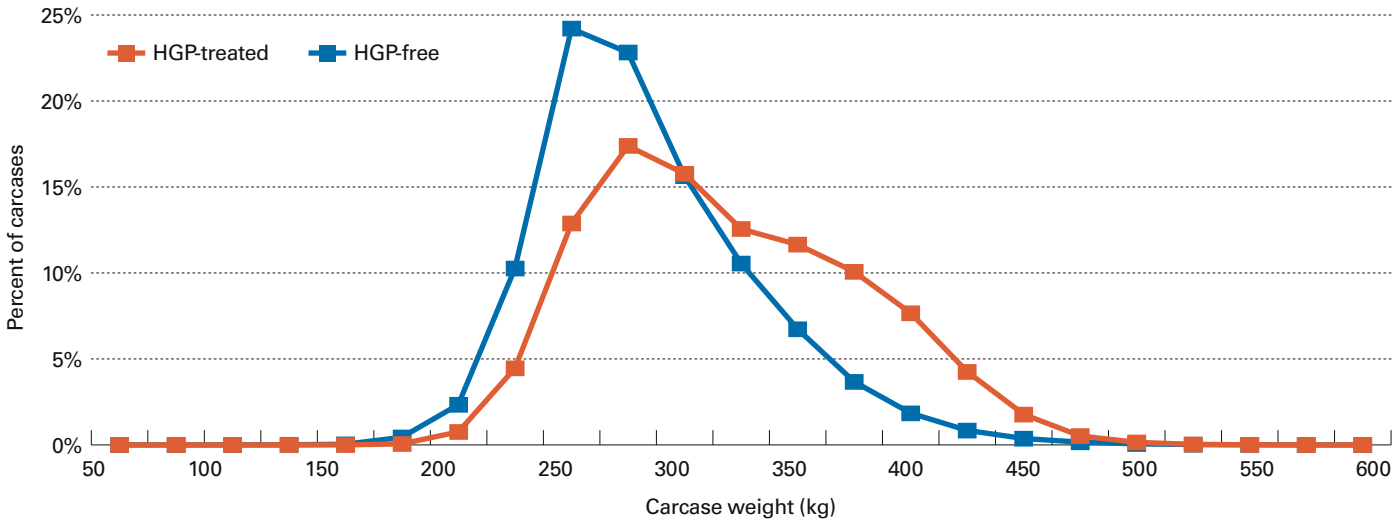
Table 7. MSA Index Percentiles bands by Growth Promotant treatment

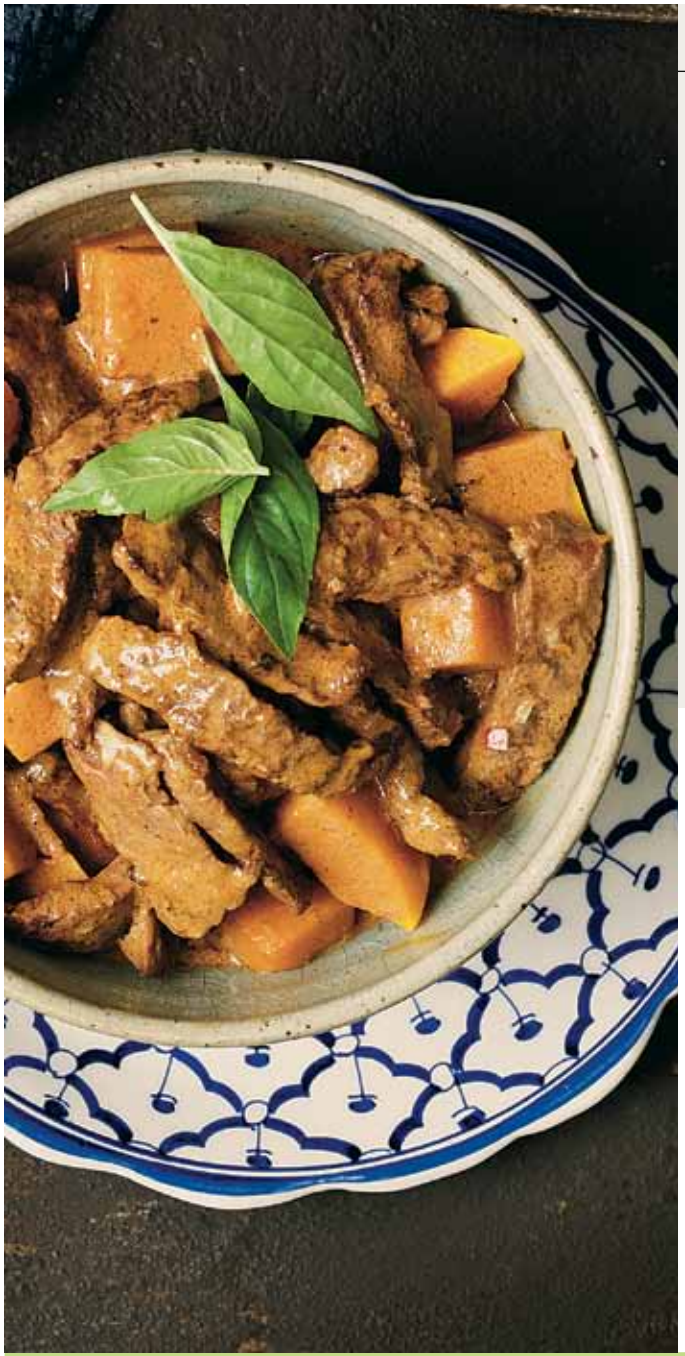
Band	HGP-treated	HGP-free
1	60.03	66.40
5	58.49	64.11
10	57.70	63.10
25	56.39	61.60
50	54.92	59.93
75	53.10	58.05
90	50.34	55.65
95	48.41	53.56
99	45.77	48.78

Implanted cattle with an index value greater than 54.92 would place an animal in the top 50% of that group. HGP-free animals require a 59.93 index value to place them in the top 50% of their population.

Carcase weight

Figure 21. Carcase weight distribution by HGP status





GENDER EFFECTS ON THE MSA INDEX

In 2014-15, 56% of MSA graded cattle were declared as male, defined as males that do not display secondary sexual characteristics. All states recorded greater MSA grading numbers for these males.

Table 8 provides an indication of the average and ranges of carcase attributes for both male and female MSA carcases, showing that on average male carcases were 54kg heavier than their female counterparts. On average, male carcases also have more favourable measurements for marbling and ossification, possibly associated with the heavier carcase weight.

This is reflected in the slightly elevated MSA index values for male carcases.

Figure 22. Proportion of male and female MSA graded cattle in 2014-15

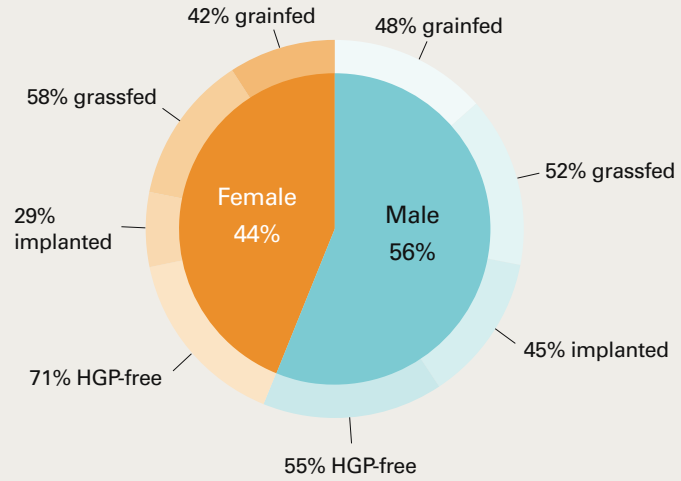


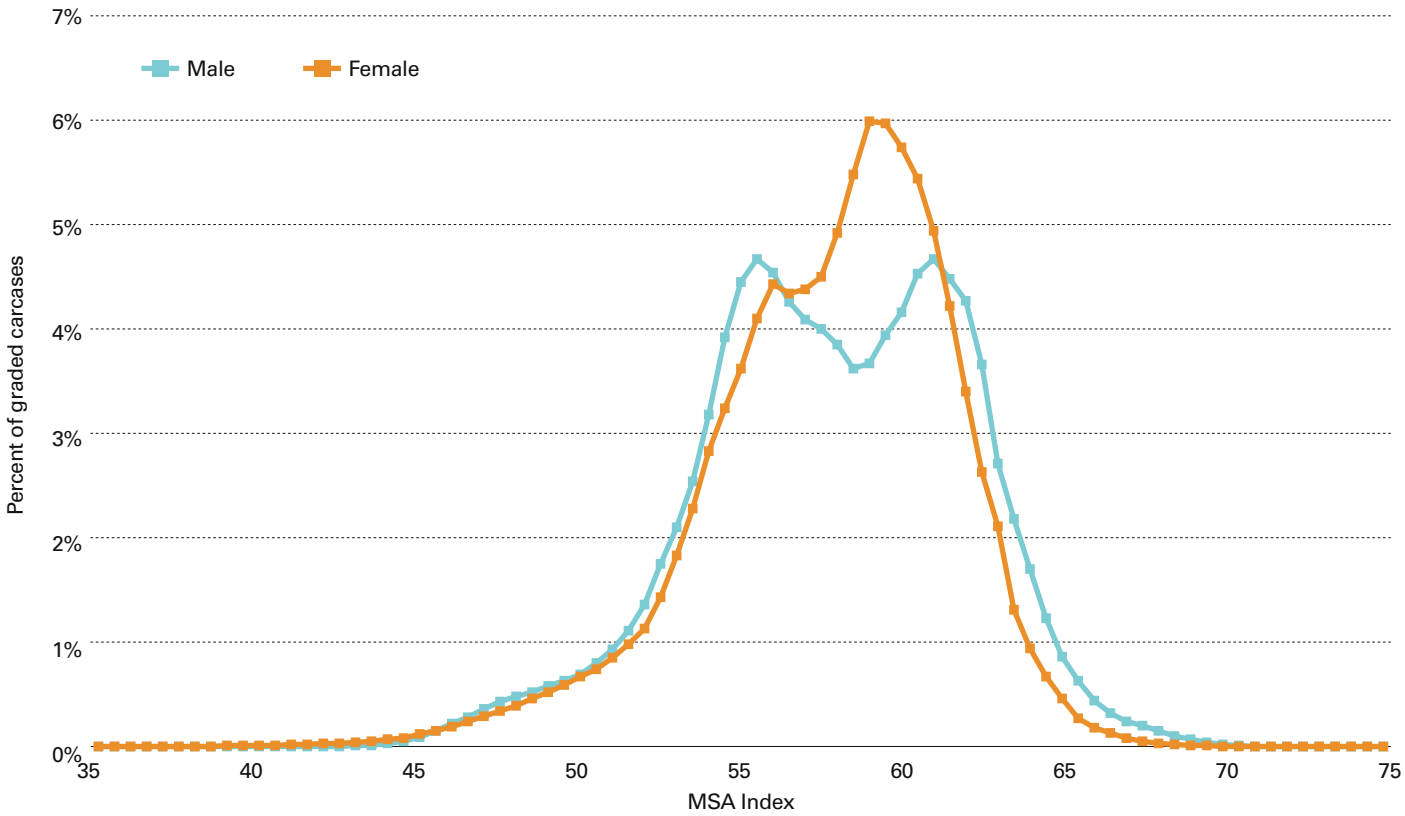
Table 8. Average carcase traits of males and females

		Carcase weight (kg)	Hump height (mm)	Ossification	MSA marbling	Rib fat (mm)	MSA Index
Male	Minimum	94	15	100	100	3	40.74
	Maximum	616	350	590	1190	60	73.22
	Average	308.9	70	150	340	8	57.65
Female	Minimum	74.8	15	100	100	3	33.64
	Maximum	578	350	590	1190	60	73.04
	Average	254.8	55	170	320	8	57.53

Figure 23 shows the distribution of the MSA index between males and females. The male population has two very distinct equally spread populations around the MSA index scores of 55 and 62 . This is primarily explained by HGP treatment, given almost an equal split between HGP treated and HGP-free populations. Whereas only 29% of females were HGP treated related to the smaller less distinct hump in the female line, explaining the higher percentage of female carcases that have MSA Index values above 60.

Previous research has established that at low ossification scores, female carcases will have enhanced eating quality compared to equivalent male counterparts, due to a range of characteristics, but primarily associated with fat, including the earlier deposition of marbling.

Figure 23. MSA Index distribution by gender in 2014-15



Male cattle had an average MSA Index of 57.65.

Female cattle had an average MSA Index of 57.53.

Carcase traits impacting on the MSA Index

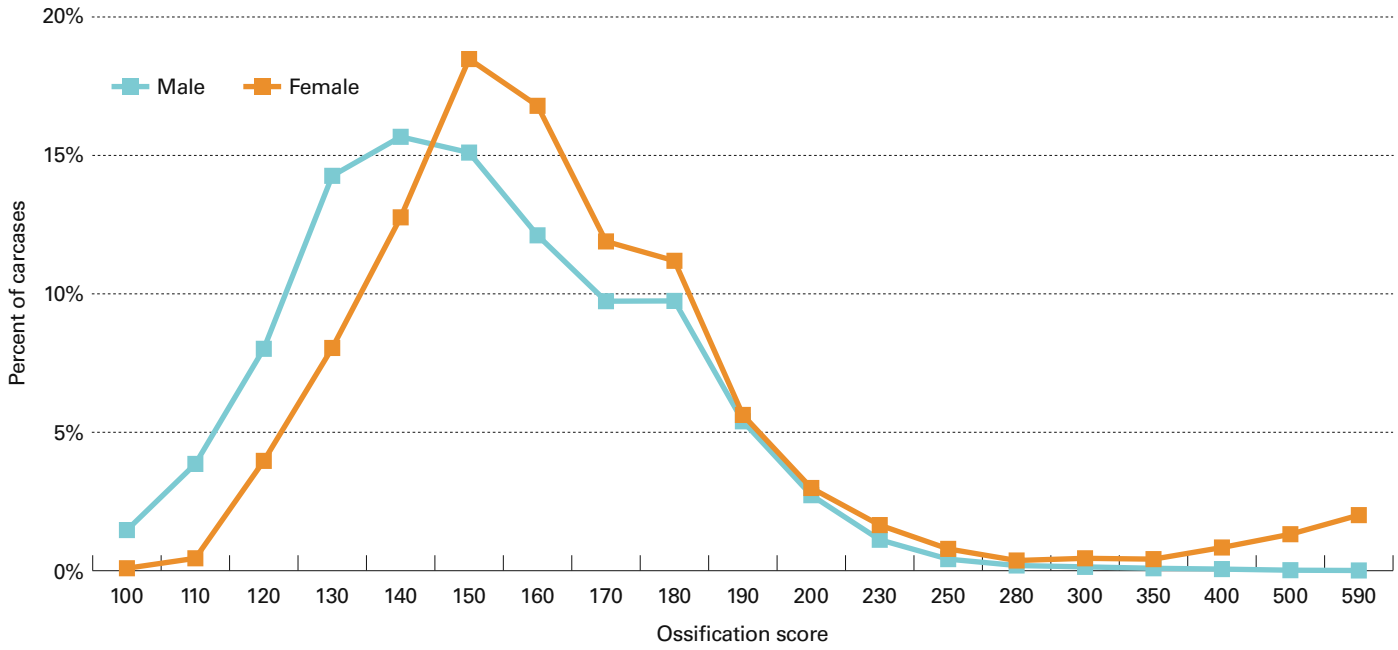
The following figures show ranges and distribution of various carcase traits between gender groups that have an impact on the MSA Index.

KEY POINTS

- Female group has a larger proportion of carcases with higher ossification scores, including older females with ossification scores over 300. Average ossification score of females is 170 compared to 150 in males.
- As much variation within as between gender groups in marbling.
- Much larger proportion of lighter carcases amongst female group.

Ossification

Figure 24. Ossification distribution by gender



Note that Figure 25 focuses MSA marbling scores to 590. 0.87% of female cattle and 1.41% of male cattle produced MSA Marbling scores 600 or greater.

Marbling

Figure 25. Marbling distribution by gender

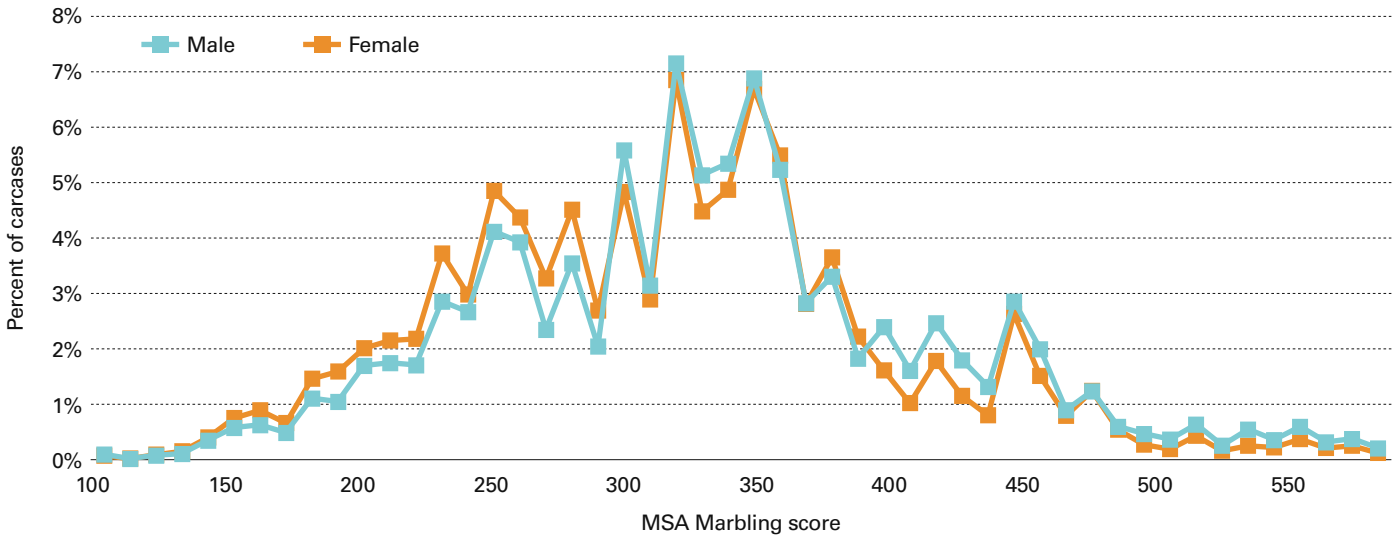


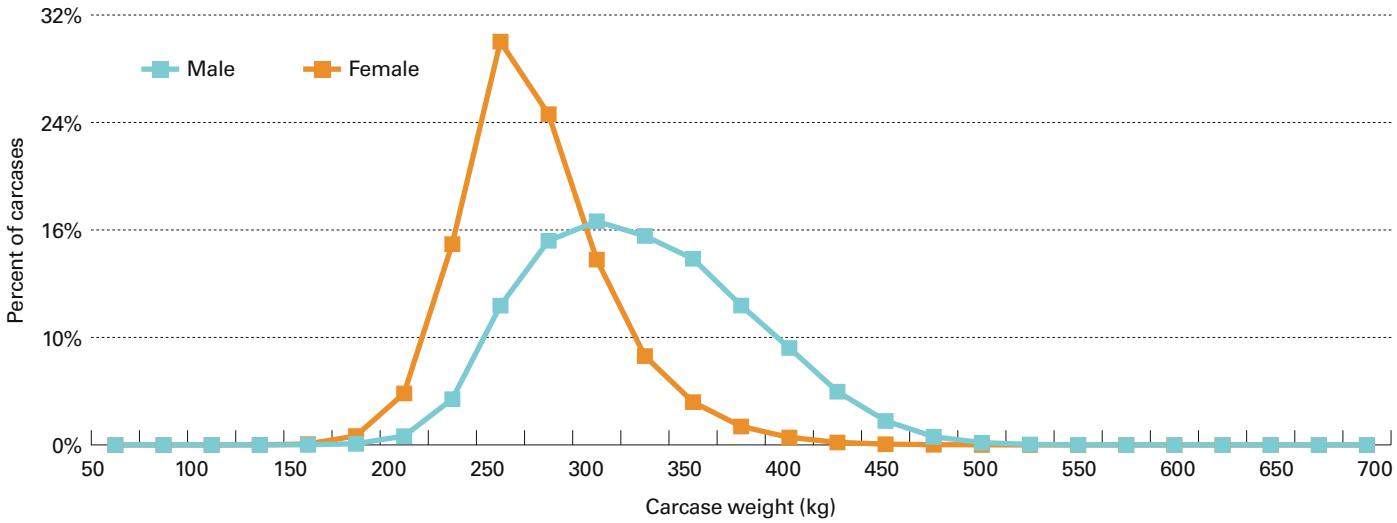
Table 9. MSA Index Percentiles bands by gender

Band	Male	Female
1	66.26	64.71
5	63.81	62.79
10	62.68	61.84
25	60.85	60.19
50	57.76	58.03
75	54.84	55.24
90	52.40	52.69
95	50.33	50.49
99	46.75	46.36

Males with a MSA Index greater than 57.76 were considered to be in the top 50% for eating quality of all MSA graded male carcases. The top 50% of female animals had a slightly higher index value of 58.03.

Carcase weight

Figure 26. Carcase weight distribution by gender




STATE SNAPSHOTS

NEW SOUTH WALES

Cattle produced in New South Wales represent 30% of all MSA graded cattle in Australia in 2014-15.

36% of MSA registered cattle producers reside in New South Wales, including ACT. This represents 6,332 MSA registered beef producers, with over 4,400 of these producers consigning cattle to the MSA program in the 2014-15.

Since 2010-11, the number of cattle graded in New South Wales has continued to increase annually with over 900,000 MSA graded in 2014-15, representing 44% of all adult cattle processed in New South Wales, as shown in Figure 27. Figure 28 shows there has been a 188% increase in MSA grading in New South Wales since 2010-11.

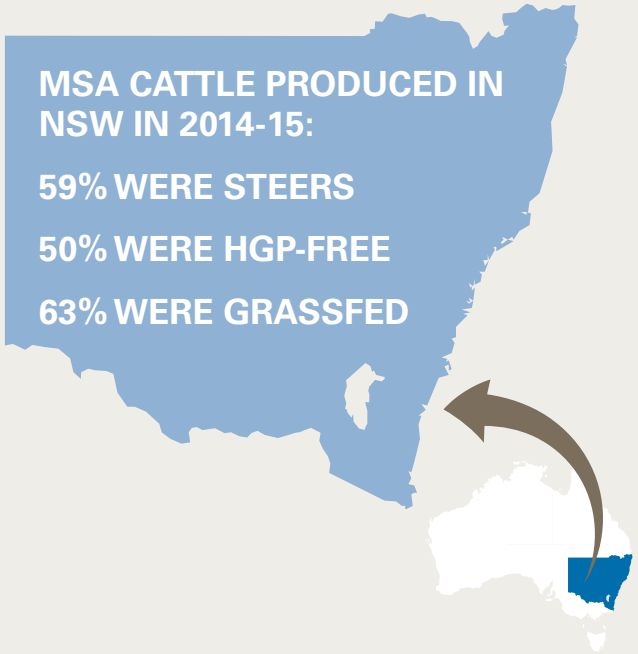


Figure 27. 44% of adult cattle slaughtered in New South Wales in 2014-015 were presented for MSA grading

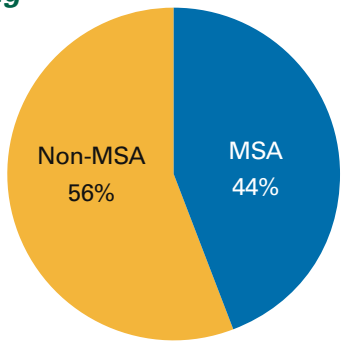
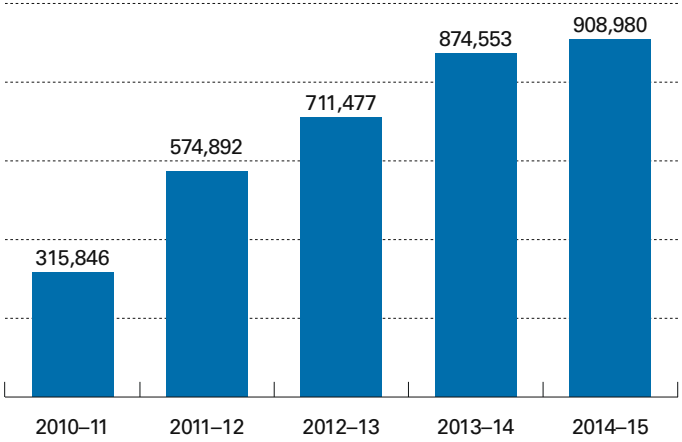


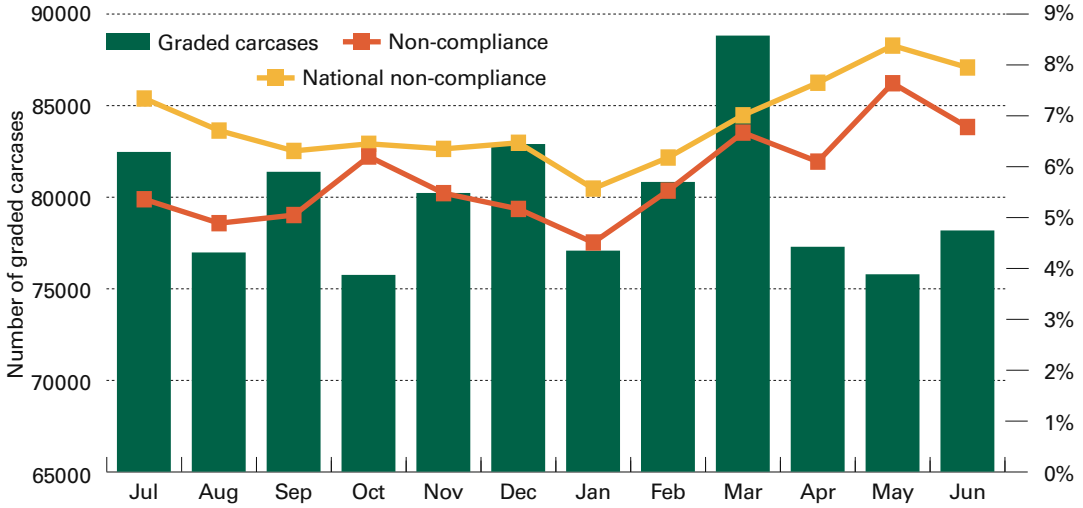
Figure 28. Growth in MSA grading in New South Wales



MSA grading numbers are the numbers reported from MSA licensed processors.

Figure 29 shows the number of cattle consigned from New South Wales per month throughout 2014-15 and the corresponding percentage of non-compliance for that month. New South Wales recorded 5.8% non-compliance to the MSA minimum requirements, with non-compliance being greatest in May and June 2015.

Figure 29. Monthly non-compliance to MSA specifications of cattle produced in New South Wales throughout 2014-15



May and June 2015 saw elevated rates of non-compliance both in NSW and nationally.

Figure 30 also shows the non-compliance to the MSA minimum requirements by month.

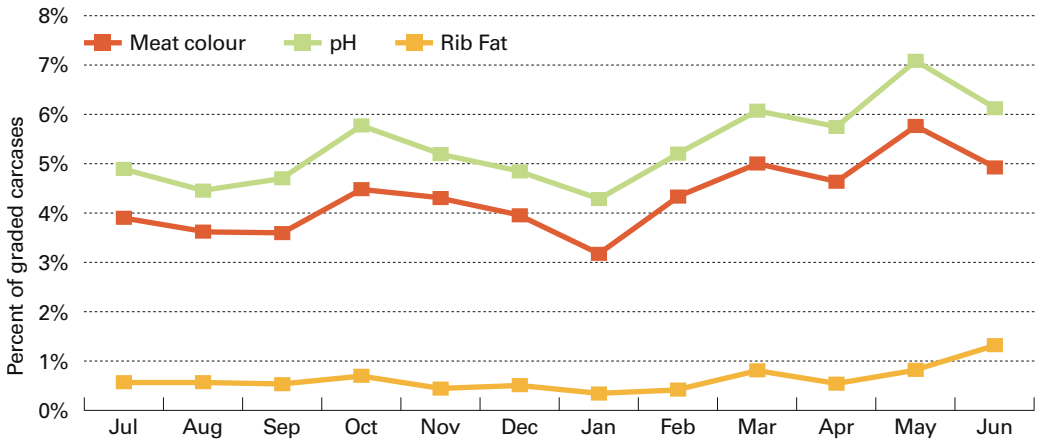
Table 10. MSA Index percentile bands for New South Wales

Band	National	NSW
1	65.74	64.98
5	63.44	62.95
10	62.37	61.90
25	60.58	60.16
50	57.61	57.54
75	55.04	55.42
90	52.52	54.06
95	50.39	53.11
99	46.60	49.80

The average MSA Index in New South Wales was 57.75 compared to the national average of 57.61.

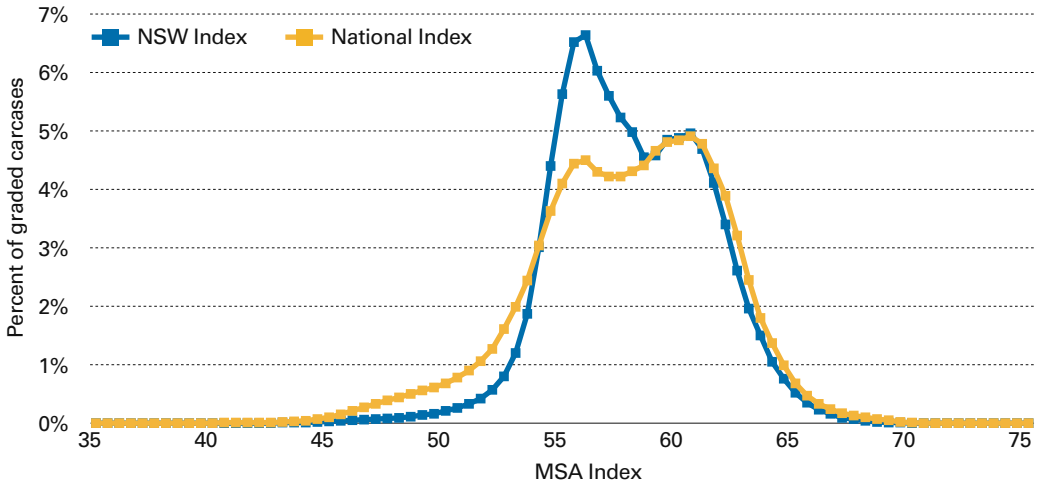
Figure 31 indicates that the MSA Index results for cattle produced in New South Wales has a similar maximum and minimum range as the national population. However New South Wales has a higher proportion of cattle within the range of 55-57. This suggests that there may be a higher percentage of animals with consistently similar carcase characteristics being supplied in New South Wales.

Figure 30. Monthly non-compliance to individual MSA specifications of cattle produced in New South Wales throughout 2014-15



pH and meat colour share a similar pattern of non-compliance. *Carcases can fail to meet MSA requirements for one or multiple reasons.*

Figure 31. 2014-15 New South Wales MSA Index distribution



Over 30% of cattle produced in NSW achieved MSA Index scores between 55 and 57.

Table 11. Carcase attributes of MSA carcases in New South Wales in 2014-15

	Carcase weight (kg)	Hump height (mm)	Ossification	MSA marbling	Rib fat (mm)	MSA Index
Minimum	103.4	15	100	100	3	37.78
Maximum	573	350	590	1170	60	71.39
Average	294.9	55	160	340	8	57.76

QUEENSLAND

Cattle produced in Queensland and Northern Territory represent 41% of all MSA graded cattle in Australia in 2014-15.

19% of MSA registered producers reside in Queensland and Northern Territory, accounting for over 5,986 individual registrations in Queensland and 49 in Northern Territory. Of the number of individual registrations, over 2,600 producers consigned MSA eligible cattle in the 2014-15 financial year.

Since 2010-11, the number of cattle graded in Queensland has continued to increase annually with over 1.35 million MSA graded in 2014-15, representing approximately 32% of all adult cattle processed in Queensland as shown in Figure 32. Figure 33 shows there has been a 103% increase in MSA grading in Queensland since 2010-11.

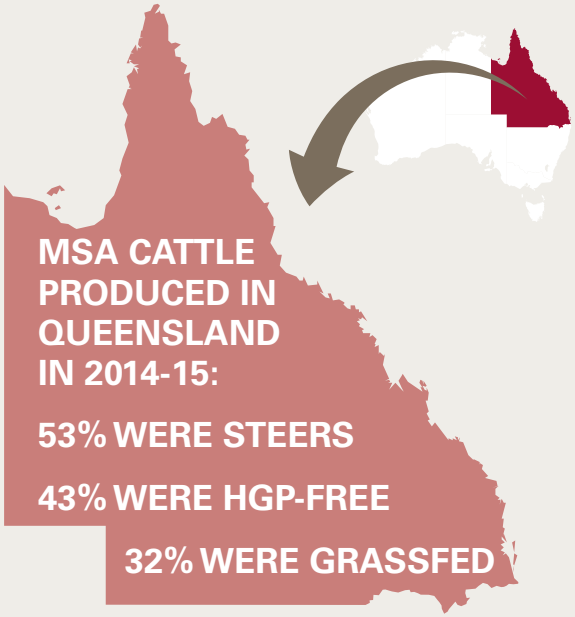


Figure 32. 32% of adult cattle slaughtered in Queensland in 2014-015 were presented for MSA grading

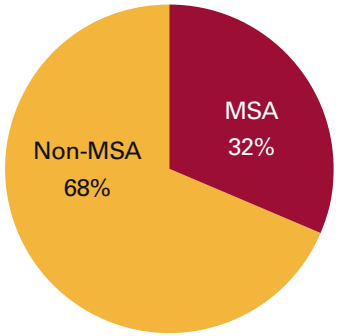
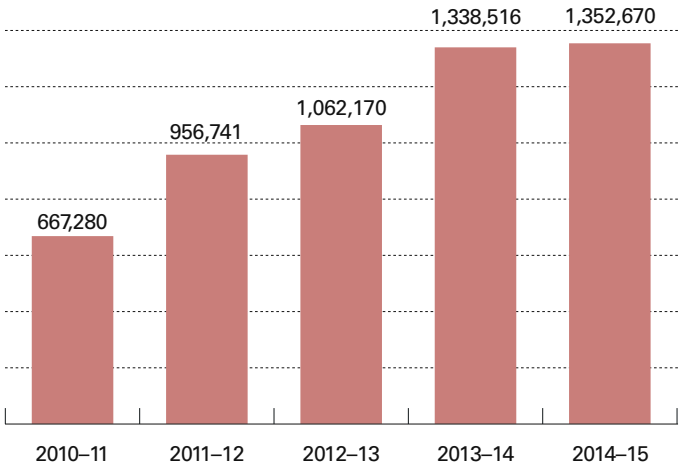


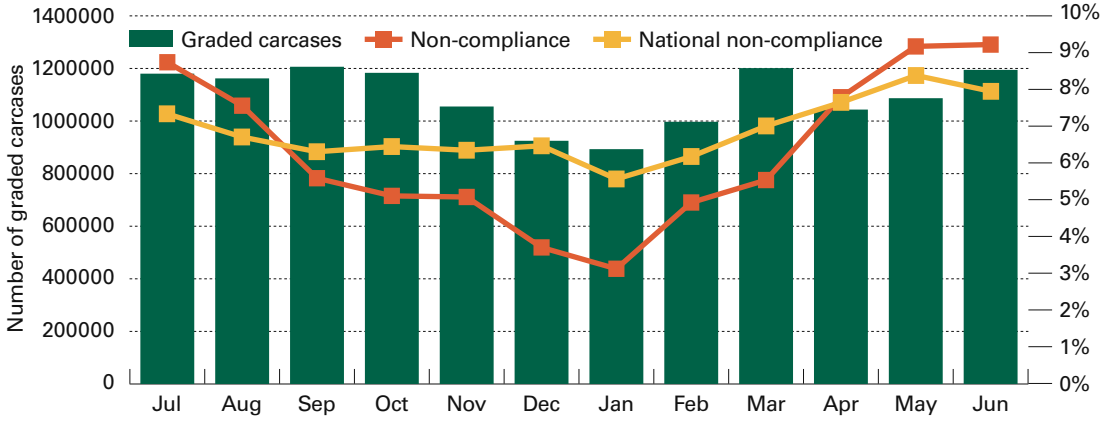
Figure 33. Growth in MSA grading in Queensland



MSA grading numbers are the numbers reported from MSA licensed processors.

Figure 34 shows the number of cattle consigned from Queensland per month throughout 2014-15 and the corresponding percentage of non-compliance. Queensland recorded 6.4% non-compliance to the MSA minimum requirements, with non-compliance being greatest in May and June 2015. A seasonal pattern is evident in this analysis showing elevated non-compliance in winter months in both 2014 and 2015. The seasonal pattern in Queensland almost mimics the national oscillation in compliance throughout the year.

Figure 34. Monthly non-compliance to MSA specifications of MSA cattle produced in Queensland throughout 2014-15



May and June 2015 saw elevated rates of non-compliance in Queensland similar to the national trend.

Figure 35 also shows the non-compliance to the MSA minimum requirements by month.

Table 12. MSA Index percentile bands for Queensland

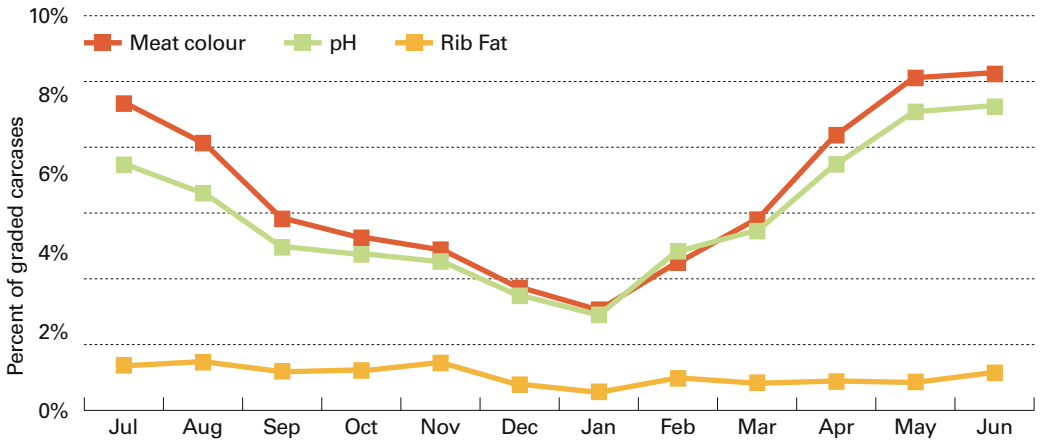
Band	National	QLD
1	65.74	64.14
5	63.44	61.83
10	62.37	60.70
25	60.58	58.85
50	57.61	56.18
75	55.04	53.22
90	52.52	50.34
95	50.39	48.34
99	46.60	45.50

The average MSA Index in Queensland was 55.84 compared to the national average of 57.61

Figure 36 indicates that the MSA Index results for cattle produced in Queensland have two distinct peaks similar to the national population.

The greatest proportion of Queensland cattle fall between the index scores of 58 to 59, accounting for 15% of all animals.

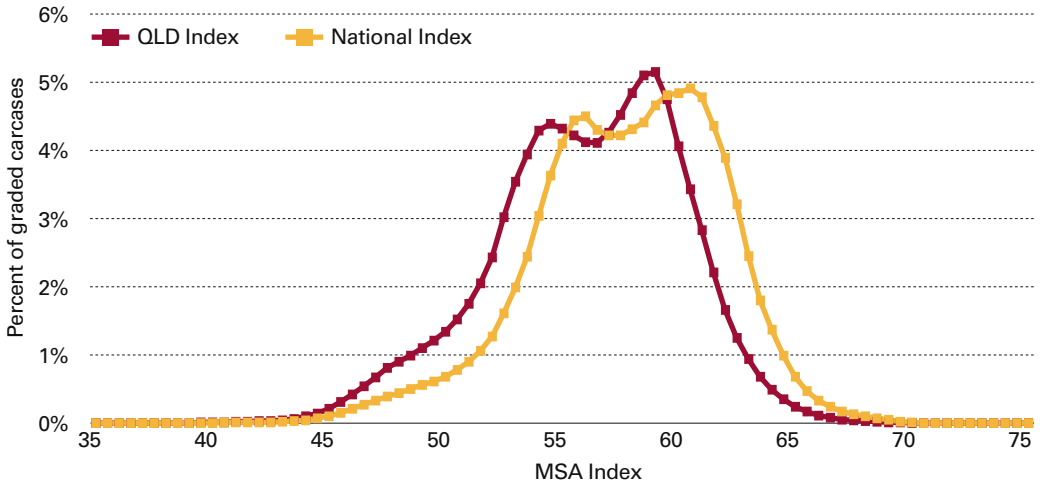
Figure 35. Monthly non-compliance by attribute of MSA cattle produced in Queensland throughout 2014-15



pH and meat colour share a similar pattern of non-compliance. *Carcases can fail to meet MSA requirements for one or multiple reasons.*

Non-compliance to fat coverage requirements remained consistent throughout the year.

Figure 36. 2014-15 Queensland MSA Index distribution



The QLD distribution of MSA Index values tracked closely to the national distribution.

The distinct humps in the Queensland distribution graph is likely to be influenced by the variation in breeds being presented for MSA grading as well as HGP treatment differences.

Table 13. Carcase attributes of MSA carcases in Queensland in 2014-15

	Carcase weight (kg)	Hump height (mm)	Ossification	MSA marbling	Rib fat (mm)	MSA Index
Minimum	82	15	100	100	3	33.64
Maximum	616	350	590	1190	60	71.02
Average	281.5	80	160	310	7	55.88

SOUTH AUSTRALIA

Cattle produced in South Australia represent 7% of all MSA graded cattle in Australia in 2014-15.

9% of MSA registered cattle producers reside in South Australia, accounting for 829 individual registrations. Of the registered population 800 unique SA producers consigned cattle to the MSA program in 2014-15.

Since 2010-11, the number of cattle graded has continued to increase annually with over 300,000 MSA graded in 2014-15, representing 64% of all adult cattle processed in South Australia as shown in Figure 37. Figure 38 shows there has been a 194% increase in MSA grading in SA since 2010-11.

MSA CATTLE PRODUCED IN SOUTH AUSTRALIA IN 2014-15

59% WERE STEERS

84% WERE HGP-FREE

78% WERE GRASSFED

Figure 37. 64% of adult cattle slaughtered in South Australia in 2014-015 were presented for MSA grading

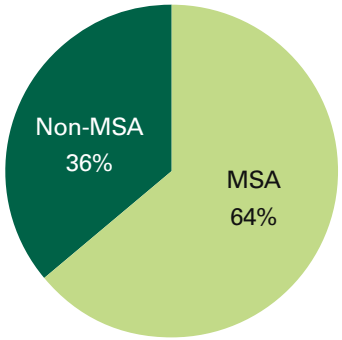
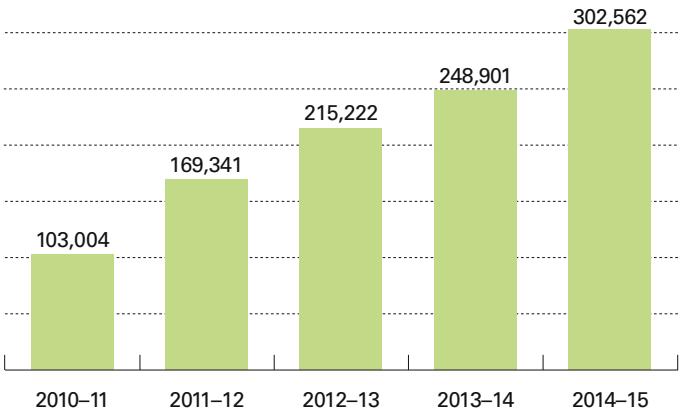


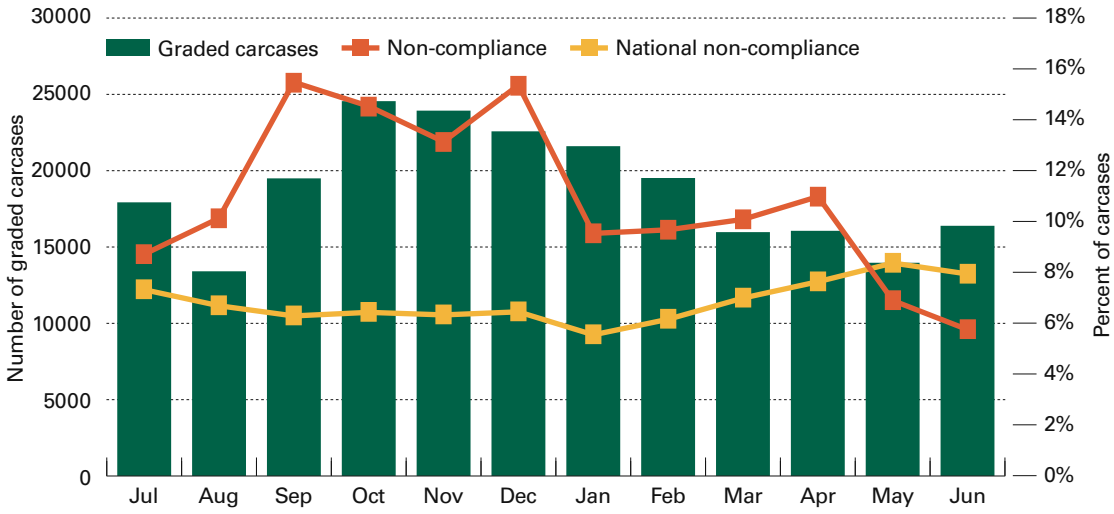
Figure 38. Growth in MSA grading in South Australia



MSA grading numbers are the numbers reported from MSA licensed processors.

Figure 39 shows shows the number of cattle consigned from South Australia per month throughout 2014-15 and the corresponding percentage of non-compliance. South Australia recorded an average of 11.2% non-compliance to the MSA minimum requirements, with non-compliance being greatest from spring through to early summer.

Figure 39. Monthly non-compliance to MSA specifications of cattle MSA graded in South Australia throughout 2014-15



Spikes in non-compliance occurred during Spring and early Summer of 2014.

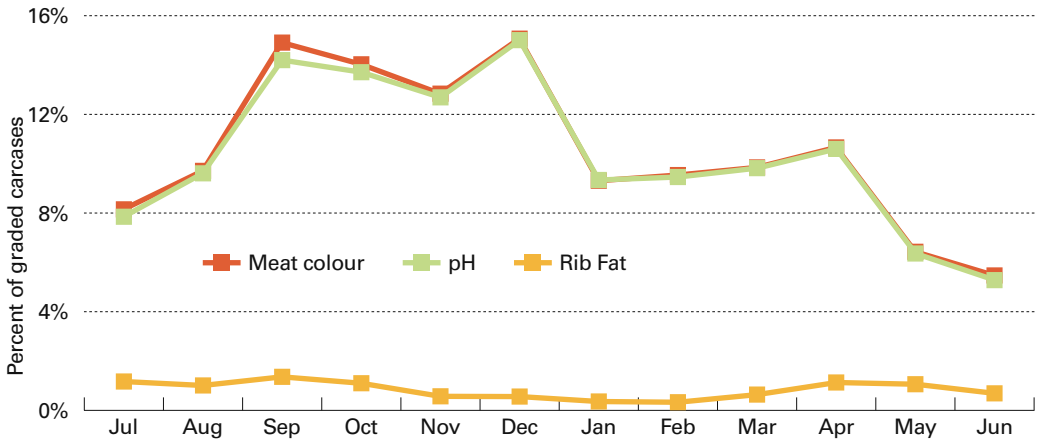
Figure 40 also shows the non-compliance to the MSA minimum requirements by month.

Table 14. MSA Index percentile bands for South Australia

Band	National	SA
1	65.74	65.53
5	63.44	64.08
10	62.37	63.26
25	60.58	62.00
50	57.61	60.55
75	55.04	58.50
90	52.52	55.78
95	50.39	54.67
99	46.60	52.39

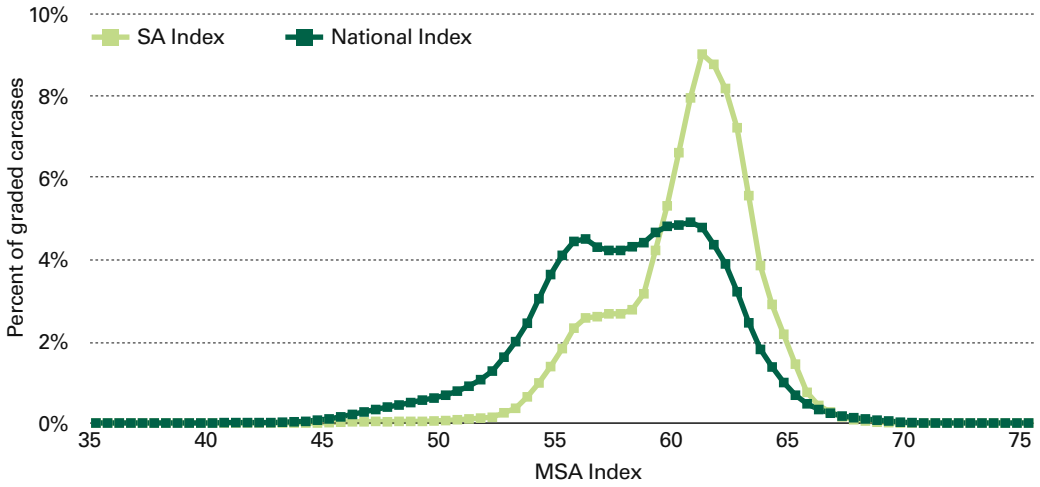
The average MSA Index in South Australia was 60.04 compared to the national average of 57.61.

Figure 40. Monthly non-compliance by attribute of cattle MSA graded in South Australia throughout 2014-15



The main reason for non-compliance during these months is attributed to dark meat colour and high pH. Non-compliance to fat coverage is below national average and remains consistent throughout the year.

Figure 41. 2014-15 South Australia MSA Index Distribution



In comparison to the national distribution, a larger proportion of cattle in South Australia had index values above 60 with over 40% of cattle between 60 and 62.

Table 15. Carcase attributes of MSA carcases in South Australia in 2014-15

	Carcase weight (kg)	Hump height (mm)	Ossification	MSA marbling	Rib fat (mm)	MSA Index
Minimum	94	15	100	100	3	42.18
Maximum	535	350	590	1050	58	70.92
Average	286.7	55	150	350	9	60.05

TASMANIA

Cattle produced in Tasmania represent 5% of all MSA graded cattle in Australia in 2014-15.

11% of MSA registered cattle producers reside in Tasmania, represented by 2,627 MSA registered beef producers. In 2014-15, over 2,000 of these producers consigned cattle to the MSA program.

Since 2010-11, the number of cattle graded has continued to increase annually with over 160,000 MSA graded in 2014-15, representing 68% of all adult cattle processed in Tasmania as shown in Figure 42. Figure 43 shows there has been a 60% increase in MSA grading in Tasmania since 2010-11.

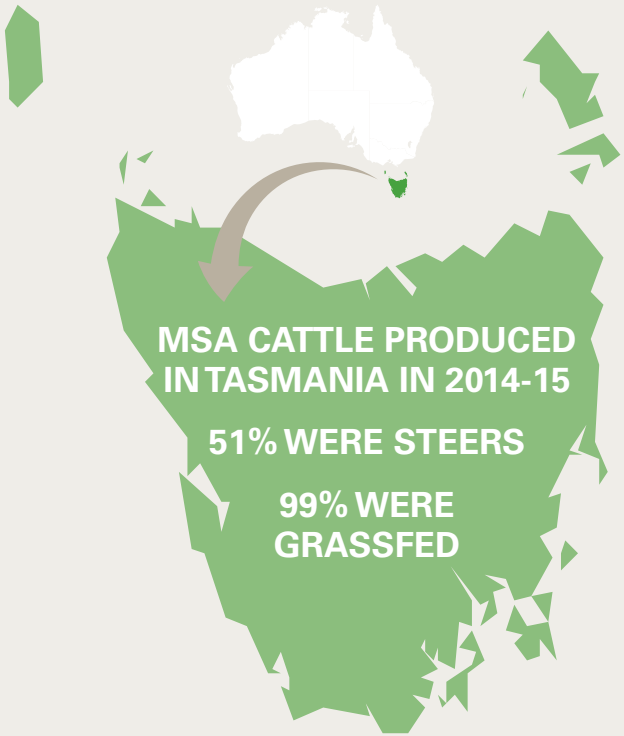


Figure 42. 68%% of adult cattle slaughtered in Tasmania in 2014-015 were presented for MSA grading

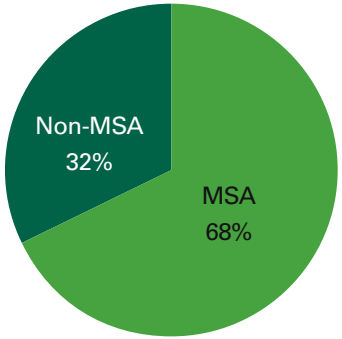
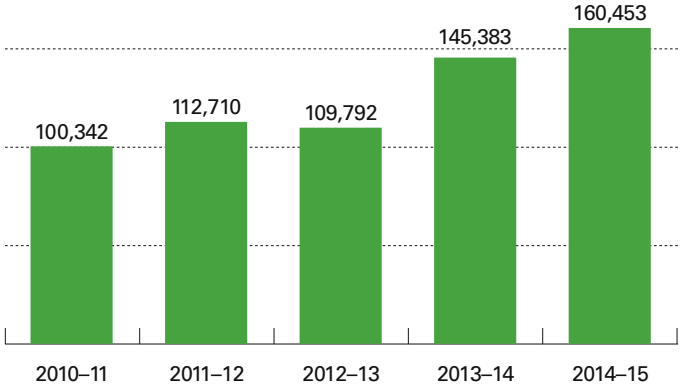


Figure 43. Growth in MSA grading in Tasmania



MSA grading numbers are the numbers reported from MSA licensed processors.

Unique to Tasmania, a much larger proportion of the states MSA graded cattle is made up of older female animals. For the purpose of this report, these animals have been defined as having an ossification score over 300 and as such comprise 12% of the states MSA graded animals.

To enable MSA producers in Tasmania to benchmark themselves based appropriately the Tasmanian snapshot has been split into animals below and above 300 ossification score.

Figure 44 shows MSA non-compliance by month of all cattle produced in Tasmania throughout 2014-15. The chart shows the number of cattle consigned per month and the corresponding percentage of non-compliance.

Figure 44. Monthly non-compliance to MSA specifications of MSA cattle produced in Tasmania throughout 2014-15

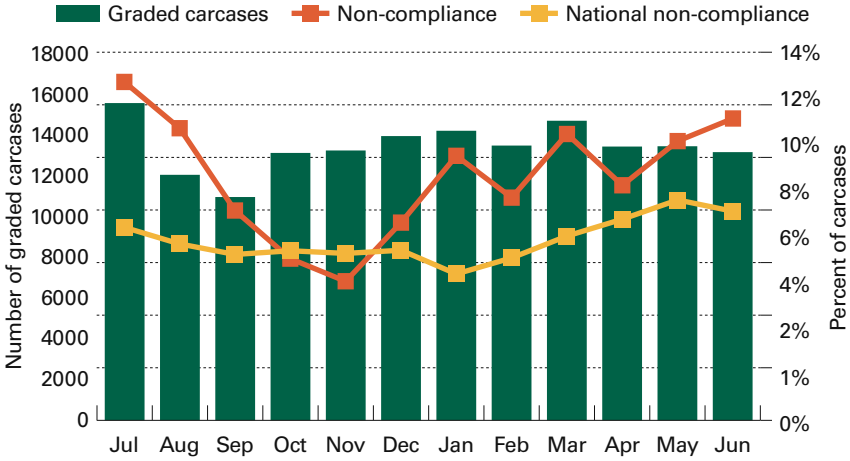


Figure 45 shows the non-compliance to MSA specifications for cattle below and above an ossification score of 300. 15.6% of cattle with ossification scores greater than 300 did not meet the MSA minimum requirements, compared to 8.65% of cattle with ossification scores lower than 300. This difference between the groups was consistent throughout the year.

The critical times of year when non-compliance was elevated were the same for each group being late Autumn and early winter.

Figure 46 shows the non-compliance for all Tasmanian cattle to the MSA minimum requirements by month and identifies that meat colour and pH are both the main contributors to non-compliance. The reasons for non-compliance were consistent between the younger and older cattle groups.

Figure 45. Monthly non-compliance to MSA specifications of MSA cattle produced in Tasmania throughout 2014-15 by ossification score

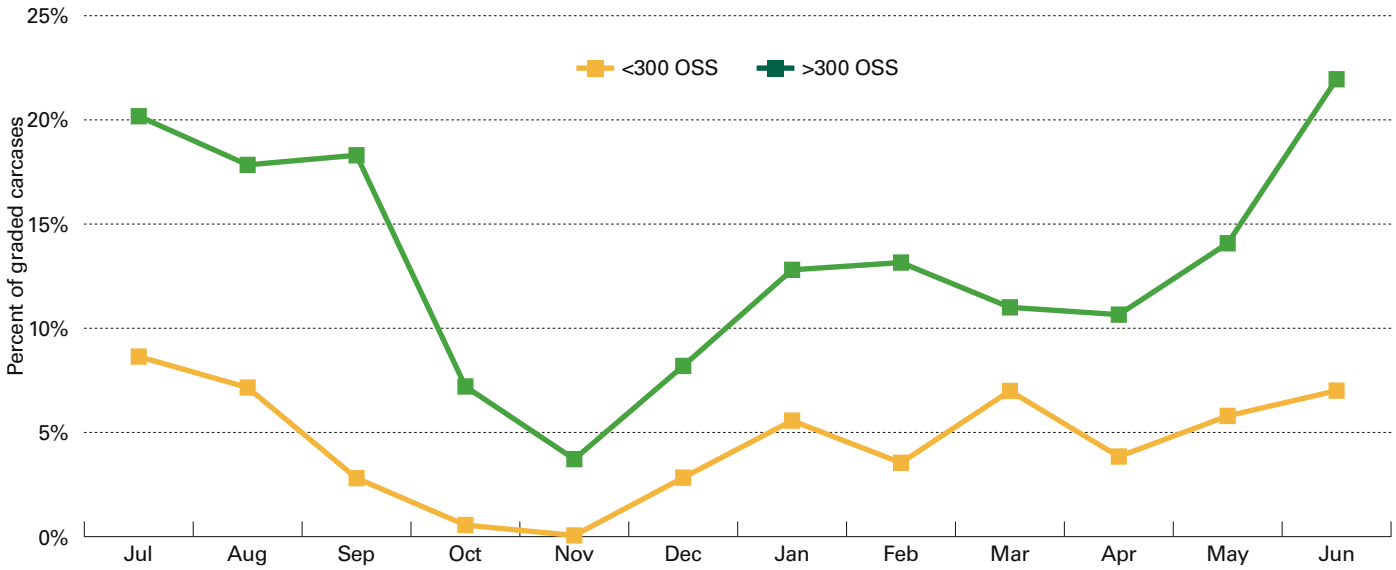


Figure 46. Monthly non-compliance by attribute of cattle MSA graded in Tasmania throughout 2014-15

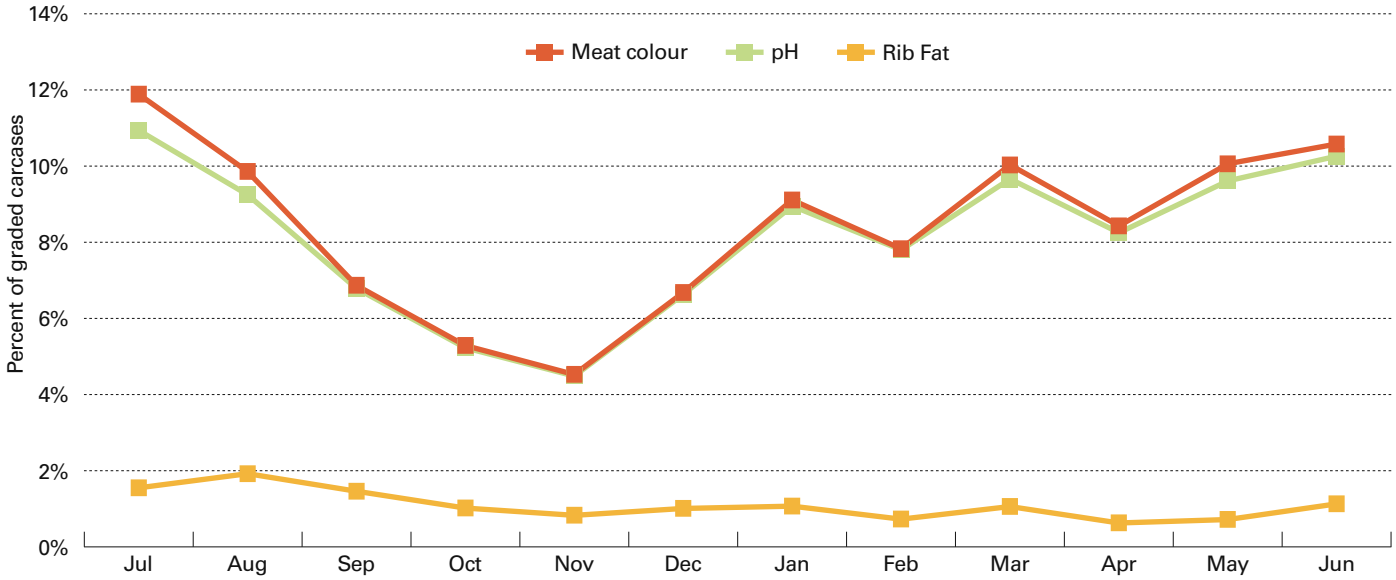


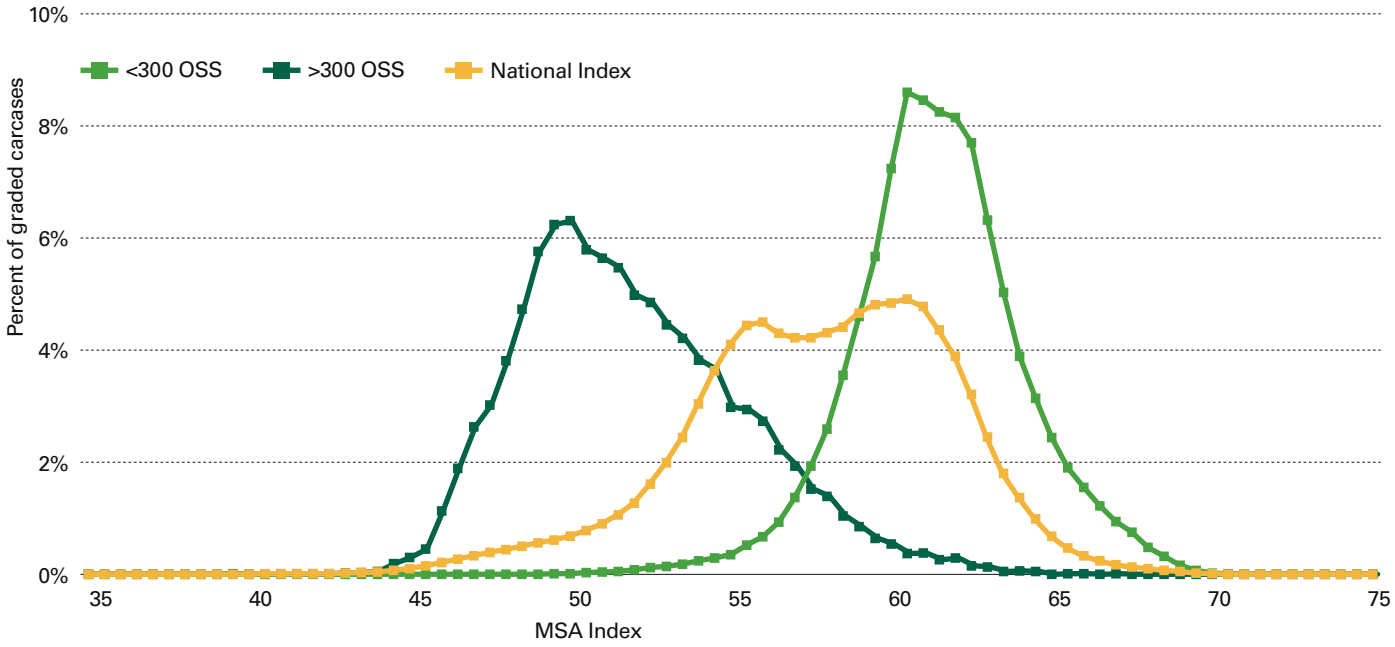
Table 16 provide the MSA index percentile bands for Tasmanian produced cattle and has broken this into an older and younger group (based on ossification scores).

Table 16. MSA index percentile bands for Tasmania

Band	National	TAS <300 Oss	TAS >300 Oss
1	65.74	67.55	61.08
5	63.44	65.66	57.95
10	62.37	64.47	56.43
25	60.58	62.74	53.9
50	57.61	61.14	51.19
75	55.04	59.62	49.08
90	52.52	58.08	47.55
95	50.39	57.00	46.68
99	46.60	54.18	45.47

The average MSA Index in Tasmania for all cattle was 60.19 compared to the national average of 57.61.

Figure 47. 2014-15 Tasmania MSA Index Distribution



In comparison to the national distribution, a larger proportion of cattle in Tasmania had index values above 60 and a tighter range of MSA index values.

Within the 2 cattle populations in Tasmania, the average MSA index for cattle with ossification greater than 300 was 51.65 compared to 61.18 for the younger group.

Table 17. Carcase attributes of all MSA cattle produced in Tasmania in 2014-15

	Carcase weight (kg)	Hump height (mm)	Ossification	MSA marbling	Rib fat (mm)	MSA Index
Minimum	137.8	15	100	110	3	39.13
Maximum	579.8	285	590	1180	60	70.56
Average	287.2	50	190	380	9	60.20

VICTORIA

Cattle produced in Victoria represent 10% of all MSA graded cattle in Australia in 2014-15.

14% of MSA registered cattle producers reside in Victoria, represented by 2,657 MSA registered beef producers. In 2014-15, over 1,400 of these producers consigned cattle to the MSA program.

Since 2010-11, the number of cattle graded has continued to increase annually with over 265,000 MSA graded in 2014-15, representing 14% of all adult cattle processed in Victoria that year as shown in Figure 48. Figure 49 shows there has been a 519% increase in MSA grading in Victoria since 2010-11.

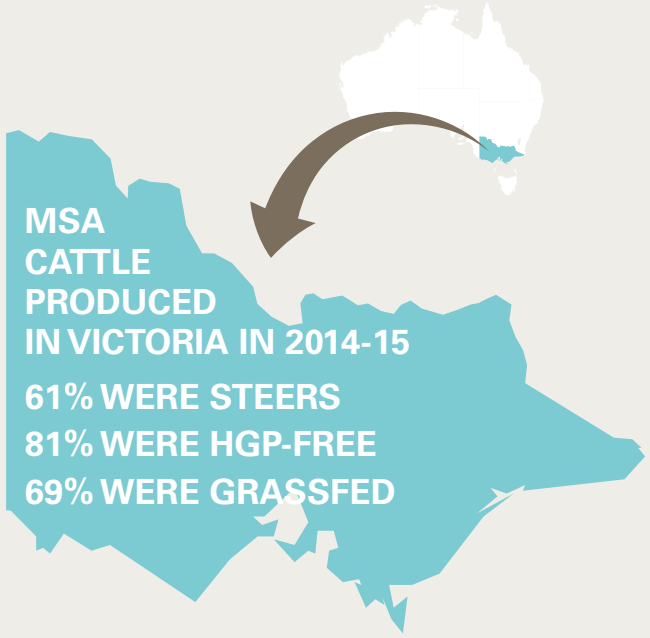


Figure 48. 14% of adult cattle slaughtered in Victoria in 2014-015 were presented for MSA grading

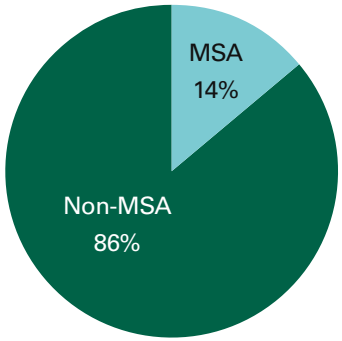
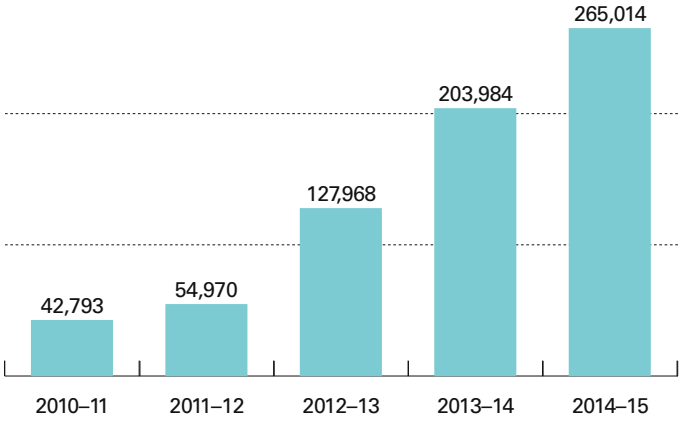


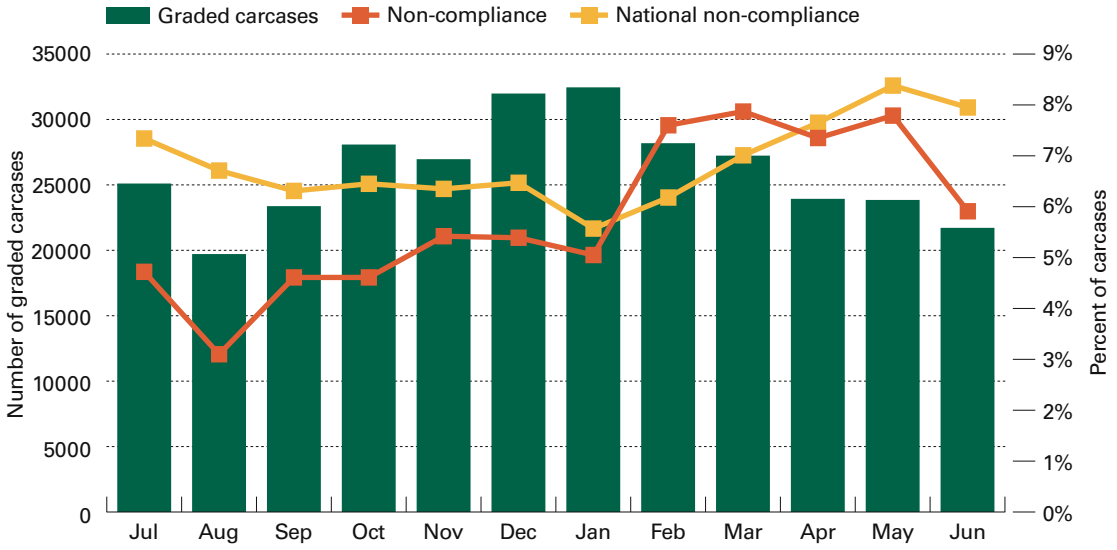
Figure 49. Growth in MSA grading in Victoria



MSA grading numbers are the numbers reported from MSA licensed processors.

Figure 50 shows the number of cattle consigned from Victoria per month throughout 2014-15 and the corresponding percentage of non-compliance.

Figure 50. Monthly non-compliance to MSA specifications of MSA cattle produced in Victoria throughout 2014-15



Victoria recorded 5.8% non-compliance to the MSA minimum requirements, with non-compliance incrementally increasing from summer to winter months.

The primary reason for the non-compliance relates to inadequate meat colour and high pH and also an increased proportion of carcases with inadequate fat coverage as shown in Figure 51.

Table 18. MSA Index percentile bands for Victoria

Band	National	VIC
1	65.74	65.52
5	63.44	64.01
10	62.37	63.19
25	60.58	61.83
50	57.61	60.25
75	55.04	57.88
90	52.52	55.09
95	50.39	53.84
99	46.60	48.97

The average MSA Index in Victoria was 59.61 compared to the national average of 57.61.

Figure 51. Monthly non-compliance by attribute of cattle MSA graded in Victoria throughout 2014-15

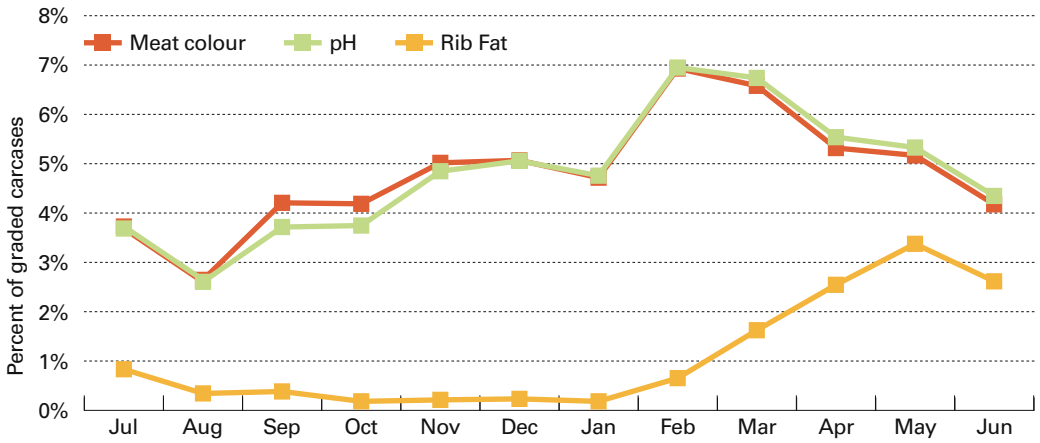
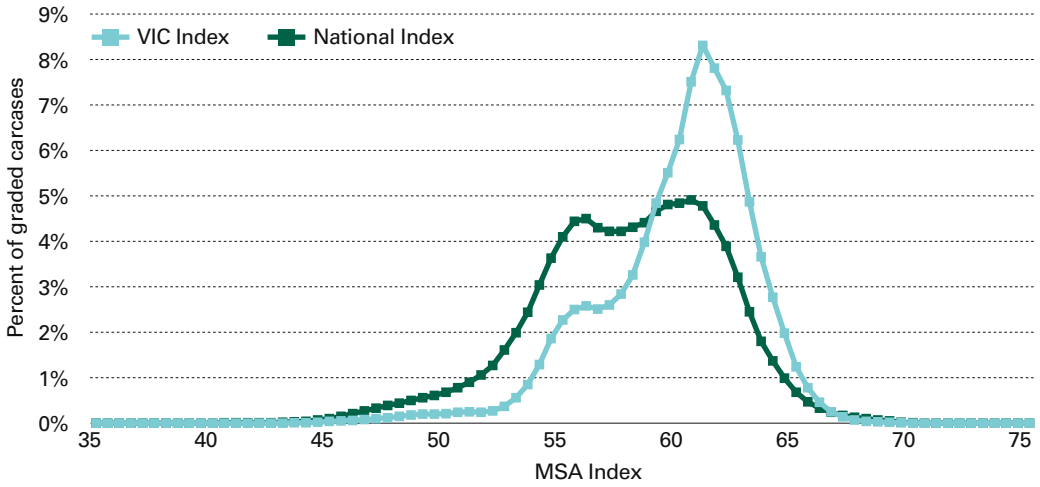


Figure 52. 2014-15 Victoria MSA Index Distribution



In comparison to the national distribution, a larger proportion of cattle in Victoria had index values above 60 and a tighter range of MSA index values.

The smaller distinct hump in the Victorian distribution graphs is likely to be representing the breeds of cattle used in production.

Table 19. Carcase attributes of MSA carcases in Victoria in 2014-15

	Carcase weight (kg)	Hump height (mm)	Ossification	MSA marbling	Rib fat (mm)	MSA Index
Minimum	98	15	100	100	3	38.77
Maximum	561	350	590	1190	58	70.33
Average	291.1	50	160	340	8	59.61

WESTERN AUSTRALIA

Cattle produced in Western Australia represent 8% of all MSA graded cattle in Australia in 2014-15.

11% of MSA registered cattle producers reside in Western Australia, represented by 2,021 MSA registered beef producers in Western Australia. In 2014-15, over 1,500 of these producers consigned cattle to the MSA program.

Since 2010-11, the number of cattle graded has continued to increase annually with over 230,000 MSA graded in 2014-15, representing 54% of all adult cattle processed in WA as shown in Figure 53. Figure 54 shows there has been a 19% increase in MSA grading in WA since 2010-11.

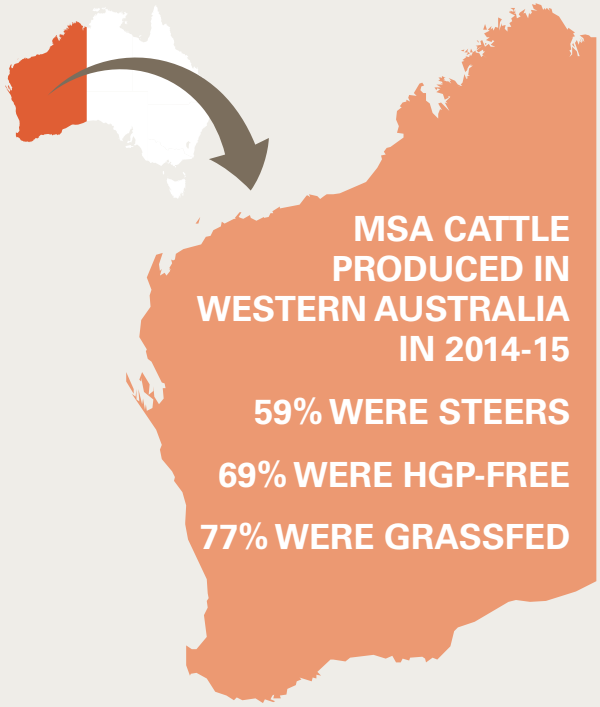


Figure 53. 54% of adult cattle slaughtered in Western Australia in 2014-015 were presented for MSA grading

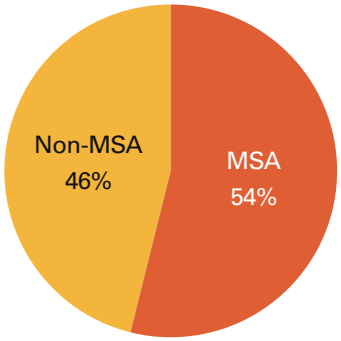
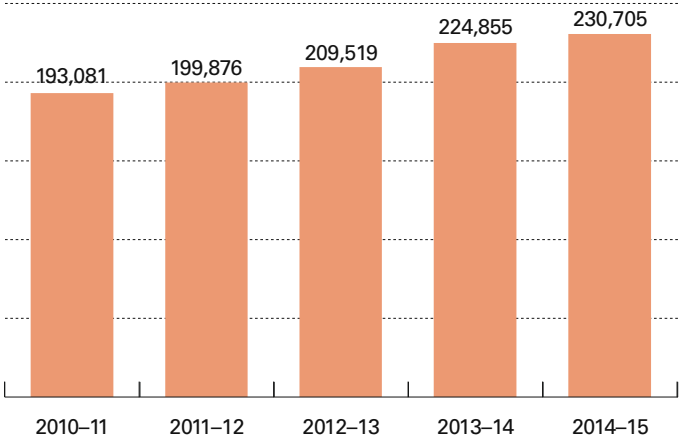


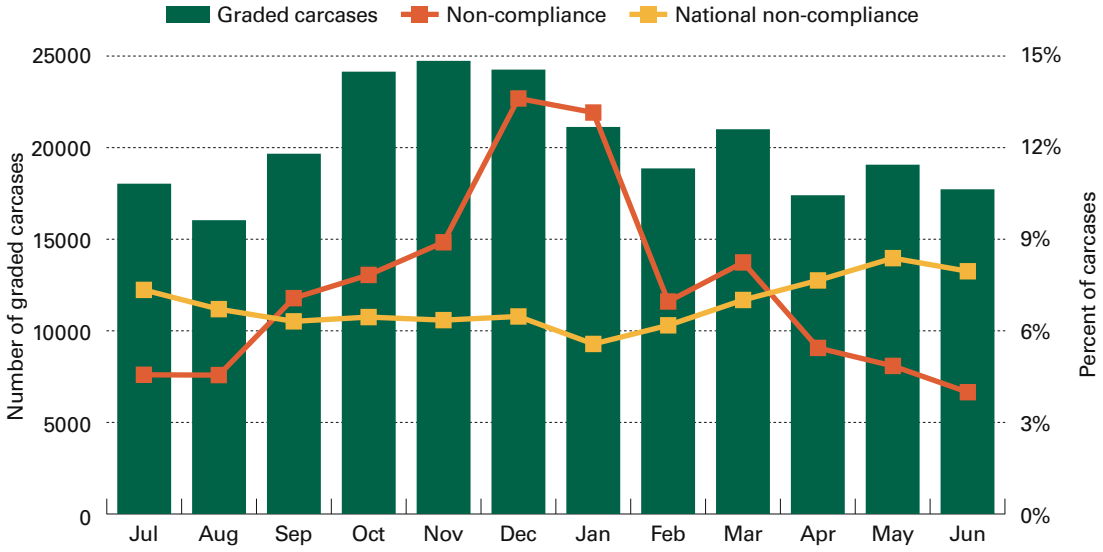
Figure 54. Growth in MSA grading in Western Australia



MSA grading numbers are the numbers reported from MSA licensed processors.

Figure 55 shows the number of cattle consigned from Western Australia per month throughout 2014-15 and the corresponding percentage of non-compliance.

Figure 55. Monthly non-compliance to MSA specifications of MSA cattle produced in Western Australia throughout 2014-15



Western Australia recorded 7.7% non-compliance to the MSA minimum requirements, with a strong trend evident for increased non-compliance from late spring to late summer.

Figure 56 illustrates that these elevated levels of non-compliance are a result of higher rates of inadequate meat colour and high pH. Non-compliance to fat coverage requirements is consistently low throughout the year.

Table 20. MSA Index percentile bands for Western Australia

Band	National	WA
1	65.74	68.38
5	63.44	65.64
10	62.37	64.01
25	60.58	62.19
50	57.61	60.36
75	55.04	56.81
90	52.52	54.89
95	50.39	53.88
99	46.60	50.89

The average MSA Index in Western Australia was 59.77 compared to the national average of 57.61.

Figure 56. Monthly non-compliance by attribute of cattle MSA graded in Western Australia throughout 2014-15

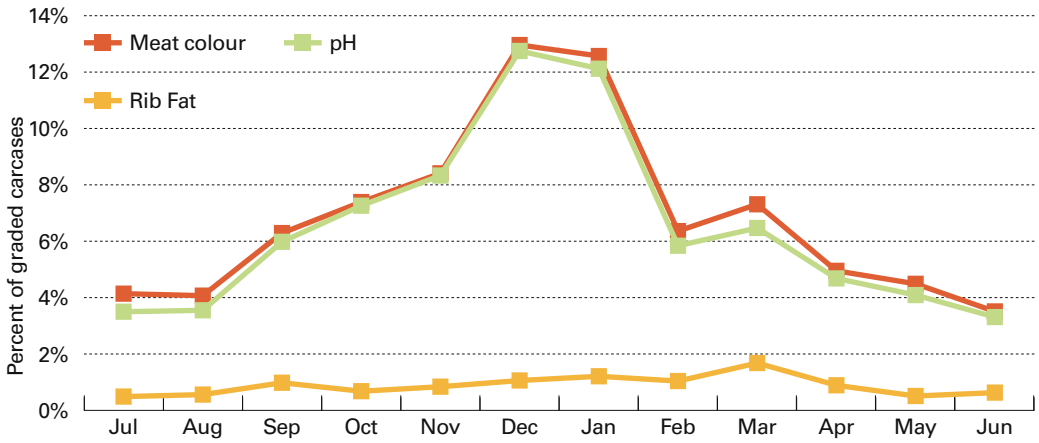
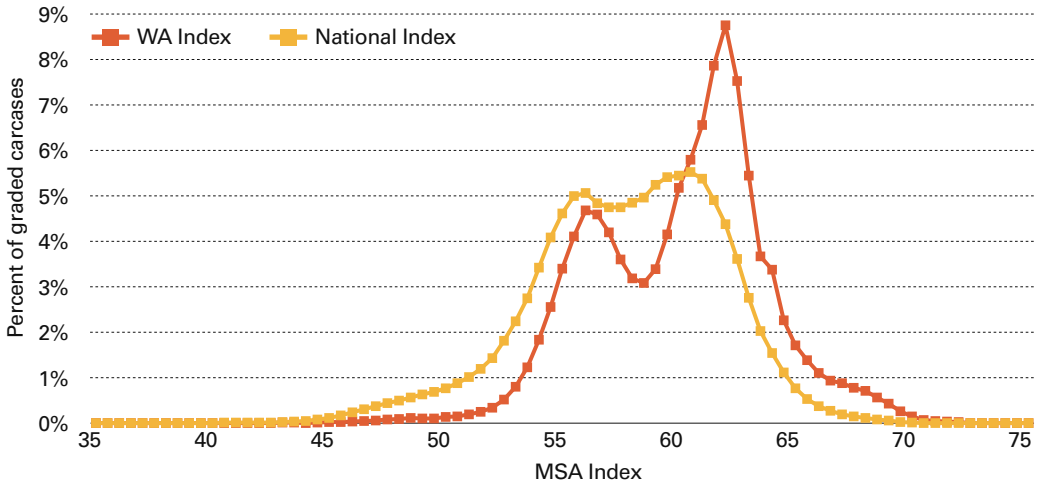


Figure 57. 2014-15 Western Australia MSA Index Distribution



In comparison to the national distribution, a larger proportion of cattle in WA had index values above 60.

The 2 distinct humps in the WA distribution graphs are likely to be representing HGP treatments.

Table 21. Carcase attributes of MSA carcases in Western Australia in 2014-15

	Carcase weight (kg)	Hump height (mm)	Ossification	MSA marbling	Rib fat (mm)	MSA Index
Minimum	74.8	15	100	100	3	35.77
Maximum	578	260	590	1180	60	73.22
Average	258.7	60	140	330	8	59.78

EATING QUALITY BENCHMARKS FOR MSA GRADED CATTLE

EATING QUALITY BENCHMARKS FOR MSA GRADED CATTLE

How to identify my performance ranking and opportunities for improvement

The follow tables are summaries of all attributes impacting on the MSA Index, distinguished by feed type and HGP treatment groups. This should allow an individual producer to identify their current performance amongst a category of similar carcases. The tables then provide insight into the average carcase attributes required to achieve an improvement in a producers MSA index performance within a herd.

EXAMPLE:

Scenario:

- Grassfed producer
- Produces steers for MSA
- Does not use HGP's
- During 2014-15 had an average MSA index of 61, ranking them in the 50% percentile band.
- They want to get into the top 25% or aiming to meet a specification of a minimum MSA index of 63.

In this scenario, it is identified that a key factor to improving the MSA index score is driven by increasing marbling, with slight increases of fat coverage and carcase weight for the same ossification score.

Find correct production category.

Identify current performance ranking.

Table 1. Attributes of HGP-free grassfed or non-feedlot cattle

HGP FREE, GRASSFED CATTLE																		
Band	**Bottom 1%**		**Bottom 5%**		**Bottom 10%**		**Bottom 25%**		**50%**		**Top 25%**		**Top 10%**		**Top 5%**		**Top 1%**	
MSA Index	46.54	51.77	50.48	54.19	53.55	56.06	57.34	58.86	59.40	60.63	61.10	62.14	62.59	63.66	63.58	64.75	65.65	67.45
Gender	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Carcase weight (kgs)	249.5	294.6	267.6	301.6	269.6	300.7	251.2	295.3	252.0	295.9	254.5	302.0	257.1	305.9	255.0	309.0	240.2	276.2
Hump Height (mm)	80	125	65	115	75	100	60	70	45	55	45	55	45	55	50	60	50	60
Ossification	590	180	500	160	400	160	210	160	170	140	160	140	150	130	140	130	130	120
MSA Marbling	250	230	300	270	320	280	290	280	310	310	370	380	410	440	460	500	490	490
Rib Fat (mm)	6	5	7	6	8	6	7	6	8	7	9	9	9	9	10	10	11	11

Identify MSA Index score or ranking wish to be achieved.

Table 1. Attributes of HGP-free grassfed or non-feedlot cattle

HGP FREE, GRASSFED CATTLE																		
Band	**Bottom 1%**		**Bottom 5%**		**Bottom 10%**		**Bottom 25%**		**50%**		**Top 25%**		**Top 10%**		**Top 5%**		**Top 1%**	
MSA Index	46.54	51.77	50.48	54.19	53.55	56.06	57.34	58.86	59.40	60.63	61.10	62.14	62.59	63.66	63.58	64.75	65.65	67.45
Gender	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Carcase weight (kgs)	249.5	294.6	267.6	301.6	269.6	300.7	251.2	295.3	252.0	295.9	254.5	302.0	257.1	305.9	255.0	309.0	240.2	276.2
Hump Height (mm)	80	125	65	115	75	100	60	70	45	55	45	55	45	55	50	60	50	60
Ossification	590	180	500	160	400	160	210	160	170	140	160	140	150	130	140	130	130	120
MSA Marbling	250	230	300	270	320	280	290	280	310	310	370	380	410	440	460	500	490	490
Rib Fat (mm)	6	5	7	6	8	6	7	6	8	7	9	9	9	9	10	10	11	11

Table 2. Attributes of HGP-free, grainfed cattle

HGP FREE, GRAINFED CATTLE																		
Band	**Bottom 1%**		**Bottom 5%**		**Bottom 10%**		**Bottom 25%**		**50%**		**Top 25%**		**Top 10%**		**Top 5%**		**Top 1%**	
MSA Index	47.78	52.55	54.08	55.03	55.61	56.38	57.39	58.30	58.97	60.37	60.56	62.34	62.03	63.99	62.90	64.98	64.46	66.85
Gender	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Carcase weight (kgs)	242.9	257.5	237.4	262.1	238.2	257.5	239.2	260.6	245.3	284.7	255.2	314.3	260.2	322.4	264.4	330.8	285.7	356.6
Hump Height (mm)	80	130	95	110	80	90	70	75	60	62	55	60	55	60	50	60	50	60
Ossification	590	160	230	150	170	150	160	140	150	140	140	130	140	130	130	120	130	130
MSA Marbling	230	230	240	260	250	260	260	260	290	300	340	390	370	440	410	500	500	700
Rib Fat (mm)	7	5	7	6	7	6	7	6	7	7	8	9	9	10	10	10	11	11

Table 3. Attributes of HGP treated, grassfed or non-feedlot cattle

HGP TREATED, GRASSFED CATTLE																		
Band	**Bottom 1%**		**Bottom 5%**		**Bottom 10%**		**Bottom 25%**		**50%**		**Top 25%**		**Top 10%**		**Top 5%**		**Top 1%**	
MSA Index	45.02	44.93	48.41	46.76	50.47	48.14	53.39	51.58	55.07	54.66	56.35	56.17	57.55	57.46	58.31	58.35	59.85	60.22
Gender	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Carcase weight (kgs)	247.0	286.8	249.8	298.0	256.9	305.6	259.0	310.9	260.3	298.3	262.7	290.9	264.0	291.2	263.1	288.1	256.1	271.4
Hump Height (mm)	110	140	105	135	90	130	65	105	50	65	50	55	45	55	45	60	50	60
Ossification	350	250	200	210	180	190	170	170	160	160	150	140	140	130	140	130	130	120
MSA Marbling	270	220	270	250	280	280	290	290	330	310	380	360	410	390	430	420	480	430
Rib Fat (mm)	6	5	6	5	6	6	7	7	8	7	9	9	9	9	9	9	10	10

Table 4. Attributes of HGP treated, grainfed cattle

HGP TREATED, GRAINFED CATTLE																		
Band	**Bottom 1%**		**Bottom 5%**		**Bottom 10%**		**Bottom 25%**		**50%**		**Top 25%**		**Top 10%**		**Top 5%**		**Top 1%**	
MSA Index	45.95	46.41	48.91	48.95	50.67	50.74	52.83	53.14	54.41	55.01	55.81	56.74	57.01	58.07	57.77	58.88	59.20	60.29
Gender	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Carcase weight (kgs)	250.6	294.5	255.6	310.0	259.3	318.2	262.5	317.8	271.9	330.8	272.9	361.7	272.4	376.0	273.6	390.0	278.3	398.6
Hump Height (mm)	130	145	110	130	85	105	70	85	60	70	50	65	50	65	50	65	50	65
Ossification	230	210	190	180	180	170	180	170	170	170	160	160	150	160	140	170	130	170
MSA Marbling	260	240	280	290	280	290	290	290	330	340	380	420	400	460	430	530	510	660
Rib Fat (mm)	8	5	6	6	6	7	7	7	8	8	9	11	9	13	9	13	10	14

USEFUL FURTHER RESOURCES

MSA Tips and Tools

To assist producers achieve their desired MSA Index score, MLA has developed a Tips & Tools Meat Standards Australia Beef Information Kit.

Opposite are a list of the individual titles.

To access this tool, go to www.mla.com.au/msa

Use the MSA Index calculator to see the impact changes on-farm can have on the MSA index results.

www.mymsa.com.au/msamobile

MSA01	What is MSA?
MSA02	How MSA grades are determined
MSA03	MSA requirements for handling cattle
MSA04	How to supply beef in the MSA system
MSA05	The effect of tropical breeds on beef eating quality
MSA06	The effect of ossification on beef eating quality
MSA07	The effect of marbling on beef eating quality
MSA08	The effect of pH on beef eating quality
MSA09	How MSA beef is graded
MSA10	The effect of the pH–temperature decline on beef eating quality
MSA11	How tenderstretch affects beef eating quality
MSA12	How ageing affects beef eating quality
MSA13	The effect of cooking on beef eating quality
MSA14	Fat distribution and eating quality
MSA15	Selling cattle through a MSA saleyard
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MSA18	Using the MSA Index to optimise beef eating quality

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