



2021 AUSTRALIAN BEEF EATING QUALITY INSIGHTS



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Introduction

The 2021 Australian Beef Eating Quality Insights (ABEQI) report is generated from the analysis of Meat Standards Australia (MSA) grading results of 7.1 million cattle, processed and graded through 38 MSA licenced processors nationally during the 2019-20 and 2020-21 financial years.

This report aims to help beef producers optimise the eating quality of their cattle by demonstrating the impact of various production factors on the MSA Index.

The 2021 report reflects the ongoing improvements MSA registered producers are making to raise the eating quality of their cattle and ultimately meet consumer expectations. The average MSA Index in 2019-21 is 57.69, an increase from the 2017-19 average of 57.62.

In a major milestone for the MSA program, MSA graded cattle now represent more than half of the national adult cattle slaughter, comprising 53% at 30 June 2021.

This report includes new information on Lean Meat Yield and insights relating to animal disease and defect impacts on the MSA Index, and ultimately eating quality.

This is the fourth time this benchmarking exercise has been conducted in Australia, following the 2015 Australian Beef Eating Quality Audit, the 2017 ABEQI, and the 2019 ABEQI. This initiative was made possible with the introduction of the MSA Index in 2014.

Released biennially, the report enables the Australian beef industry to measure its improvements and identify areas where further gains can be made.

About the MSA program



MSA IS THE WORLD'S LEADING EATING QUALITY GRADING PROGRAM FOR BEEF AND SHEEPMEAT.

IT PROVIDES PRODUCERS WITH THE INFORMATION AND TOOLS TO UNDERSTAND THE TRENDS AND DRIVERS OF EATING QUALITY.



THIS ALLOWS SUPPLY CHAIN STAKEHOLDERS TO IMPLEMENT IMPROVEMENT STRATEGIES AND CREATE OPPORTUNITIES FOR IMPROVED RETURNS.



Performance snapshot (at 30 June 2021)



Figure 1. Number of MSA graded cattle – national

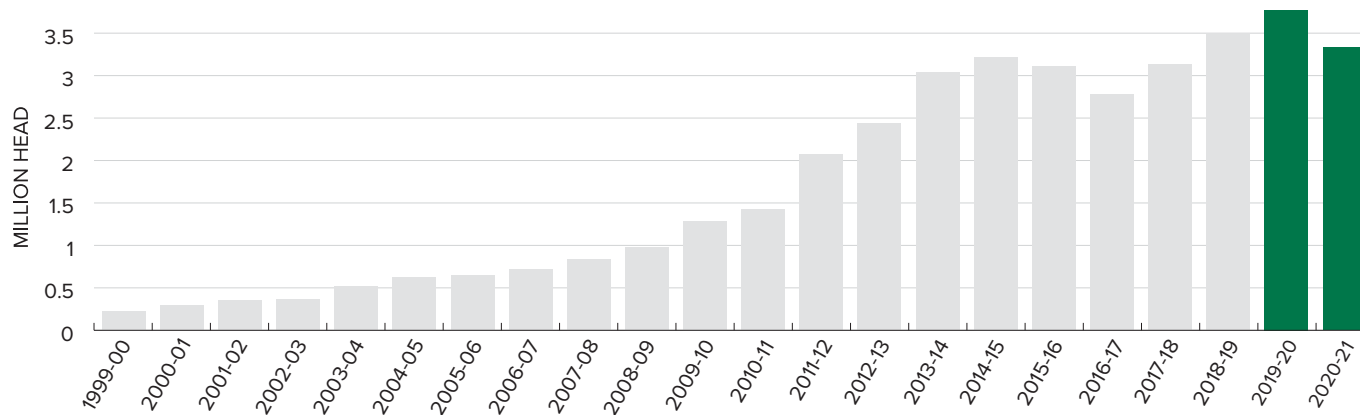


Figure 2. Proportion of Australian adult cattle slaughter presented for MSA grading

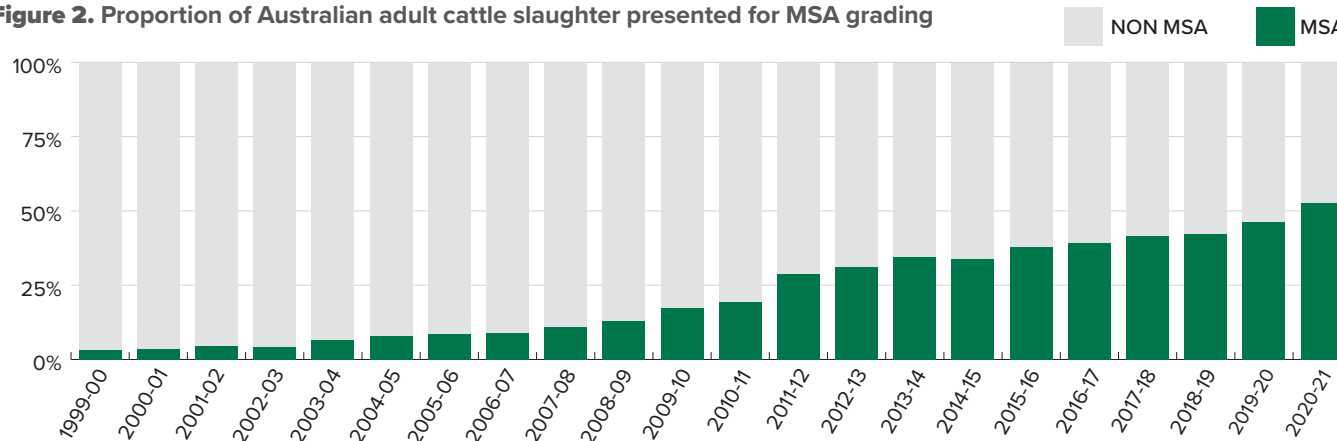
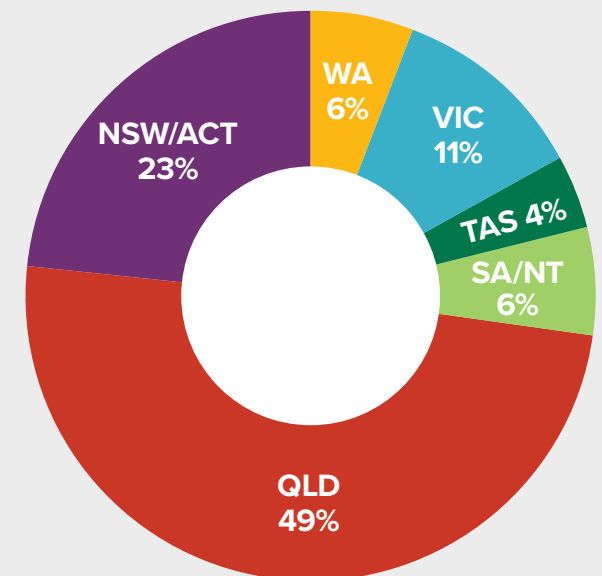


Figure 3. Proportion of MSA graded cattle by state





Using this report

Methodology

This report was generated through the analysis of all MSA graded cattle in the 2019-21 financial years using data collected by MSA-accredited graders, along with additional data from sources such as the National Livestock Reporting Service and further information such as animal disease and defect data.

All data analysis related to the MSA Index outcomes are based on the location of the MSA-registered property that the cattle were consigned from, rather than the location of the processor.

This method was chosen to give a more accurate indication of state-based production opportunities and challenges.

From July 2019 to June 2021 inclusive, 7.1 million cattle were MSA graded. Based on MSA requirements, carcasses which meet the minimum specifications receive an MSA Index score. This report uses the MSA Index scores of 6.7 million compliant carcasses.

“From July 2019 to June 2021 inclusive, 7.1 million cattle were MSA graded. This report uses the MSA Index scores of 6.7 million compliant carcasses.”

Why benchmarking is important

Benchmarking is the process of measuring performance, as an industry or individual business, with the objective to identify opportunities for improvement. It provides producers with the ability to identify strengths and weaknesses within their business, enabling them to make informed decisions and to better meet customer specifications. The benchmarking data presented in this report, and tools available on myMSA, allow producers to:

- > measure and compare current compliance and eating quality performance
- > identify key drivers of eating quality to inform on-farm decisions, for example, genetic selection
- > identify areas of performance where improvement can be made.



The myMSA portal

The online myMSA portal is a key tool that producers can use to analyse their own performance, in conjunction with the insights provided in this report.

During 2020, myMSA has been updated, allowing MSA-registered producers to access a range of new features including:

- > **Opportunity Index:** the Opportunity Index shows what the MSA Index would have been if non-compliant carcasses met the MSA minimum requirements. It helps provide an insight into where attention could be focused for financial gains.
- > **New look and feel:** the myMSA portal has been refreshed and is easier to use. New features include:
 - » easy navigation on the left-hand menu
 - » help prompts on every page
 - » accessible on any device
 - » re-designed reports to make interpreting carcass feedback easier.

The myMSA portal allows producers to:

- > comprehensively benchmark the performance of their herd against the average for their region, state and, nationally, and by selecting for different production groups and carcass traits, such as feed type, hormonal growth promotant (HGP) status, sex, and ossification
- > create customised carcass feedback datasets
- > look at performance trends
- > identify causes of non-compliance and analyse consignments over time
- > download data to import into farm software.

Since the new myMSA portal was released in 2020, more than 3,462 producers have logged into the portal 22,355 times to access carcass grading feedback.



Log into
mymsa.com.au

The online myMSA portal is a **key tool** that producers can use to analyse their own performance, in conjunction with the insights provided in this report.

Since the new myMSA portal was released in 2020, more than **3,462 producers** have logged into the portal **22,355 times** to access carcass grading feedback.

Setting eating quality benchmarks with the MSA Index

What is the MSA Index?

The MSA Index is a number between 30 and 80 expressed to two decimal places, for example 57.69, and is a weighted average of the predicted MSA eating quality scores of 39 cuts in a carcass.

The MSA Index is a standard measure of the predicted eating quality and potential merit of a whole carcass and is calculated using only attributes influenced by pre-slaughter production. It reflects the impact of management, environmental and genetic differences between cattle at the point of slaughter and can be used across all processors, geographic regions and over time.

The MSA Index is calculated for all carcasses that meet minimum MSA requirements (refer to page 12). It is calculated in myMSA once grading data from the processor is received.

The value of supplying MSA cattle

In many instances, processors and brand owners offer financial incentives for meeting minimum MSA compliance and eating quality specifications.

In 2019-21, young non-Grainfed cattle that met MSA and company requirements, potentially received on average an additional \$0.27/kg over-the-hooks (OTH) compared with non-MSA cattle. The average non-Grainfed animal consigned for MSA grading in 2019-21 weighed 287kg, which potentially equated to an additional \$77.49 per head.

Likewise, the premium for Grainfed cattle that met MSA and company requirements, received an additional \$0.10/kg over-the-hooks (OTH) compared with non-MSA Grainfed cattle. The average Grainfed animal consigned for MSA grading in 2019-21 weighed 323kg, which potentially equated to an additional \$32.30 per head.

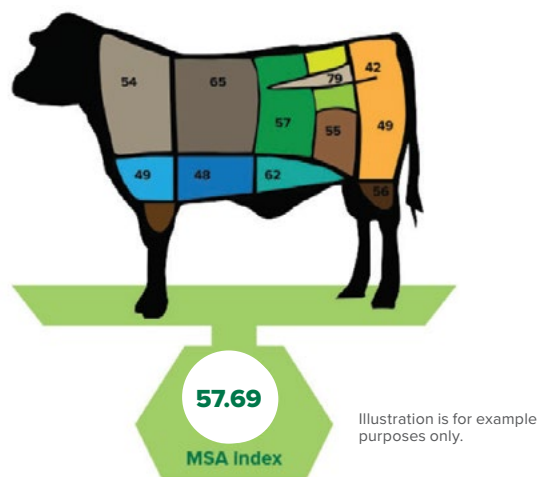


Figure 4. Understanding the MSA Index

The numbers on each muscle illustrate the individual predicted eating quality scores for each of the 39 cuts across the carcass. Improving the MSA Index means the eating quality scores of each cut also improve.


\$0.27/kg
 over the hooks

Potential additional income received for young non-Grainfed MSA cattle compared to non-MSA cattle.


\$77.49

Potential additional income per head for young non-Grainfed MSA cattle with an average weight of 287kg.


\$0.10/kg
 over the hooks

Potential additional income received for Grainfed MSA cattle compared to non-MSA Grainfed cattle.


\$32.30

Potential additional income per head for Grainfed MSA cattle with an average weight of 323kg.

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

CARCASS INPUT	EFFECT ON THE MSA INDEX (UNITS)	CLARIFICATION OF EFFECT	RELATIVE IMPORTANCE OF THESE TRAITS IN CHANGING THE MSA INDEX*
Hormonal growth promotant (HGP) status	5	The MSA Index of carcasses with no HGP implant is about five index units higher	Very high
Milk-fed vealer	4	The MSA Index of milk-fed vealer carcasses is about four index units higher	Very high
Saleyard	5	Carcasses that were consigned directly to slaughter and NOT processed through a saleyard have an MSA Index about five index units higher	Very high
MSA marbling	0.15	As MSA marbling score increases by 10, the MSA Index increases by about 0.15 index units	High
Hump height	-0.7	As hump height increases by 10mm, the MSA Index decreases by about 0.7 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 1mm, the MSA Index increases by 0.1 index units	Medium
Hot standard carcass weight (HSCW)	0.01	As HSCW increases by 1kg, the MSA Index increases by less than 0.01 index units	Low
Sex	0.3	With low ossification values, females have a higher index value than steers by about 0.3 index units	Low

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

* Relative importance indicates the size of effect that 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.

Current Australian eating quality performance

The average MSA Index for 2019-21 was 57.69 – an increase from the 2017-19 average MSA Index of 57.62.

Figure 5 shows the national distribution of the MSA Index for MSA graded carcasses throughout 2019-21. MSA Index values from the 6.7 million MSA-compliant carcasses ranged from 30.95 to 73.30. The distribution of the green bars shows the proportion, or number, of carcasses relative to the MSA Index received over the past two financial years. The yellow line shows the comparative distribution observed in the previous two financial years (2017-2019).

The three peaks in the MSA Index distribution as seen on **Figure 5** and **Figure 7**, are indicative of the different populations and can be attributed to a range of on-farm management interventions, including, but not limited to, the impact of hormonal growth promotants (HGP), marbling, ossification, and hump height.

The average MSA Index of the national herd has improved by 0.88 Index points since 2010-11 (**Figure 6**). This improvement is reflective of changes in on-farm management and genetic decisions.

Figure 5. National MSA Index distribution 2019-21

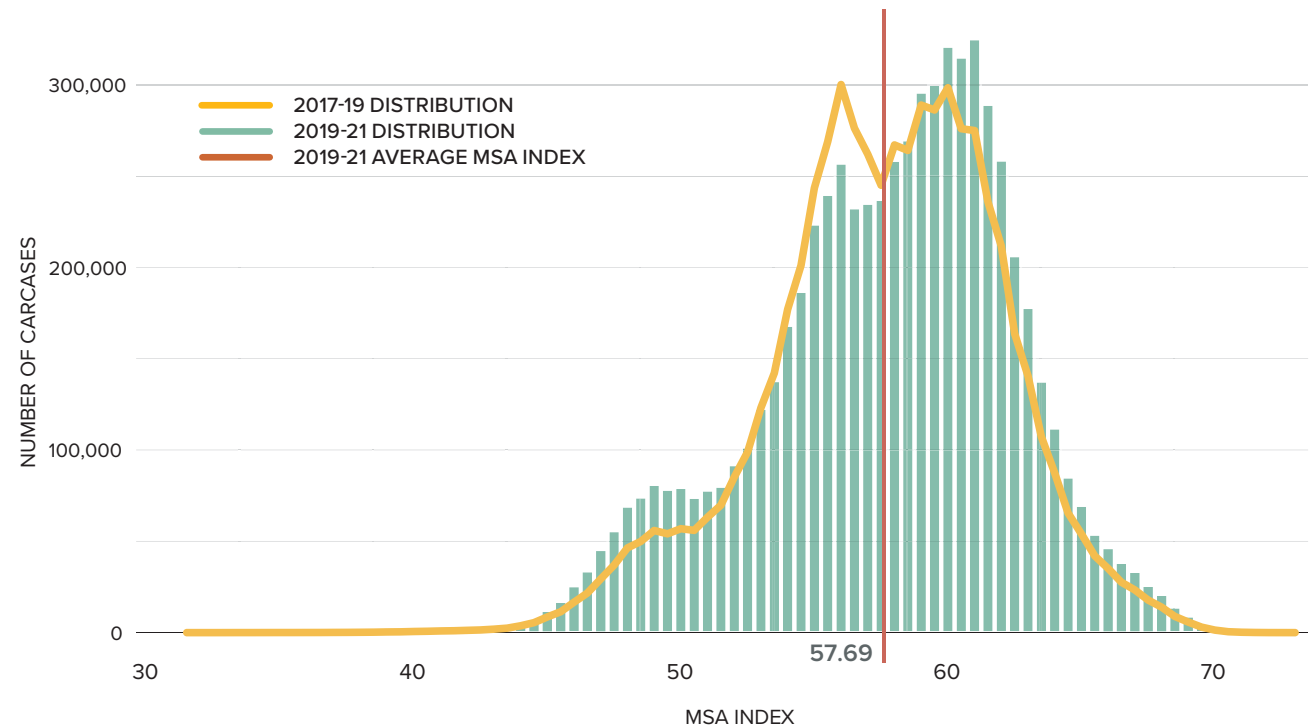
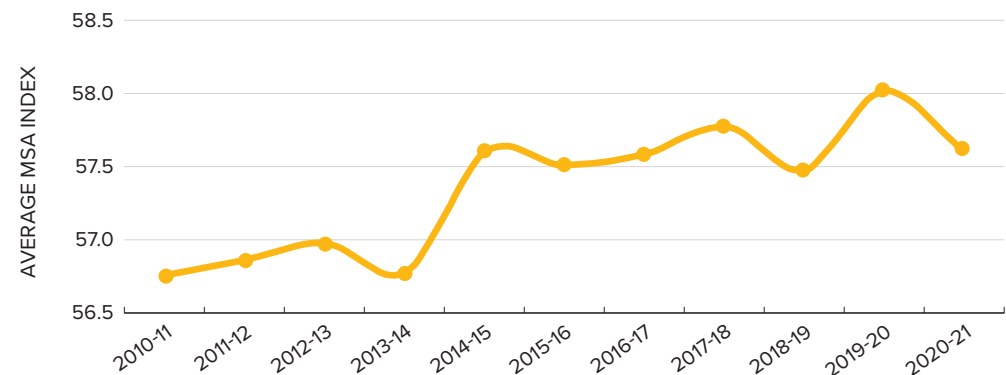


Table 2. Carcase attributes and Lean Meat Yield of all MSA graded carcasses 2019-21 (all traits are independent of each other)

	CARCASE WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)	LEAN MEAT YIELD (%)
TOP 5%	415	40	120	570	17	62.8
AVERAGE	308	75	170	360	9	58.7
BOTTOM 5%	225	130	250	200	3	52.3

Figure 6. Change in national MSA Index since 2010-11



Benchmarking individual MSA Index performance

This report ranks carcasses by percentile bands, from the bottom 1% to the top 1%, to allow producers to benchmark how their cattle are performing against others in their state.

What are the MSA Index percentile bands?

The MSA Index percentile bands provide an indication of an individual's MSA Index performance relative to the performance of others (*Table 3*). For example, an average MSA Index greater than 63.19 places a herd in the top 10% of producers in Australia for eating quality performance (*Figure 7*).

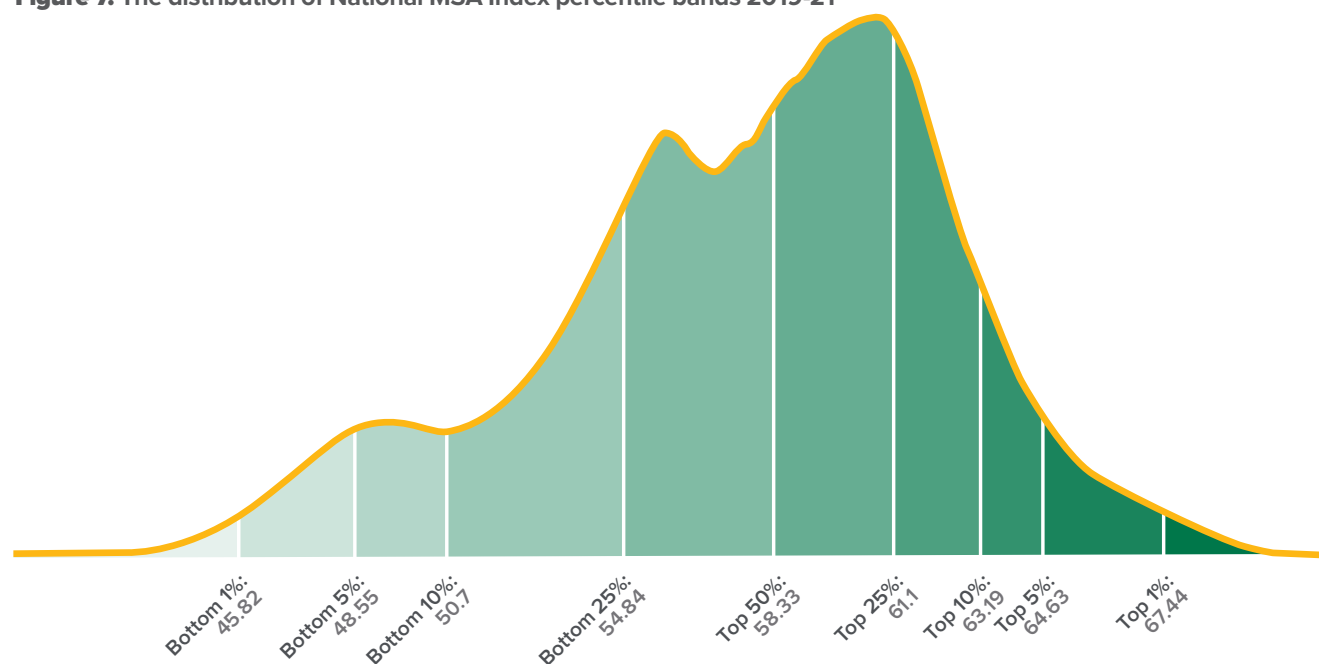
Understanding the specific carcass attributes that determine the MSA Index, and ultimately the performance indicated by the percentile band, provides producers with the tools to improve their herd's performance. These attributes by state and production system can be found in the individual state analyses.



Table 3. National MSA Index percentile bands by state 2019-21

PRODUCER STATE	TOP 1%	TOP 5%	TOP 10%	TOP 25%	TOP 50%	BOTTOM 25%	BOTTOM 10%	BOTTOM 5%	BOTTOM 1%
NSW/ACT	67.09	64.19	62.99	61.10	58.48	55.87	53.88	51.94	47.04
QLD	67.60	64.76	62.75	59.74	56.15	52.33	48.76	47.42	44.96
SA/NT	67.46	65.22	64.09	62.45	60.77	58.95	55.97	54.09	51.13
TAS	66.02	64.06	63.11	61.73	60.11	58.38	56.33	54.31	49.26
VIC	67.24	64.68	63.61	62.04	60.43	58.38	55.18	53.58	50.55
WA	67.67	65.06	63.69	61.82	60.12	57.94	55.51	54.63	52.45
NATIONAL	67.44	64.63	63.19	61.10	58.33	54.84	50.70	48.55	45.82

Figure 7. The distribution of National MSA Index percentile bands 2019-21



MSA compliance

In 2019-21, 94.9% of carcasses met the MSA minimum requirements. The primary reason for non-compliance was high ultimate pH (greater than or equal to 5.71), followed by inadequate rib fat depth (less than 3mm of rib fat). **Figure 8** illustrates the reasons for non-compliance by month for the two-year period.

At both a national and a state level, variation in compliance observed across the year is driven predominantly by non-Grainfed systems that are impacted by seasonal variation.

Victoria had the highest overall compliance to MSA minimum requirements at 96.3%, followed closely by New South Wales/Australian Capital Territory and South Australia/Northern Territory, all achieving an average 96.1% compliance. Tasmania had the lowest compliance at 92.6% (**Figure 9**), however, this represents more than a two percentage point increase from the 2017-19 compliance rate of 90.5%.

Compliance in 2019-21 was higher than 2017-19 (94.0%) and may be attributed to a range of factors, including an increase in supplementary feeding in non-Grainfed cattle and a higher proportion of Grainfed animals in all states, excluding Tasmania.

Grainfed cattle have an inherently higher compliance to MSA minimum requirements due to the consistent, high energy ration they are fed leading up to slaughter. Given Tasmania's predominately pasture-based production systems, with no National Feedlot Accreditation Scheme (NFAS) accredited feedlots within the state, seasonal conditions can have a greater impact on the compliance to MSA minimum requirements compared to other states.

MSA minimum requirements

To be eligible for an MSA Index score, MSA graded carcasses must have:

- > Met MSA pre-slaughter requirements
- > pH less than 5.71
- > Minimum rib fat of 3mm
- > Adequate fat coverage over all major primals.

Figure 8. National non-compliance by attribute 2019-21

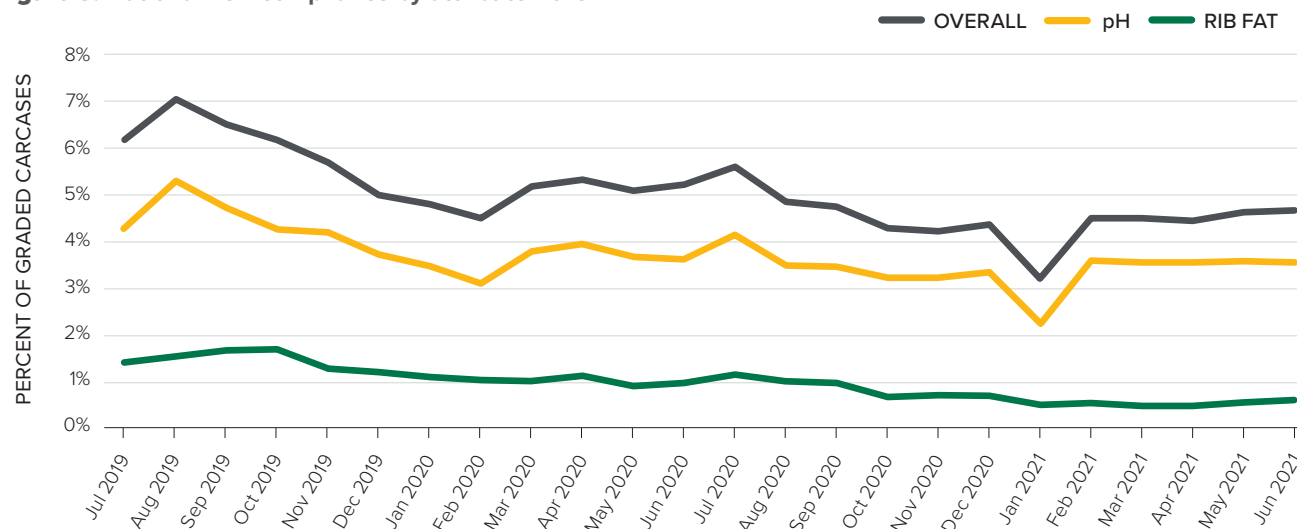


Figure 9. Compliance to MSA minimum requirements by state and production variables (HGP, sex and feed type) 2019-21

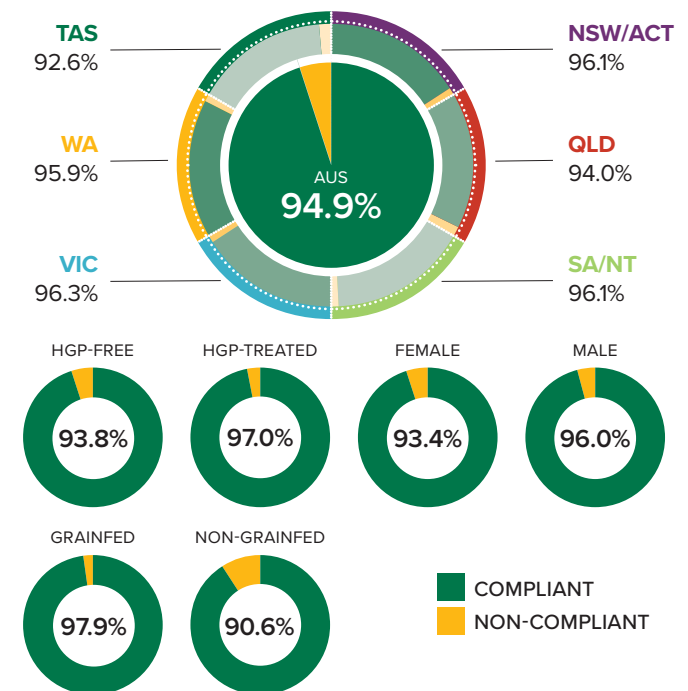


Figure 9 also shows that cattle treated with hormonal growth promotants (HGP) have a higher rate of compliance compared to those without (97.0% and 93.8% respectively). The majority of HGP-treated cattle are also Grainfed cattle, which have a higher average rate of compliance to MSA minimum requirements, compared to non-Grainfed cattle (97.9% and 90.6% respectively).

Females had a lower compliance at 93.4% compared to males at 96.0%. The difference in non-compliance between sexes may be attributed to finishing system. Only 33% of MSA graded Grainfed cattle are female, while 51% of non-Grainfed cattle are female. Females in oestrous are also more susceptible to high ultimate pH due to extra pre-slaughter activity and stress.

Lean Meat Yield

Lean Meat Yield (LMY%) is the proportion of a carcass that is lean meat (muscle) as opposed to fat or bone, and is expressed as a percentage.

In 2019-21, non-Grainfed MSA graded carcasses averaged 59.6 LMY% and Grainfed MSA graded carcasses averaged 58.0 LMY%.

LMY% is calculated with a predictive equation using hot standard carcass weight (HSCW) and rib fat depth.

Research has shown that there is a negative relationship between LMY% and eating quality, therefore it is important for producers to balance factors which impact these outcomes. Producers can manage LMY% through genetics and on-farm management such as nutrition.

Figure 11 shows the national MSA Index by LMY%. There is a minor trend, whereby as MSA Index increases, LMY% decreases. The purple area on the graph indicates where the majority of the cattle perform for LMY% and MSA Index.



Figure 10. National distribution of Lean Meat Yield 2019-21

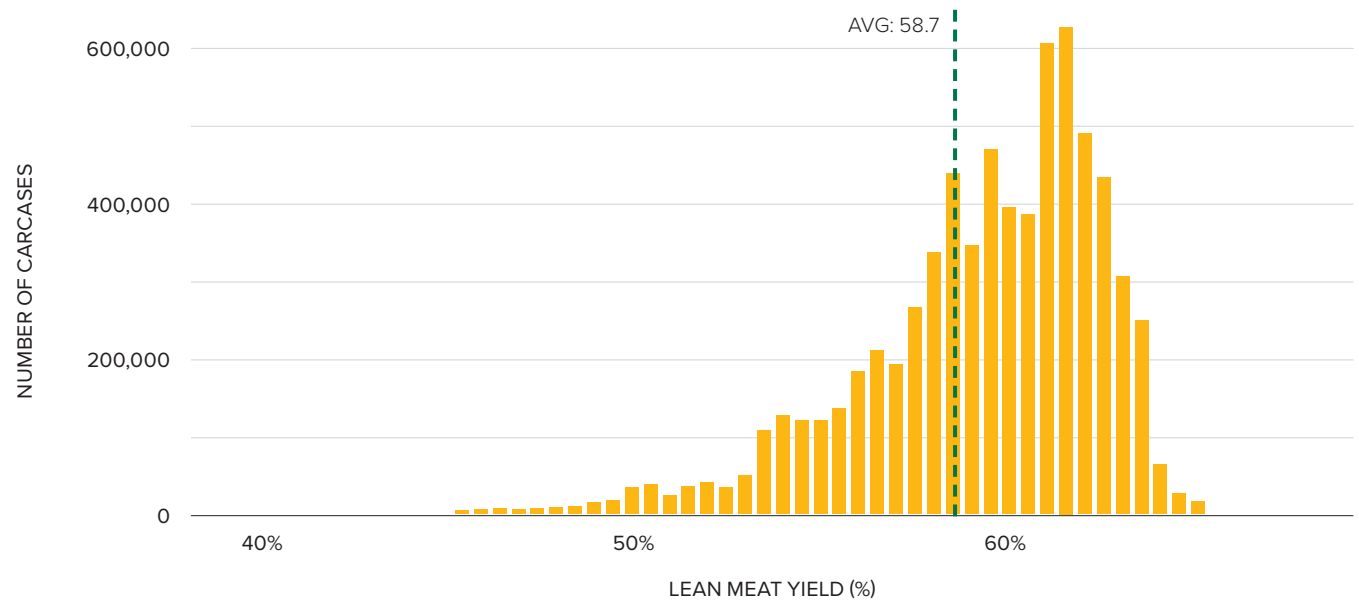
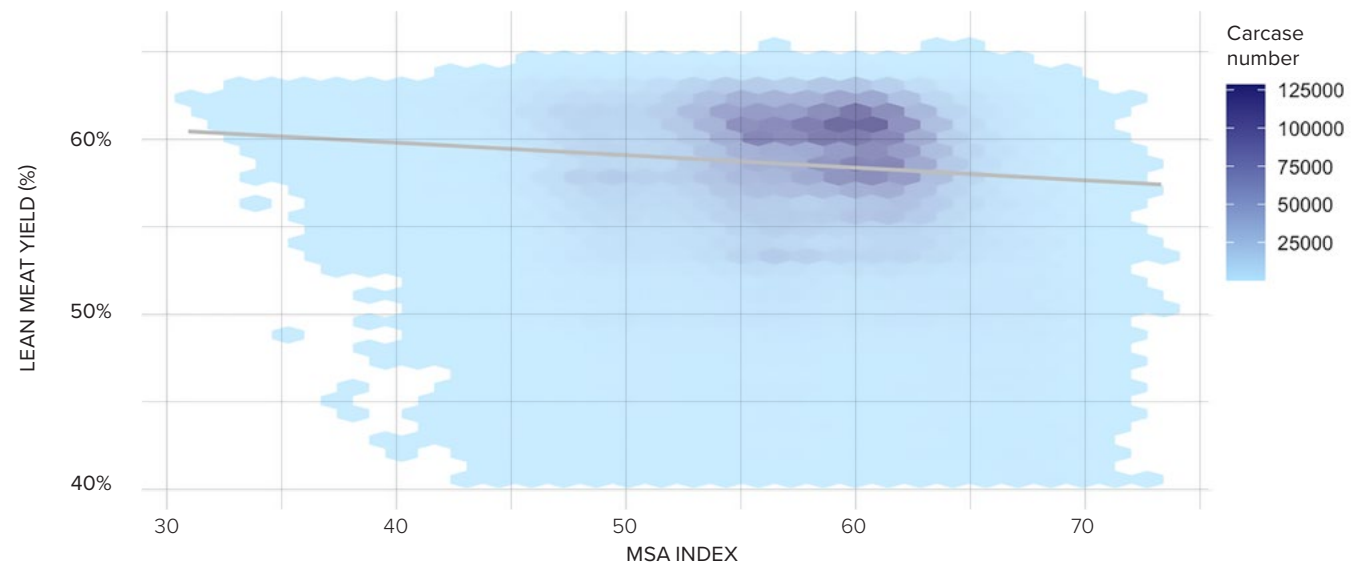


Figure 11. National MSA Index by Lean Meat Yield 2019-21



Animal disease and defect impacts

For the first time as part of this report, beef producers supplying cattle to a number of processors can access animal disease and defect feedback on their consignments through Livestock Data Link (LDL) as well as company owned feedback systems.

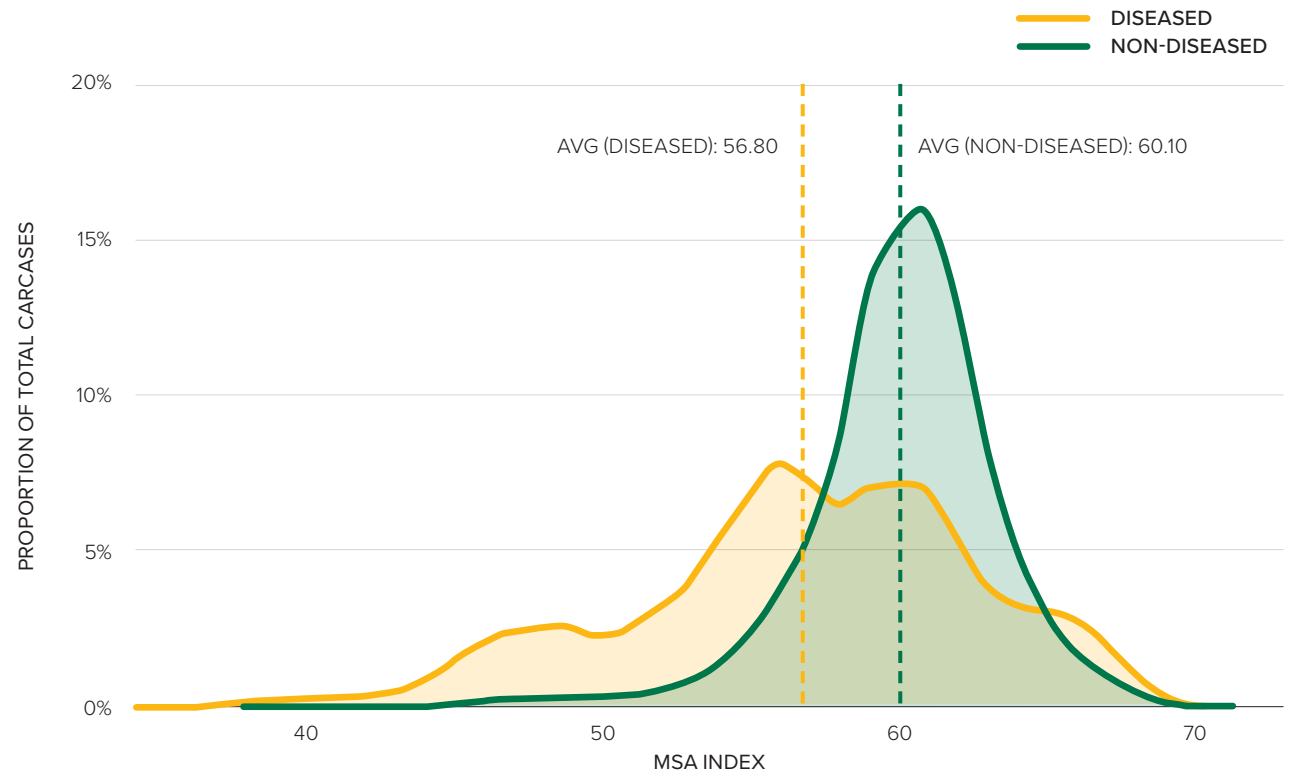
This data has become available through a series of red meat pilot trials undertaken through the Health 4 Wealth (H4W) Rural Research & Development for Profit project. The pilot trials were conducted to demonstrate the value of sharing and utilising disease and defect data along the supply chain to improve productivity and profitability on-farm.


While many meat processing recording systems are already in place, data feedback on disease-related carcass and offal condemnations varies considerably. The H4W project introduced a standardised, comprehensive approach to data collection and feedback on disease-related carcass and offal condemnations. This will allow producers to monitor disease prevalence in their livestock and make informed decisions to maximise yield outcomes.

As a result of the trials, a beef disease and defect report is now available in the LDL system and currently reports on five of the most common conditions observed in animals consigned to processors. This includes liver abscesses, liver fluke, hydatids, nephritis, and pneumonia.

The MLA Group (MLA and Integrity Systems Company) is currently exploring how to advance the animal disease reporting to provide benchmarking, seasonal trends and linkages to other datasets such as eating quality and carcass compliance impacts. This animal disease and defect snapshot demonstrates national benchmarking for animal disease as well as impacts of eating quality. Disease and defect data is voluntary feedback supplied to the MLA Group. It is not a mandatory requirement to supply this information, therefore this is a sample of the data provided via the H4W trials.

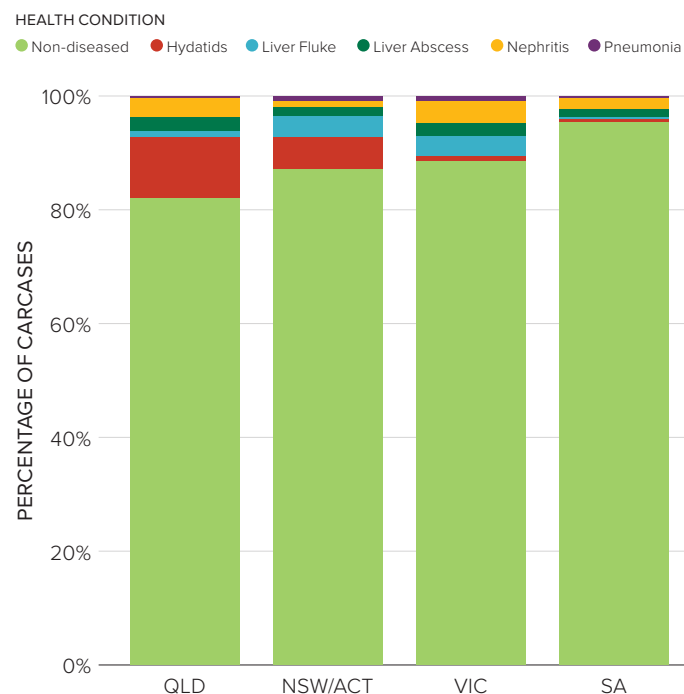
Figure 12. MSA Index by disease status 2020-21




 Disease status impacted MSA Index, whereby non-diseased animals had a higher MSA Index than diseased animals (*Figure 12*).

- > The average MSA Index for diseased animals was 56.80.
- > The average MSA Index for non-diseased animals was 60.10.
- > Over 62% of non-diseased animals had a MSA Index equal to or higher than 60, while just 35% of diseased animals had a score equal to or higher than 60.
- > The non-diseased animal population had a narrower distribution and therefore greater consistency.

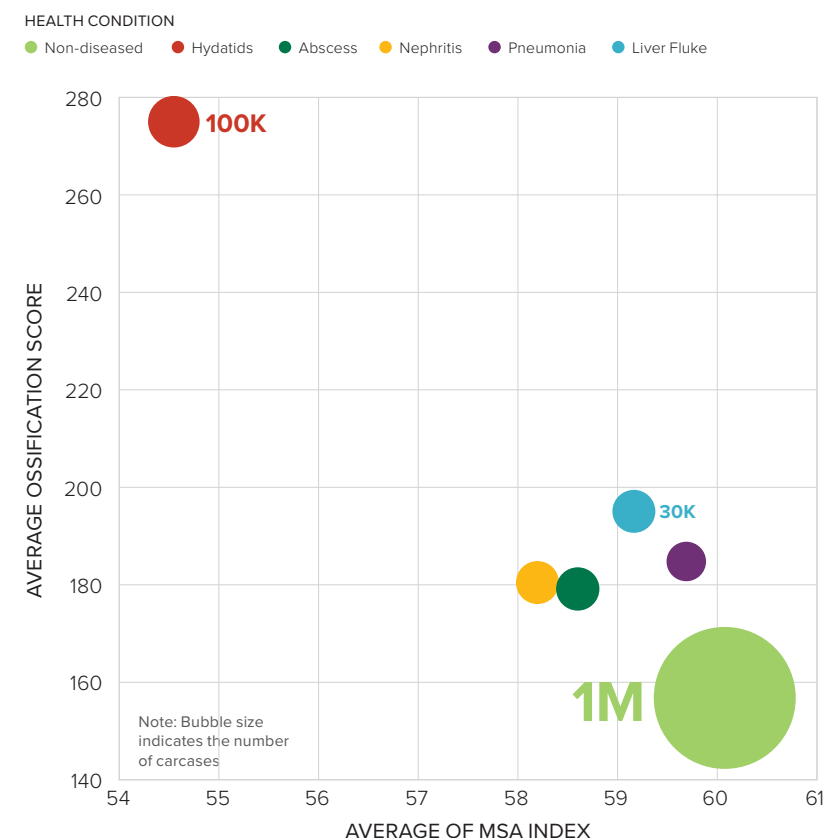
Figure 13. Incidence of disease or defect condition by state 2020-21



Based on the data available, 82% of carcasses assessed in Queensland were classified as non-diseased, while hydatids (11%) was found to be the most prominent health condition, followed by nephritis (3.3%) and liver abscess (2.6%). In NSW/ACT, hydatids was also the major disease condition (5%), followed by liver fluke (3.8%) and liver abscess (1.7%). Approximately 87% of animals were free of any disease condition. Over 90% of animals in Victoria were found to be non-diseased, with nephritis (3.5%) and liver fluke (2.9%) being the predominant disease conditions, followed by liver abscess (2%). Hydatids appears to be a major disease issue for Queensland and NSW/ACT, with approximately 8% of all carcasses assessed across the two states combined, having this condition.

Disclaimers for charts: Diseased data only cover five disease conditions – liver fluke, hydatids, liver abscess, pneumonia and nephritis. Non-diseased data may contain cattle with disease conditions. De-identified aggregated sample data has been used for this snapshot to demonstrate how we can benchmark and link animal disease and defect data with eating quality. The time period used is from 1 July 2020 to 30 June 2021. Please note, saleyard and feedlot data has been removed from this analysis.

Figure 14. MSA Index by health status 2020-21



Useful resources

- > For more information about the disease or defect conditions and how to manage these conditions on-farm, visit the **Solutions to Feedback library** available through LDL.
- > To start using and accessing data from LDL, go to ldl.mla.com.au to register. Registration requires your NLIS user ID and password. Once registered, you will be able to log on to the LDL system, and you will be taken directly to the LDL dashboard where you can view information on your recent consignments.
- > For further information or assistance with LDL, contact ldl@integritysystems.com.au. Integrity Systems Company (ISC) Customer Service is also available on 1800 683 111 to help with setting up an NLIS and LDL account.
- > For more information on LDL, visit the ISC website: integritysystems.com.au



It was found that for all carcasses examined, animals classified as non-diseased had on average the highest MSA Index, along with the lowest ossification scores. Higher observed ossification may be due to an increase in prevalence of disease in older animals, along with increased ossification due to the physiological response to disease in younger animals. Animals with hydatids had an average ossification score of almost 280 points, well above all other categories. For the other disease conditions, the ossification scores were also higher than non-diseased animals. More research needs to be conducted in this area to understand any possible relationships of carcass trait and eating quality outcomes to disease and defect incidence.

MSA performance by feed type

Effect of feed type on MSA performance

In 2019-21, 60% of MSA graded cattle were identified as Grainfed (*Figure 15*).

For the purposes of MSA data, Grainfed cattle are defined as those that were lot fed at a registered NFAS feedlot, and met the Australian Grainfed beef minimum standard specifications. Non-Grainfed cattle are defined as cattle derived from any production system that did not meet the Grainfed specifications.

In 2019-21, cattle on feed for a minimum of 100 days, presented the largest number of animals for MSA grading of the Grainfed proportion, at a total of 2.3 million carcasses. Queensland had the largest proportion of Grainfed cattle supplied through the MSA program at 78%, while Tasmania had no accredited Grainfed cattle as the state is based on pasture based production systems (*Figure 16*).

Approximately 5.7 million cattle were finished in Australian feedlots during 2019-21. Of these, it is estimated that 74% were MSA graded.

MSA compliance by feed type

Compliance to MSA minimum requirements differs between feed type.

In 2019-21, 97.9% of MSA graded Grainfed carcasses were MSA-compliant, compared to 90.6% of non-Grainfed carcasses.

Figure 17 illustrates the non-compliance by month for each feed type.

Grainfed cattle displayed consistently higher compliance rates throughout the year, averaging around 2% non-compliance across the year, whereas non-Grainfed cattle had lower compliance rates, which was variable throughout the year due to seasonal impacts on pasture availability and quality.

Figure 15. Proportion of non-Grainfed vs Grainfed 2019-21

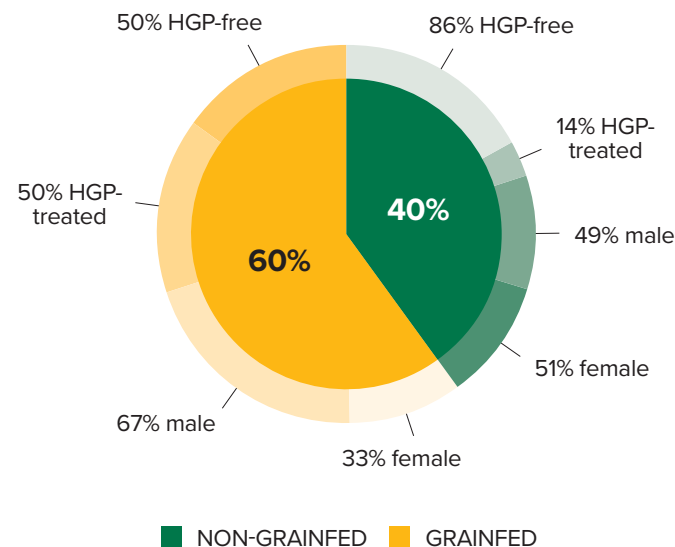


Figure 16. Proportion of non-Grainfed and Grainfed carcasses by state 2019-21

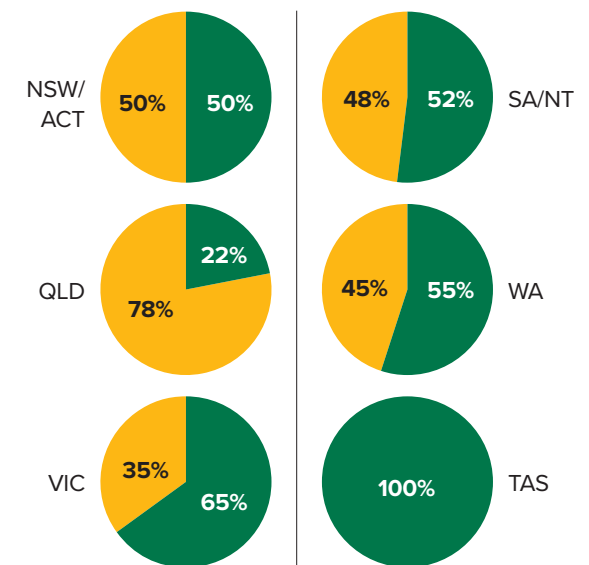
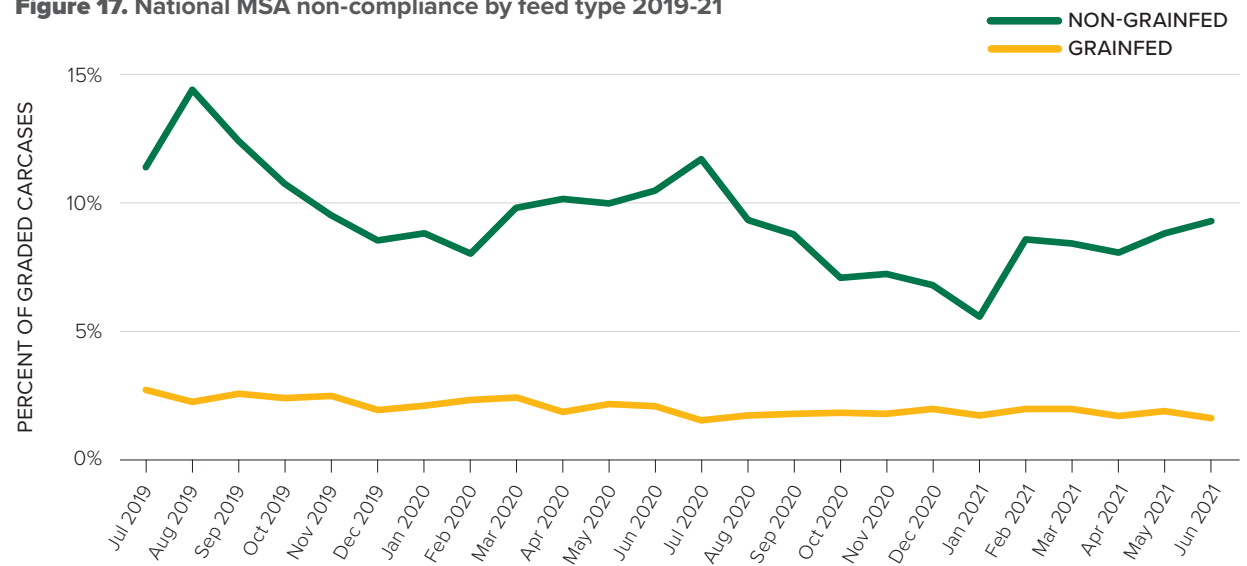


Figure 17. National MSA non-compliance by feed type 2019-21



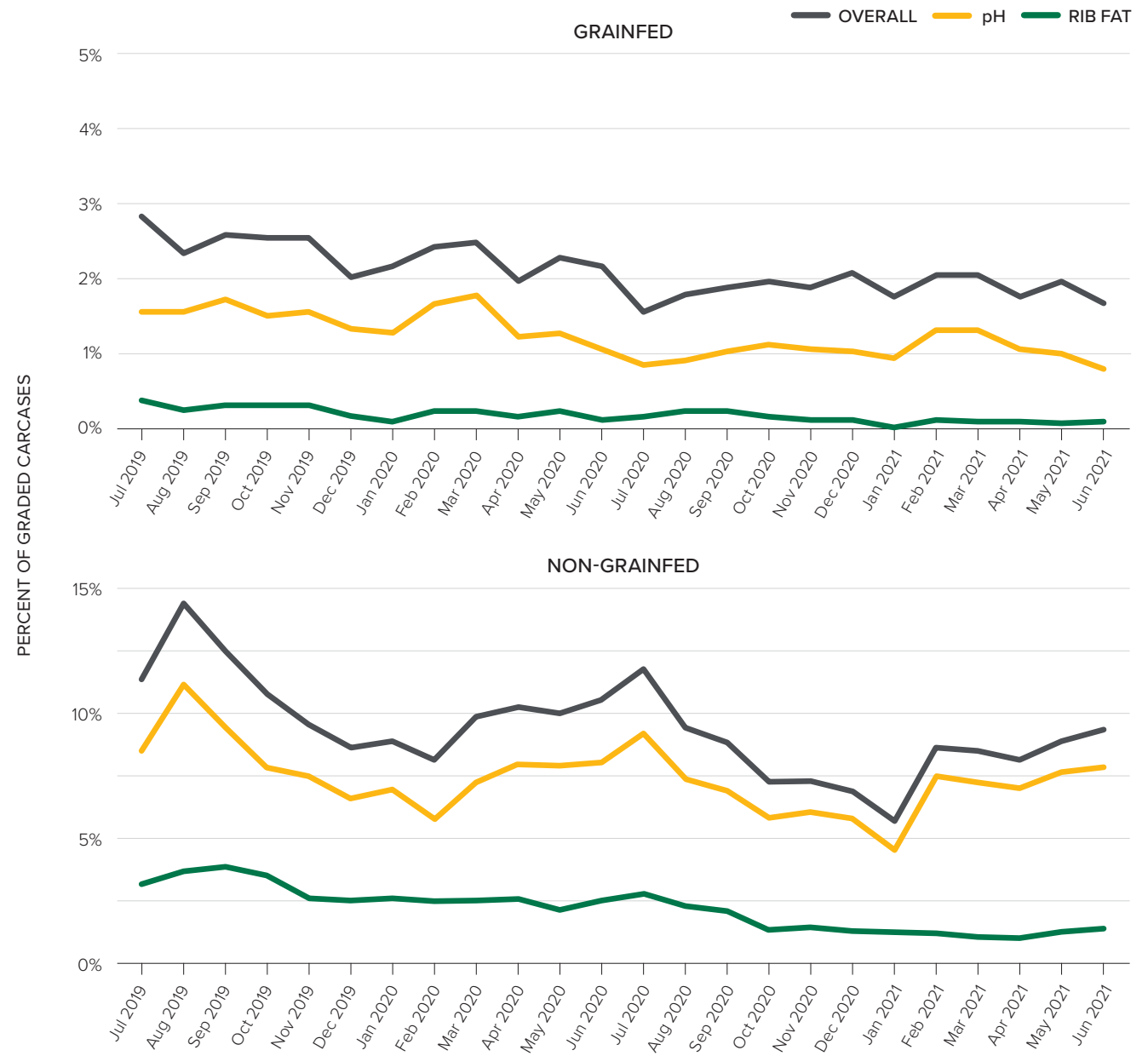


While each state will vary in seasonal conditions, on average there was an increased incidence of high pH (≥ 5.71) in non-Grainfed cattle in the autumn and winter months, though this varies based on rainfall and climatic zones.

South Australia/Northern Territory, Tasmania and Western Australia had lower compliance during the summer-autumn period while in Queensland, lower compliance was observed from May to September.



Figure 18 and 19. Reasons for non-compliance for Grainfed and non-Grainfed cattle in 2019-21



Effect of feed type on MSA Index

On average in 2019-21, Grainfed carcasses were 36kg heavier than non-Grainfed carcasses, with slightly lower ossification scores. Grainfed carcasses were observed to have both higher average MSA marbling scores and a greater range, compared to non-Grainfed carcasses.

The average MSA Index for non-Grainfed cattle was 58.41, which is 1.17 points higher than the average MSA Index of 57.24 for Grainfed cattle. The average MSA Index for non-Grainfed cattle increased by 0.31 from 2017-19, whilst the average MSA Index for Grainfed cattle increased 0.07 points from 2017-19. This could partly be due to the difference in the proportionate use of HGP treatments between the groups.

As seen in *Figure 20*, both feed types have slightly different population distributions. Non-Grainfed cattle consist of one main population, whilst Grainfed cattle had three key peaks, similar to the national distribution.

These peaks may be attributed to HGP usage or, to a lesser extent a population of carcasses with higher ossification scores. *Figure 20* also shows that there is a higher percentage of non-Grainfed cattle with MSA Index values greater than 60, and fewer cattle with MSA Index values below 50.

Table 5. MSA Index percentile bands by feed type 2019-21

FEED TYPE	GRAINFED	NON-GRAINFED
TOP 1%	67.89	65.84
TOP 5%	65.28	63.71
TOP 10%	63.60	62.72
TOP 25%	61.05	61.14
TOP 50%	57.49	59.17
BOTTOM 25%	53.96	56.25
BOTTOM 10%	49.67	53.21
BOTTOM 5%	48.12	50.71
BOTTOM 1%	46.04	44.97

Table 4. Carcase attributes, Lean Meat Yield and MSA Index of all MSA graded carcasses by feed type 2019-21
(all traits are independent of each other)

FEED TYPE	STAT	CARCASE WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)	EMA (CM ²)	LEAN MEAT YIELD (%)	MSA INDEX
GRAINFED	TOP 5%	429	45	120	630	19	96	62.6	65.28
	AVERAGE	323	80	160	380	9	77	58.0	57.24
	BOTTOM 5%	232	140	230	220	4	60	50.8	48.12
NON-GRAINFED	TOP 5%	377	40	120	490	14	87	62.8	63.71
	AVERAGE	287	60	180	330	7	72	59.5	58.41
	BOTTOM 5%	220	105	400	190	3	56	54.4	50.71

Figure 20. MSA Index distribution by feed type 2019-21

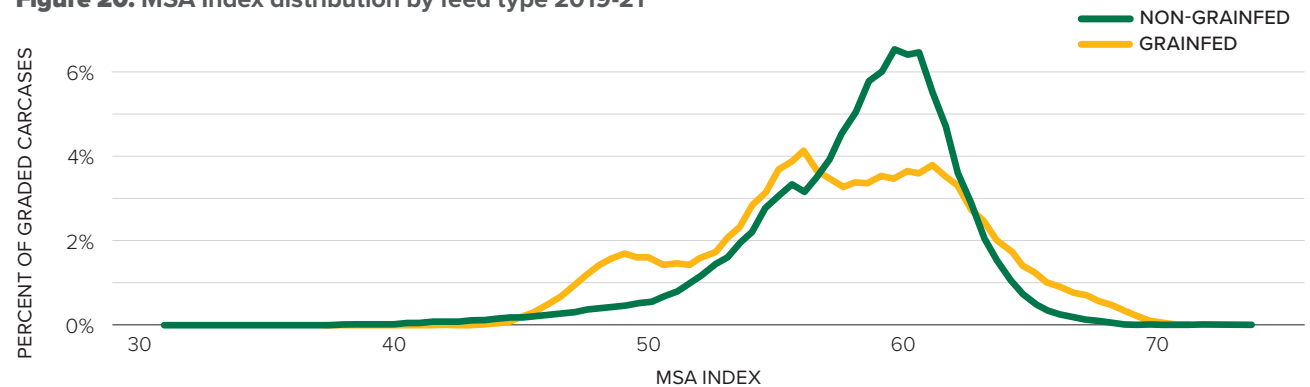
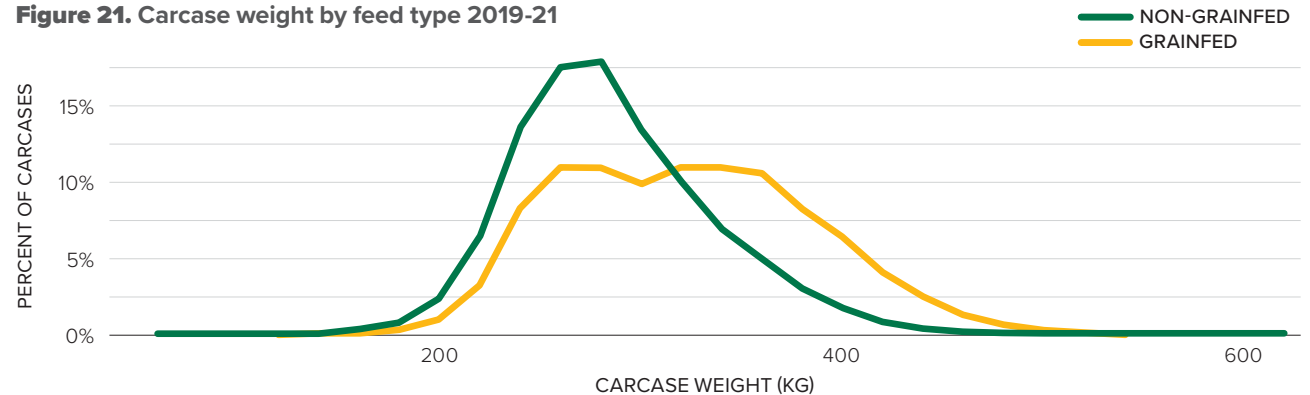


Figure 21. Carcase weight by feed type 2019-21



Carcase traits impacting on MSA Index and Lean Meat Yield by feed type

Ossification and marbling are key carcase traits that impact the MSA Index, which are influenced by nutrition management and genetic selection.

Key points:

- > Non-Grainfed cattle had more cattle with ossification scores of 180 or less (80.4%), compared to Grainfed carcasses (78.1%).
- > Differences in marbling distribution showed that a greater proportion of non-Grainfed cattle had marbling scores less than or equal to 400 (82.7%), when compared to Grainfed cattle (72.1%).
- > Non-Grainfed MSA graded carcasses averaged 59.6 LMY% and Grainfed MSA graded carcasses averaged 58.0 LMY%.

Ossification

Ossification refers to the physiological maturity of the carcase, and is measured on a scale of 100-590, with 100 being, physiologically, the 'least mature'.

Animals that reach market weight at a younger age are likely to have lower ossification scores.

Higher ossification is linked to an increased amount of connective tissue in the muscles, which has a negative effect on tenderness and eating quality. While ossification increases as the animal ages, it can also increase with nutritional or health stress and provides an indicator of the growth path of the animal in conjunction with HSCW.

MSA Marbling score

MSA Marbling is measured on a score range from 100-1190, with the score taking into account the amount, distribution and fineness of intramuscular fat.

Marbling has a positive effect on eating quality in many high-value cuts. However, marbling only contributes to a proportion of eating quality, as other traits such as ossification and hump height also have a considerable impact on eating quality.

Figure 23 illustrates the distribution of MSA Marbling score for Grainfed and non-Grainfed carcasses.

Lean Meat Yield (LMY)

In 2019-21, non-Grainfed MSA graded carcasses averaged 59.6 LMY% and Grainfed MSA graded carcasses averaged 58.0 LMY%. LMY% is calculated using HSCW and rib fat depth.

On-farm management and genetic factors which influence LMY% should be balanced with those that influence eating quality.

Figure 22. Ossification score by feed type 2019-21

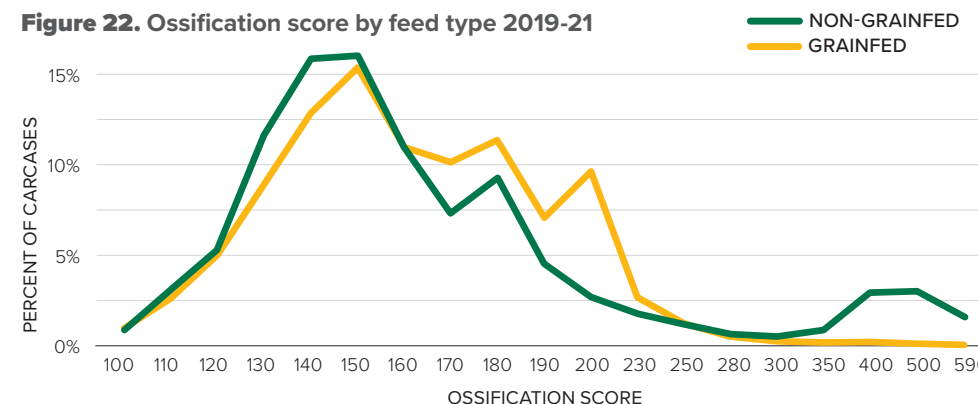


Figure 23. MSA Marbling score by feed type 2019-21

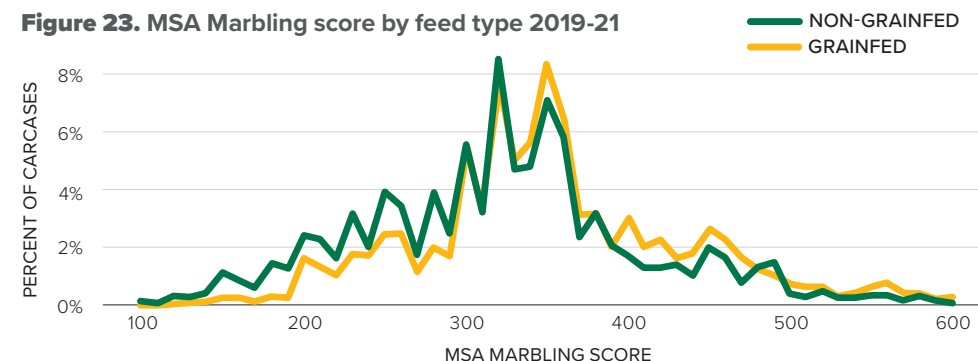
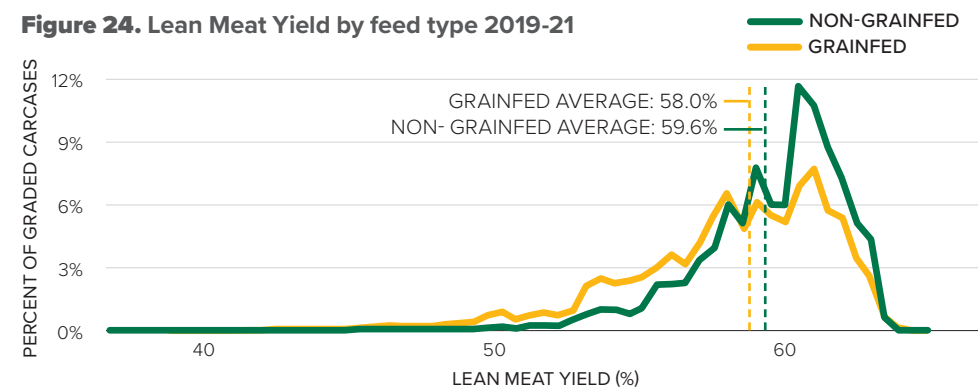


Figure 24. Lean Meat Yield by feed type 2019-21



MSA performance by HGP status

In 2019-21, 35% of MSA graded cattle received a hormonal growth promotant (HGP), with 84% of treated cattle being Grainfed. Queensland had the highest percentage of HGP usage at 45%.

Figure 27 illustrates the distribution of the MSA Index by HGP status. In 2019-21, HGP-free MSA graded cattle achieved a higher average MSA Index of 59.96, compared to HGP-treated cattle which averaged an MSA Index of 53.65.

Why HGP status matters

The use of HGPs has been proven to increase productivity through weight gain and feed conversion efficiencies. However, MSA consumer sensory testing has validated that HGP treatment has a negative impact on eating quality, partly due to an increase in enzymes which inhibit ageing.

The MSA Index of a HGP-free carcase is approximately five index units higher than a HGP-treated carcase with the same attributes.

Additionally, carcase attributes measured as part of MSA grading are also impacted by HGP treatment. For example, HGP use increases ossification and hump height, and negatively impacts marbling distribution, primarily through a dilution effect as the animal diverts energy to growth of muscle, rather than a reduction in the amount of marbling per se. The effect of HGPs on carcase traits can depend on the production system, timing and type of HGP implant.

Figure 27. MSA Index distribution by HGP status 2019-21

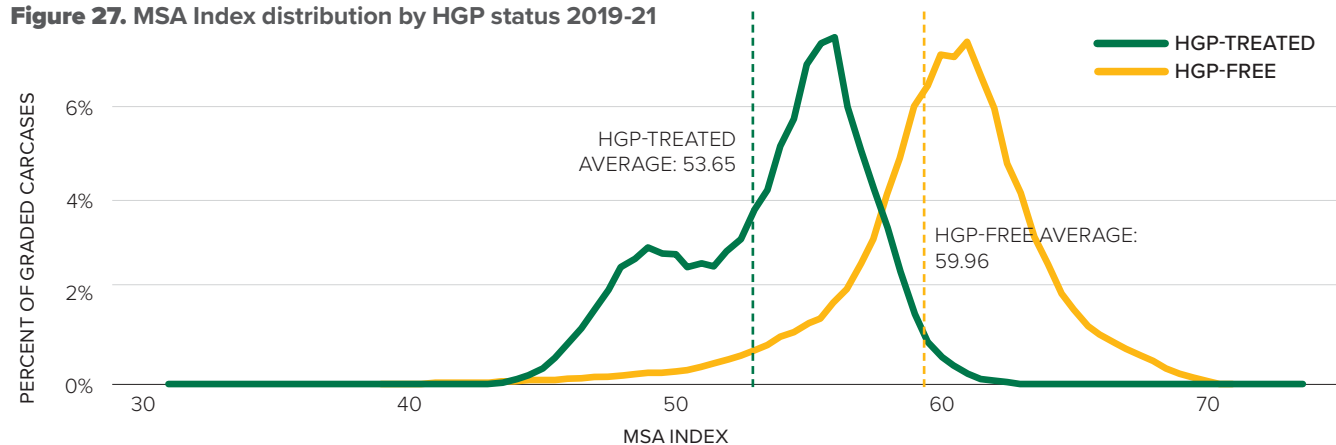


Figure 25. Proportion of HGP-free and HGP-treated MSA graded cattle by sex and feed type 2019-21

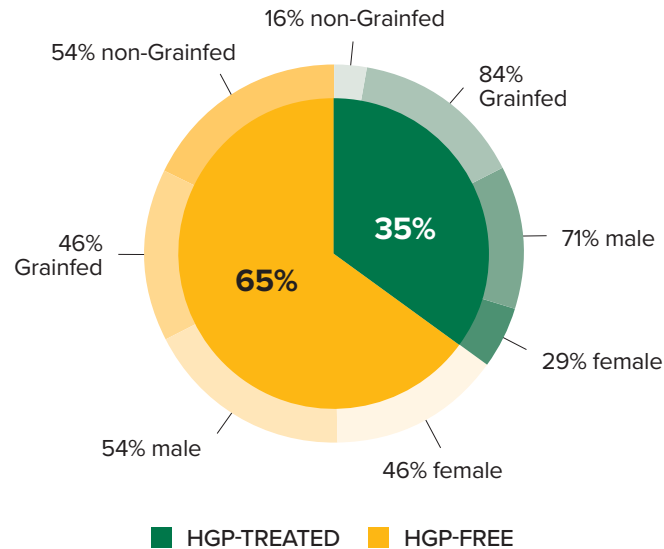


Figure 26. Proportion of HGP-free and HGP-treated MSA graded cattle by state 2019-21

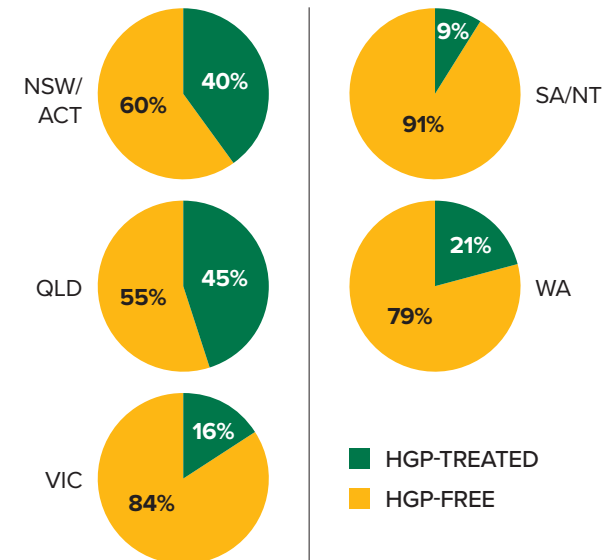


Table 6. MSA Index percentile bands by HGP status 2019-21

HGP	HGP-FREE	HGP-TREATED
TOP 1%	67.94	60.02
TOP 5%	65.55	58.48
TOP 10%	64.11	57.69
TOP 25%	62.16	56.24
TOP 50%	60.33	54.46
BOTTOM 25%	58.31	51.05
BOTTOM 10%	55.43	48.32
BOTTOM 5%	53.09	47.23
BOTTOM 1%	47.07	45.41

Carcase traits impacting on the MSA Index and Lean Meat Yield by HGP status

Not surprisingly, HGP-treated cattle had a higher average carcase weight of 328kg, compared to HGP-free cattle, which averaged 297kg.

HGP-treated cattle had greater hump heights and lower marbling scores, with similar average ossification scores.

Lean Meat Yield percentage (LMY%) was also similar between the two groups with HGP-free cattle achieving an average 59.0 LMY% and HGP-treated cattle achieving 58.1 LMY%.

There are two principal post-slaughter management procedures that can be utilised to improve the eating quality of animals treated with HGPs. The negative impact of HGPs on eating quality is the greatest on cuts that have the highest ageing rates, which are often the highest value cuts. The HGP impact, however, can be mitigated through ageing. Additionally, the use of the tenderstretch carcase hang method improves the eating quality of loin and hindquarter muscles, also reducing the negative eating quality impact due to HGP use.

Table 7. Carcase attributes, Lean Meat Yield and MSA Index of all MSA graded carcasses by HGP status 2019-21
(all traits are independent of each other)

HGP	STAT	CARCASE WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)	EMA (CM ²)	LEAN MEAT YIELD (%)	MSA INDEX
HGP-FREE	TOP 5%	404	40	110	630	16	90	62.8	65.55
	AVERAGE	297	65	170	360	8	73	59.0	59.96
	BOTTOM 5%	220	110	350	200	3	57	52.8	53.09
HGP-TREATED	TOP 5%	425	45	130	490	18	96	62.6	58.48
	AVERAGE	328	85	170	350	9	78	58.1	53.65
	BOTTOM 5%	237	155	230	210	4	59	51.4	47.23

Figure 28. Carcase weight by HGP status 2019-21

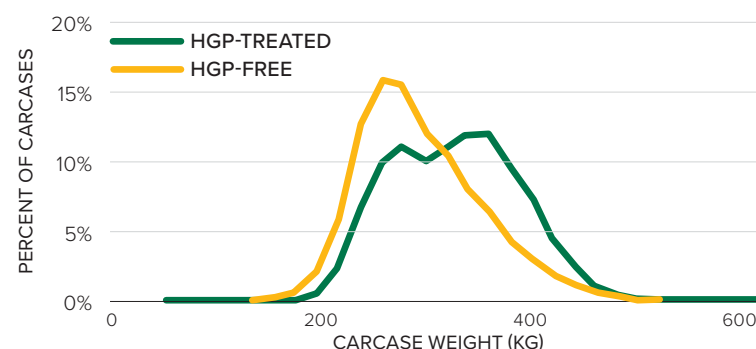


Figure 30. MSA Marbling score by HGP status 2019-21

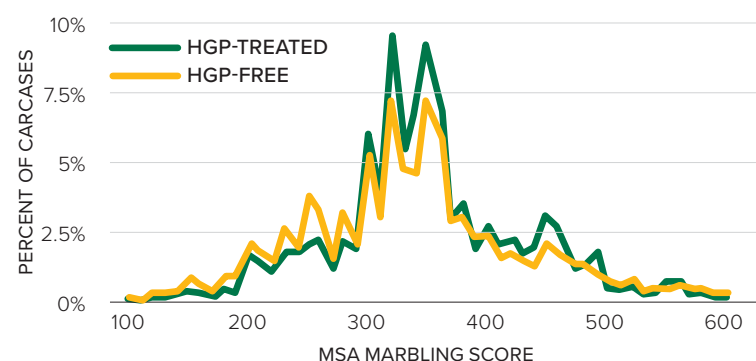
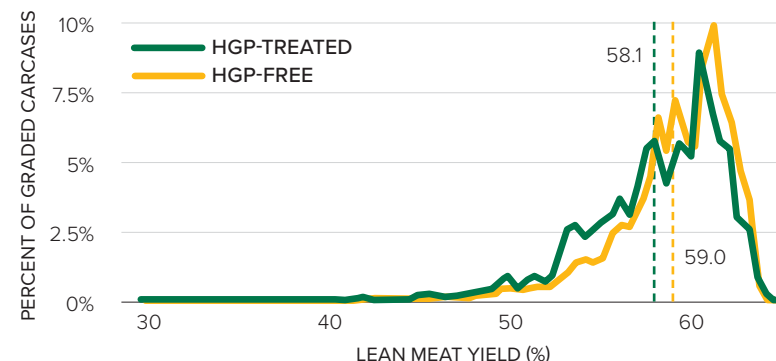


Figure 29. Ossification score by HGP status 2019-21



Figure 31. Lean Meat Yield by HGP status 2019-21



MSA performance by sex

In 2019-21, 60% of MSA graded cattle were identified as male. Of this 60%, 67% were Grainfed and 58% were HGP-free. Of the 40% of females presented, 51% were non-Grainfed and 75% were HGP-free.

South Australia and the Northern Territory had the largest proportion of male cattle supplied through the MSA program at 65%, while Tasmania had the lowest with 51%.

Figure 34 illustrates the distribution of the MSA Index for sex. In 2019-21, male and female MSA graded cattle achieved comparable average MSA Indexes of 57.70 and 57.68.

Table 8. MSA Index percentile band by sex 2019-21

HGP	FEMALE	MALE
TOP 1%	66.81	67.71
TOP 5%	63.65	65.06
TOP 10%	62.29	63.65
TOP 25%	60.43	61.54
TOP 50%	58.31	58.37
BOTTOM 25%	55.49	54.35
BOTTOM 10%	52.29	50.00
BOTTOM 5%	49.27	48.34
BOTTOM 1%	44.51	46.30

Figure 32. Proportion of MSA graded carcasses by sex, HGP status and feed type 2019-21

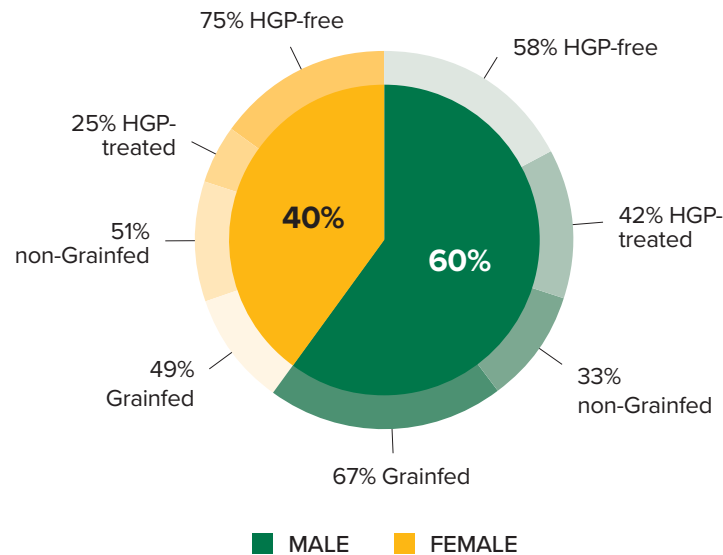


Figure 33. Proportion of MSA graded carcasses by sex and state 2019-21

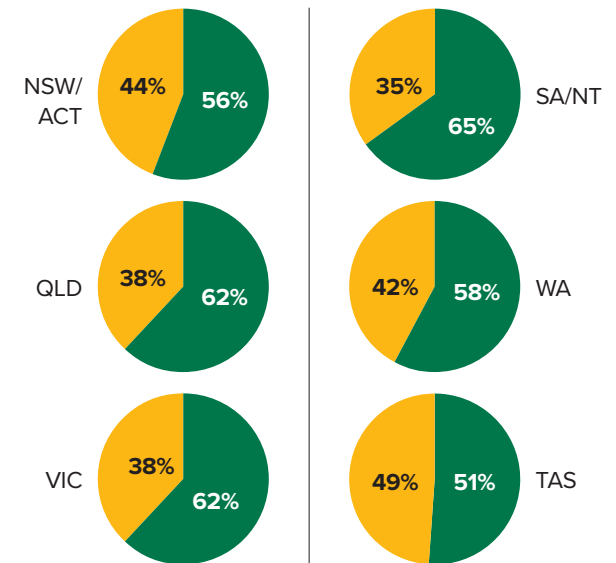
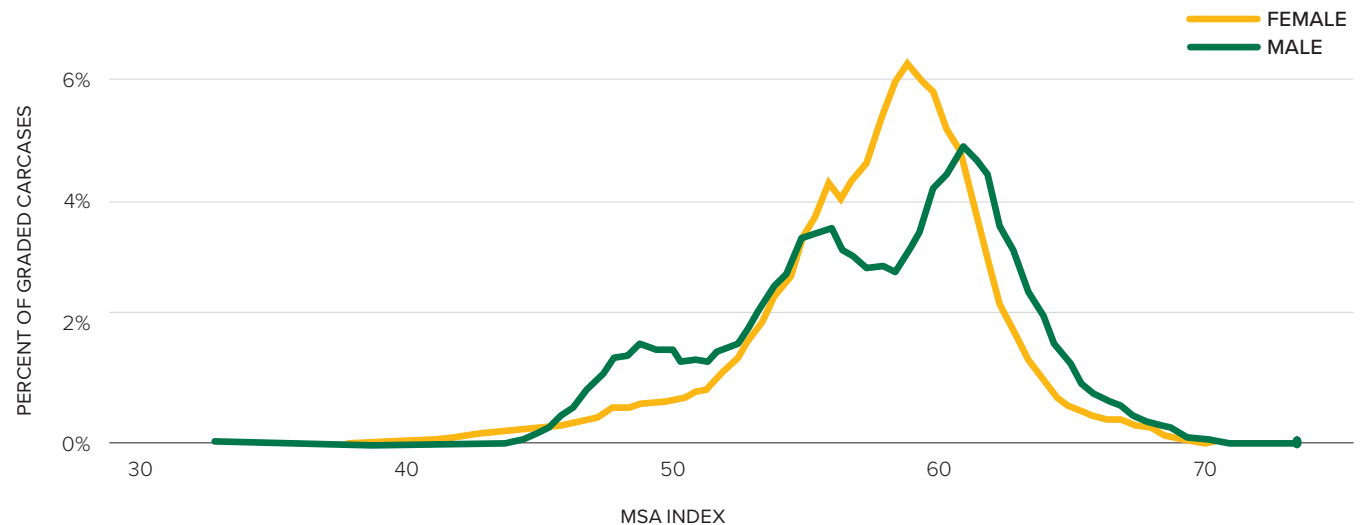


Figure 34. MSA Index distribution by sex 2019-21



Does sex status matter?

Sex status has a minimal impact on eating quality, although at low ossification scores, females may have a slightly higher MSA Index (+0.3) compared to males.

Table 9 refers to the average, top and bottom 5th percentiles for each trait. This shows that whilst male cattle were heavier with lower ossification scores, females tended to have lower hump heights and comparable marbling, as well as similar Lean Meat Yields as their male counterparts.

Table 9. Carcase attributes, Lean Meat Yield and MSA Index of all MSA graded carcasses by sex 2019-21
(all traits are independent of each other)

HGP	STAT	CARCASE WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)	EMA (CM ²)	LEAN MEAT YIELD (%)	MSA INDEX
FEMALE	Top 5%	361	35	130	550	16	89	62.7	63.65
	Average	272	65	190	350	8	72	59.0	57.68
	Bottom 5%	211	105	400	200	3	56	52.9	49.27
MALE	Top 5%	427	45	110	570	18	95	62.8	65.06
	Average	331	80	160	360	9	77	58.5	57.70
	Bottom 5%	246	140	200	200	3	60	51.8	48.34

Figure 35. Carcase weight by sex 2019-21

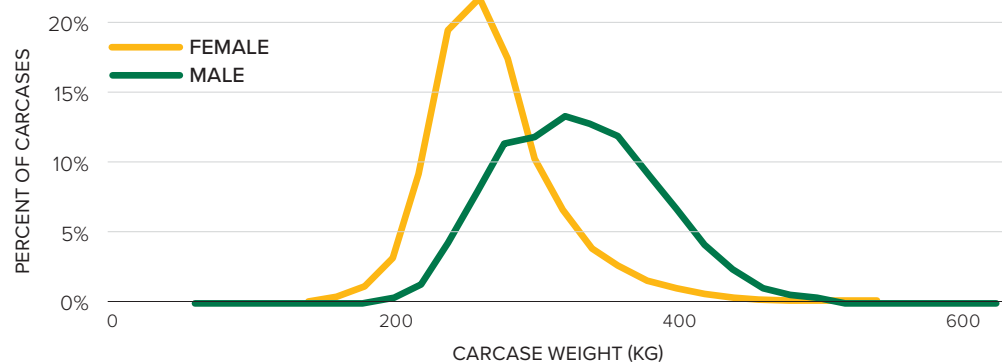


Figure 36. Ossification score by sex 2019-21



Figure 37. MSA Marble score by sex 2019-21

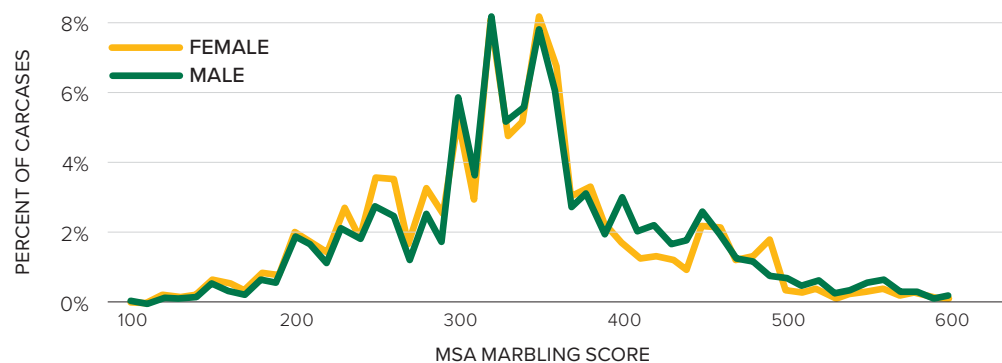
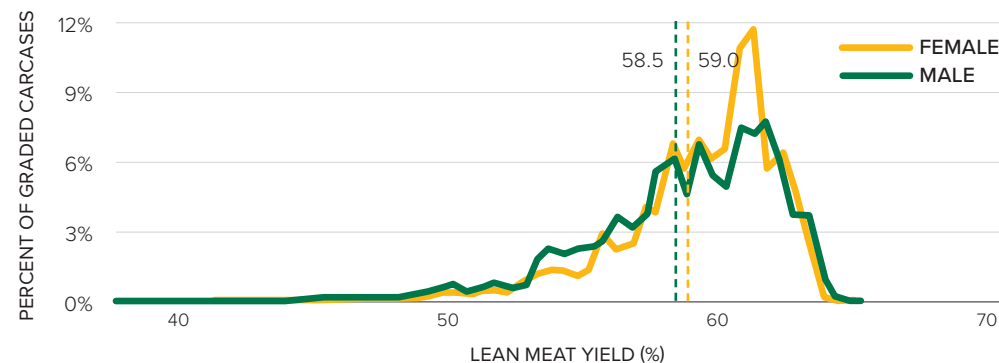


Figure 38. Lean Meat Yield by sex 2019-21



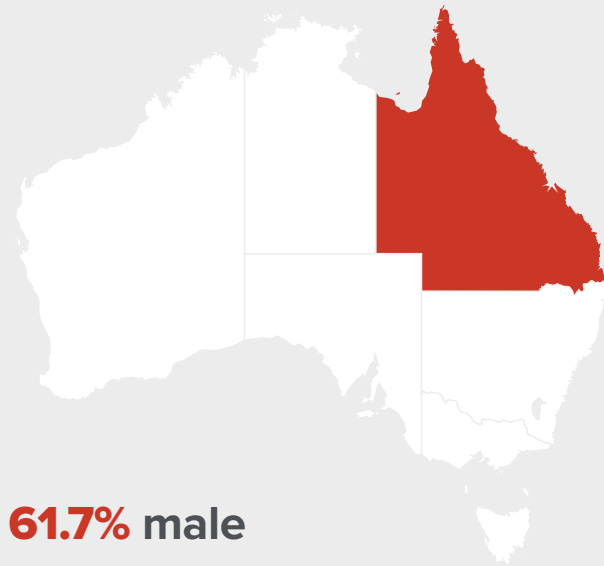
STATE



SNAPSHOTS



Queensland



61.7% male

54.9% HGP-free

78.2% Grainfed

50% MSA of QLD slaughter

56.03 Average MSA Index

More than 3.4 million MSA cattle were consigned from Queensland producers, representing a record 50% of all MSA graded cattle in Queensland in 2019-21.

19% of MSA-registered cattle producers reside in Queensland. This equates to 8,908 MSA-registered beef producers, with more than 2,850 of these producers consigning cattle to the program in 2019-21.

MSA-registered beef producers in Queensland achieved 94.0% MSA compliance in 2019-21, which was slightly lower than the national average at 95.5%.

Figure 39. QLD MSA graded carcasses 2019-21

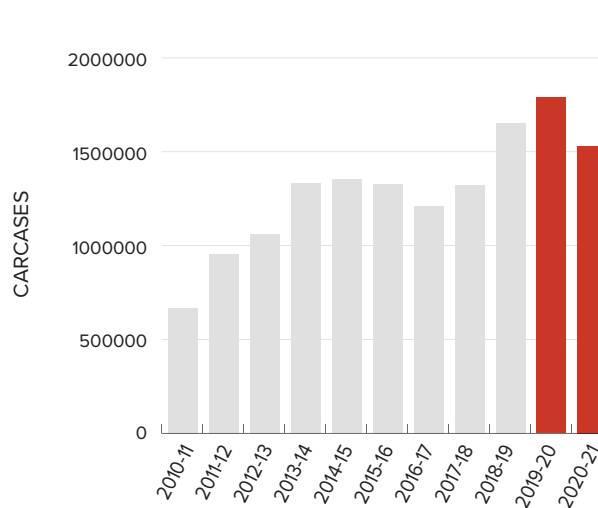
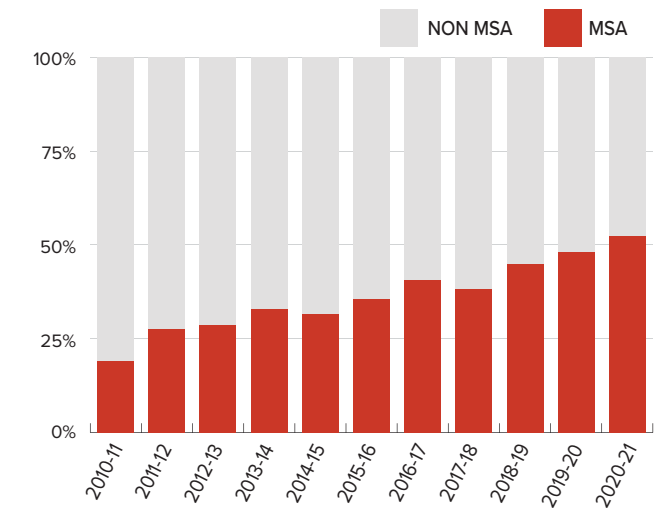


Figure 40. Proportion of carcasses presented for MSA grading to total QLD adult cattle slaughter 2019-21



For the first time, in the 2020-21 financial year the proportion of MSA was 53% of the slaughter in Queensland.

Figure 41. QLD total non-compliance to MSA minimum requirements 2019-21

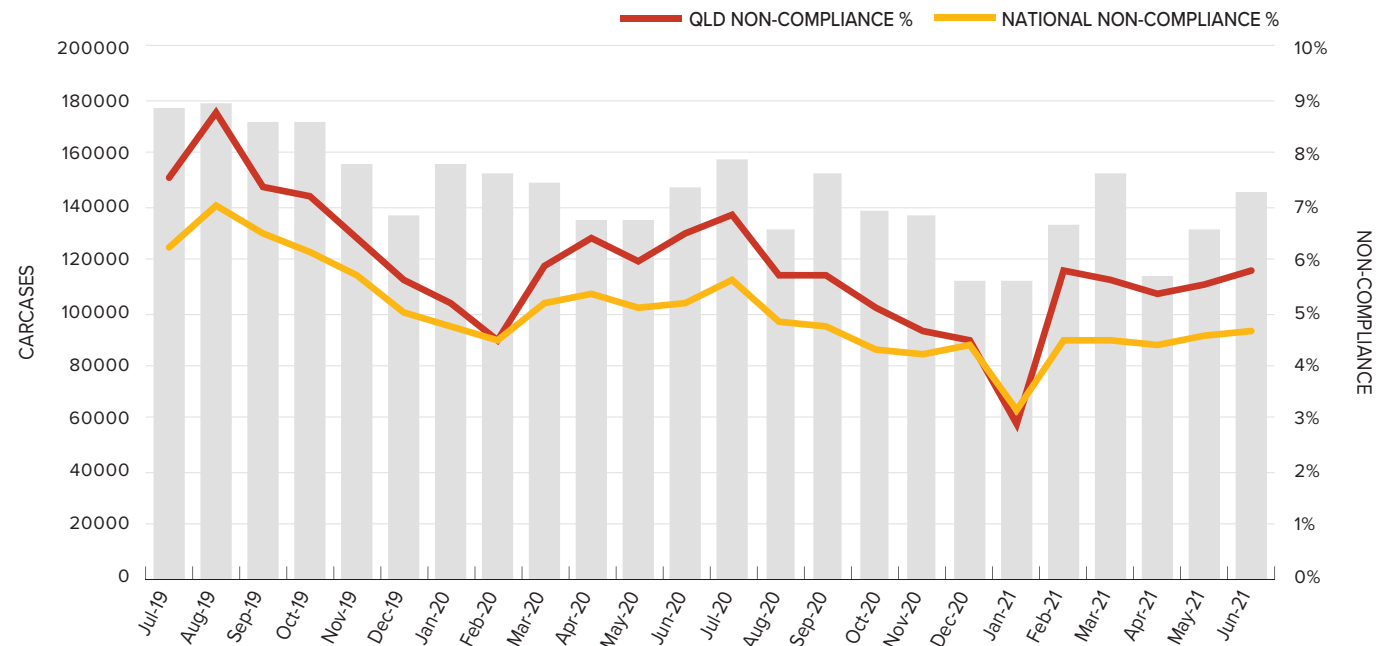
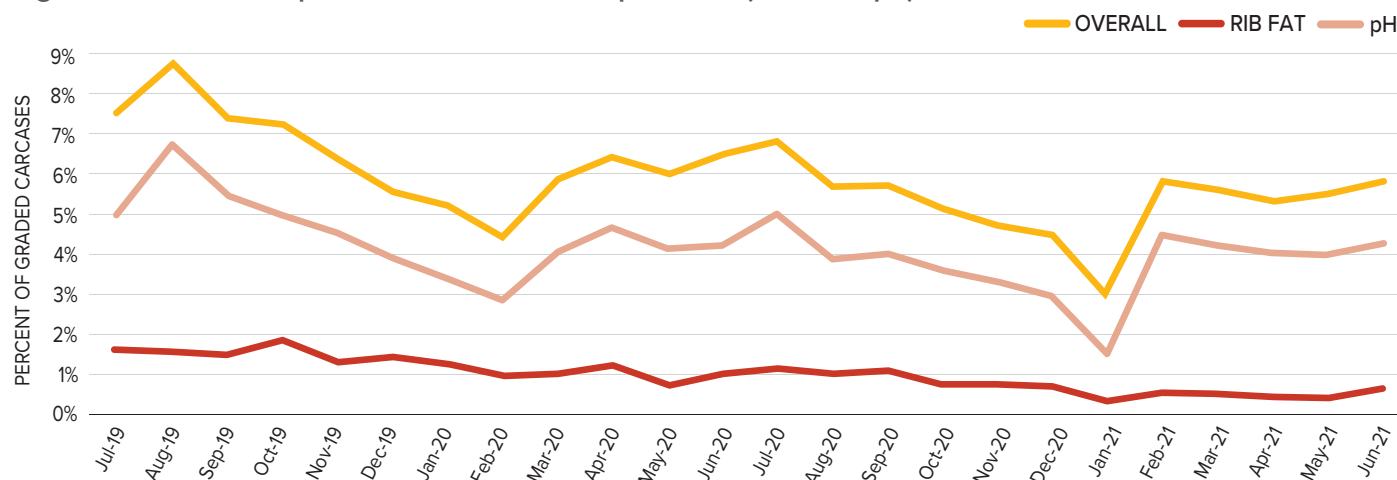
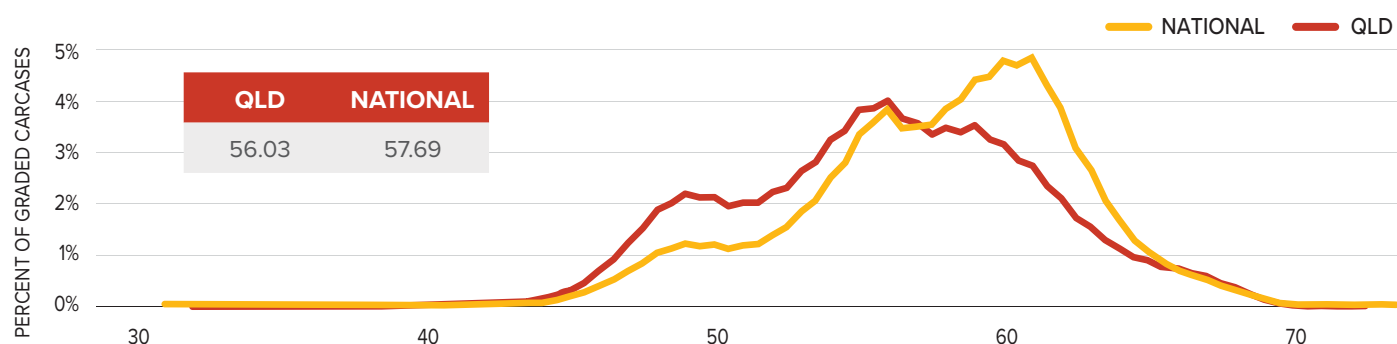


Figure 42. QLD non-compliance to MSA minimum requirements (rib fat and pH) 2019-21**Figure 43. QLD MSA Index performance 2019-21****Table 10. Carcase attributes, Lean Meat Yield and MSA Index of MSA graded carcasses in QLD 2019-21**

(all traits are independent of each other)

	CARCASE WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)	EMA (CM ²)	LEAN MEAT YIELD (%)	MSA INDEX
TOP 5%	424.0	45	120	620	19	94	62.7	64.76
AVERAGE	314.6	85	170	360	9	76	58.3	56.03
BOTTOM 5%	222.6	150	250	200	3	60	50.8	47.42

Table 11. QLD MSA Index percentile bands 2019-21

PRODUCER STATE	QLD	NATIONAL
TOP 1%	67.60	67.44
TOP 5%	64.76	64.63
TOP 10%	62.75	63.19
TOP 25%	59.74	61.10
TOP 50%	56.15	58.33
BOTTOM 25%	52.33	54.84
BOTTOM 10%	48.76	50.70
BOTTOM 5%	47.42	48.55
BOTTOM 1%	44.96	45.82

In the 2019-21 timeframe, non-compliance fluctuated between 3% and 9% with the highest non-compliance in August 2019 and lowest in January 2021. The main reason for non-compliance was ultimate pH, which was highest during August 2019. Non-compliance due to rib fat peaked at 2% in October 2019, as observed in *Figure 42*.

Figure 43 illustrates the MSA Index distribution of MSA graded carcasses across Queensland and nationally. The Queensland MSA Index is lower than the national MSA Index, due partly to a higher proportion of HGP usage.

Eating quality benchmarks for MSA graded cattle in Queensland

New to the 2021 MSA Australian Beef Eating Quality Insights report are state-based eating quality benchmarks. *These tables were previously only provided on a national basis.*

Identifying opportunities for improvement

The percentile band tables are ranked by the MSA Index. The carcass traits displayed are the average of the animals within the percentile band. These are presented by feed type, HGP status and sex. These assist producers to match their production system and benchmark their herd's performance.

For example, if a producer's production system was based on HGP-free, non-Grainfed, male cattle they would focus on **Table 12**. If the producer's average MSA Index was 56.50 or above, they would be in the middle 50th percentile of the state for MSA Index. If the producer wanted to improve their eating quality to the Top 25%, they would need to implement practices to improve their MSA Index to 59.02. Carcasses in the Top 25% percentile had lower hump heights, lower ossification scores and higher MSA marbling when compared to cattle in the top 50%.



Kerwee Feedlot Livestock Manager, Stevie-Lee Wayman. Kerwee Feedlot won the 2019 MSA Excellence in Eating Quality Awards for Most Outstanding MSA Feedlot in Queensland.

Table 12. QLD percentile bands for MSA Index and their average carcass traits for HGP-free, non-Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	63.35	268.2	55	140	510	9
	TOP 5%	61.20	258.4	55	150	400	9
	TOP 10%	60.08	256.4	60	150	350	8
	TOP 25%	58.02	253.0	65	160	320	7
	TOP 50%	55.25	253.7	75	210	280	7
	BOTTOM 25%	51.51	267.4	95	360	270	7
	BOTTOM 10%	46.63	267.7	95	490	250	7
	BOTTOM 5%	43.97	264.5	115	520	250	7
MALE	BOTTOM 1%	40.48	239.8	120	520	190	5
	TOP 1%	64.32	300.8	65	120	490	8
	TOP 5%	62.19	292.1	65	120	390	7
	TOP 10%	60.99	298.2	65	130	350	7
	TOP 25%	59.02	305.7	75	140	320	7
	TOP 50%	56.50	308.5	95	150	280	6
	BOTTOM 25%	54.09	308.5	120	150	250	6
	BOTTOM 10%	52.34	307.3	125	160	220	5
	BOTTOM 5%	51.47	304.5	130	170	200	5
	BOTTOM 1%	50.04	299.7	135	200	180	4

Table 13. QLD percentile bands for MSA Index and their average carcass traits for HGP-free, Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	67.92	419.5	75	170	980	22
	TOP 5%	66.00	397.6	75	180	850	19
	TOP 10%	64.29	351.5	70	170	670	15
	TOP 25%	61.66	283.0	65	150	440	10
	TOP 50%	59.74	256.2	65	150	320	7
	BOTTOM 25%	58.10	250.7	75	160	290	7
	BOTTOM 10%	56.27	251.8	85	170	290	7
	BOTTOM 5%	54.87	255.7	105	190	290	8
MALE	BOTTOM 1%	51.05	252.6	105	400	260	5
	TOP 1%	68.73	450.8	80	150	1020	18
	TOP 5%	67.24	429.9	80	160	910	16
	TOP 10%	66.06	406.4	80	150	760	14
	TOP 25%	63.67	369.2	75	140	570	12
	TOP 50%	61.24	318.5	70	140	370	9
	BOTTOM 25%	58.74	296.5	90	150	300	8
	BOTTOM 10%	56.20	310.6	115	150	310	9
	BOTTOM 5%	54.78	313.5	130	150	290	9
	BOTTOM 1%	52.72	304.9	135	170	240	8

Table 14. QLD percentile bands for MSA Index and their average carcass traits for HGP-treated, non-Grainfed cattle

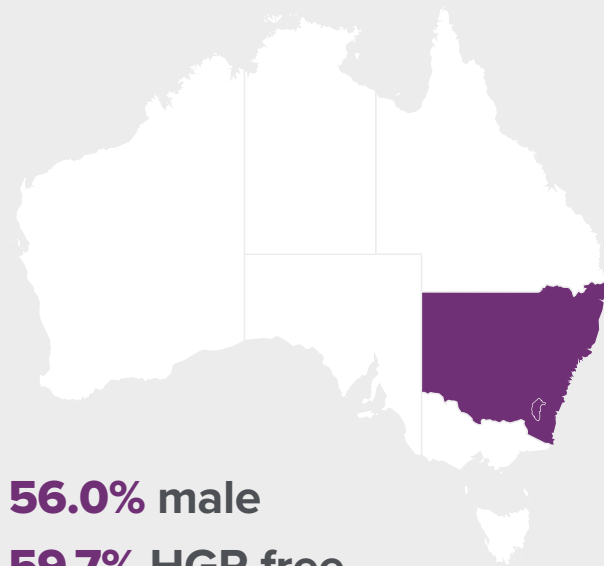
SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	59.50	266.2	50	130	480	8
	TOP 5%	58.51	264.5	50	130	400	7
	TOP 10%	58.07	260.0	50	130	380	7
	TOP 25%	56.59	260.3	50	140	390	7
	TOP 50%	55.30	256.9	55	160	340	7
	BOTTOM 25%	52.68	247.3	75	190	300	6
	BOTTOM 10%	48.67	244.0	105	200	270	6
	BOTTOM 5%	46.20	254.4	110	310	260	6
MALE	BOTTOM 1%	41.08	248.5	105	510	250	6
	TOP 1%	59.19	274.7	55	120	460	7
	TOP 5%	57.95	277.0	55	130	420	7
	TOP 10%	57.46	274.1	50	130	390	7
	TOP 25%	56.19	274.0	55	140	370	6
	TOP 50%	55.03	278.3	60	150	320	6
	BOTTOM 25%	52.23	300.6	100	170	280	6
	BOTTOM 10%	48.25	300.7	125	180	260	6
	BOTTOM 5%	46.70	291.1	130	180	230	5
	BOTTOM 1%	44.70	278.8	135	210	180	5

Table 15. QLD percentile bands for MSA Index and their average carcass traits for HGP-treated, Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	59.88	280.6	60	130	540	10
	TOP 5%	58.26	277.3	60	140	460	9
	TOP 10%	57.39	279.0	60	150	420	9
	TOP 25%	55.95	282.7	60	150	380	9
	TOP 50%	54.17	290.1	70	170	330	8
	BOTTOM 25%	51.21	296.2	105	190	310	9
	BOTTOM 10%	48.12	292.9	125	200	290	9
	BOTTOM 5%	46.73	285.2	130	220	260	8
MALE	BOTTOM 1%	44.50	271.8	125	320	230	6
	TOP 1%	59.56	384.4	70	170	590	13
	TOP 5%	57.73	378.0	70	170	480	11
	TOP 10%	56.77	375.0	75	170	420	11
	TOP 25%	55.01	364.4	75	170	380	10
	TOP 50%	52.06	355.7	105	180	330	11
	BOTTOM 25%	49.17	346.7	140	190	300	10
	BOTTOM 10%	47.57	336.5	145	200	270	9
	BOTTOM 5%	46.73	329.2	145	210	230	8
	BOTTOM 1%	45.31	316.4	150	230	190	7



New South Wales and Australian Capital Territory



56.0% male

59.7% HGP-free

49.6% Grainfed

64% MSA of NSW/ACT slaughter

58.35 Average MSA Index

More than 1.6 million MSA cattle were consigned from New South Wales and the Australian Capital Territory, representing 23% of all MSA graded cattle in Australia in 2019-21.

30% of MSA-registered cattle producers reside in NSW/ACT. This equates to 14,066 MSA-registered beef producers, with more than 4,600 of these producers consigning cattle to the program in 2019-21.

MSA-registered beef producers in NSW/ACT achieved 96.1% MSA compliance in 2019-21.

Figure 44. NSW/ACT MSA graded carcasses 2019-21

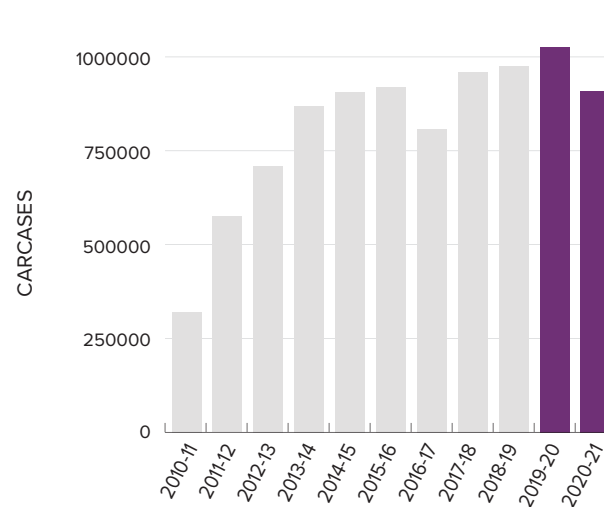
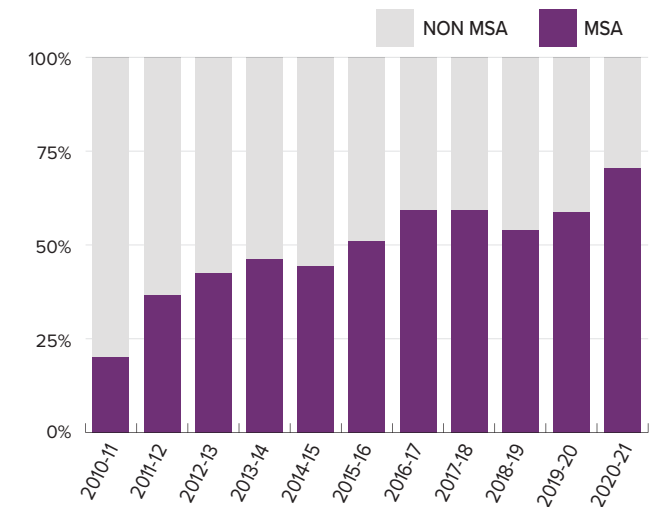


Figure 45. Proportion of carcasses presented for MSA grading to total NSW/ACT adult cattle slaughter 2019-21



Between the 2019-20 and 2020-21 financial years, the proportion of MSA cattle in the NSW/ACT slaughter increased by 11% points from 59% to 70%.

Figure 46. NSW/ACT total non-compliance to MSA minimum requirements 2019-21

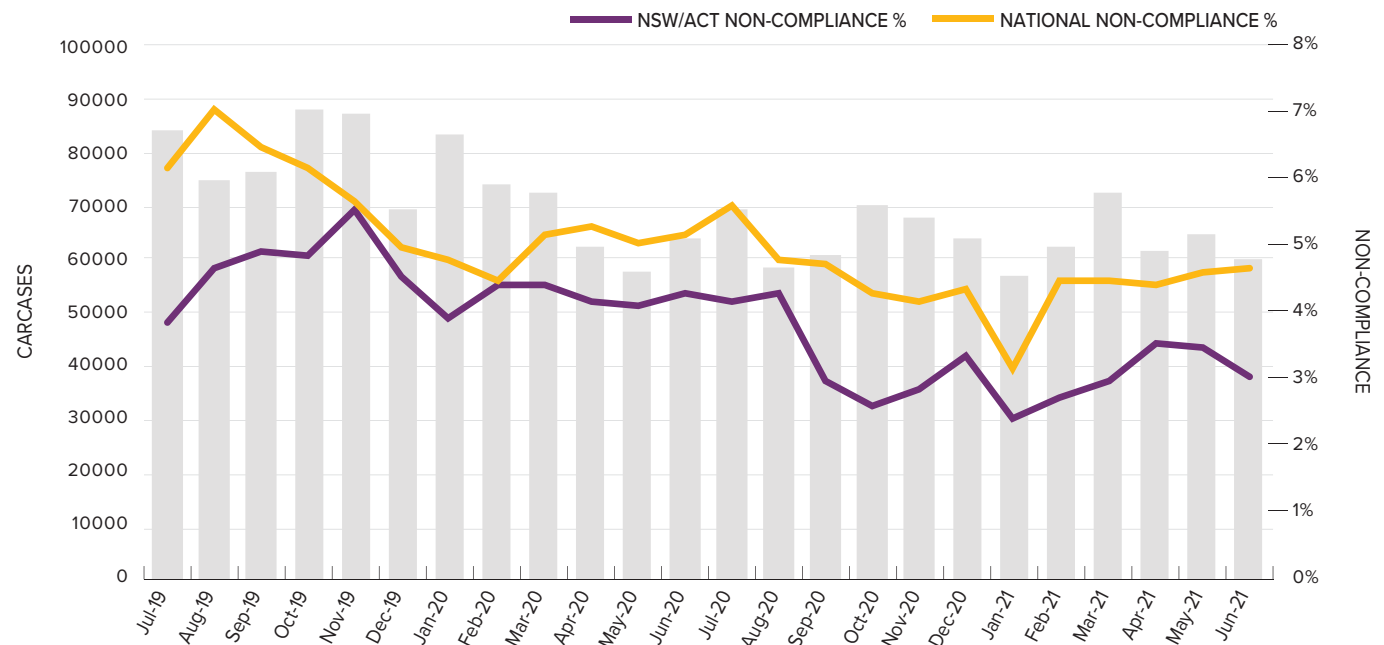
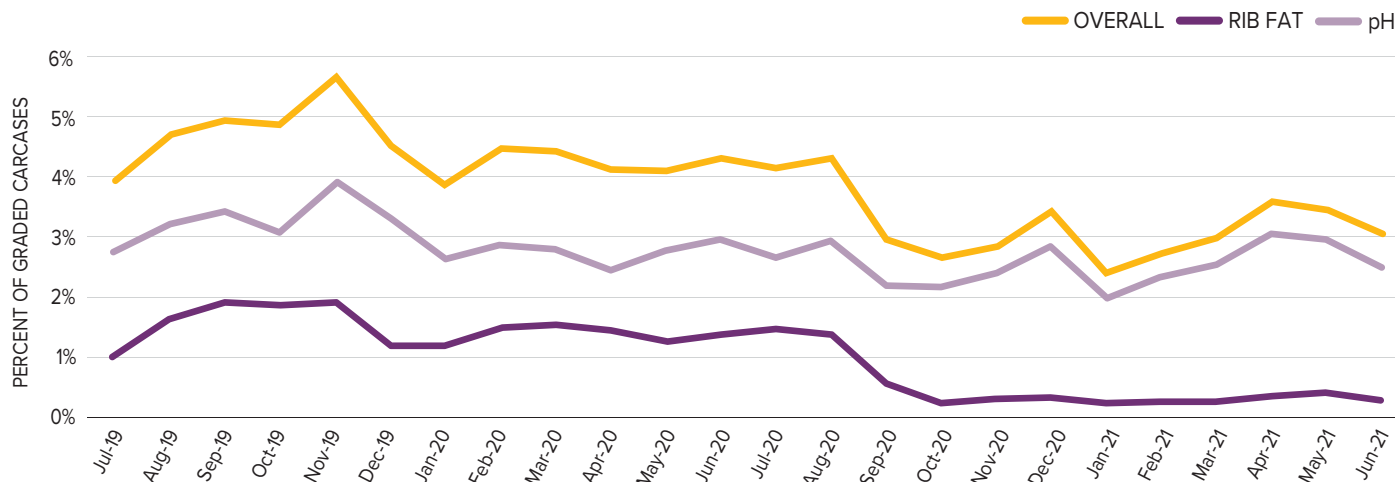
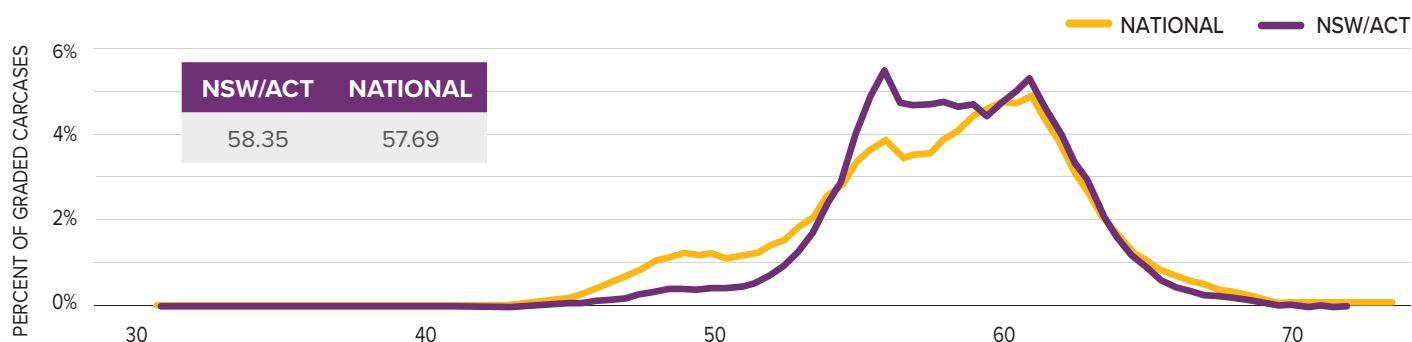


Figure 47. NSW/ACT non-compliance to MSA minimum requirements (rib fat and pH) 2019-21**Figure 48. NSW/ACT MSA Index performance 2019-21****Table 16. Carcase attributes, Lean Meat Yield and MSA Index of MSA graded carcasses in NSW/ACT 2019-21**
(all traits are independent of each other)

	CARCASE WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)	EMA (CM ²)	LEAN MEAT YIELD (%)	MSA INDEX
TOP 5%	412.0	40	120	550	16	95	62.5	64.19
AVERAGE	308.8	65	170	370	9	76	58.7	58.35
BOTTOM 5%	232.2	100	250	210	4	56	52.9	51.94

Table 17. NSW/ACT MSA Index percentile bands 2019-21

PRODUCER STATE	NSW/ACT	NATIONAL
TOP 1%	67.09	67.44
TOP 5%	64.19	64.63
TOP 10%	62.99	63.19
TOP 25%	61.10	61.10
TOP 50%	58.48	58.33
BOTTOM 25%	55.87	54.84
BOTTOM 10%	53.88	50.70
BOTTOM 5%	51.94	48.55
BOTTOM 1%	47.04	45.82

In the 2019-21 timeframe, non-compliance fluctuated between 2% and 6% with the highest non-compliance in November 2019 and lowest in January 2021. The main reason for non-compliance was ultimate pH peaking at 4% in November 2019. The highest incidence of rib-fat non compliance was observed between August 2019 and November 2019, which was approximately 2%.

Figure 48 illustrates the MSA Index distribution of MSA graded carcasses across NSW/ACT and nationally. On average, the NSW/ACT MSA Index was higher than the national MSA Index, in part due to the higher average MSA marbling scores and lower average hump height in proportion to carcass weight, when compared to national figures.

Eating quality benchmarks for MSA graded cattle in New South Wales and Australian Capital Territory

New to the 2021 MSA Australian Beef Eating Quality Insights report are state-based eating quality benchmarks. *These tables were previously only provided on a national basis.*

Identifying opportunities for improvement

The percentile band tables are ranked by the MSA Index. The carcass traits displayed are the average of the animals within the percentile band. These are presented by feed type, HGP status and sex. These assist producers to match their production system and benchmark their herd's performance.

For example, if a producer's production system was based on HGP-free, non-Grainfed, male cattle they would focus on **Table 18**. If the producer's average MSA Index was 60.96 or above, they would be in the middle 50th percentile of the state for that trait. If the producer wanted to improve their eating quality to the Top 25%, they would need to implement practices to improve their MSA Index to 62.33. Carcasses in the Top 25% percentile had similar hump heights but lower ossification scores and higher MSA marbling when compared to cattle in the top 50%.



Tom Amey, Mummulgum, NSW, won the 2019 MSA Excellence in Eating Quality Awards for Most Outstanding MSA Producer in NSW for Band 2 producers.

Table 18. NSW/ACT percentile bands for MSA Index and their average carcass traits for HGP-free, non-Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	64.76	282.4	50	140	560	9
	TOP 5%	63.18	272.1	50	140	470	9
	TOP 10%	62.34	268.1	50	150	420	8
	TOP 25%	60.88	269.4	50	150	370	8
	TOP 50%	59.20	268.0	55	170	310	8
	BOTTOM 25%	57.11	276.9	60	280	300	7
	BOTTOM 10%	52.71	299.9	60	460	330	7
	BOTTOM 5%	48.90	273.2	65	510	290	5
MALE	BOTTOM 1%	43.97	259.7	95	520	270	5
	TOP 1%	66.17	329.0	60	120	620	10
	TOP 5%	64.49	312.4	60	120	480	9
	TOP 10%	63.68	306.5	60	120	420	8
	TOP 25%	62.33	303.1	60	130	380	8
	TOP 50%	60.96	301.2	60	140	310	7
	BOTTOM 25%	59.62	302.2	65	150	260	7
	BOTTOM 10%	58.38	297.3	70	160	250	6
	BOTTOM 5%	57.50	297.1	75	160	250	6
	BOTTOM 1%	54.93	309.2	95	180	250	5

Table 19. NSW/ACT percentile bands for MSA Index and their average carcass traits for HGP-free, Grainfed cattle

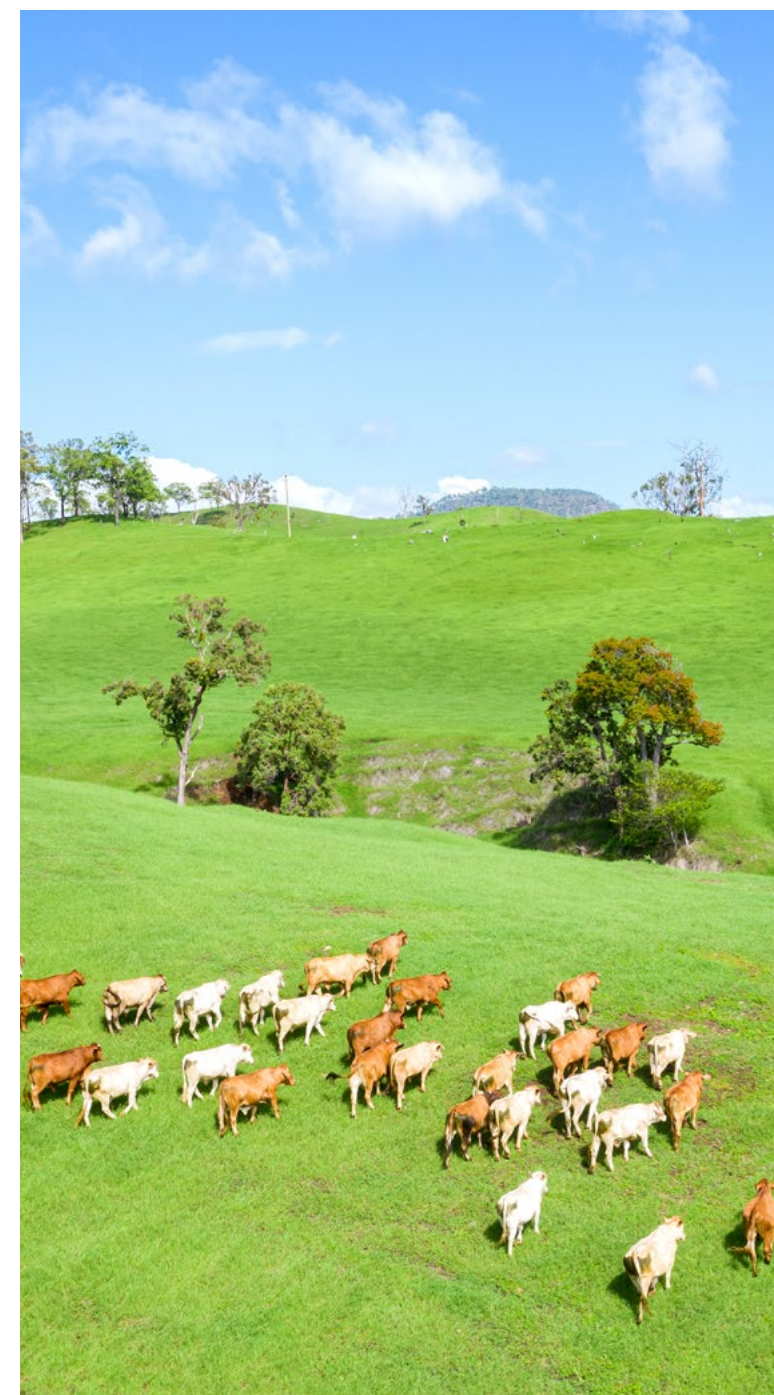
SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	68.95	445.4	55	160	1040	25
	TOP 5%	66.60	422.9	50	180	900	21
	TOP 10%	64.23	353.3	55	170	660	13
	TOP 25%	62.09	311.5	55	160	470	10
	TOP 50%	60.66	289.8	55	160	360	8
	BOTTOM 25%	59.19	278.6	60	180	310	7
	BOTTOM 10%	57.31	276.6	75	190	300	7
	BOTTOM 5%	54.93	290.0	125	210	340	7
MALE	BOTTOM 1%	50.91	285.3	135	290	310	7
	TOP 1%	69.02	446.9	60	140	980	19
	TOP 5%	67.15	412.4	65	140	790	14
	TOP 10%	65.76	376.7	70	130	630	11
	TOP 25%	63.83	349.0	65	130	480	10
	TOP 50%	62.13	334.3	65	140	390	9
	BOTTOM 25%	60.69	319.4	70	150	340	8
	BOTTOM 10%	58.99	312.4	80	150	320	7
	BOTTOM 5%	57.07	318.9	120	150	330	7
	BOTTOM 1%	53.72	312.8	150	170	290	7

Table 20. NSW/ACT percentile bands for MSA Index and their average carcass traits for HGP-treated, non-Grainfed cattle

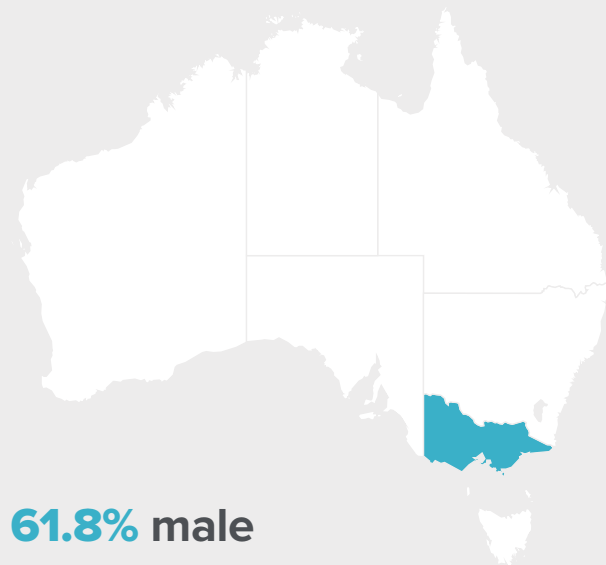
SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	60.60	297.7	50	140	590	11
	TOP 5%	59.07	286.9	50	150	520	10
	TOP 10%	58.49	278.7	50	140	440	9
	TOP 25%	57.47	273.0	50	150	430	8
	TOP 50%	56.04	273.0	50	160	370	8
	BOTTOM 25%	54.84	276.3	55	180	330	7
	BOTTOM 10%	53.25	275.9	55	190	300	7
	BOTTOM 5%	52.21	268.8	65	220	290	6
	BOTTOM 1%	48.46	262.1	115	270	290	7
MALE	TOP 1%	60.54	328.6	60	130	580	11
	TOP 5%	58.88	313.2	55	130	470	9
	TOP 10%	58.16	300.2	55	140	440	8
	TOP 25%	57.40	288.2	50	130	390	7
	TOP 50%	56.15	285.4	50	140	360	6
	BOTTOM 25%	55.24	276.8	55	150	310	6
	BOTTOM 10%	54.42	286.7	60	160	300	6
	BOTTOM 5%	53.54	297.2	75	180	310	5
	BOTTOM 1%	50.50	296.4	110	180	280	5

Table 21. NSW/ACT percentile bands for MSA Index and their average carcass traits for HGP-treated, Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	60.46	297.3	50	130	520	9
	TOP 5%	58.88	293.4	50	140	480	9
	TOP 10%	58.41	279.0	50	140	410	8
	TOP 25%	57.29	282.7	50	150	420	8
	TOP 50%	55.96	287.9	55	160	370	8
	BOTTOM 25%	54.73	294.9	60	190	360	8
	BOTTOM 10%	52.88	287.1	75	200	330	7
	BOTTOM 5%	50.24	296.3	135	190	330	6
	BOTTOM 1%	46.05	280.6	145	250	290	5
MALE	TOP 1%	60.38	414.7	80	170	650	15
	TOP 5%	59.11	407.5	80	170	560	15
	TOP 10%	58.32	397.9	80	170	510	14
	TOP 25%	57.17	385.6	80	170	450	14
	TOP 50%	55.79	359.2	75	170	380	11
	BOTTOM 25%	54.29	332.2	80	180	330	8
	BOTTOM 10%	52.42	334.2	95	180	320	8
	BOTTOM 5%	50.23	341.4	130	180	320	7
	BOTTOM 1%	47.26	322.2	145	210	270	6



Victoria



61.8% male

84.0% HGP-free

34.8% Grainfed

24% MSA of VIC slaughter

59.97 Average MSA Index

More than 758,000 MSA cattle were consigned from Victoria, representing 11% of all MSA graded cattle in Australia in 2019-21.

17% of MSA-registered cattle producers reside in Victoria. This equates to 7,970 MSA-registered beef producers, with more than 2,600 of these producers consigning cattle to the program in 2019-21.

MSA-registered beef producers in Victoria achieved 96.3% MSA compliance in 2019-21.

Figure 49. VIC MSA graded carcasses 2019-21

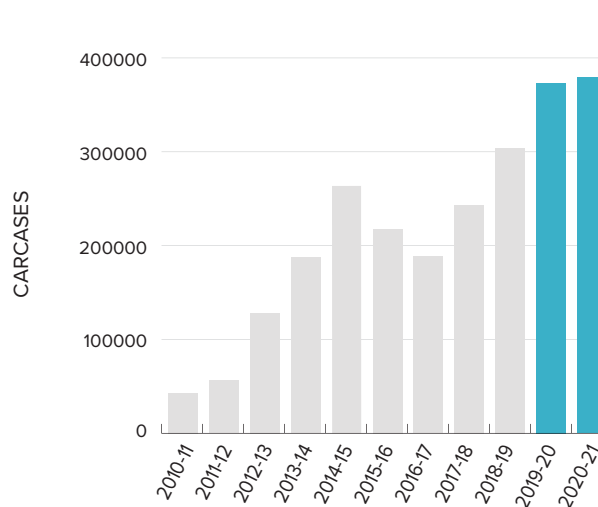
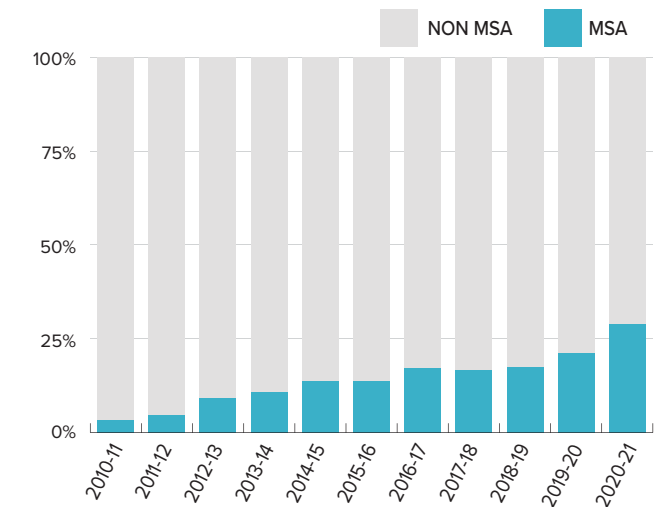


Figure 50. Proportion of carcasses presented for MSA grading to total VIC adult cattle slaughter 2019-21



Between the 2019-20 and 2020-21 financial years, the proportion of MSA within the total Victorian slaughter increased by 8% from 21% to 29%

Figure 51. VIC total non-compliance to MSA minimum requirements 2019-21

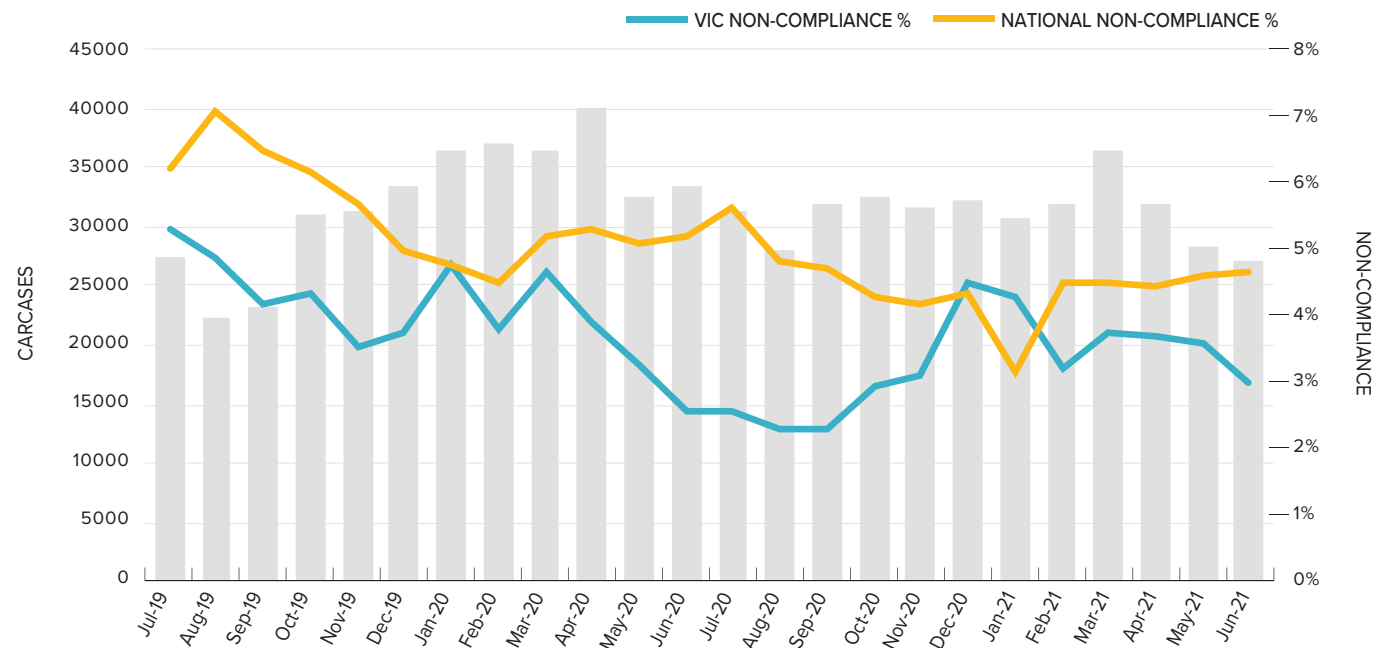
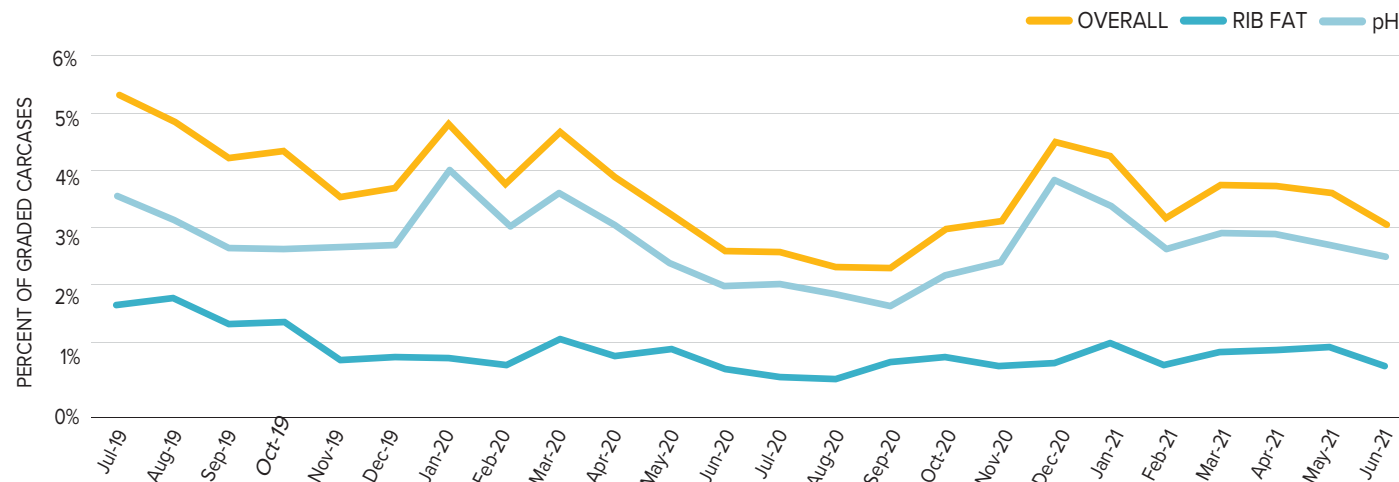
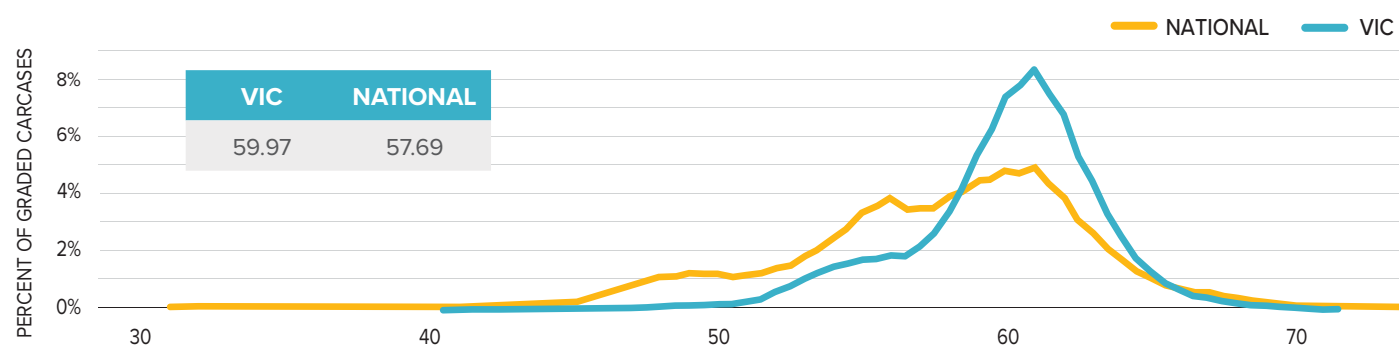


Figure 52. VIC non-compliance to MSA minimum requirements (rib fat and pH) 2019-21**Figure 53. VIC MSA Index performance 2019-21****Table 22. Carcase attributes, Lean Meat Yield and MSA Index of MSA graded carcasses in VIC 2019-21**

(all traits are independent of each other)

	CARCASE WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)	EMA (CM ²)	LEAN MEAT YIELD (%)	MSA INDEX
TOP 5%	411.0	35	110	570	15	91	62.5	64.68
AVERAGE	310.7	55	160	370	8	72	59.3	59.97
BOTTOM 5%	235.2	85	200	220	4	56	53.8	53.58

Table 23. VIC MSA Index percentile bands 2019-21

PRODUCER STATE	VIC	NATIONAL
TOP 1%	67.24	67.44
TOP 5%	64.68	64.63
TOP 10%	63.61	63.19
TOP 25%	62.04	61.10
TOP 50%	60.43	58.33
BOTTOM 25%	58.38	54.84
BOTTOM 10%	55.18	50.70
BOTTOM 5%	53.58	48.55
BOTTOM 1%	50.55	45.82

In the 2019-21 timeframe, non-compliance fluctuated between 2% and 6% with the highest non-compliance in July 2019 and the lowest from June 2020 to September 2020.

The main reason for non-compliance was pH, peaking at 4% in January 2020. High incidences of non-compliance due to rib fat was observed between July to October 2019, peaking at just under 2%.

Figure 53 illustrates the MSA Index distribution of MSA graded carcasses across Victoria and nationally. On average, the Victorian MSA Index was higher than the national MSA Index, due to a lower proportion of HGP-treated cattle, carcasses with lower average ossification and hump height in proportion to carcass weight as well as higher average MSA marble scores, compared to national figures.

Eating quality benchmarks for MSA graded cattle in Victoria

New to the 2021 MSA Australian Beef Eating Quality Insights report are state-based eating quality benchmarks. *These tables were previously only provided on a national basis.*

Identifying opportunities for improvement

The percentile band tables are ranked by the MSA Index. The carcass traits displayed are the average of the animals within the percentile band. These are presented by feed type, HGP status and sex. These assist producers to match their production system and benchmark their herd's performance.

For example, if a producer's production system was based on HGP-free, non-Grainfed, male cattle they would focus on **Table 24**. If the producer's average MSA Index was 61.18 or above, they would be in the middle 50th percentile of the state for that trait. If the producer wanted to improve their eating quality to the Top 25%, they would need to implement practices to improve their MSA Index to 62.43. Carcasses in the Top 25% percentile had similar hump heights and similar ossification scores, but higher MSA marbling and higher rib fat when compared to cattle in the top 50%.



David Gillett of Jalna Feedlot, Anakie, near Geelong, Victoria. Jalna Feedlot won the 2019 MSA Excellence in Eating Quality Award for Most Outstanding MSA Feedlot in Victoria.

Table 24. VIC percentile bands for MSA Index and their average carcass traits for HGP-free, non-Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	64.82	297.7	50	150	610	10
	TOP 5%	63.14	287.0	50	150	500	9
	TOP 10%	62.24	284.0	50	150	450	9
	TOP 25%	60.88	281.1	50	160	390	8
	TOP 50%	59.44	276.0	45	170	330	7
	BOTTOM 25%	58.00	271.6	45	200	300	6
	BOTTOM 10%	56.24	293.4	50	330	320	8
	BOTTOM 5%	52.26	317.3	50	540	330	8
MALE	BOTTOM 1%	48.34	263.1	45	540	280	5
	TOP 1%	66.34	362.5	60	140	710	11
	TOP 5%	64.62	352.5	60	140	560	9
	TOP 10%	63.76	345.4	60	140	490	9
	TOP 25%	62.43	337.1	60	140	420	8
	TOP 50%	61.18	333.0	60	140	340	7
	BOTTOM 25%	60.04	326.4	55	150	290	6
	BOTTOM 10%	59.03	321.2	60	160	260	6
	BOTTOM 5%	58.37	319.2	60	170	240	5
	BOTTOM 1%	56.62	325.9	70	180	170	5

Table 25. VIC percentile bands for MSA Index and their average carcass traits for HGP-free, Grainfed cattle

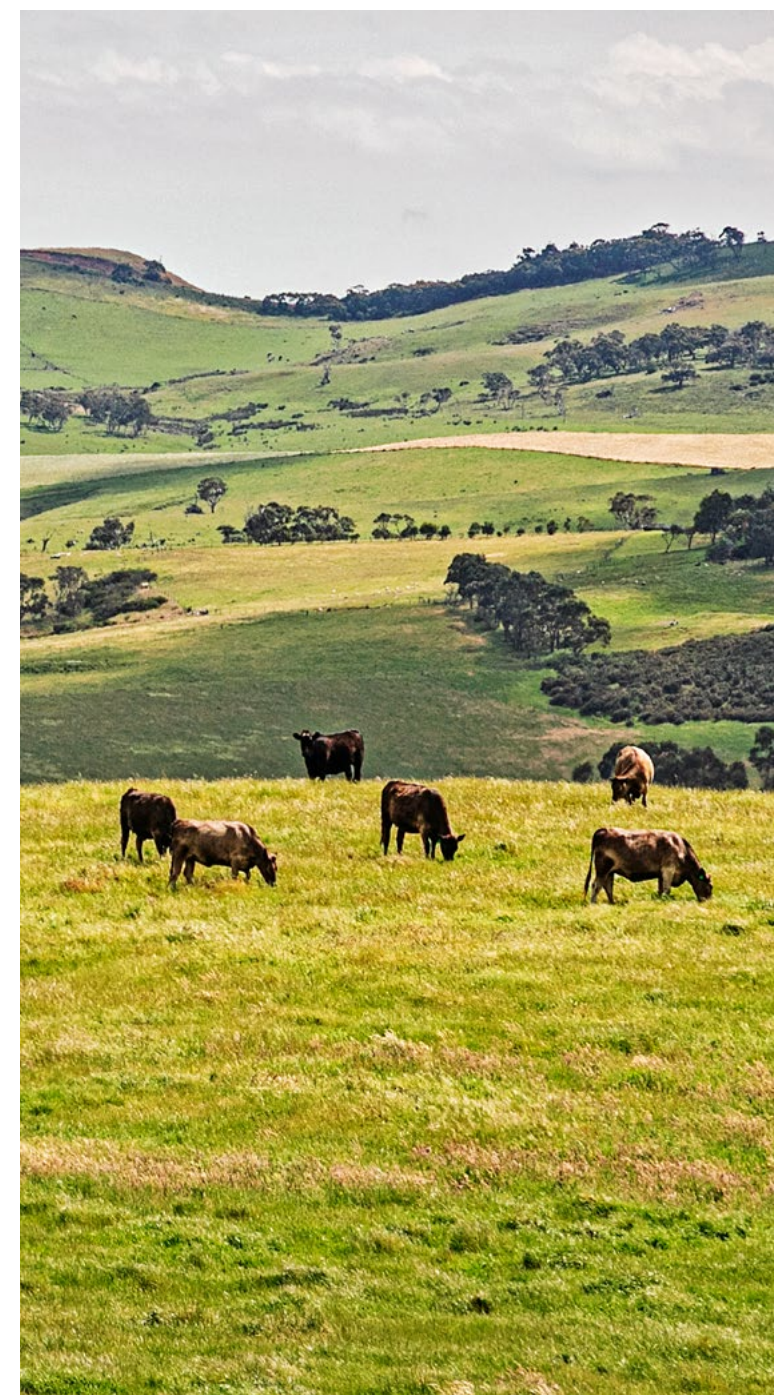
SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	68.37	440.8	45	170	1030	23
	TOP 5%	65.48	396.1	50	180	820	18
	TOP 10%	63.56	296.6	50	160	560	9
	TOP 25%	61.78	271.0	50	150	420	8
	TOP 50%	60.40	266.2	50	160	350	7
	BOTTOM 25%	59.09	263.5	50	170	320	6
	BOTTOM 10%	58.00	259.5	50	180	300	6
	BOTTOM 5%	57.41	254.2	50	180	290	6
MALE	BOTTOM 1%	56.41	248.5	50	190	260	5
	TOP 1%	68.92	467.7	50	140	1000	20
	TOP 5%	66.56	417.9	65	140	750	13
	TOP 10%	65.22	365.4	70	130	580	10
	TOP 25%	63.52	331.8	65	130	460	9
	TOP 50%	62.05	317.3	65	140	380	8
	BOTTOM 25%	60.79	309.0	65	150	330	8
	BOTTOM 10%	59.70	304.1	70	150	310	7
	BOTTOM 5%	59.04	297.9	70	160	300	7
	BOTTOM 1%	57.71	296.9	85	170	300	7

Table 26. VIC percentile bands for MSA Index and their average carcass traits for HGP-treated, non-Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	59.10	273.5	50	130	480	8
	TOP 5%	57.81	267.4	50	140	430	8
	TOP 10%	56.88	275.1	50	150	410	8
	TOP 25%	55.56	275.4	50	160	370	8
	TOP 50%	54.26	275.0	50	170	330	7
	BOTTOM 25%	53.08	267.7	50	180	300	6
	BOTTOM 10%	52.14	262.8	50	190	280	5
	BOTTOM 5%	51.56	257.8	55	190	260	5
MALE	BOTTOM 1%	50.21	274.9	120	200	240	8
	TOP 1%	59.46	292.8	55	120	470	8
	TOP 5%	57.99	288.1	55	130	430	7
	TOP 10%	57.38	284.0	50	130	400	7
	TOP 25%	56.03	288.5	55	140	380	6
	TOP 50%	54.86	292.1	60	160	340	6
	BOTTOM 25%	53.60	292.6	65	180	320	5
	BOTTOM 10%	52.47	287.6	70	180	310	4
	BOTTOM 5%	51.73	291.8	80	190	310	4
	BOTTOM 1%	50.10	294.4	100	190	290	4

Table 27. VIC percentile bands for MSA Index and their average carcass traits for HGP-treated, Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	60.41	284.1	50	130	490	8
	TOP 5%	58.72	280.3	50	140	460	8
	TOP 10%	58.33	274.1	50	130	390	8
	TOP 25%	57.11	268.3	50	150	430	7
	TOP 50%	55.68	269.1	50	160	380	7
	BOTTOM 25%	54.28	269.2	55	180	340	7
	BOTTOM 10%	53.01	262.1	55	190	320	6
	BOTTOM 5%	52.34	258.6	55	190	300	5
MALE	BOTTOM 1%	50.87	259.7	100	200	290	6
	TOP 1%	60.61	433.1	80	180	680	17
	TOP 5%	59.26	421.5	80	190	580	16
	TOP 10%	58.50	412.3	80	190	530	15
	TOP 25%	57.24	402.9	80	190	480	14
	TOP 50%	55.83	366.2	75	190	400	11
	BOTTOM 25%	54.43	332.0	80	180	340	9
	BOTTOM 10%	53.22	322.1	85	190	330	8
	BOTTOM 5%	52.39	328.3	95	190	330	9
	BOTTOM 1%	49.90	339.8	120	190	320	9



Tasmania

50.6% male

100% HGP-free

71% MSA of TAS slaughter

59.81 Average MSA Index

More than 302,400 MSA cattle were consigned from Tasmania, representing 4% of all MSA graded cattle in Australia in 2019-21.

16% of MSA-registered cattle producers reside in Tasmania. This equates to 7,500 MSA-registered beef producers, with more than 2,400 of these producers consigning cattle to the program in 2019-21.

MSA-registered beef producers in Tasmania achieved 92.6% MSA compliance in 2019-21.

Figure 54. TAS MSA graded carcasses 2019-21

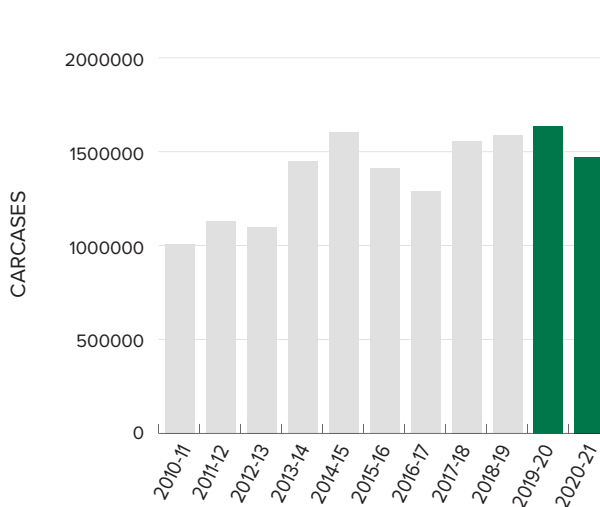
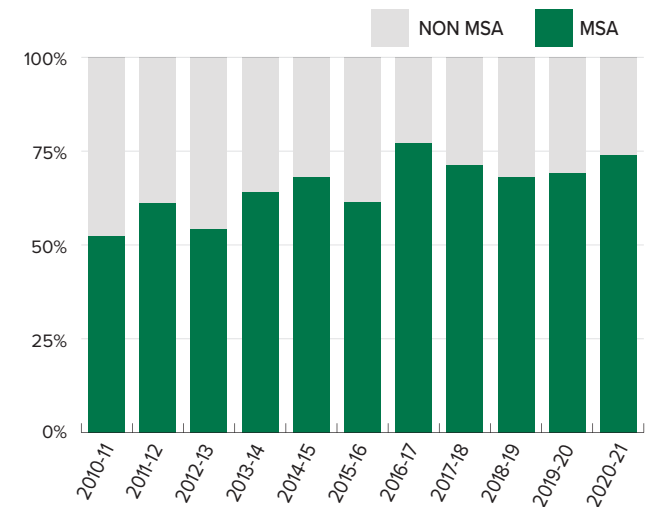


Figure 55. Proportion of carcasses presented for MSA grading to total TAS adult cattle slaughter 2019-21



Between the 2019-20 and 2020-21 financial years, the MSA proportion of the Tasmanian slaughter increased from 69% to 74%, just under the record high of 77% in 2016-17.

Figure 56. TAS total non-compliance to MSA minimum requirements 2019-21

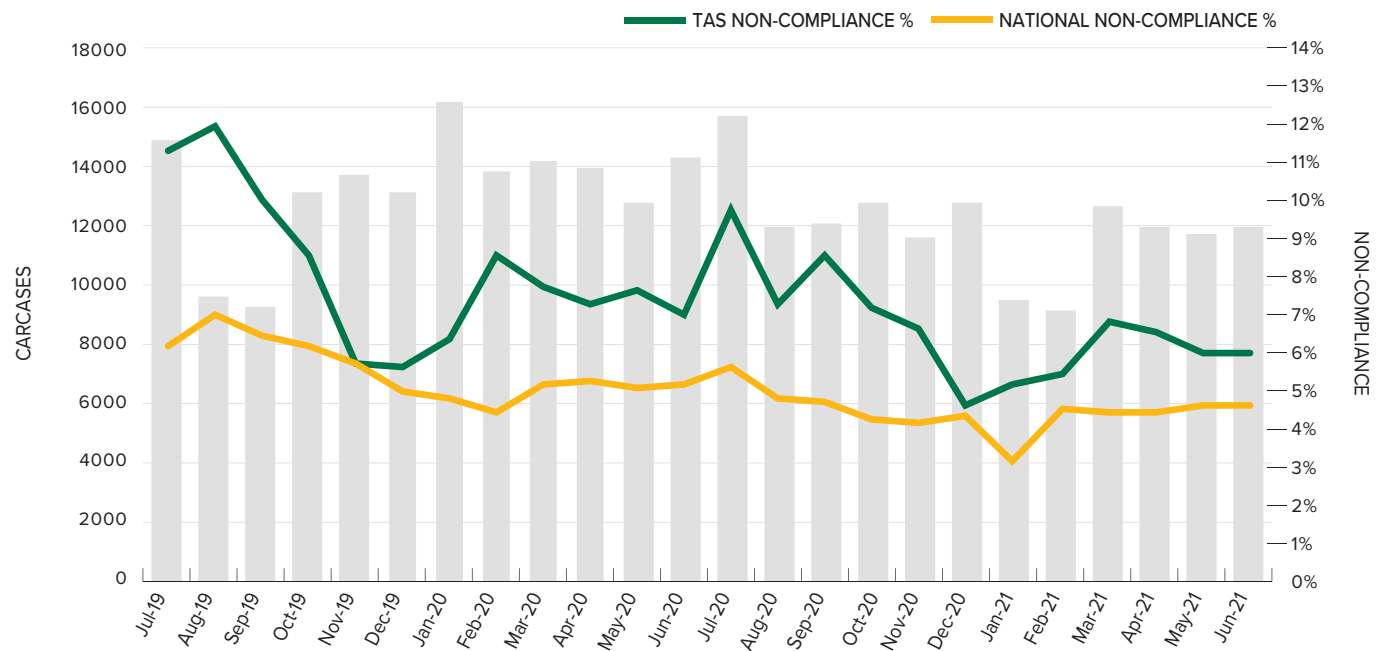
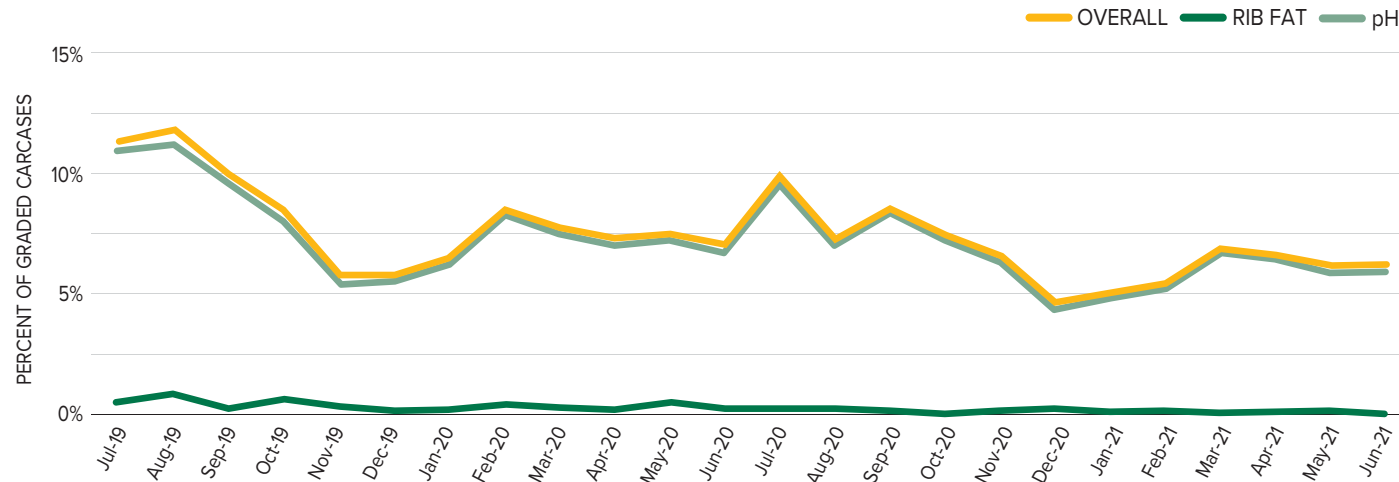
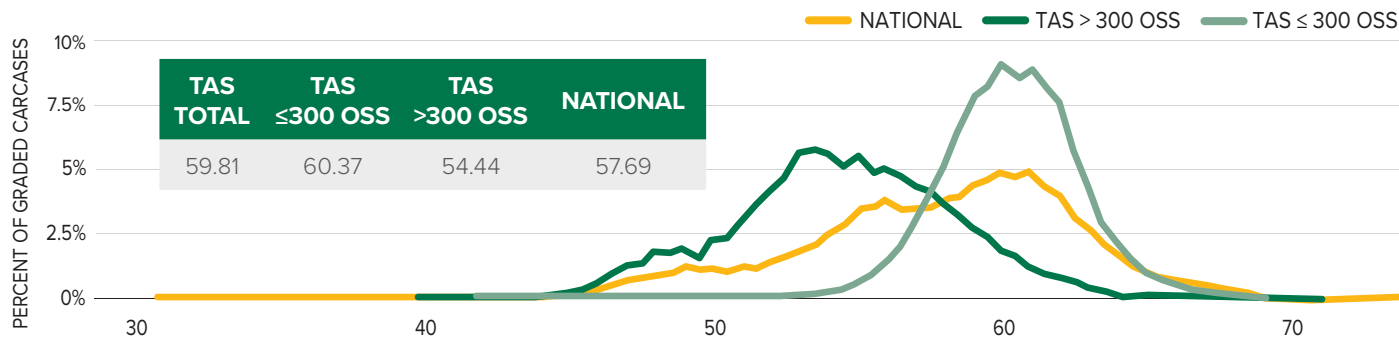


Figure 57. TAS non-compliance to MSA minimum requirements (rib fat and pH) 2019-21**Figure 58. TAS MSA Index performance 2019-21**

Tasmania has traditionally graded higher proportions of cows compared to other states. Animals have been grouped by ossification score to show the eating quality differences between younger and older animals that have been consigned for MSA grading.

Table 28. Carcase attributes, Lean Meat Yield and MSA Index of MSA graded carcasses in TAS 2019-21

(all traits are independent of each other)

	CARCASE WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)	EMA (CM ²)	LEAN MEAT YIELD (%)	MSA INDEX
TOP 5%	386.2	35	130	590	15	89	61.7	64.06
AVERAGE	300.9	55	190	370	9	74	58.3	59.81
BOTTOM 5%	229.0	75	400	210	5	62	53.3	54.31

Table 29. TAS MSA Index percentile bands 2019-21

PRODUCER STATE	TAS	NATIONAL
TOP 1%	66.02	67.44
TOP 5%	64.06	64.63
TOP 10%	63.11	63.19
TOP 25%	61.73	61.10
TOP 50%	60.11	58.33
BOTTOM 25%	58.38	54.84
BOTTOM 10%	56.33	50.70
BOTTOM 5%	54.31	48.55
BOTTOM 1%	49.26	45.82

In the 2019-21 timeframe, non-compliance fluctuated between 5% and 12% with the highest non-compliance in August 2019, and lowest in December 2020.

The main reason for non-compliance was ultimate pH, with very few carcasses presented that were non-compliant due to inadequate rib fat.

Figure 58 illustrates the MSA Index distribution of MSA graded carcasses across Tasmania (for above 300 ossification or less than or equal to 300 ossification) and nationally. On average, the Tasmanian MSA Index for cattle with <300 ossification was higher than the national MSA Index, due to no usage of HGPs, lower average ossification and hump height in proportion to carcass weight, as well as higher average MSA marble scores, when compared to national figures.

Eating quality benchmarks for MSA graded cattle in Tasmania

New to the 2021 MSA Australian Beef Eating Quality Insights report are state-based eating quality benchmarks. *These tables were previously only provided on a national basis.*

Identifying opportunities for improvement

The percentile band tables are ranked by the MSA Index. The carcass traits displayed are the average of the animals within the percentile band. These are presented by feed type, HGP status and sex. These assist producers to match their production system and benchmark their herd's performance.

For example, if a producer's production system was based on HGP-free, non-Grainfed, male cattle they would focus on **Table 30**. If the producer's average MSA Index was 61.12 or above, they would be in the middle 50th percentile of the state for that trait. If the producer wanted to improve their eating quality to the Top 25%, they would need to implement practices to improve their MSA Index to 62.42. Carcasses in the Top 25% percentile had similar hump heights and similar ossification scores, but higher MSA marbling and higher rib fat when compared to cattle in the top 50%.



Martin and Rosemary Walker, 'Marapana', Flinders Island, won the 2019 MSA Excellence in Eating Quality Progress Award for Tasmania.

Table 30. TAS percentile bands for MSA Index and their average carcass traits for HGP-free, non-Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	64.52	319.1	55	180	740	13
	TOP 5%	62.87	298.4	55	180	590	12
	TOP 10%	61.97	287.4	50	180	490	11
	TOP 25%	60.50	282.5	50	180	430	10
	TOP 50%	58.93	274.5	50	200	350	9
	BOTTOM 25%	56.99	276.7	50	260	280	8
	BOTTOM 10%	54.35	283.3	50	390	280	7
	BOTTOM 5%	52.20	278.2	45	470	280	7
MALE	BOTTOM 1%	47.81	255.6	45	520	230	6
	TOP 1%	66.62	407.6	70	150	880	12
	TOP 5%	64.72	364.8	65	150	650	11
	TOP 10%	63.78	348.5	65	150	530	11
	TOP 25%	62.42	338.6	60	150	450	10
	TOP 50%	61.12	320.7	60	150	350	9
	BOTTOM 25%	59.74	306.1	60	150	280	7
	BOTTOM 10%	58.50	299.9	55	160	230	7
	BOTTOM 5%	57.85	291.5	55	160	210	6
	BOTTOM 1%	56.70	281.3	60	170	170	6

Table 31. TAS percentile bands for MSA Index and their average carcass traits for HGP-free, Grainfed cattle

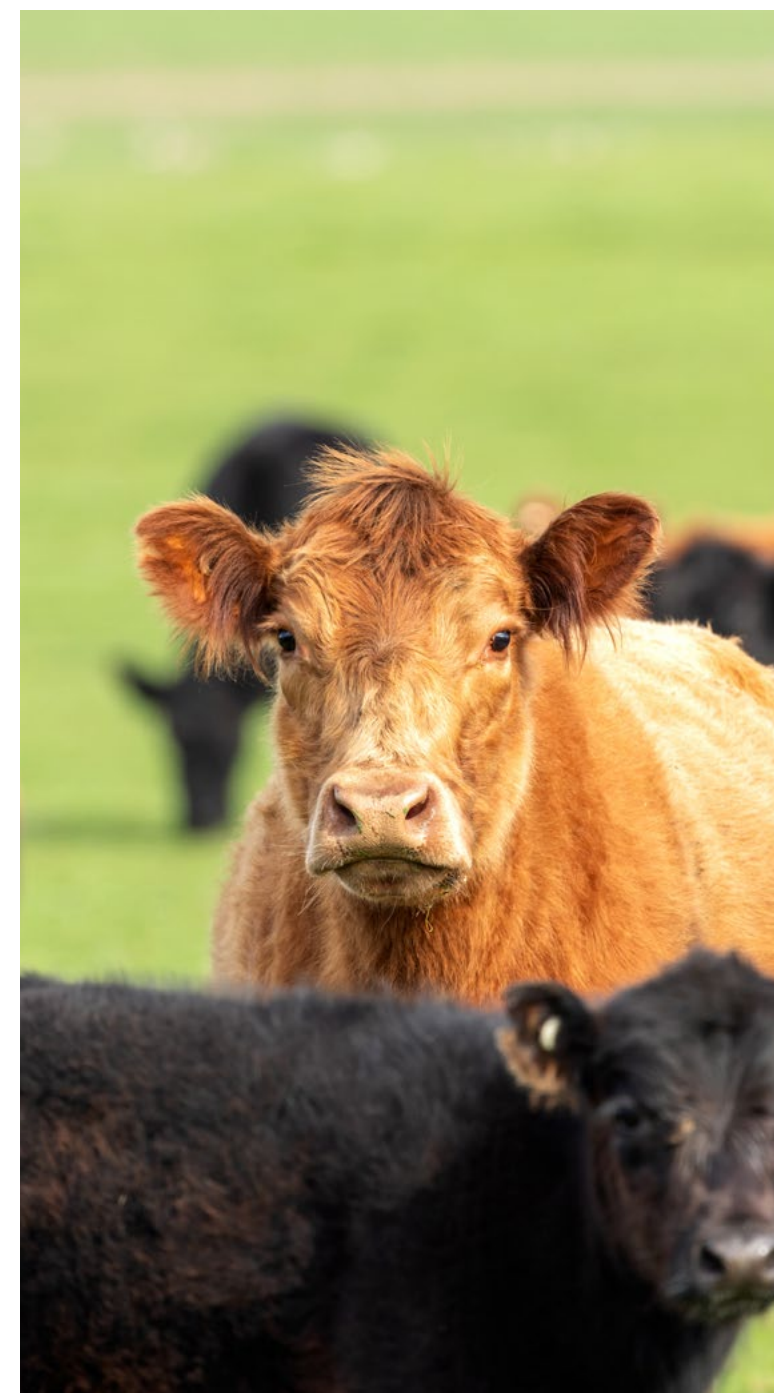
SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	64.22	327.8	45	180	640	24
	TOP 5%	63.47	326.1	60	160	570	10
	TOP 10%	62.76	327.8	60	180	540	14
	TOP 25%	61.80	319.3	55	160	440	14
	TOP 50%	60.47	329.0	55	180	400	12
	BOTTOM 25%	59.29	303.4	50	180	320	16
	BOTTOM 10%	58.45	328.2	60	180	290	12
	BOTTOM 5%	58.03	297.4	55	190	280	12
MALE	BOTTOM 1%	57.46	313.2	60	190	250	12
	TOP 1%	65.97	346.0	55	110	580	15
	TOP 5%	64.80	320.3	60	120	520	13
	TOP 10%	64.25	327.7	55	130	480	14
	TOP 25%	62.67	323.6	60	130	420	13
	TOP 50%	61.34	326.7	65	140	360	12
	BOTTOM 25%	59.71	326.9	80	150	290	11
	BOTTOM 10%	57.80	332.5	90	140	250	9
	BOTTOM 5%	56.85	330.9	105	140	250	10
	BOTTOM 1%	54.92	340.2	130	140	250	8

Table 32. TAS percentile bands for MSA Index and their average carcass traits for HGP-treated, non-Grainfed cattle

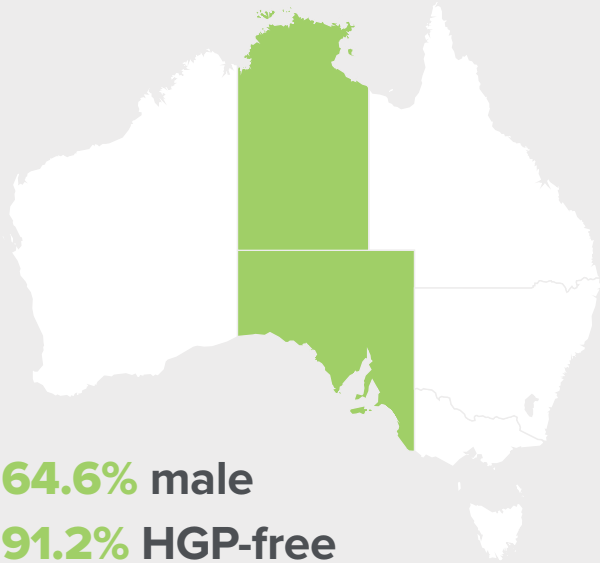
SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	56.67	186.2	50	120	330	4
	TOP 5%	56.34	215.2	50	120	320	4
	TOP 10%	55.55	241.6	55	130	300	5
	TOP 25%	54.24	213.8	55	130	260	6
	TOP 50%	53.32	207.8	65	140	240	5
	BOTTOM 25%	51.78	211.1	70	140	190	4
	BOTTOM 10%	51.26	188.2	75	130	200	3
	BOTTOM 5%	51.16	329.6	95	150	220	8
	BOTTOM 1%	50.54	230.2	75	150	200	3
MALE	TOP 1%	57.03	289.4	85	130	560	8
	TOP 5%	55.30	218.0	65	120	320	6
	TOP 10%	54.45	228.3	70	110	260	4
	TOP 25%	53.38	238.2	70	120	230	4
	TOP 50%	51.37	234.4	80	130	240	5
	BOTTOM 25%	49.79	250.2	115	140	260	5
	BOTTOM 10%	47.35	232.6	115	140	230	5
	BOTTOM 5%	46.92	243.5	130	140	220	5
	BOTTOM 1%	46.18	225.8	140	150	200	4

Table 33. TAS percentile bands for MSA Index and their average carcass traits for HGP-treated, Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	55.76	223.7	60	120	300	5
	TOP 5%	54.65	255.7	65	160	350	7
	TOP 10%	54.04	242.5	65	150	320	6
	TOP 25%	52.78	252.5	70	150	290	5
	TOP 50%	51.06	270.6	80	180	300	5
	BOTTOM 25%	49.16	272.5	95	180	270	4
	BOTTOM 10%	47.90	269.5	100	170	250	4
	BOTTOM 5%	47.27	302.3	120	200	290	4
	BOTTOM 1%	44.05	257.9	145	320	310	5
MALE	TOP 1%	58.23	362.2	80	180	600	8
	TOP 5%	54.96	374.9	80	160	410	11
	TOP 10%	54.13	273.1	65	150	320	8
	TOP 25%	53.24	251.0	75	140	300	7
	TOP 50%	51.60	249.6	85	140	270	6
	BOTTOM 25%	49.85	255.9	105	150	270	6
	BOTTOM 10%	47.88	241.2	115	150	250	7
	BOTTOM 5%	47.04	271.8	125	170	270	8
	BOTTOM 1%	45.57	208.4	95	320	180	5



South Australia and Northern Territory



64.6% male

91.2% HGP-free

48.2% Grainfed

81% MSA of SA/NT slaughter

60.45 Average MSA Index

More than 442,400 MSA cattle were consigned from South Australia and the Northern Territory, representing 6% of all MSA graded cattle in Australia in 2019-21.

With most MSA cattle from the Northern Territory flowing south for processing, rather than to Queensland, data from the Northern Territory is now grouped with South Australia. Seven percent of MSA-registered cattle producers reside in South Australia and the Northern Territory. This equates to just over 3,200 MSA-registered beef producers, with more than 770 of these producers consigning cattle to the program in 2019-21.

MSA-registered beef producers in South Australia and the Northern Territory achieved 96.1% MSA compliance in 2019-21.

Figure 59. SA/NT MSA graded carcasses 2019-21

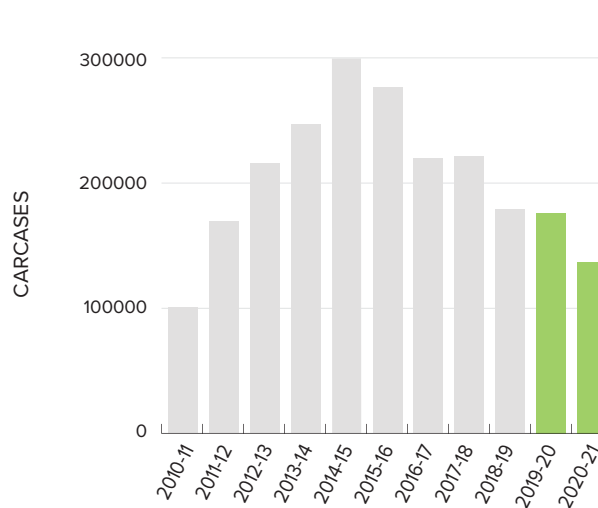
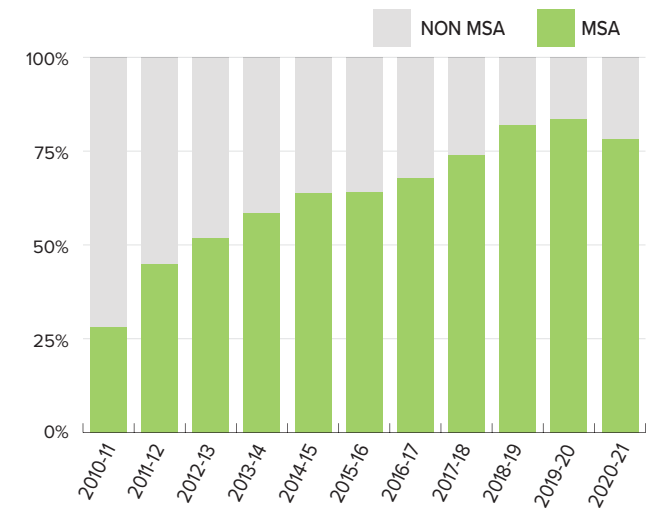


Figure 60. Proportion of carcasses presented for MSA grading to total SA/NT adult cattle slaughter 2019-21



Between the 2019-20 and 2020-21 financial years, SA saw a decrease in the proportion of MSA slaughter, from 84% to 78%.

Figure 61. SA/NT total non-compliance to MSA minimum requirements 2019-21

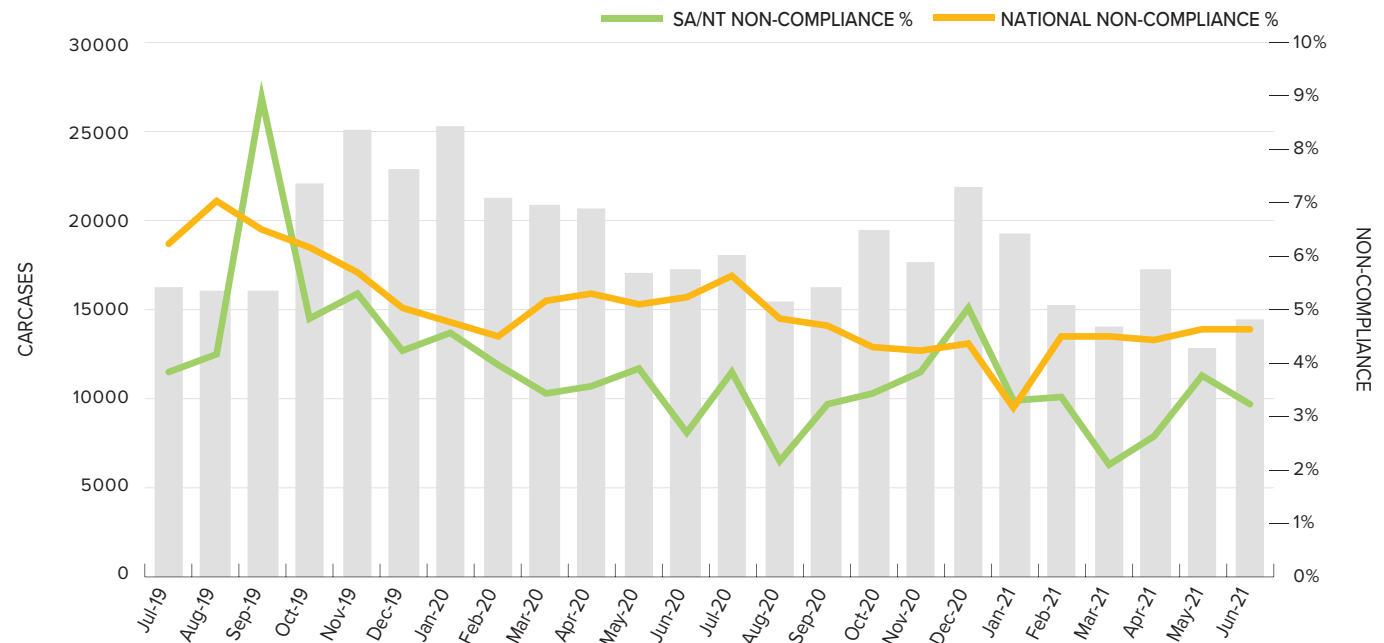
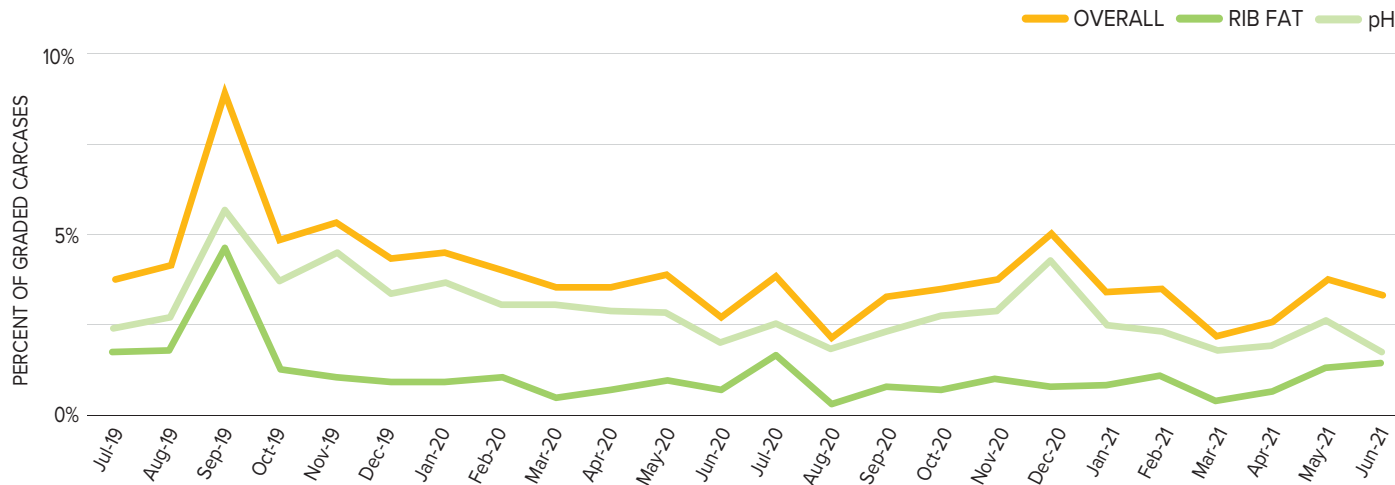
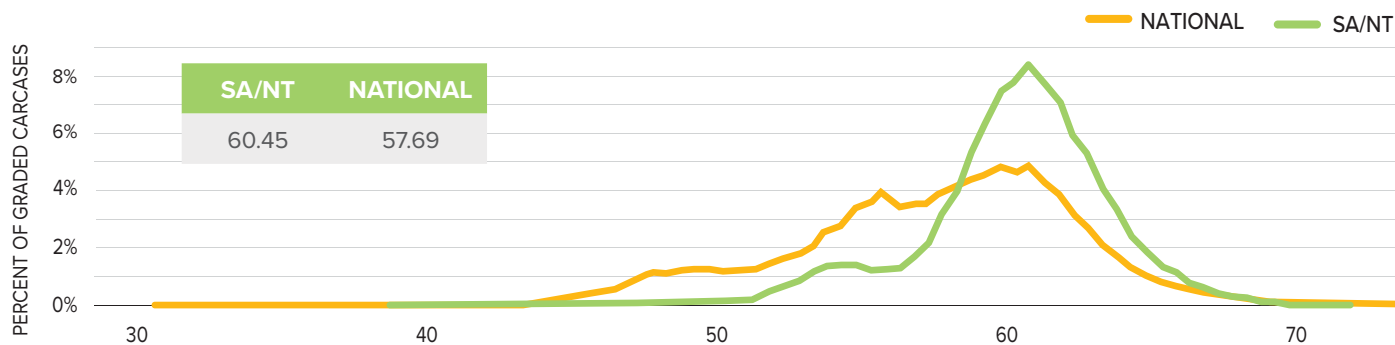


Figure 62. SA/NT non-compliance to MSA minimum requirements (rib fat and pH) 2019-21**Figure 63. SA/NT MSA Index performance 2019-21****Table 34. Carcase attributes, Lean Meat Yield and MSA Index of MSA graded carcasses in SA/NT 2019-21**
(all traits are independent of each other)

	CARCASE WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)	EMA (CM ²)	LEAN MEAT YIELD (%)	MSA INDEX
TOP 5%	409.0	40	110	550	15	92	62.6	65.22
AVERAGE	310.0	60	160	370	8	74	58.9	60.45
BOTTOM 5%	233.4	90	200	250	3	59	53.3	54.09

Table 35. SA/NT MSA Index percentile bands 2019-21

PRODUCER STATE	SA/NT	NATIONAL
TOP 1%	67.46	67.44
TOP 5%	65.22	64.63
TOP 10%	64.09	63.19
TOP 25%	62.45	61.10
TOP 50%	60.77	58.33
BOTTOM 25%	58.95	54.84
BOTTOM 10%	55.97	50.70
BOTTOM 5%	54.09	48.55
BOTTOM 1%	51.13	45.82

In the 2019-21 timeframe, non-compliance fluctuated between 2% and 9% with the highest non-compliance in September 2019 and lowest in August 2020 and March 2021. The main reason for non-compliance was ultimate pH, peaking at 6% in September 2019, along with the highest incidences of rib fat non-compliance.

Figure 63 illustrates the MSA Index distribution of MSA graded carcasses across South Australia and the Northern Territory, and nationally. On average, the SA/NT MSA Index was higher than the national MSA Index, due to the lower HGP usage, higher average MSA marble scores and lower average ossification and hump height in proportion to carcass weight, when compared to national figures.

Eating quality benchmarks for MSA graded cattle in South Australia and Northern Territory

New to the 2021 MSA Australian Beef Eating Quality Insights report are state-based eating quality benchmarks. *These tables were previously only provided on a national basis.*

Identifying opportunities for improvement

The percentile band tables are ranked by the MSA Index. The carcass traits displayed are the average of the animals within the percentile band. These are presented by feed type, HGP status and sex. These assist producers to match their production system and benchmark their herd's performance.

For example, if a producer's production system was based on HGP-free, non-Grainfed, male cattle they would focus on **Table 36**. If the producer's average MSA Index was 61.08 or above, they would be in the middle 50th percentile of the state for that trait. If the producer wanted to improve their eating quality to the Top 25%, they would need to implement practices to improve their MSA Index to 62.36. Carcasses in the Top 25% percentile had similar hump heights but lower ossification scores, higher MSA marbling and higher rib fat when compared to cattle in the top 50%.



Thomas Foods International Feedlot General Manager, Thomas Green, Tintinara, South Australia. Thomas Foods International Feedlot won the the 2019 MSA Excellence in Eating Quality Awards for Most Outstanding MSA Feedlot in South Australia.

Table 36. SA/NT percentile bands for MSA Index and their average carcass traits for HGP-free, non-Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	64.79	275.8	50	140	510	10
	TOP 5%	62.95	280.7	50	150	460	9
	TOP 10%	62.05	279.4	50	150	430	9
	TOP 25%	60.68	273.9	50	160	390	8
	TOP 50%	59.24	269.4	50	170	340	7
	BOTTOM 25%	57.78	264.6	50	200	300	6
	BOTTOM 10%	55.72	272.3	55	330	320	7
	BOTTOM 5%	52.46	302.0	55	510	330	8
	BOTTOM 1%	47.98	243.5	50	540	280	5
MALE	TOP 1%	66.36	296.8	60	110	500	10
	TOP 5%	64.52	313.2	60	120	470	9
	TOP 10%	63.69	312.0	60	120	420	9
	TOP 25%	62.36	311.9	60	130	390	8
	TOP 50%	61.08	308.3	60	140	340	7
	BOTTOM 25%	59.96	299.4	60	150	300	6
	BOTTOM 10%	58.94	294.8	60	150	280	5
	BOTTOM 5%	58.21	290.0	65	160	270	5
	BOTTOM 1%	55.98	287.9	95	170	260	5

Table 37. SA/NT percentile bands for MSA Index and their average carcass traits for HGP-free, Grainfed cattle

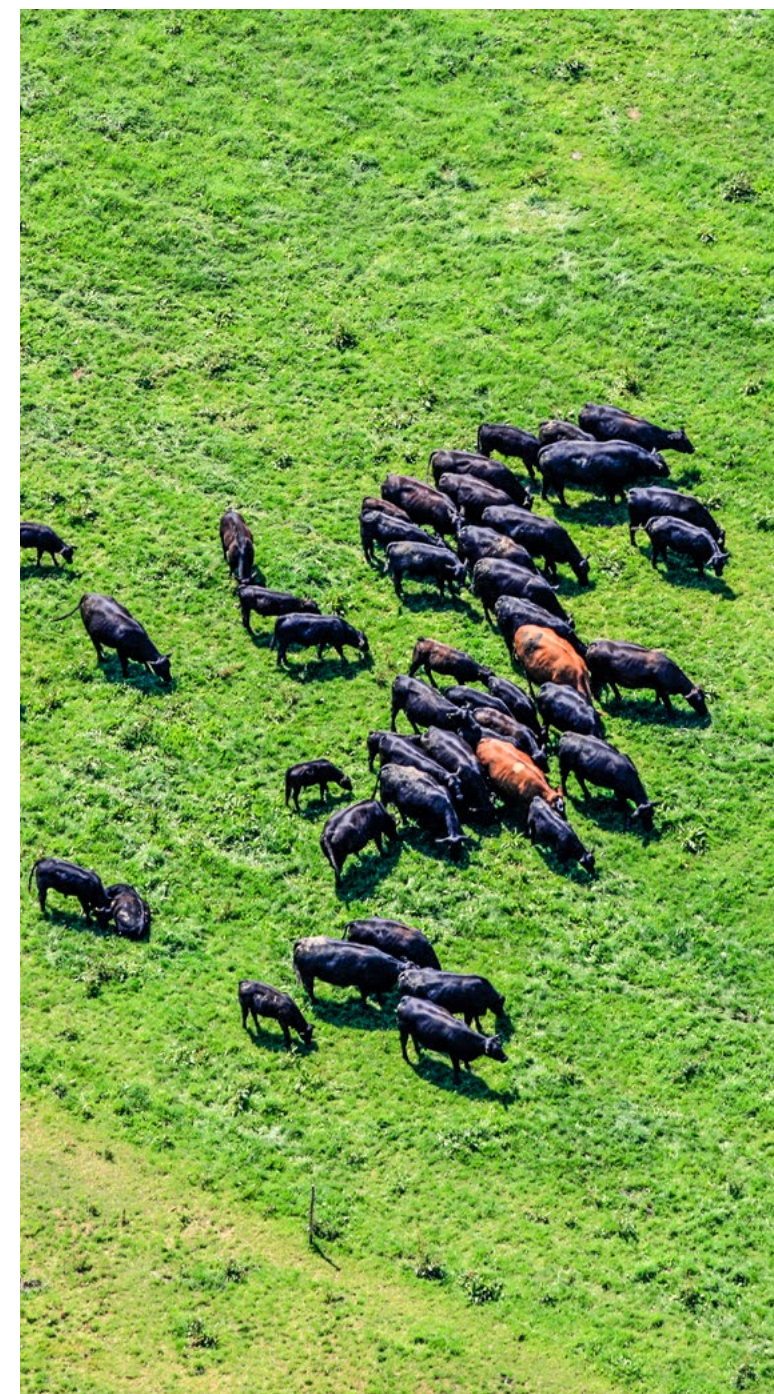
SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	65.17	342.8	55	140	600	12
	TOP 5%	63.54	327.5	55	150	520	11
	TOP 10%	62.76	322.1	60	160	480	11
	TOP 25%	61.49	314.7	55	160	440	10
	TOP 50%	60.18	300.0	55	170	390	9
	BOTTOM 25%	58.98	286.6	55	180	340	8
	BOTTOM 10%	57.98	276.5	55	190	320	7
	BOTTOM 5%	57.36	268.8	60	190	310	6
	BOTTOM 1%	55.73	277.0	90	200	320	8
MALE	TOP 1%	68.48	435.6	65	130	810	19
	TOP 5%	66.58	412.9	65	130	650	16
	TOP 10%	65.49	391.4	65	130	540	13
	TOP 25%	63.78	364.9	65	130	460	12
	TOP 50%	62.22	343.6	65	140	380	9
	BOTTOM 25%	60.78	319.8	70	150	340	8
	BOTTOM 10%	59.40	313.3	75	160	320	7
	BOTTOM 5%	58.44	314.4	90	160	320	7
	BOTTOM 1%	55.02	309.7	135	160	290	7

Table 38. SA/NT percentile bands for MSA Index and their average carcass traits for HGP-treated, non-Grainfed cattle

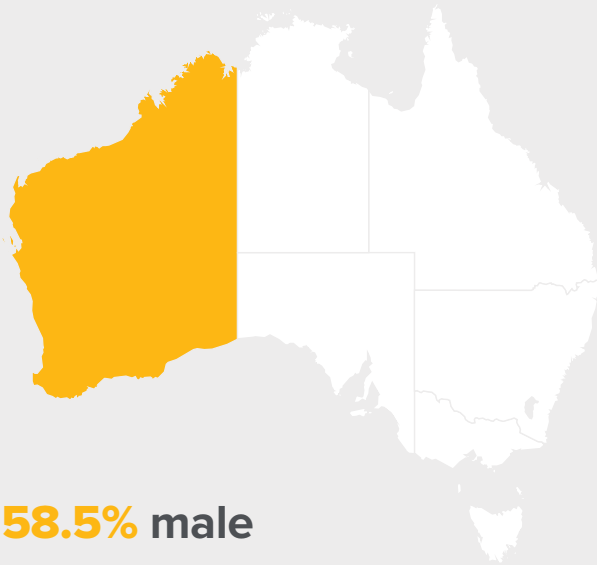
SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	59.02	258.7	50	130	470	9
	TOP 5%	57.42	264.4	50	140	430	9
	TOP 10%	56.62	262.7	50	150	400	9
	TOP 25%	55.41	259.0	50	150	370	9
	TOP 50%	54.25	261.2	50	170	330	8
	BOTTOM 25%	53.04	261.6	55	180	290	7
	BOTTOM 10%	51.90	260.6	65	180	270	6
	BOTTOM 5%	50.91	273.2	105	180	250	7
	BOTTOM 1%	47.55	262.5	145	180	230	7
MALE	TOP 1%	60.49	275.5	60	110	480	9
	TOP 5%	58.76	260.5	55	110	400	8
	TOP 10%	57.87	259.8	55	120	380	7
	TOP 25%	56.43	263.4	55	130	360	7
	TOP 50%	55.19	263.6	60	140	330	6
	BOTTOM 25%	54.13	262.3	60	150	300	5
	BOTTOM 10%	53.09	260.5	60	160	290	5
	BOTTOM 5%	52.39	255.4	70	170	290	5
	BOTTOM 1%	50.16	267.7	115	180	300	5

Table 39. SA/NT percentile bands for MSA Index and their average carcass traits for HGP-treated, Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	58.96	312.2	60	160	560	11
	TOP 5%	57.42	299.8	60	170	500	10
	TOP 10%	56.68	290.4	55	170	450	10
	TOP 25%	55.52	281.2	55	160	400	9
	TOP 50%	54.40	273.3	50	170	350	8
	BOTTOM 25%	53.40	266.2	50	180	320	6
	BOTTOM 10%	52.57	260.3	50	180	310	6
	BOTTOM 5%	52.06	255.6	50	190	290	5
	BOTTOM 1%	50.88	282.7	90	190	250	7
MALE	TOP 1%	59.23	337.2	70	140	510	10
	TOP 5%	57.82	331.9	70	150	460	9
	TOP 10%	57.01	319.2	65	150	420	9
	TOP 25%	55.86	310.4	65	150	380	8
	TOP 50%	54.79	299.4	65	160	330	7
	BOTTOM 25%	53.84	292.1	65	160	310	6
	BOTTOM 10%	52.87	295.7	70	170	300	6
	BOTTOM 5%	52.14	318.5	85	170	290	8
	BOTTOM 1%	50.03	362.1	120	180	260	11



Western Australia



58.5% male

79.1% HGP-free

44.7% Grainfed

52% MSA of WA slaughter

59.89 Average MSA Index

More than 455,000 MSA cattle were consigned from Western Australia, representing 6% of all MSA graded cattle in Australia in 2019-21.

11% of MSA-registered cattle producers reside in Western Australia. This equates to just over 5,100 MSA-registered beef producers, with more than 1,600 of these producers consigning cattle to the program in 2019-21.

MSA-registered beef producers in Western Australia achieved 95.9% MSA compliance in 2019-21.

Figure 64. WA MSA graded carcasses 2019-21

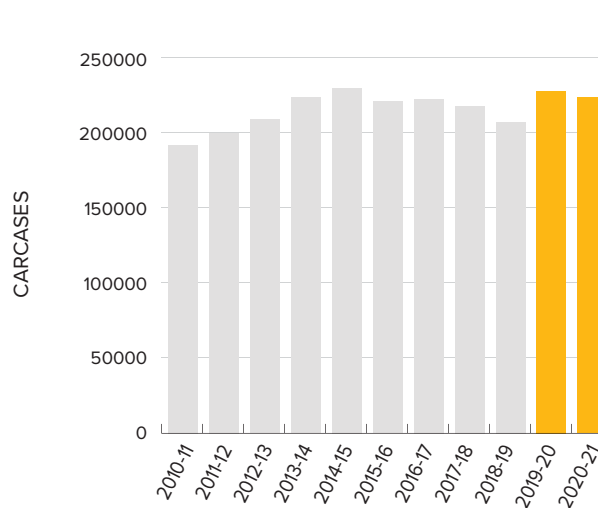
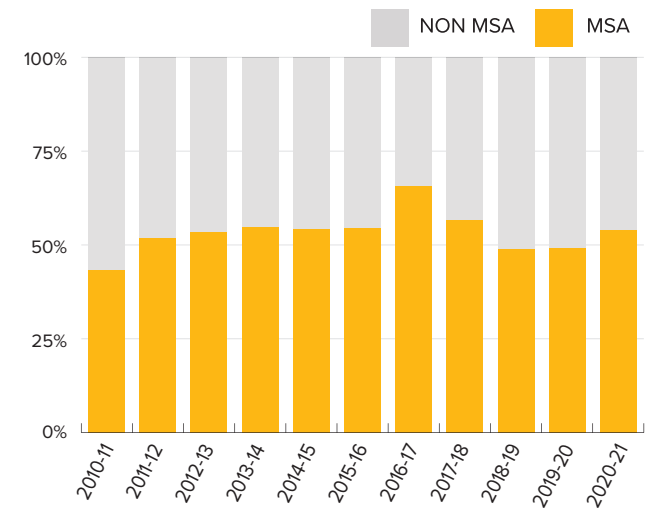


Figure 65. Proportion of carcasses presented for MSA grading to total WA adult cattle slaughter 2019-21



Between the 2019-20 and 2020-21 financial years, the proportion of MSA in the WA slaughter increased from 50% to 54%.

Figure 66. WA total non-compliance to MSA minimum requirements 2019-21

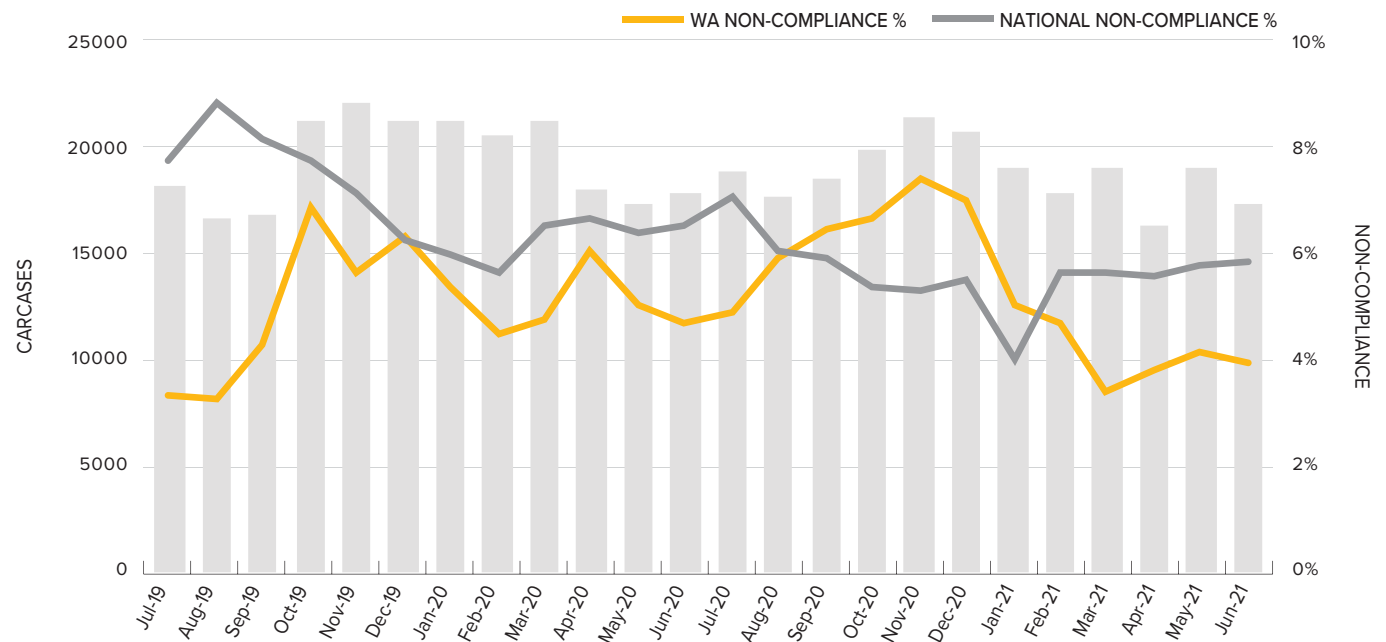
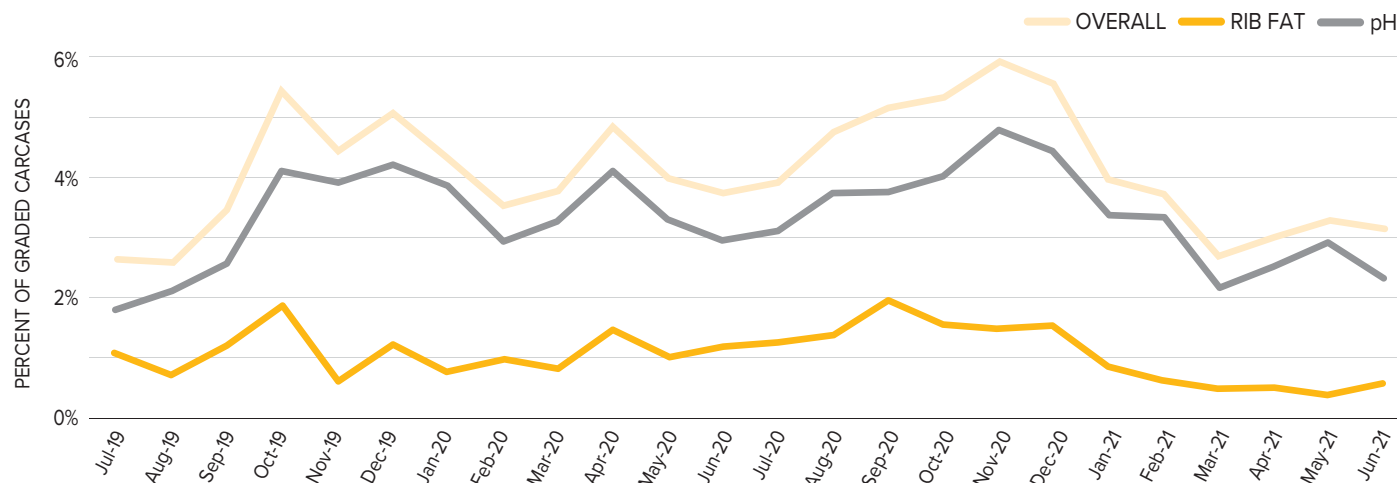
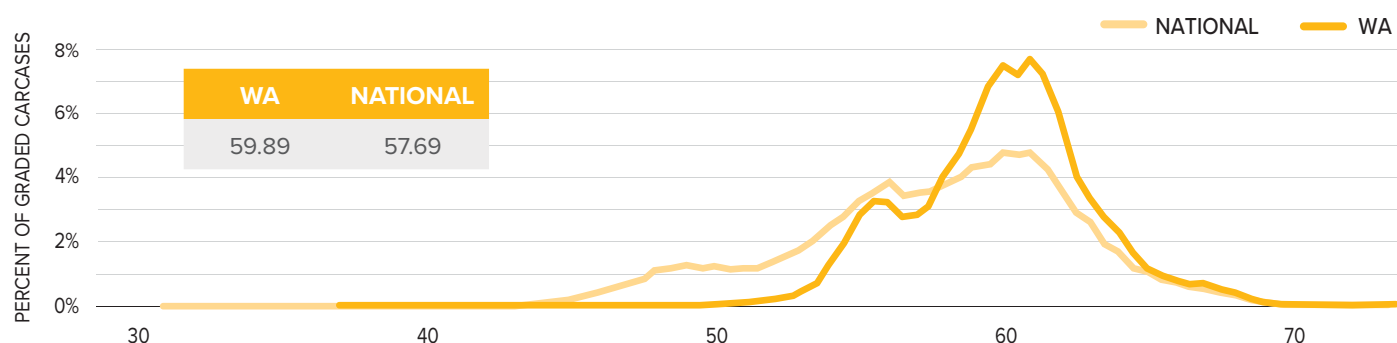


Figure 67. WA non-compliance to MSA minimum requirements (rib fat and pH) 2019-21**Figure 68. WA MSA Index performance 2019-21****Table 40. Carcase attributes, Lean Meat Yield and MSA Index of MSA graded carcasses in WA 2019-21**
(all traits are independent of each other)

	CARCASE WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)	EMA (CM ²)	LEAN MEAT YIELD (%)	MSA INDEX
TOP 5%	349.0	45	110	480	14	87	62.7	65.06
AVERAGE	271.4	60	150	350	8	72	58.8	59.89
BOTTOM 5%	215.0	75	190	260	3	56	53.9	54.63

Table 41. WA MSA Index percentile bands 2019-21

PRODUCER STATE	WA	NATIONAL
TOP 1%	67.67	67.44
TOP 5%	65.06	64.63
TOP 10%	63.69	63.19
TOP 25%	61.82	61.10
TOP 50%	60.12	58.33
BOTTOM 25%	57.94	54.84
BOTTOM 10%	55.51	50.70
BOTTOM 5%	54.63	48.55
BOTTOM 1%	52.45	45.82

In the 2019-21 timeframe, non-compliance fluctuated between 3% and 6% with the highest non-compliance observed in November 2020, and lowest in July 2019. The main reason for non-compliance was ultimate pH, however, there were higher incidences of rib fat non-compliance throughout the entire timeframe, when compared to the national data.

Figure 68 illustrates the MSA Index distribution of MSA graded carcasses across WA and nationally. On average, the WA MSA Index was higher than the national MSA Index, in part due to lower usage of HGPs, higher presence of milk fed vealers, and lower average ossification and hump height in proportion to carcass weight, when compared to national figures.

Eating quality benchmarks for MSA graded cattle in Western Australia

New to the 2021 MSA Australian Beef Eating Quality Insights report are state-based eating quality benchmarks. *These tables were previously only provided on a national basis.*

Identifying opportunities for improvement

The percentile band tables are ranked by the MSA Index. The carcass traits displayed are the average of the animals within the percentile band. These are presented by feed type, HGP status and sex. These assist producers to match their production system and benchmark their herd's performance.

For example, if a producer's production system was based on HGP-free, non-Grainfed, male cattle they would focus on **Table 42**. If the producer's average MSA Index was 60.91 or above, they would be in the middle 50th percentile of the state for that trait. If the producer wanted to improve their eating quality to the Top 25%, they would need to implement practices to improve their MSA Index to 62.40. Carcasses in the Top 25% percentile had similar hump heights but lower ossification scores, higher MSA marbling and higher rib fat when compared to cattle in the top 50%.



Wayne and Carol Dumbrell, Walpole, Western Australia, won the 2019 MSA Excellence in Eating Quality Awards for Most Outstanding MSA Producer in Western Australia for Band 1 producers.

Table 42. WA percentile bands for MSA Index and their average carcass traits for HGP-free, non-Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	66.66	230.6	50	130	450	11
	TOP 5%	64.57	235.0	50	140	400	11
	TOP 10%	63.44	244.1	55	140	380	10
	TOP 25%	61.68	257.8	55	150	390	9
	TOP 50%	60.05	253.9	55	160	340	8
	BOTTOM 25%	58.59	243.5	55	180	300	7
	BOTTOM 10%	56.96	232.9	65	190	290	6
	BOTTOM 5%	54.75	238.4	80	260	300	6
MALE	BOTTOM 1%	48.84	243.1	65	510	300	6
	TOP 1%	68.45	240.9	55	100	380	11
	TOP 5%	66.84	240.2	55	110	340	10
	TOP 10%	64.95	254.9	60	120	370	7
	TOP 25%	62.40	288.7	60	130	390	8
	TOP 50%	60.91	286.6	60	140	340	7
	BOTTOM 25%	59.60	275.7	60	160	300	6
	BOTTOM 10%	58.41	269.1	60	170	280	7
	BOTTOM 5%	57.75	261.1	60	170	270	5
	BOTTOM 1%	55.87	270.0	105	160	260	5

Table 43. WA percentile bands for MSA Index and their average carcass traits for HGP-free, Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	66.76	380.7	65	160	840	15
	TOP 5%	64.39	315.5	60	150	590	10
	TOP 10%	63.30	280.4	60	140	470	9
	TOP 25%	61.93	273.3	55	150	420	9
	TOP 50%	60.78	265.2	55	160	360	8
	BOTTOM 25%	59.50	260.0	55	180	340	8
	BOTTOM 10%	58.50	255.3	55	180	300	8
	BOTTOM 5%	57.88	251.7	55	180	280	7
MALE	BOTTOM 1%	56.74	254.7	65	220	280	7
	TOP 1%	67.75	382.6	75	140	910	12
	TOP 5%	65.61	336.1	70	130	660	10
	TOP 10%	64.48	296.5	65	120	450	9
	TOP 25%	62.97	287.7	60	120	390	8
	TOP 50%	61.38	287.6	60	140	360	8
	BOTTOM 25%	60.06	277.4	60	160	330	8
	BOTTOM 10%	58.91	278.8	60	170	290	7
	BOTTOM 5%	58.21	269.8	60	170	290	7
	BOTTOM 1%	56.97	281.4	105	150	320	6

Table 44. WA percentile bands for MSA Index and their average carcass traits for HGP-treated, non-Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	60.77	238.2	50	140	420	11
	TOP 5%	59.28	237.8	50	140	360	10
	TOP 10%	58.61	240.9	55	140	350	10
	TOP 25%	57.48	247.1	55	140	360	11
	TOP 50%	55.99	247.3	50	150	340	10
	BOTTOM 25%	54.78	242.9	50	160	320	7
	BOTTOM 10%	53.73	239.9	55	170	310	6
	BOTTOM 5%	52.86	229.2	70	180	300	5
	BOTTOM 1%	48.73	237.4	100	310	290	5
MALE	TOP 1%	62.40	242.3	55	110	360	10
	TOP 5%	60.32	247.4	55	120	340	8
	TOP 10%	59.18	254.9	55	130	330	8
	TOP 25%	57.55	272.5	60	130	350	9
	TOP 50%	56.37	285.8	60	140	340	10
	BOTTOM 25%	55.30	273.7	60	150	320	7
	BOTTOM 10%	54.48	270.1	60	160	310	6
	BOTTOM 5%	54.04	261.7	65	160	300	5
	BOTTOM 1%	52.89	236.4	85	160	290	4

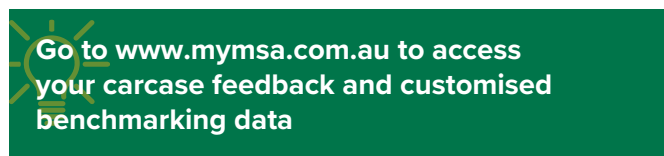
Table 45. WA percentile bands for MSA Index and their average carcass traits for HGP-treated, Grainfed cattle

SEX	BAND	MSA INDEX	CARCASS WEIGHT (KG)	HUMP HEIGHT (MM)	OSSIFICATION	MSA MARBLING	RIB FAT (MM)
FEMALE	TOP 1%	59.29	276.6	55	150	560	12
	TOP 5%	57.91	268.4	55	150	470	12
	TOP 10%	57.21	265.3	55	160	430	11
	TOP 25%	56.20	264.9	55	160	390	11
	TOP 50%	55.34	261.7	55	160	340	10
	BOTTOM 25%	54.51	258.7	55	170	330	8
	BOTTOM 10%	53.66	257.8	55	180	320	7
	BOTTOM 5%	53.11	259.7	60	190	310	6
	BOTTOM 1%	51.97	257.7	80	190	300	7
MALE	TOP 1%	60.67	278.4	60	110	480	11
	TOP 5%	59.19	276.8	60	120	400	11
	TOP 10%	58.31	278.0	60	120	380	10
	TOP 25%	56.96	279.7	60	140	370	10
	TOP 50%	55.96	278.0	60	150	330	9
	BOTTOM 25%	55.16	275.1	60	150	320	7
	BOTTOM 10%	54.41	275.9	65	160	310	6
	BOTTOM 5%	53.87	302.1	80	170	310	8
	BOTTOM 1%	50.76	354.0	125	190	300	12



Useful resources

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



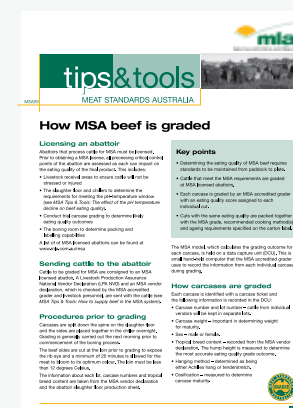
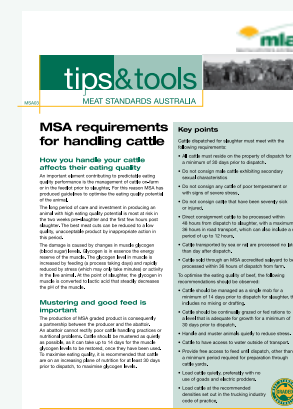
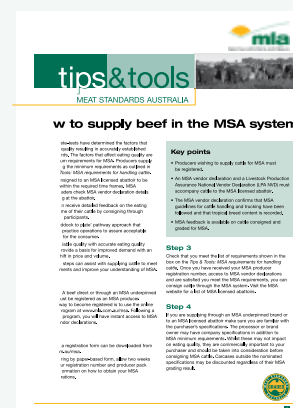
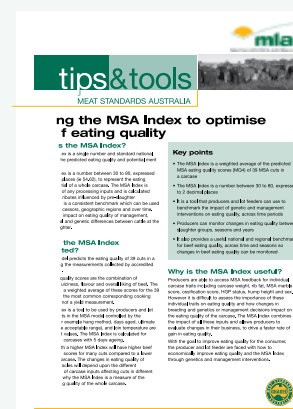
MSA Index calculator

Use the MSA Index Calculator to see the impact of on-farm changes on the MSA Index at www.mymssa.com.au/msamobile or scan the below QR code.



Tips & Tools Meat Standards Australia Beef Information Kit.

- 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 an MSA saleyard
- MSA16** The effect of growth promotants on beef eating quality
- MSA17** Maximising eating quality with tropical breed cattle
- MSA18** Using the MSA Index to optimise beef eating quality



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Notes

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