



Department of
Primary Industries

Quality of Australian canola

2019–2020



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Quality of Australian canola 2019–2020

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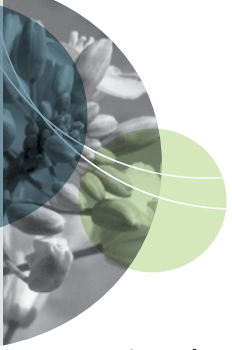
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Introduction

Sample analysis

Canola samples representing the 2019 harvest were received from GrainCorp Operations Limited (New South Wales and Victoria), Viterro Pty Ltd (South Australia) and CBH Group (Western Australia). These samples represent the seed collected at each receival point and have been taken to cumulatively represent the Australian harvest. Samples were received per site from New South Wales, South Australia and Victoria. Samples representing each of the four port zones were received from Western Australia. The NSW Department of Primary Industries (DPI) Oil Testing Service (OTS) has no control over sample collection and all data reported derives from analysing the provided samples.

All averages reported are weighted, based on the tonnage represented.

Each sample was analysed for oil, protein and glucosinolate content; fatty acid profiles and volumetric grain weights according to the standard methods outlined in the [Definitions, methods and references on page 33](#) at the back of this book.

The DPI OTS performed all analyses on the samples. Oil content is reported at 6% moisture in whole seed, protein content is reported in oil-free meal at 10% moisture, and glucosinolate content is reported in oil-free meal at 10% moisture.

The DPI OTS at Wagga Wagga prepared composite samples to determine chlorophyll content. Composite samples were prepared to represent GrainCorp's southern New South Wales and Victorian regions and Viterro's Adelaide, Central, Eastern and Western regions in South Australia. Western Australia's four port zone samples were analysed as received from CBH. No samples were received from GrainCorp's northern NSW region. Composite samples were created on a per weight basis to proportionally represent each site.

Units of measurement

Unless otherwise stated, units of measurement are as follows:

Oil content – % oil, whole seed at 6% moisture

Protein content – % protein, oil-free meal at 10% moisture

Glucosinolate content – $\mu\text{moles/g}$, oil-free meal at 10% moisture

Oleic acid (18:1) content – % of total fatty acids

Linoleic acid (18:2) content – % of total fatty acids

Linolenic acid (18:3) content – % of total fatty acids

Saturated fatty acids content – % of total fatty acids

Monounsaturated fatty acids content – % of total fatty acids

Polyunsaturated fatty acids content – % of total fatty acids

Chlorophyll content – mg/kg in whole seed, as received

Weather and production review

Growing conditions in 2019 were very mixed across the four main canola producing states, with severe drought conditions persisting in NSW (figures 1 and 2). Rainfall for the first half of the season (Figure 1) was decile 1–6 (very much below average to average) across south-eastern Australia, but decile 1–3 across most of New South Wales. The seasonal break was very patchy and generally late in NSW, early May across South Australia and Victoria, and very late, arriving in early June in Western Australia. From July through to the end of September, rainfall was decile 1 (lowest 10% of years) for most of NSW for the second consecutive year, decile 2–6 for Victoria and decile 1–3 for most of South Australia (Figure 2). Western Australia experienced dry conditions for the same period and was mostly decile 2–3 rainfall but decile 1 in some regions. A feature of the 2019 season was that rain-bearing weather systems were continually pushed south by intense and slow-moving high-pressure systems, meaning the further inland the less rain. Yield potential nationally was reduced by drought and lack of spring rainfall, and in Western Australia was exacerbated by spring frosts.

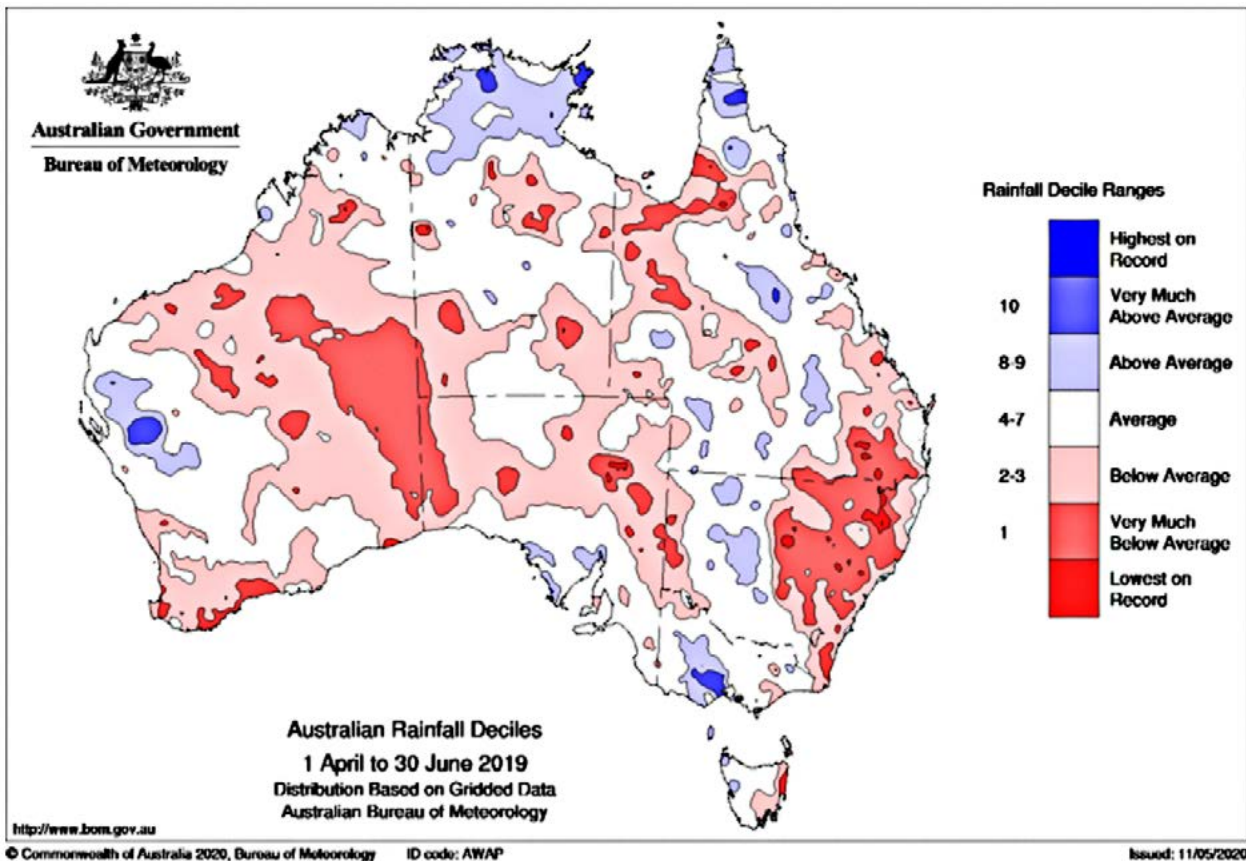


Figure 1. Australian rainfall deciles 1 April to 30 June 2019.
Source: Bureau of Meteorology (<http://www.bom.gov.au/climate/history/rainfall/>)

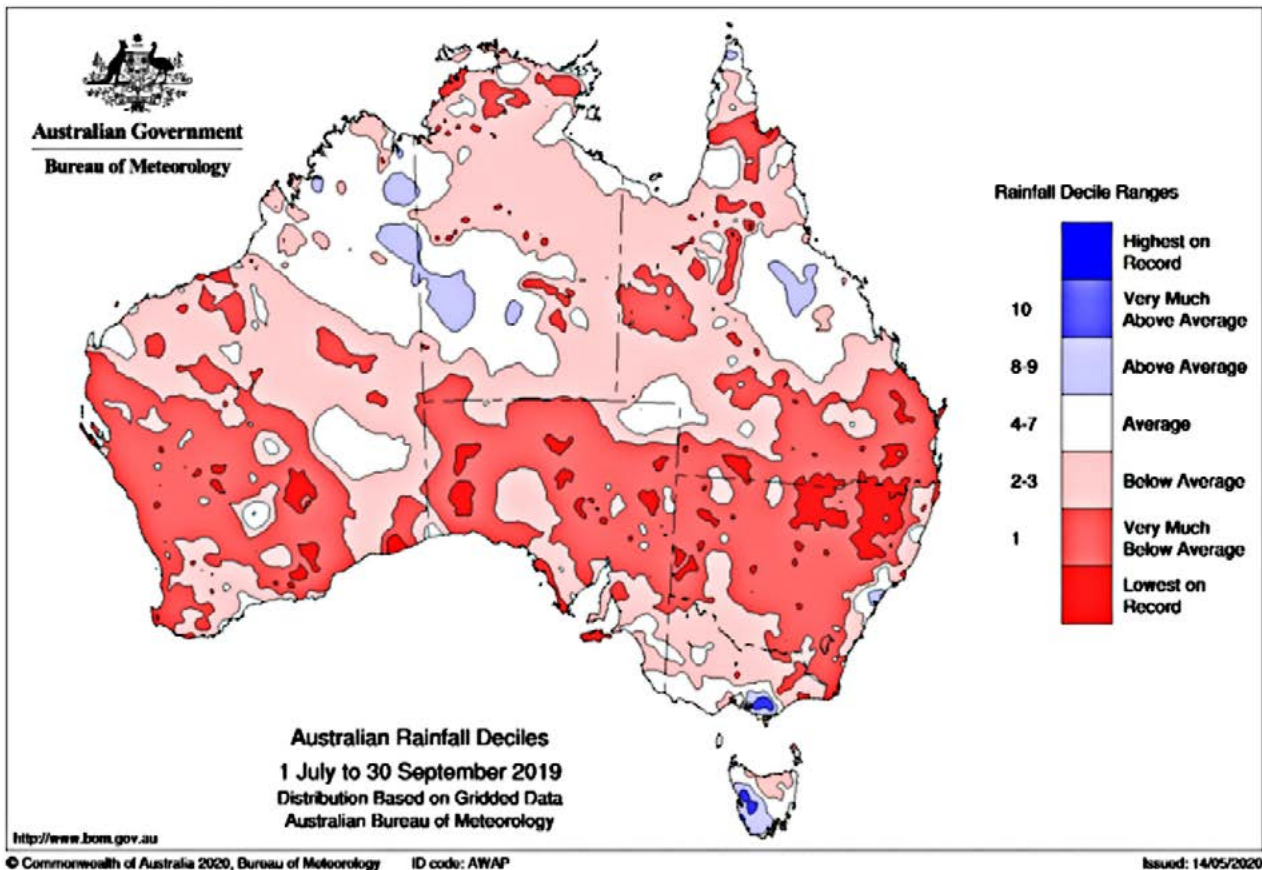


Figure 2. Australian rainfall deciles 1 July to 30 September 2019.

Source: Bureau of Meteorology (<http://www.bom.gov.au/climate/history/rainfall/>)

New South Wales

The canola crop area was down about 10% on 2018. The reduction was mainly in the western, drier areas of the centre and south of the state. Opening seasonal rains were patchy and started in late March in southern NSW. April was generally very dry, followed by below average rain in May and about average for June. Early sown crops in the south that had adequate seed bed moisture established reasonably well, but the dry April resulted in patchy emergence for the remainder of the crop. Crop growth through May and June was very good, but by July soil moisture was depleting and decisions on the 400,000 ha crop were being made, with the very poorest of crops being spray-fallowed or grazed. Rainfall was mostly decile 1–2 for the remainder of the growing season. This severe rainfall deficiency took its toll on the crop as growers opted for grazing, silage and hay to recoup some growing costs. Some of the better crops cut for hay produced 3–4 t/ha. Approximately 40% of the sown crop made it through to harvest. The dry season resulted in few disease problems, but more insect pressure; most crops were treated for aphids or heliothis or both.

Average oil content of the crop that was eventually harvested was better than expected considering the very dry season.

Final estimated production for NSW was 176,000 t from an estimated 160,000 ha for an average yield of 1.10 t/ha.

GOTO PAGES

Bureau of Meteorology
(<http://www.bom.gov.au/climate/history/rainfall/>)

Victoria

The Victorian crop was similar in area to the 2018 crop. The seasonal break for Victoria and South Australia arrived in early May and continuing showery weather through most of May meant that sowing was a stop/start process, especially in the Wimmera and South West regions that received the most rain. A significant proportion of the total area was dry sown in mid-late April ahead of the forecast early May rain. Rainfall for May and June was above average but lighter through July. The frequent rainfall in mid-winter triggered blackleg disease infection and development leading to widespread foliar spraying on susceptible varieties. Rainfall through early to mid-spring was mostly below average in the Wimmera and northwards. About 5–7% of the total area was cut for hay, primarily in the eastern Mallee, North Central and North East, which received much less rain than further south. Most of the production came from the southern Wimmera and the South West where crops finished in mild conditions to record high average yields.

The final estimated production for Victoria was 699,000 t from an estimated 385,000 ha for an average yield of 1.82 t/ha.

South Australia

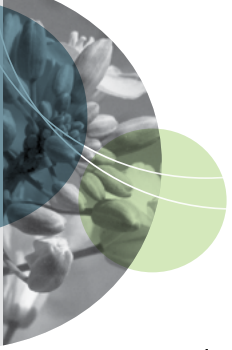
The area sown to canola was 6% lower than in 2018. The seasonal break and growing conditions in SA followed a similar pattern to Victoria. There was little crop sown in the Mallee due to the lack of an early sowing opportunity. Most of the state crop was dry sown just before or after the autumn break in early May. Average to above average rain fell through May and June. July was drier with frequent lighter falls. This frequent showery weather (10–20 rain days) led to a substantial increase in blackleg infections and growers applied fungicides to their higher yield potential crops in the Lower Eyre Peninsula and the Lower South East. Mild conditions through early spring supported good yield potential with the state average yield being slightly above the long-term average. Large crop areas were sprayed in spring for aphids and heliothis.

The final estimated production for South Australia was 324,000 t from an estimated 220,000 ha for an average yield of 1.47 t/ha.

Western Australia

The sown canola area declined by 23% to 995,000 ha in 2019. The main seasonal break arrived on 7 June for most regions, which was 7–10 days later than 2018. A large area was dry sown before the break. Crops sown in May on light falls of rain had patchy and staggered emergence, while later-sown crops established much better, but were slower developing. Following good rainfall in June, July was comparatively dry. Average to above average rainfall was recorded in most areas in August, except for Geraldton port zone where it remained dry. Rainfall in spring was generally well below average and frosts in early and mid September, followed by hot finishing conditions reduced yield potential in many areas. Crops yielded poorly in the drier areas of each port zone, but higher than expected yields in the higher rainfall areas resulted in yields being close to the long-term average.

The final estimated production for Western Australia was 1.12 million tonnes from an estimated 923,000 hectares for an average yield of 1.21 t/ha.



Yield

Australia produced an estimated 2.32 million tonnes of canola in 2019 from a harvested area of 1.69 million hectares for an average yield of 1.37 t/ha. State yields ranged from 1.10 t/ha in New South Wales to 1.82 t/ha in Victoria.

The area sown to canola fell by 15% compared with 2018, while production was similar to 2018 due mostly to higher production in Victoria and better than average yields in South Australia. National production was the equal lowest since the drought-affected 2009 eastern Australia crop. The area sown and harvested, and production, in each state is shown in Table 1.

Table 1. Estimated Australian canola production by state in 2019.

State	Area sown (hectares)	Area harvested (hectares)	Production (tonnes)	Average yield (tonnes/hectare)
New South Wales	400,000	160,000	176,000	1.10
South Australia	225,000	220,000	324,000	1.47
Victoria	415,000	385,000	699,000	1.82
Western Australia	995,000	923,000	1,117,000	1.21
Australia	2,035,000	1,688,000	2,316,000	1.37

Source: ABARES Crop Report February 2020; GIWA Crop Report February 2020; Lachstock Consulting: industry estimates

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ABARES (<https://www.agriculture.gov.au/abares/research-topics/agricultural-commodities/australian-crop-report>)

GIWA (<http://www.giwa.org.au/2019>)

Lachstock (<https://www.lachstockconsulting.com.au/>)

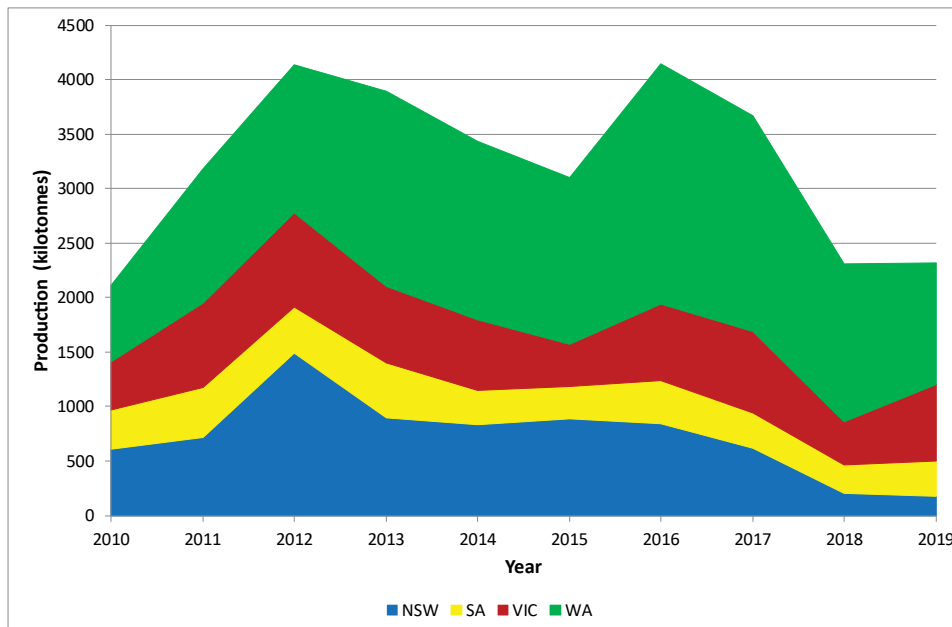


Figure 3. Canola production in Australia 2010–2019.



Australian quality parameter summary

A weighted average of each region and state was calculated based on the tonnages each site and grade represents.

The Australian national weighted average was calculated using the production figures for each state.

Due to tonnages being confidential information, individual site tonnages cannot be reported.

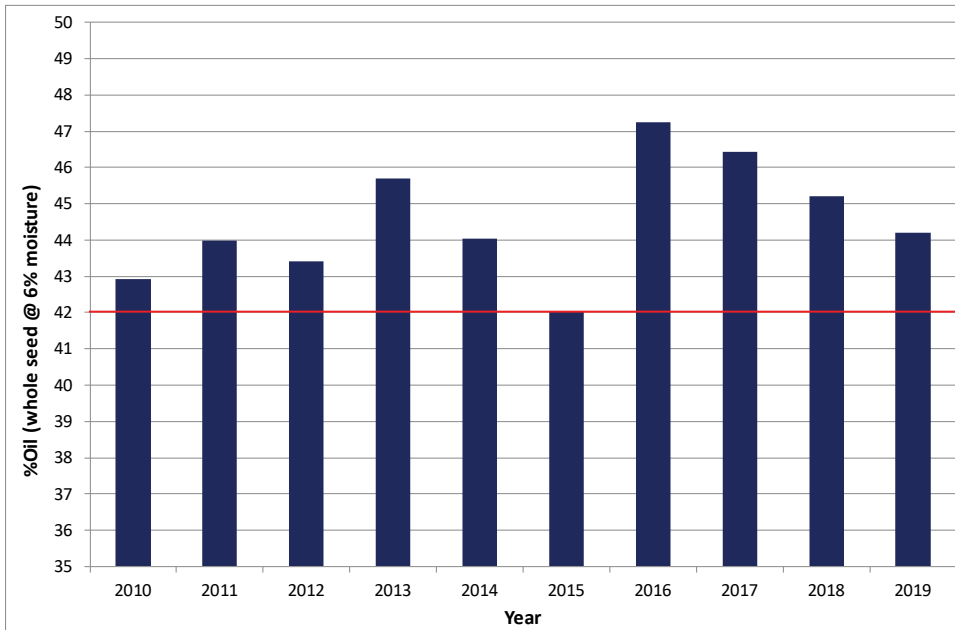
Table 2. Average quality of Australian canola 2019.

Quality parameter	Australian weighted average
Oil content, % in whole seed @ 6% moisture	44.2
Protein content, % in oil-free meal @ 10% moisture	39.9
Glucosinolates, μ moles/g in oil-free meal @ 10% moisture	11
Test weight, kg/hL	67.21
Oleic acid (C18:1), % ¹	61.9
Linoleic acid (C18:2), % ¹	19.3
Linolenic acid (C18:3), % ¹	10.2
Erucic acid (C22:1), % ¹	<0.1
Polyunsaturated fatty acids, % ¹	29.5
Monounsaturated fatty acids, % ¹	63.5
Saturated fatty acids, % ¹	7.0
Iodine value	114.4
Chlorophyll content, mg/kg in whole seed as received	5

¹Fatty acids are reported as a % of total fatty acids.

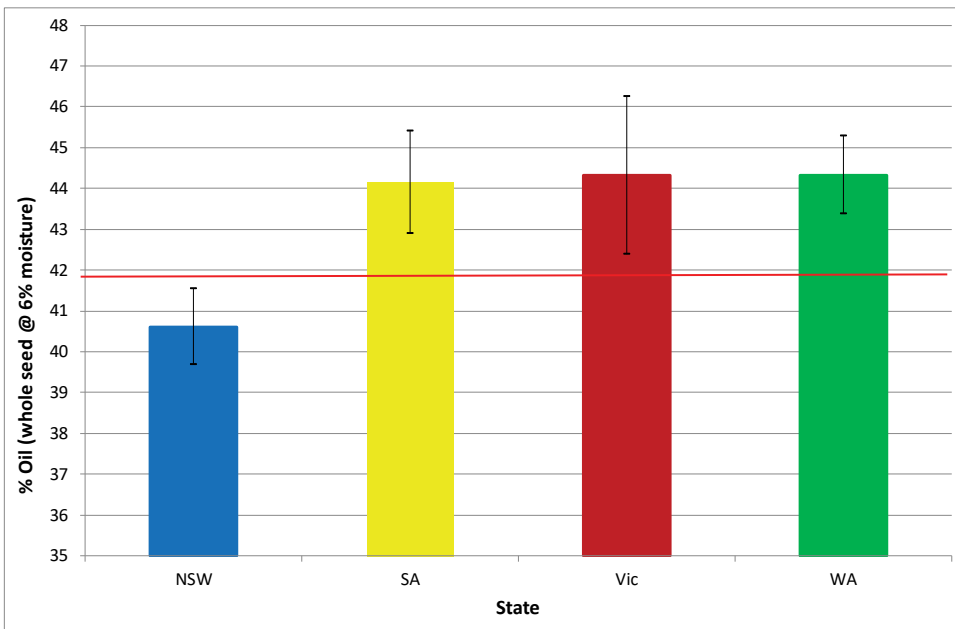
Oil content

The average oil content for the Australian harvest in 2019 was 44.2%. This was 1.0 percentage points lower than the 2018 harvest. The receive site oil content ranged from 38.5% at Bribbaree in New South Wales to 47.8% at Hamilton in Victoria. The port zone oil content ranged from 43.0% at Geraldton in Western Australia to 45.3% at Albany in Western Australia.



2015 average was determined with NSW, SA and Vic results only.

Figure 4. Average Australian oil content 2010–2019.

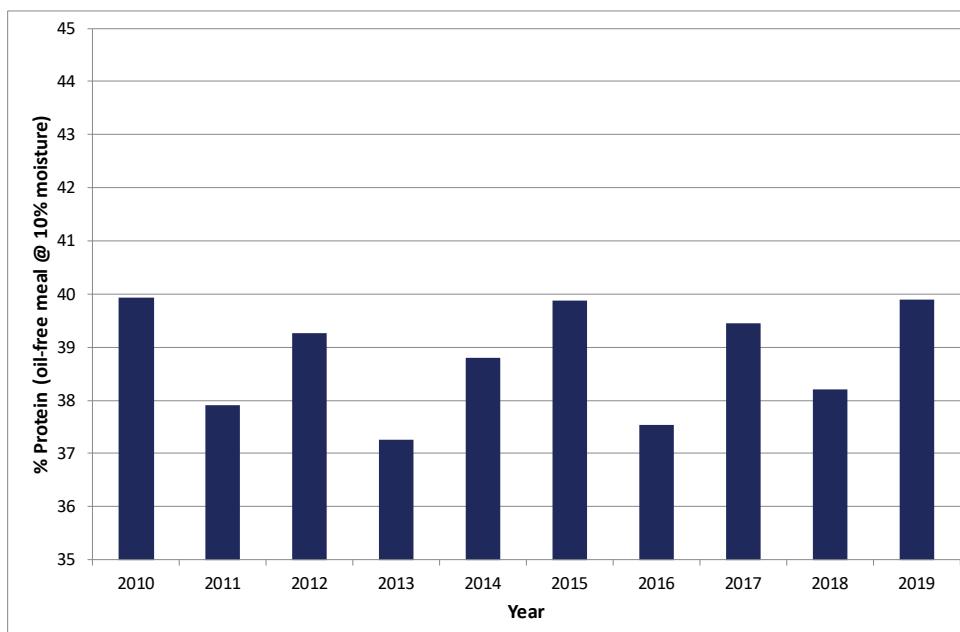


Bars indicate the standard deviation for each state
Red line indicates the AOF base level oil content of 42%.

Figure 5. Average oil content by state 2019.

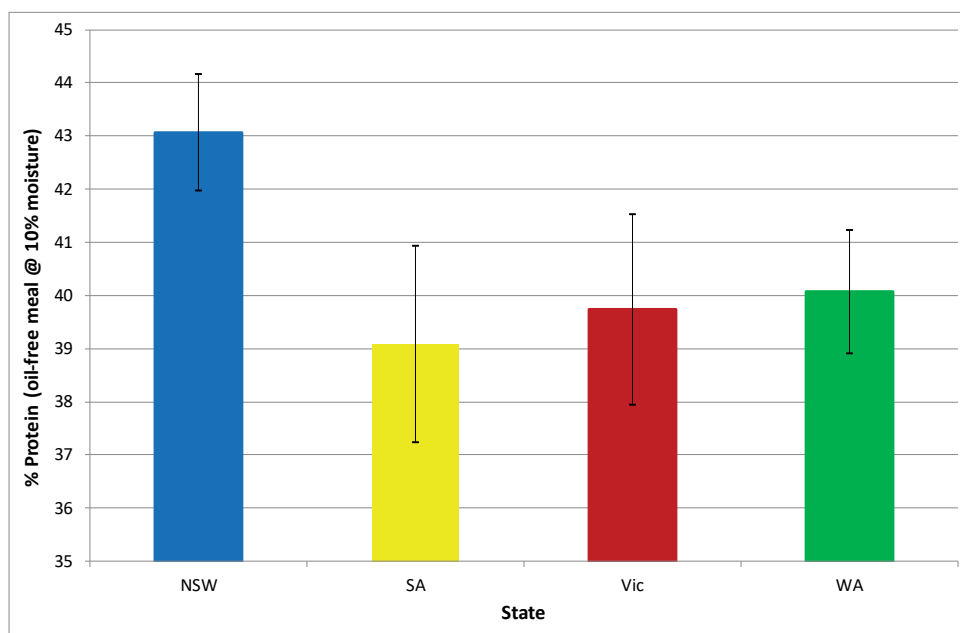
Protein content – meal

The average protein content for the 2019 Australian canola harvest was 39.9% – an increase of 1.7 percentage points from the 2018 harvest. Protein ranged from 36.0% at Hamilton in Victoria to 45.1% at Milvale in New South Wales. The port zone protein content ranged from 38.7% at Albany in Western Australia to 41.5% at Geraldton in Western Australia.



2015 average was determined with NSW, SA and Vic results only.

Figure 6. Average Australian protein content 2010–2019.



Bars indicate the standard deviation for each state.

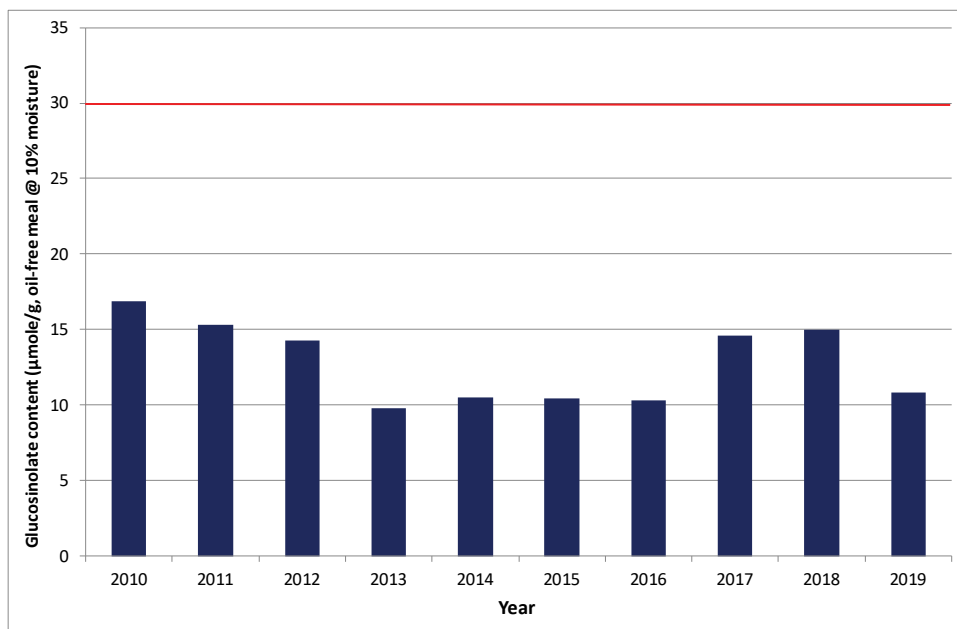
Figure 7. Average protein content by state 2019.

Glucosinolate content – meal

The Australian Oilseeds Federation (AOF) Trade Standard sets the limit for glucosinolate content at 30 $\mu\text{moles/g}$, oil-free meal. Glucosinolate content has been reported as $\mu\text{moles/g}$, oil-free meal at 10% moisture to allow comparison with the AOF Trade Standard.

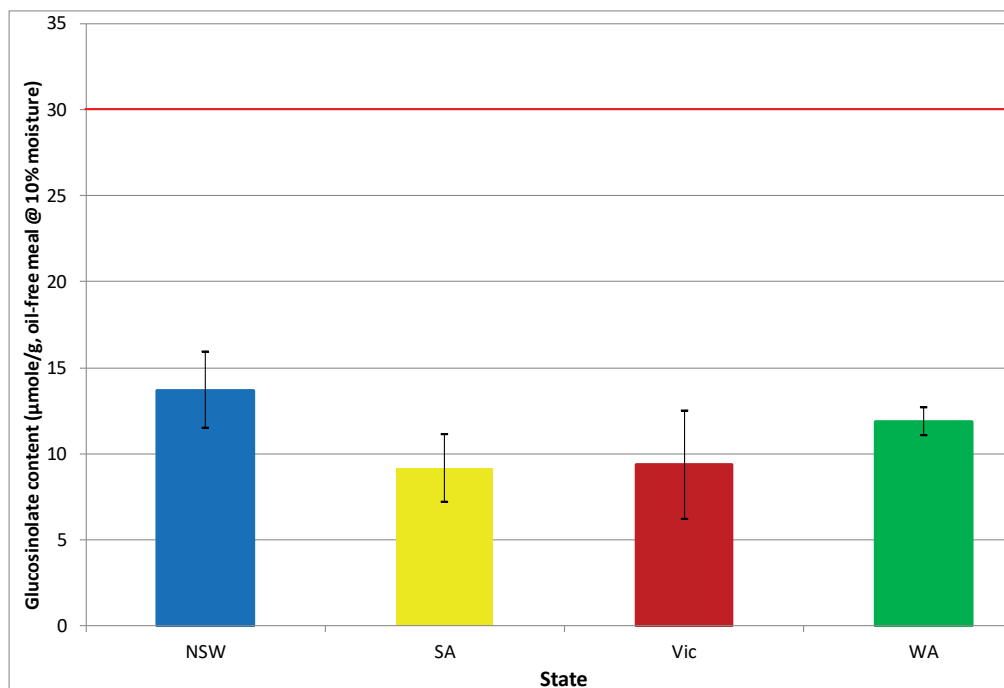
The average glucosinolate content for the Australian harvest in 2019 was 11 $\mu\text{moles/g}$. This was a decrease of 4 $\mu\text{moles/g}$ from the 2018 harvest. The receival site glucosinolate content ranged from 3 $\mu\text{moles/g}$ at Berrybank and Willaura, both in Victoria, to 18 $\mu\text{moles/g}$ at Grong Grong in New South Wales.

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 The Australian Oilseeds Federation (AOF) Trade Standard (http://www.australianoilseeds.com/Technical_Info/standards_manual)



2014 and 2015 averages were determined with NSW, SA and Vic results only.

Figure 8. Average Australian glucosinolate content in meal 2010–2019.



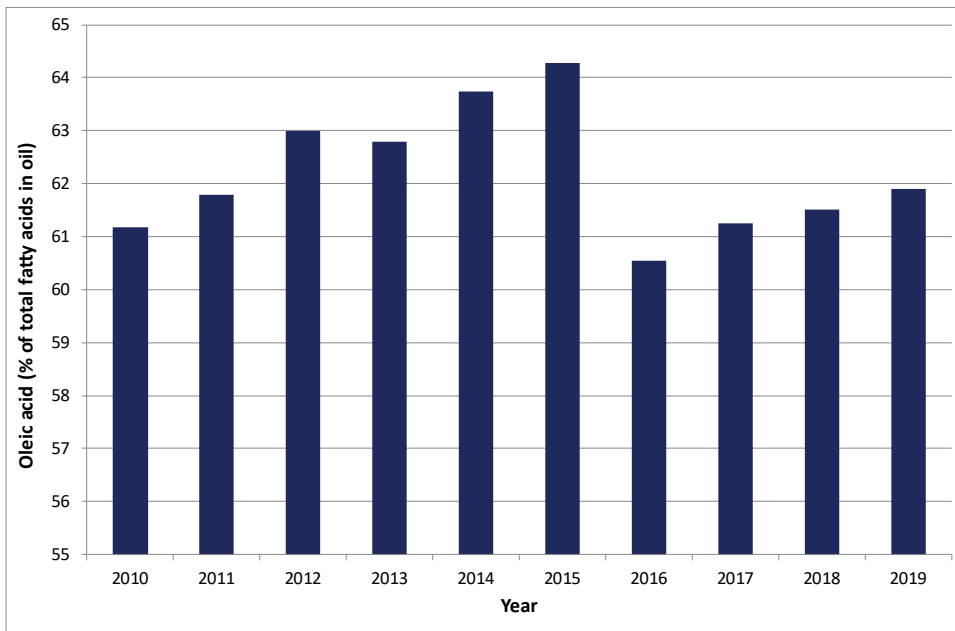
Bars indicate the standard deviation for each state.

Red line indicates the AOF limit of 30 $\mu\text{moles/g}$ in oil-free meal.

Figure 9. Average glucosinolate content in meal by state 2019.

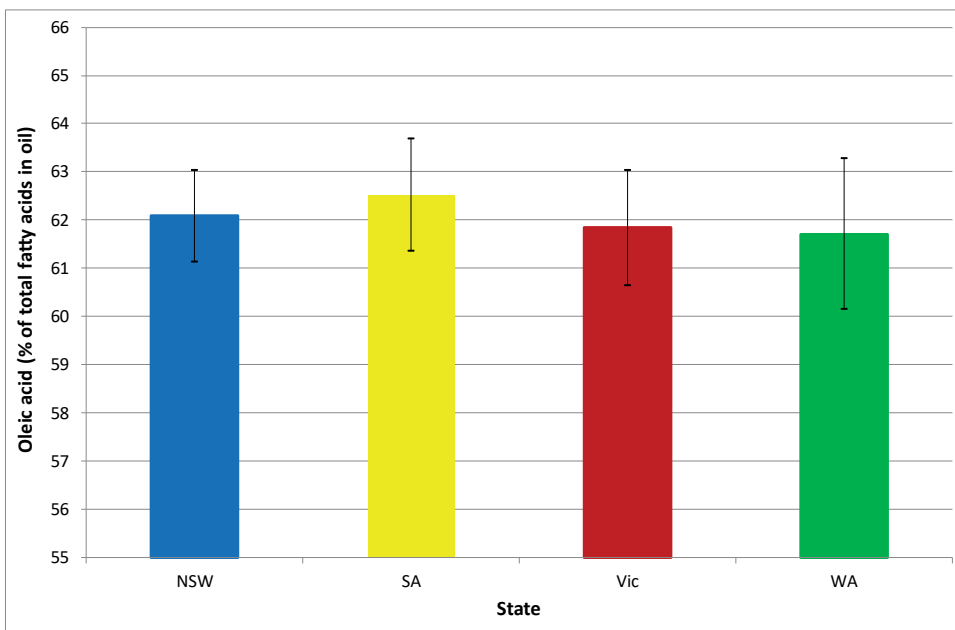
Oleic acid

The average Australian oleic acid (C18:1) content from the 2019 harvest was 61.9%. This was an increase of 0.4 percentage points from the 2018 season. Oleic acid ranged from 59.7% at Rudall in South Australia to 65.4% at Tarlee in South Australia.



2014 and 2015 averages were determined with NSW, SA and Vic results only.

Figure 10. Average Australian percentage of oleic acid in canola oil 2010–2019.

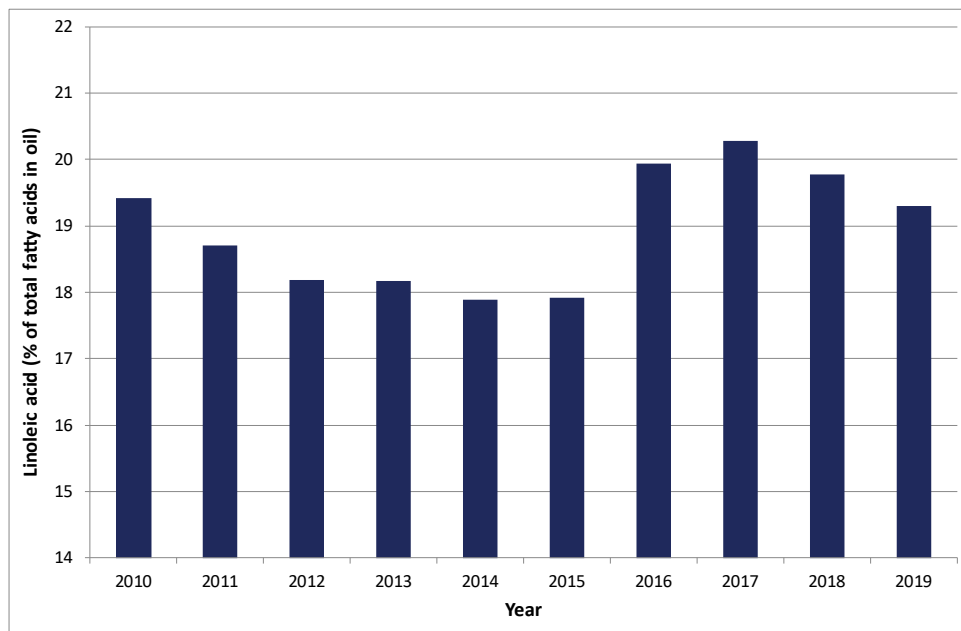


Bars indicate the standard deviation for each state.

Figure 11. Average percentage of oleic acid in canola oil by state 2019.

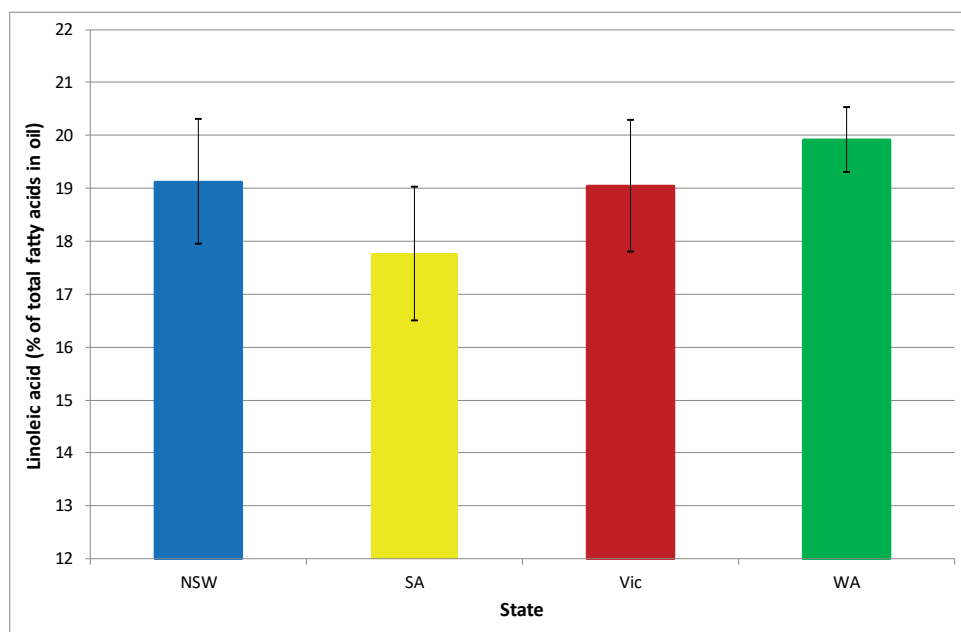
Linoleic acid

The average Australian linoleic acid (C18:2) content from the 2019 harvest was 19.3%. This was a decrease of 0.5 percentage points from the 2018 season. Linoleic acid ranged from 16.6% at Ardlethan in New South Wales to 22.1% at Tarlee in South Australia.



2014 and 2015 averages were determined with NSW, SA and Vic results only.

Figure 12. Average Australian percentage of linoleic acid in canola oil 2010–2019.

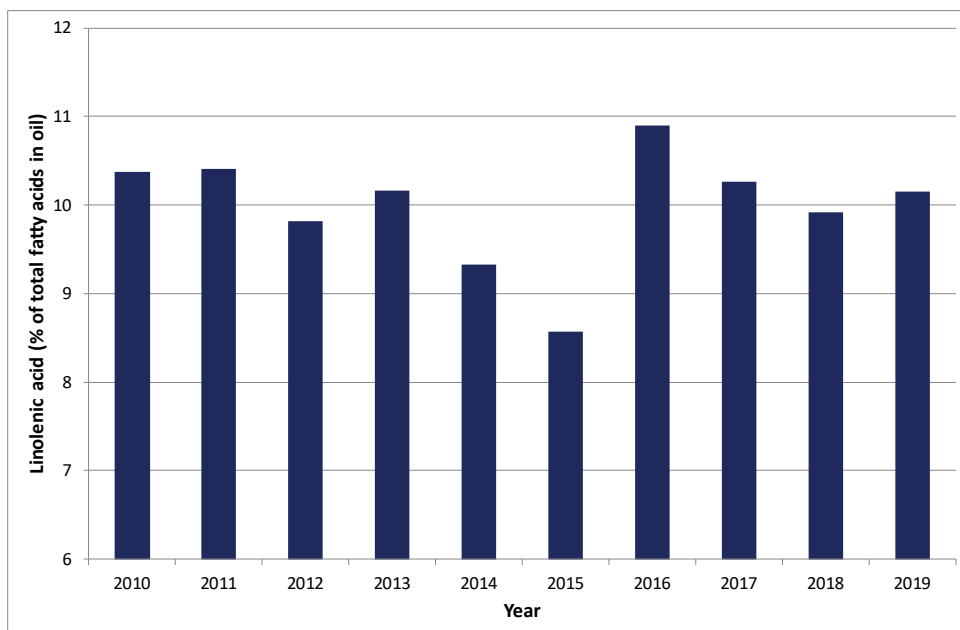


Bars indicate the standard deviation for each state.

Figure 13. Average percentage of linoleic acid in canola oil by state 2019.

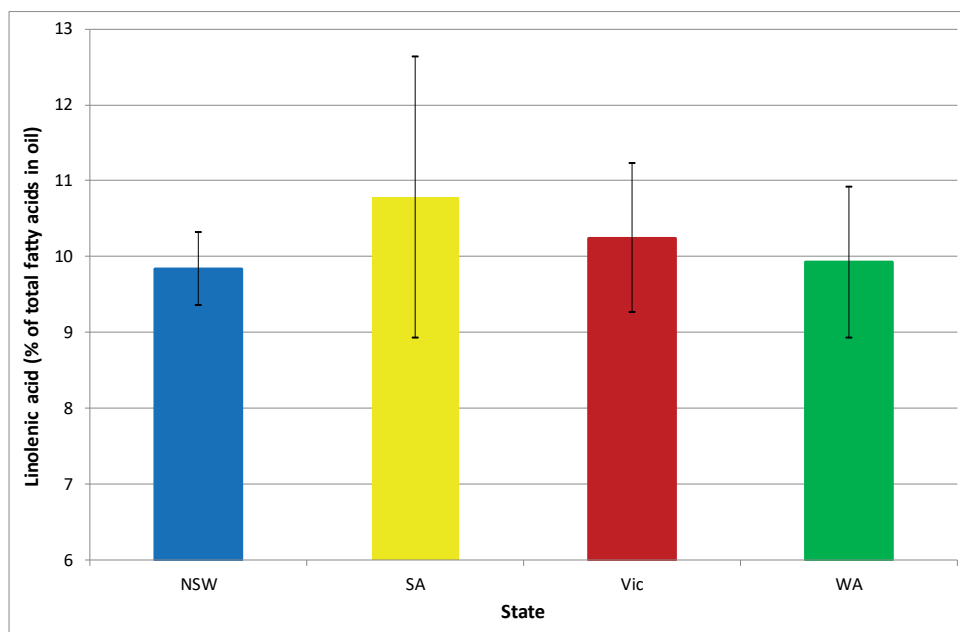
Linolenic acid

The average Australian linolenic acid (C18:3) content from the 2019 harvest was 10.2%. This was an increase of 0.3 percentage points from the 2018 season. Linolenic acid ranged from 3.6% at Tarlee in South Australia to 12.3% at Naracoorte in South Australia. (**Note:** Naracoorte falls under GrainCorp's Wimmera region in Victoria).



2014 and 2015 averages were determined with NSW, SA and Vic results only.

Figure 14. Average Australian percentage of linolenic acid in canola oil 2010–2019.

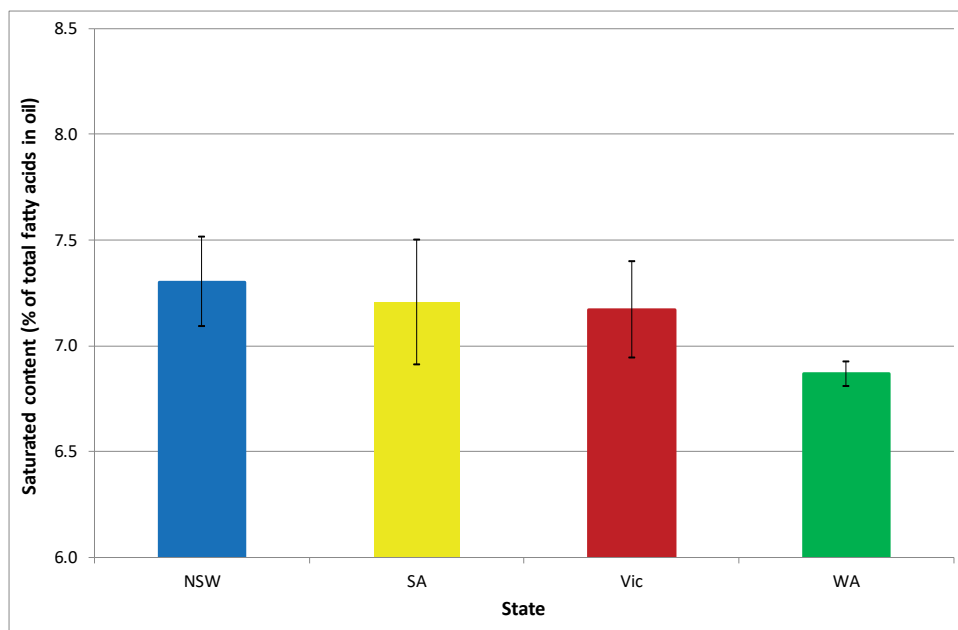


Bars indicate the standard deviation for each state.

Figure 15. Average percentage of linolenic acid in canola oil by state 2019.

Saturated fatty acids

The average Australian saturated fatty acids content from the 2019 harvest was 7.0%. This was a decrease of 0.2 percentage points from the 2018 season. Saturated fatty acids ranged from 6.8% at Berrybank and Westmere in Victoria, Oaklands in New South Wales (under GrainCorp's North East region in Victoria) and Albany and Geraldton in Western Australia, to 7.9% at Bordertown and Wolseley in South Australia.

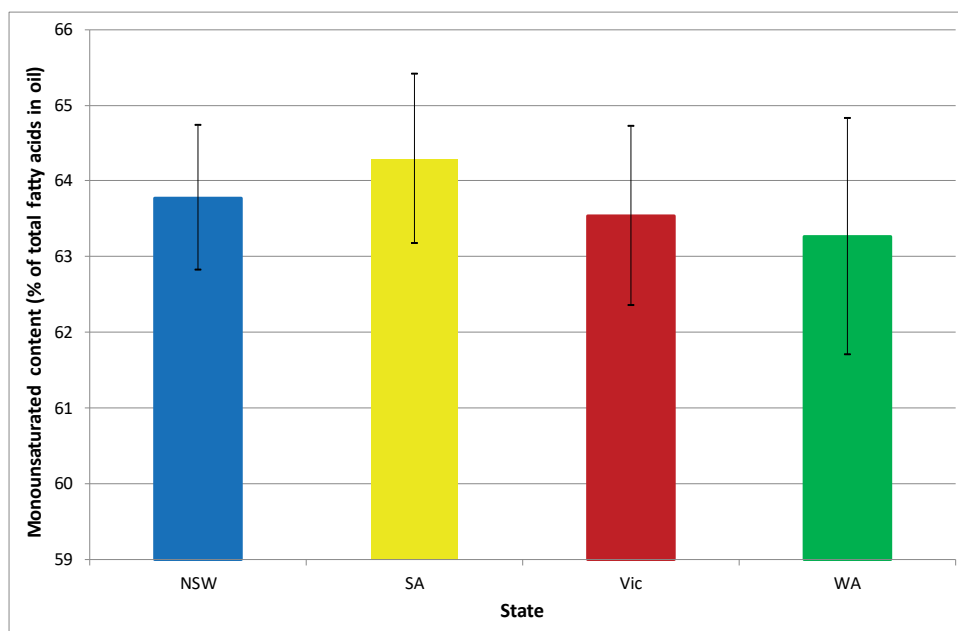


Bars indicate the standard deviation for each state.

Figure 16. Average percentage of saturated fatty acids in canola oil by state 2019.

Monounsaturated fatty acids

The average Australian monounsaturated fatty acids content from the 2019 harvest was 63.5%. This was an increase of 0.4 percentage points from the 2018 harvest. Monounsaturated fatty acids ranged from 61.5% at Hamilton in Victoria to 67.0% at Tarlee in South Australia.

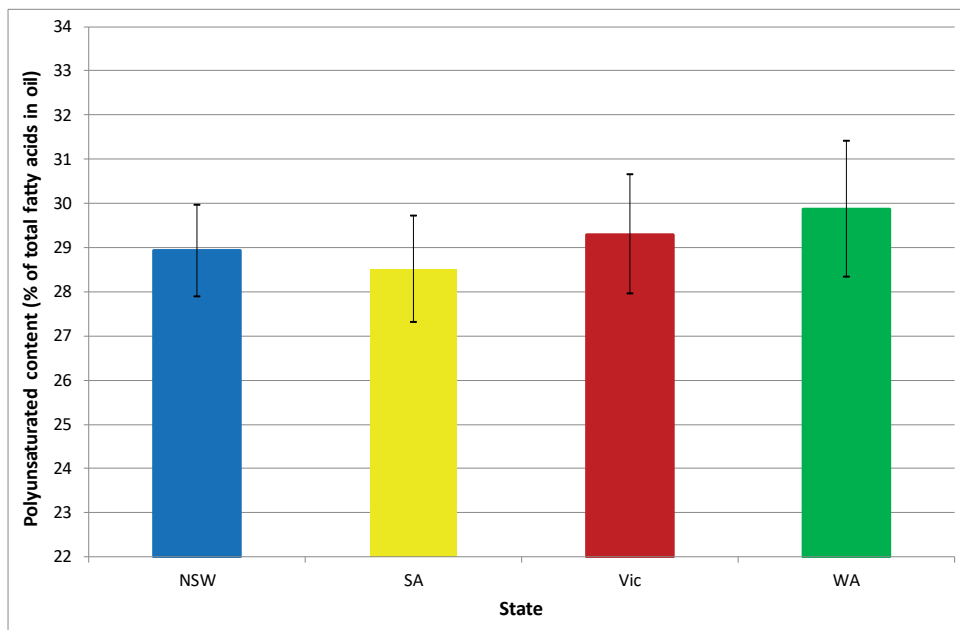


Bars indicate the standard deviation for each state.

Figure 17. Average percentage of monounsaturated fatty acids in canola oil by state 2019.

Polyunsaturated fatty acids

The average Australian polyunsaturated fatty acids content from the 2019 harvest was 29.5%. This was a decrease of 0.2 percentage points from the 2018 harvest. Polyunsaturated fatty acids ranged from 25.7% at Tarlee in South Australia to 31.4% at Hamilton in Victoria.

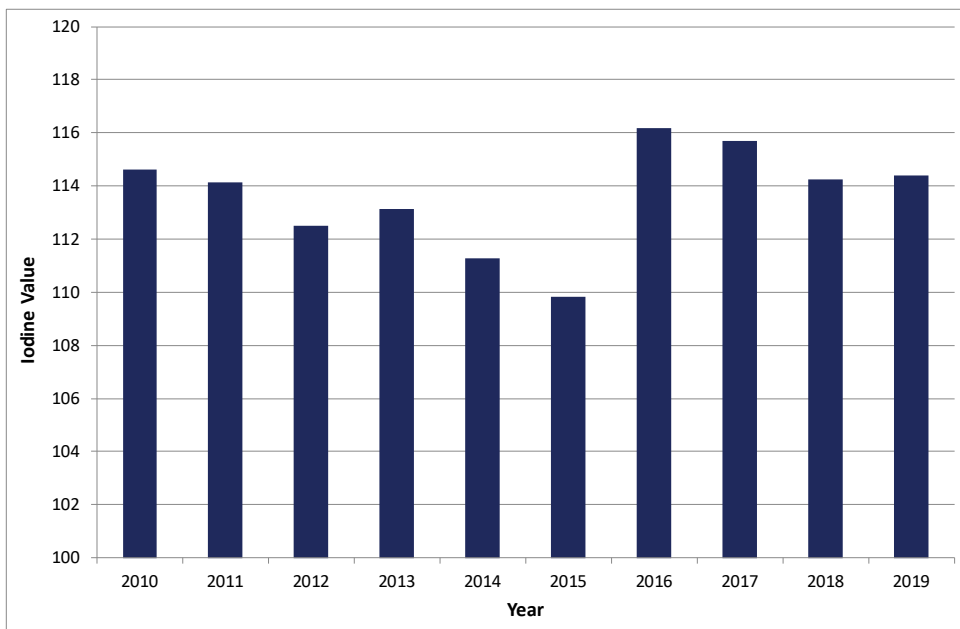


Bars indicate the standard deviation for each state.

Figure 18. Average percentage of polyunsaturated fatty acids in canola oil by state 2019.

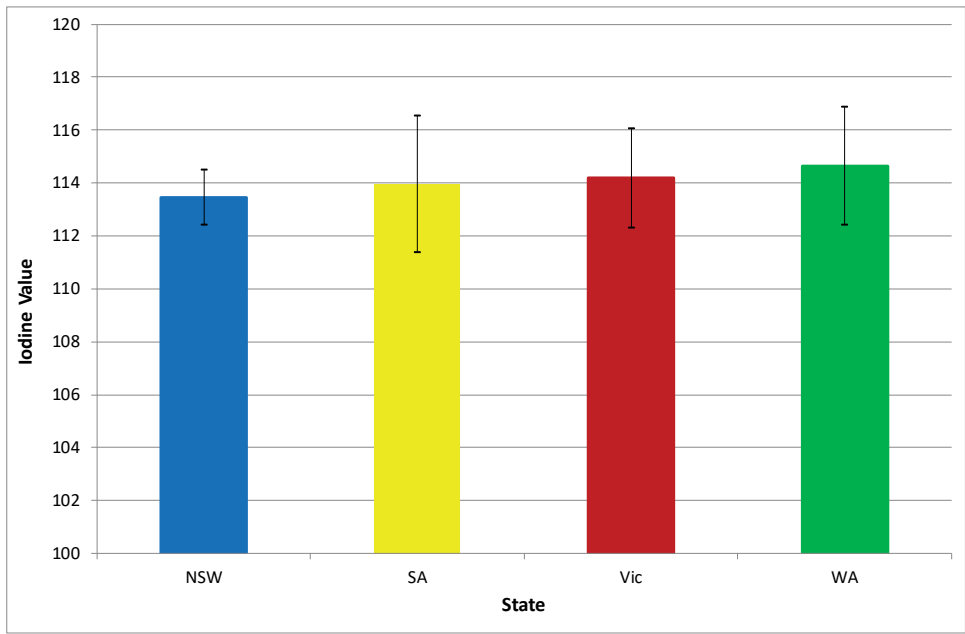
Iodine value

The average Australian iodine value in the oil portion of the seed from the 2019 harvest was 114.4. This was an increase of 0.2 from the 2018 harvest of 114.2. The iodine value ranged from 105.1 at Tarlee in South Australia to 117.4 at Hamilton in Victoria.



2014 and 2015 averages were determined with NSW, SA and Vic results only.

Figure 19. Average Australian iodine value in canola oil 2010–2019.



Bars indicate the standard deviation for each state.

Figure 20. Average iodine value in canola oil by state 2019.

Quality data by state

In each state the bulk handlers group the receival sites into Zones and Regions. Results are reported according to these Zones and Regions.

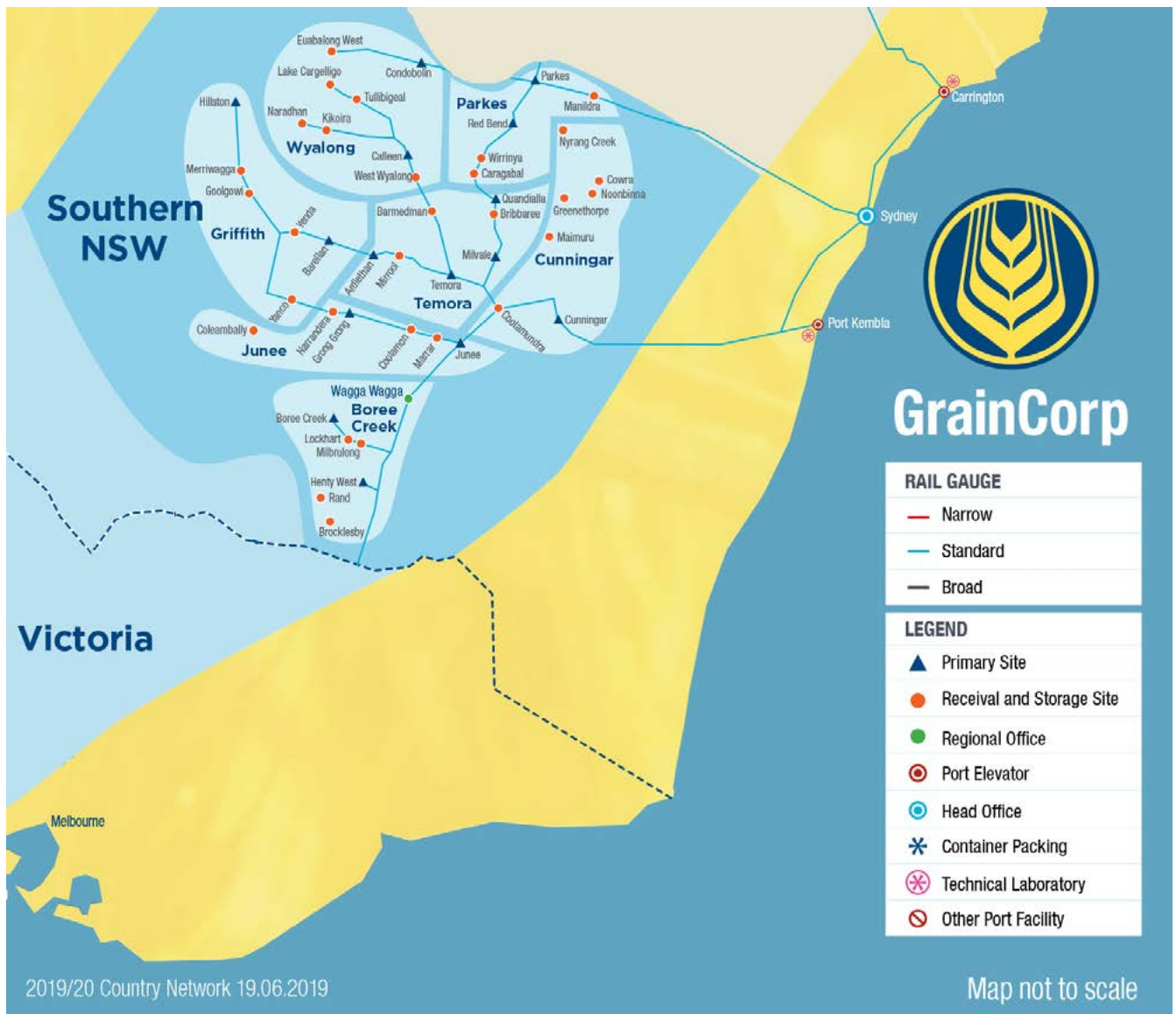


Figure 21. 2019–2020 GrainCorp Country Network map of Southern NSW regions.

Source: GrainCorp



Figure 22. 2019–2020 GrainCorp Country Network map of Victorian regions.
Source: GrainCorp

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GrainCorp (<http://www.graincorp.com.au/>)

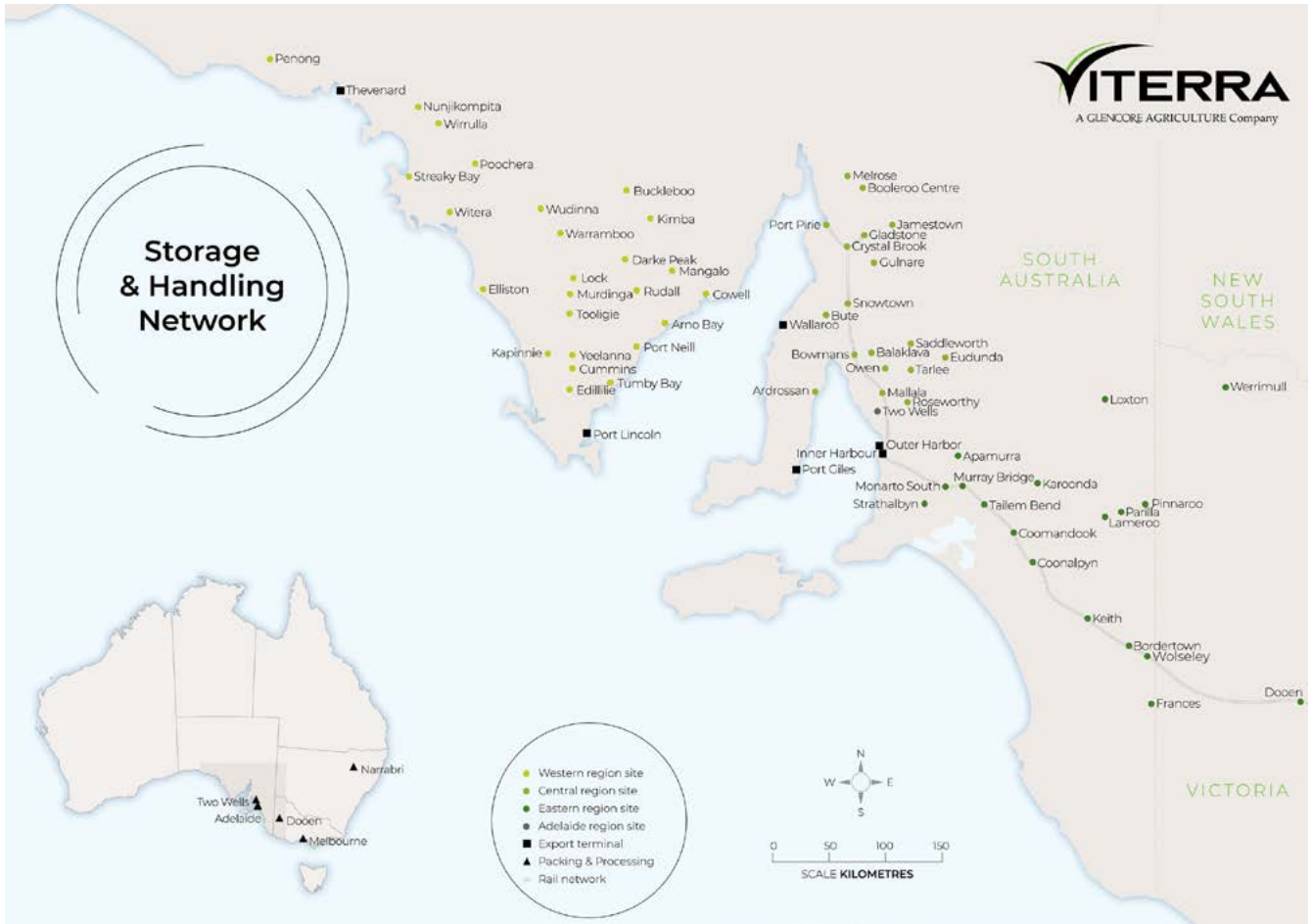


Figure 23. Viterra storage and handling network map.

Source: Viterra

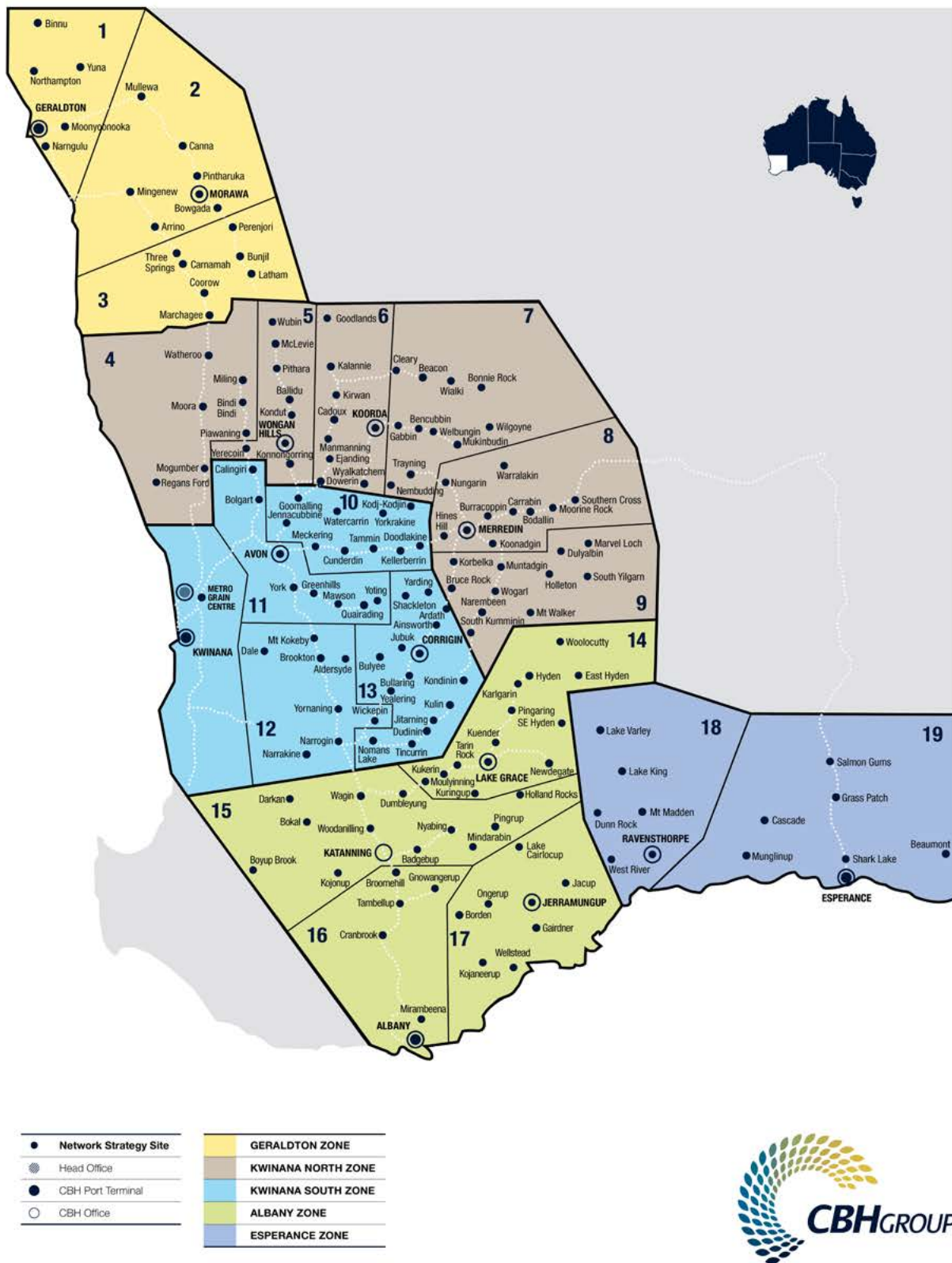
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Viterra
[\(http://viterra.com.au/\)](http://viterra.com.au/)

CBH Group
[\(https://www.cbh.com.au/\)](https://www.cbh.com.au/)

CBH NETWORK MAP

Receival Sites



October 2019



Figure 24. CBH receival sites network map.

Source: CBH Group

Quality data by state

Table 3. Quality data – New South Wales.

Region/zone/site	Grade	Oil	Protein	Glucosinolates	Test weight
		% ¹	% ²	µmoles/g ³	kg/hL ⁴
Southern NSW					
Boree Creek					
Boree Creek	CAN	39.7	41.5	15	68.75
Henty West	CAN	41.2	42.9	12	67.58
Milbrulong	CAN	40.6	43.0	14	67.92
Rand	CAN	39.9	44.7	13	68.67
Cunningar					
Cootamundra	CAN	40.8	43.6	11	67.58
Cunningar	CAN	41.8	44.2	13	67.50
Griffith					
Barellan	CAN	40.7	42.7	14	67.25
Junee					
Grong Grong	CAN	39.9	42.9	18	N/A
Junee Sub	CAN	39.1	42.9	16	68.00
Temora					
Ardlethan	CAN	40.1	41.7	17	67.58
Bribbaree	CAN	38.5	44.0	17	66.83
Milvale	CAN	39.4	45.1	13	67.67
Southern NSW weighted average		40.6	43.1	14	67.17
NSW weighted average		40.6	43.1	14	67.17
NSW minimum		38.5	41.5	11	66.83
NSW maximum		41.8	45.1	18	68.75

¹ % in whole seed @ 6% moisture

² % in oil-free meal @ 10% moisture

³ µmoles/g in oil-free meal @ 10% moisture

⁴ kilograms/ hectolitre.

Table 4. Quality data – South Australia.

Region/zone/site	Grade	Oil	Protein	Glucosinolates	Test weight
		% ¹	% ²	µmoles/g ³	kg/hL ⁴
Adelaide					
Port Adelaide	CANO	42.9	40.5	11	67.50
Adelaide weighted average		42.9	40.5	11	67.50
Central					
Bowmans	CANO	42.5	41.3	10	68.00
Gladstone	CANO	41.3	43.7	11	68.42
Port Giles	CANO	44.2	39.0	9	67.50
Roseworthy	CANO	42.0	41.8	9	68.50
Central weighted average		42.4	41.5	10	68.11
Eastern					
Bordertown	CANO	42.9	39.4	11	68.50
Dooen	CANO	43.7	39.2	8	67.75
Frances	CANO	44.5	38.3	12	67.00
Keith	CANO	42.7	38.4	10	68.83
Tailem Bend	CANO	44.0	38.3	12	67.75
Tarlee	CANO	42.6	41.7	11	69.00
Wolseley	CANO	42.5	39.6	11	68.50
Eastern weighted average		43.5	38.8	11	68.03
Western					
Cummins	CANO	45.7	37.6	8	67.25
Pt Lincoln	CANO	45.1	38.2	7	67.00
Rudall	CANO	42.2	43.1	15	67.50
Tumby Bay	CANO	44.8	39.5	9	67.50
Western weighted average		45.3	39.5	8	67.18
SA weighted average		44.2	39.1	9	67.62
SA minimum		41.3	37.6	7	67.00
SA maximum		45.7	43.7	15	69.00

¹ % in whole seed @ 6% moisture

² % in oil-free meal @ 10% moisture

³ µmoles/g in oil-free meal @ 10% moisture

⁴ kilograms/ hectolitre.

Table 5. Quality data – Victoria.

Region/zone/site	Grade	Oil	Protein	Glucosinolates	Test weight
		% ¹	% ²	µmoles/g ³	kg/hL ⁴
Victoria					
Port Zone					
Geelong	CAN	46.1	38.1	11	67.25
Central Victoria					
Berrybank	CAN	46.4	38.8	3	67.25
Dunolly Sub	CAN	42.8	41.0	13	68.00
Elmore	CAN	42.2	42.1	14	67.75
Mitiamo	CAN	42.4	43.0	11	67.75
Murchison	CAN	41.7	43.1	11	68.25
Westmere	CAN	47.5	39.0	5	67.25
Willaura	CAN	45.5	38.0	3	67.50
North east					
Deniliquin	CAN	43.8	40.7	11	67.75
Dookie	CAN	43.5	41.5	12	67.33
Numurkah Sutcliffe	CAN	42.0	41.4	9	68.00
Oaklands	CAN	40.2	43.5	13	68.00
Tocumwal	CAN	41.6	43.8	13	68.50
Yarrawonga	CAN	42.5	43.7	13	67.75
Southern Mallee					
Beulah	CAN	40.9	41.6	14	69.00
Charlton	CAN	42.1	40.3	13	67.67
Donald	CAN	43.1	40.6	9	68.25
Rainbow	CAN	42.7	40.4	16	68.25
Warracknabeal	CAN	42.5	39.1	10	68.00
Wycheproof	CAN	43.2	40.8	5	68.25
Swan Hill					
Boort	CAN	41.5	41.3	9	67.50
Piangil	CAN	41.9	41.2	12	67.33
Quambatook	CAN	42.1	39.3	11	68.25
Woomelang	CAN	41.5	40.2	9	69.00
Wimmera					
Carpolac	CAN	43.4	39.8	11	68.00
Hamilton	CAN	47.8	36.0	8	66.50
Lillimur	CAN	42.4	39.8	7	68.50
Murtoa Sub	CAN	44.0	39.5	12	67.75
Naracoorte	CAN	46.4	39.2	10	66.00
Natimuk	CAN	44.9	39.3	12	67.50
Nhill	CAN	42.8	40.2	9	68.50
VIC weighted average		44.3	39.7	9	67.68
Vic minimum		40.2	36.0	3	66.00
Vic maximum		47.8	43.8	16	69.00

¹ % in whole seed @ 6% moisture

² % in oil-free meal @ 10% moisture

³ µmoles/g in oil-free meal @ 10% moisture

⁴ kilograms/ hectolitre.

Table 6. Quality data – Western Australia.

Port zone	Grade	Oil	Protein	Glucosinolates	Test weight
		% ¹	% ²	µmoles/g ³	kg/hL ⁴
Albany	N/A	45.3	38.7	11	67.25
Esperance	N/A	44.4	40.1	12	67.00
Geraldton	N/A	43.0	41.5	13	66.00
Kwinana	N/A	44.0	40.5	12	66.75
WA weighted average		44.3	40.1	12	66.87
WA minimum		43.0	38.7	11	66.00
WA maximum		45.3	41.5	13	67.25

¹ % in whole seed @ 6% moisture

² % in oil-free meal @ 10% moisture

³ µmoles/g in oil-free meal @ 10% moisture

⁴ kilograms/ hectolitre.

Fatty acid composition by state

Table 7. Fatty acid composition – New South Wales.

Region/zone/site	14:0	16:0	16:1	17:0	17:1	18:0	18:1	18:2	18:3	20:0	20:1	22:0	22:1	24:0	24:1	Poly ¹	Mono ²	Sat ³	IV ⁴
Southern NSW																			
Boree Creek																			
Boree Creek	0.06	4.0	0.3	0.1	0.1	1.9	61.4	19.5	10.1	0.6	1.1	0.3	<0.1	0.2	0.1	29.6	63.2	7.2	114.4
Henty West	0.06	4.1	0.3	0.1	0.1	2.0	62.4	19.6	9.1	0.6	1.1	0.3	<0.1	0.1	0.1	28.6	64.1	7.3	112.5
Milbrulong	0.06	4.1	0.3	0.1	0.1	1.9	61.1	20.6	9.5	0.6	1.1	0.3	<0.1	0.1	0.1	30.1	62.8	7.1	114.3
Rand	0.05	3.9	0.3	0.1	0.1	1.9	61.4	20.5	9.5	0.6	1.2	0.3	<0.1	0.2	0.2	29.9	63.1	7.0	114.2
Cunningar																			
Cootamundra	0.05	3.9	0.3	0.2	0.2	2.2	62.2	18.5	10.2	0.7	1.1	0.3	<0.1	0.2	0.1	28.7	63.8	7.5	113.4
Cunningar	0.06	4.1	0.3	0.2	0.1	2.1	61.8	19.5	9.7	0.6	1.1	0.3	<0.1	0.1	0.1	29.2	63.4	7.4	113.5
Griffith																			
Barellan	0.05	3.7	0.3	0.1	0.1	2.0	62.5	19.1	9.7	0.6	1.2	0.3	<0.1	0.2	0.1	28.7	64.2	7.1	113.3
Junee																			
Grong Grong	0.06	4.0	0.3	0.1	0.1	1.9	64.2	17.3	9.7	0.6	1.2	0.3	<0.1	0.2	0.1	27.0	65.9	7.1	111.8
Junee Sub	0.06	4.0	0.3	0.1	0.1	1.9	61.7	18.9	10.4	0.6	1.1	0.3	<0.1	0.2	0.1	29.3	63.5	7.2	114.4
Temora																			
Ardlethan	0.06	3.8	0.3	0.2	0.2	2.4	63.8	16.6	10.1	0.7	1.2	0.3	<0.1	0.2	0.1	26.7	65.6	7.7	111.4
Bribbaree	0.06	3.8	0.3	0.2	0.2	2.3	61.6	18.2	10.9	0.7	1.2	0.3	<0.1	0.2	0.1	29.1	63.4	7.5	114.4
Milvale	0.05	3.9	0.3	0.2	0.1	2.2	62.0	18.9	10.1	0.6	1.1	0.3	<0.1	0.2	0.1	28.9	63.7	7.4	113.5
Southern NSW weighted average	0.06	4.0	0.3	0.1	0.1	2.1	62.1	19.1	9.8	0.6	1.1	0.3	<0.1	0.2	0.1	28.9	63.8	7.3	113.5
NSW weighted average	0.06	4.0	0.3	0.1	0.1	2.1	62.1	19.1	9.8	0.6	1.1	0.3	<0.1	0.2	0.1	28.9	63.8	7.3	113.5
NSW minimum	0.05	3.7	0.3	0.1	0.1	1.9	61.1	16.6	9.1	0.6	1.1	0.3	<0.1	0.1	0.1	26.7	62.8	7.0	111.4
NSW maximum	0.06	4.1	0.3	0.2	0.2	2.4	64.2	20.6	10.9	0.7	1.2	0.3	<0.1	0.2	0.2	30.1	65.9	7.7	114.4

¹ Poly – sum of polyunsaturated fatty acids (18:2 and 18:3).

² Mono – sum of monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 and 24:1).

³ Sat – sum of saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 and 24:0).

⁴ IV – iodine value calculated from fatty acid composition.

Table 8. Fatty acid composition – South Australia.

Region/zone/site	14:0	16:0	16:1	17:0	17:1	18:0	18:1	18:2	18:3	20:0	20:1	22:0	22:1	24:0	24:1	Poly ¹	Mono ²	Sat ³	IV ⁴
Adelaide																			
Port Adelaide	0.06	4.0	0.3	0.2	0.2	2.1	61.9	18.3	10.8	0.6	1.1	0.3	<0.1	0.1	0.1	29.0	63.6	7.4	114.3
Adelaide weighted average	0.06	4.0	0.3	0.2	0.2	2.1	61.9	18.3	10.8	0.6	1.1	0.3	<0.1	0.1	0.1	29.0	63.6	7.4	114.3
Central																			
Bowmans	0.05	3.9	0.3	0.2	0.2	2.1	62.0	18.3	10.7	0.6	1.2	0.3	<0.1	0.2	0.1	28.9	63.8	7.3	114.1
Gladstone	0.05	4.0	0.3	0.1	0.1	1.9	61.6	19.5	10.1	0.6	1.1	0.3	<0.1	0.1	0.1	29.7	63.2	7.1	114.5
Port Giles	0.05	3.8	0.3	0.2	0.2	2.0	61.6	17.9	11.6	0.6	1.2	0.3	<0.1	0.1	0.1	29.5	63.4	7.1	115.6
Roseworthy	0.06	4.1	0.3	0.2	0.1	2.0	61.8	18.7	10.4	0.6	1.1	0.3	<0.1	0.2	0.1	29.1	63.5	7.4	114.1
Central weighted average	0.05	3.9	0.3	0.2	0.2	2.0	61.8	18.5	10.7	0.6	1.2	0.3	<0.1	0.2	0.1	29.2	63.6	7.3	114.4
Eastern																			
Bordertown	0.06	4.1	0.3	0.2	0.1	2.3	62.6	17.6	10.4	0.7	1.1	0.3	<0.1	0.2	0.1	28.0	64.1	7.9	112.7
Dooen	0.05	4.0	0.3	0.2	0.1	2.2	62.5	18.4	9.9	0.6	1.1	0.3	<0.1	0.2	0.1	28.3	64.2	7.5	112.8
Frances	0.05	4.1	0.3	0.1	0.1	2.0	62.6	17.9	10.4	0.6	1.1	0.3	<0.1	0.1	0.1	28.3	64.3	7.4	113.3
Keith	0.06	4.1	0.3	0.2	0.2	2.2	63.6	17.4	9.8	0.6	1.1	0.3	<0.1	0.2	0.1	27.2	65.1	7.7	111.6
Tailem Bend	0.05	3.9	0.3	0.2	0.1	2.0	62.4	18.2	10.6	0.6	1.1	0.3	<0.1	0.1	0.1	28.8	64.1	7.1	114.1
Tarlee	0.06	4.2	0.3	0.1	0.1	1.9	65.4	22.1	3.6	0.6	1.0	0.3	<0.1	0.2	0.2	25.7	67.0	7.3	105.1
Wolseley	0.06	4.2	0.3	0.2	0.2	2.3	62.5	17.7	10.2	0.7	1.1	0.3	<0.1	0.2	0.1	27.9	64.2	7.9	112.3
Eastern weighted average	0.05	4.0	0.3	0.2	0.1	2.1	62.6	18.0	10.3	0.6	1.1	0.3	<0.1	0.2	0.1	28.3	64.3	7.4	113.1
Western																			
Cummins	0.05	3.9	0.3	0.2	0.2	2.0	62.9	17.2	11.0	0.6	1.1	0.3	<0.1	0.1	0.1	28.2	64.7	7.1	114.0
Port Lincoln	0.05	3.8	0.3	0.2	0.2	2.0	63.0	17.1	11.1	0.6	1.2	0.3	<0.1	0.1	0.1	28.1	64.9	7.0	114.0
Rudall	0.06	4.0	0.3	0.2	0.1	1.8	59.7	19.9	11.4	0.6	1.2	0.3	<0.1	0.2	0.2	31.3	61.6	7.1	117.0
Tumby Bay	0.05	3.9	0.3	0.2	0.2	1.9	62.2	17.5	11.6	0.6	1.1	0.3	<0.1	0.1	0.1	29.0	64.0	7.0	115.3
Western weighted average	0.05	3.9	0.3	0.2	0.2	2.0	62.8	17.3	11.1	0.6	1.1	0.3	<0.1	0.1	0.1	28.3	64.6	7.1	114.2
SA weighted average	0.05	3.9	0.3	0.2	0.2	2.0	62.5	17.8	10.8	0.6	1.1	0.3	<0.1	0.1	0.1	28.5	64.3	7.2	114.0
SA minimum	0.05	3.8	0.3	0.1	0.1	1.8	59.7	17.1	3.6	0.6	1.0	0.3	<0.1	0.1	0.1	25.7	61.6	7.0	105.1
SA maximum	0.06	4.2	0.3	0.2	0.2	2.3	65.4	22.1	11.6	0.7	1.2	0.3	<0.1	0.2	0.2	31.3	67.0	7.9	117.0

¹ Poly – sum of polyunsaturated fatty acids (18:2 and 18:3).

² Mono – sum of monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 and 24:1).

³ Sat – sum of saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 and 24:0).

⁴ IV – iodine value calculated from fatty acid composition.

Table 9. Fatty acid composition – Victoria.

Region/zone/site	14:0	16:0	16:1	17:0	17:1	18:0	18:1	18:2	18:3	20:0	20:1	22:0	22:1	24:0	24:1	Poly ¹	Mono ²	Sat ³	IV ⁴
Port Zone																			
Geelong	0.05	3.9	0.3	0.1	0.1	1.9	60.9	19.2	11.0	0.6	1.2	0.3	<0.1	0.1	0.2	30.2	62.7	7.1	115.6
Central Victoria																			
Berrybank	0.04	3.7	0.2	0.1	0.1	1.8	60.5	19.7	11.2	0.6	1.2	0.3	<0.1	0.1	0.2	30.9	62.3	6.8	116.7
Dunolly Sub	0.05	3.9	0.3	0.1	0.1	2.0	62.0	18.9	10.2	0.6	1.2	0.3	<0.1	0.2	0.2	29.1	63.7	7.2	114.0
Elmore	0.05	4.2	0.3	0.1	0.1	1.9	61.0	21.1	9.1	0.6	1.1	0.3	<0.1	0.1	0.1	30.3	62.5	7.2	114.1
Mitiamo	0.05	3.9	0.3	0.1	0.1	1.9	61.7	20.8	9.0	0.3	1.2	0.3	<0.1	0.2	0.1	29.7	63.3	7.0	113.6
Murchison East	0.05	4.1	0.3	0.1	0.1	1.9	61.3	20.9	8.9	0.6	1.1	0.3	<0.1	0.2	0.1	29.8	63.0	7.2	113.5
Westmere	0.04	3.9	0.2	0.1	0.1	1.8	60.2	20.0	11.2	0.6	1.2	0.3	<0.1	0.1	0.2	31.2	62.0	6.8	117.0
Willaura	0.05	3.9	0.3	0.1	0.1	1.9	61.7	18.9	10.9	0.6	1.2	0.3	<0.1	0.1	0.1	29.7	63.4	6.9	115.4
North east																			
Deniliquin	0.05	3.8	0.2	0.1	0.1	1.9	61.4	20.6	9.5	0.6	1.1	0.3	<0.1	0.1	0.1	30.1	63.0	6.9	114.6
Dookie	0.05	3.9	0.3	0.1	0.1	2.0	61.4	20.3	9.5	0.6	1.2	0.3	<0.1	0.1	0.1	29.8	63.1	7.1	114.0
Numurkah Sutcliffe	0.05	4.1	0.3	0.1	0.1	2.0	63.6	20.2	7.2	0.6	1.1	0.3	<0.1	0.1	0.1	27.4	65.3	7.3	109.8
Oaklands	0.05	3.8	0.3	0.1	0.1	1.8	61.3	20.9	9.3	0.6	1.2	0.3	<0.1	0.2	0.1	30.2	63.0	6.8	114.5
Tocumwal	0.05	3.9	0.3	0.1	0.1	1.8	60.6	21.6	9.2	0.6	1.2	0.3	<0.1	0.2	0.2	30.8	62.3	6.9	114.8
Yarrowonga	0.05	4.0	0.3	0.1	0.1	1.9	61.8	20.5	9.1	0.6	1.1	0.3	<0.1	0.1	0.1	29.5	63.4	7.1	113.5
Southern Mallee																			
Beulah	0.05	3.9	0.3	0.1	0.1	2.0	61.2	20.3	9.6	0.6	1.2	0.3	<0.1	0.2	0.2	29.9	62.9	7.2	114.2
Charlton	0.05	3.9	0.3	0.1	0.1	2.1	63.5	18.1	9.4	0.6	1.2	0.3	<0.1	0.2	0.1	27.5	65.2	7.3	111.7
Donald	0.05	4.0	0.3	0.2	0.1	2.2	63.8	17.4	9.6	0.6	1.1	0.3	<0.1	0.2	0.2	27.1	65.4	7.5	111.4
Rainbow	0.06	4.3	0.3	0.1	0.1	1.9	60.4	21.0	9.7	0.5	1.0	0.3	<0.1	0.1	0.1	30.7	62.0	7.3	114.9
Warracknabeal	0.05	3.9	0.3	0.2	0.2	2.2	63.7	17.7	9.4	0.7	1.2	0.3	<0.1	0.2	0.1	27.1	65.4	7.5	111.3
Wycheproof	0.06	4.0	0.3	0.2	0.1	2.1	63.2	18.6	9.3	0.3	1.1	0.3	<0.1	0.1	0.1	27.9	64.8	7.3	112.0
Swan Hill																			
Boort	0.06	3.9	0.3	0.2	0.2	2.2	62.5	18.4	10.0	0.6	1.1	0.3	<0.1	0.2	0.1	28.4	64.2	7.4	113.0
Piangil	0.06	3.9	0.3	0.2	0.1	2.0	61.3	19.3	10.4	0.6	1.1	0.3	<0.1	0.1	0.1	29.7	63.1	7.2	114.7
Quambatook	0.05	3.9	0.3	0.2	0.1	2.0	62.2	19.2	9.7	0.6	1.1	0.3	<0.1	0.1	0.1	29.0	63.9	7.1	113.5
Woomelang	0.06	4.0	0.3	0.2	0.2	2.1	61.9	19.0	10.0	0.6	1.1	0.3	<0.1	0.2	0.1	29.0	63.6	7.4	113.6
Wimmera																			
Carpolac	0.05	4.1	0.3	0.1	0.1	2.0	62.0	18.1	10.8	0.6	1.1	0.3	<0.1	0.1	0.1	29.0	63.6	7.4	114.3
Hamilton	0.05	4.1	0.3	0.2	0.1	1.9	59.8	19.7	11.7	0.6	1.1	0.3	<0.1	0.1	0.2	31.4	61.5	7.1	117.4
Lillimur	0.06	4.0	0.3	0.2	0.2	2.3	63.3	17.3	9.9	0.7	1.1	0.3	<0.1	0.2	0.1	27.2	65.1	7.7	111.6
Murtoa Sub	0.05	3.9	0.3	0.1	0.1	2.1	64.2	17.4	9.5	0.6	1.1	0.3	<0.1	0.2	0.1	26.9	65.8	7.3	111.4
Naracoorte	0.05	3.9	0.3	0.2	0.2	1.9	60.4	18.5	12.3	0.6	1.2	0.3	<0.1	0.1	0.2	30.7	62.2	7.1	117.3
Natimuk	0.05	4.0	0.3	0.1	0.1	2.0	61.9	19.1	10.3	0.6	1.1	0.3	<0.1	0.1	0.1	29.4	63.5	7.1	114.3
Nhill	0.06	4.0	0.3	0.2	0.1	2.2	63.3	17.9	9.6	0.6	1.1	0.3	<0.1	0.2	0.1	27.5	65.0	7.5	111.7
Victorian weighted average	0.05	3.9	0.3	0.1	0.1	2.0	61.8	19.0	10.2	0.6	1.2	0.3	<0.1	0.1	0.1	29.3	63.5	7.2	114.2
Vic minimum	0.04	3.7	0.2	0.1	0.1	1.8	59.8	17.3	7.2	0.3	1.0	0.3	<0.1	0.1	0.1	26.9	61.5	6.8	109.8
Vic maximum	0.06	4.3	0.3	0.2	0.2	2.3	64.2	21.6	12.3	0.7	1.2	0.3	<0.1	0.2	0.2	31.4	65.8	7.7	117.4

¹ Poly – sum of polyunsaturated fatty acids (18:2 and 18:3).

² Mono – sum of monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 and 24:1).

³ Sat – sum of saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 and 24:0).

⁴ IV – iodine value calculated from fatty acid composition.

Table 10. Fatty acid composition – Western Australia.

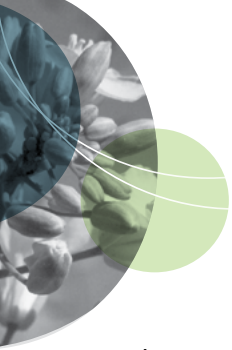
Region/zone/site	14:0	16:0	16:1	17:0	17:1	18:0	18:1	18:2	18:3	20:0	20:1	22:0	22:1	24:0	24:1	Poly ¹	Mono ²	Sat ³	IV ⁴
Albany	0.05	3.9	0.3	0.1	0.1	1.8	61.2	19.7	10.5	0.6	1.2	0.3	<0.1	0.1	0.2	30.3	62.9	6.8	115.6
Esperance	0.05	4.0	0.3	0.2	0.1	1.8	60.3	20.5	10.8	0.5	1.1	0.3	<0.1	0.1	0.1	31.3	61.8	6.9	116.7
Geraldton	0.05	3.7	0.2	0.1	0.1	2.0	63.8	19.0	8.8	0.5	1.1	0.3	<0.1	0.1	0.1	27.8	65.4	6.8	111.9
Kwinana	0.05	3.9	0.3	0.1	0.1	2.0	62.7	19.8	19.8	0.5	1.1	0.2	<0.1	0.1	0.1	28.9	64.2	6.9	113.0
WA weighted average	0.05	3.9	0.3	0.1	0.1	1.9	61.7	19.9	9.9	0.5	1.1	0.3	<0.1	0.1	0.1	29.9	63.3	6.9	114.6
WA Minimum	0.05	3.7	0.2	0.1	0.1	1.8	60.3	19.0	8.8	0.5	1.1	0.2	<0.1	0.1	0.1	27.8	61.8	6.8	111.9
WA Maximum	0.05	4.0	0.3	0.1	0.1	2.0	63.8	20.5	10.8	0.6	1.2	0.3	<0.1	0.1	0.2	31.3	65.4	6.9	116.7

¹ Poly – sum of polyunsaturated fatty acids (18:2 and 18:3).

² Mono – sum of monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 and 24:1).

³ Sat – sum of saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 and 24:0).

⁴ IV – iodine value calculated from fatty acid composition.



Chlorophyll

The average chlorophyll content for the Australian harvest in 2019 was 5 mg/kg (5 ppm) in whole seed as received. This was an increase of 1 mg/kg (1ppm) from the 2017 harvest. There was no change in chlorophyll content from the 2018 harvest.

Table 11. Chlorophyll by region/ port zone.

State	Region/port zone	Chlorophyll (mg/kg) ¹
NSW	Southern	5
SA	Adelaide	7
SA	Central	7
SA	Eastern	5
SA	Western	9
Vic	Victoria	7
WA	Albany	6
WA	Esperance	2
WA	Geraldton	2
WA	Kwinana	2
Australian weighted average		5

¹ mg/kg in whole seed as received

Red line indicates the AOF limit of 12 mg/kg in whole seed

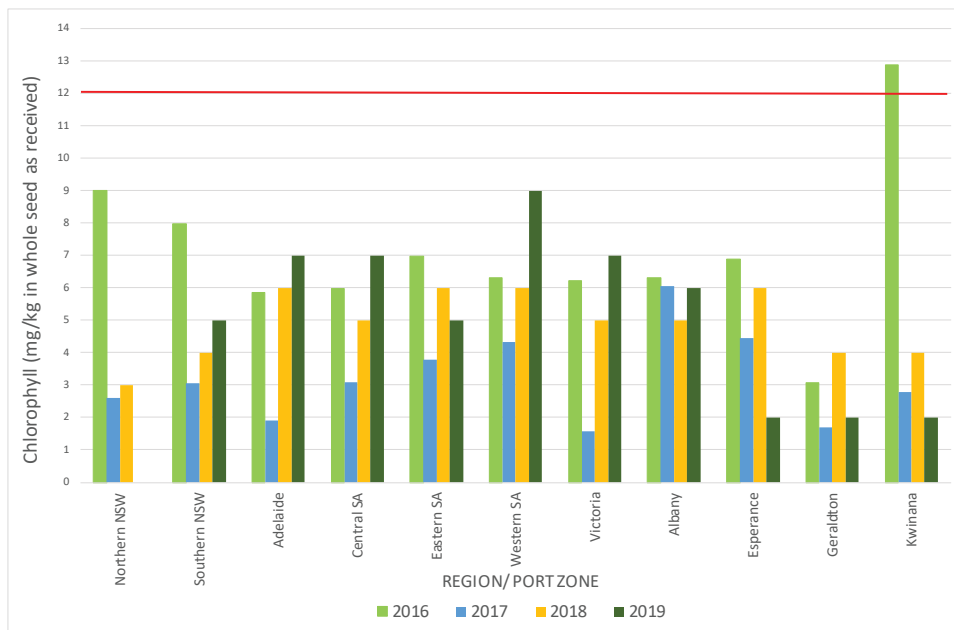


Figure 25. Average chlorophyll content by region/ port zone 2016–2019.



Definitions, methods and references

Definitions

Canola

Canola is defined as seed of the species *Brassica napus* or *Brassica rapa*, but containing less than 30 micromoles of specified glucosinolates per gram of oil-free, air-dry solids and not more than 2% erucic acid of total fatty acids in the oil component. The specified glucosinolates are any one or a mixture of 3-butenyl, 4-pentenyl, 2-hydroxy-3-butenyl and 2-hydroxy-4-pentenyl glucosinolates (Australian Oilseeds Federation (AOF) 2019, page 31)).

Canola is traded under the grade 'CAN' by GrainCorp Operations Limited and 'CANO' by Viterro Pty Ltd.

The AOF *Section 1: Quality Standards, Technical Information & Typical Analysis (2019)* Standard Reference for canola is CSO 1, Standard Reference for non-GM canola is CSO 1-a.

GM canola

Genetically modified (GM) canolas are lines approved for commercial release in Australia by the Office of the Gene Technology Regulator (OGTR).

Methods

Moisture content

Moisture is determined on whole seed using a Bruker MPA II spectrometer (NIRs) calibrated from results obtained using the International Standards Organisation (ISO) 665 – 'Oilseeds – determination of moisture and volatile matter content' method. The moisture contents are used to convert the raw data for oil, protein and glucosinolates to the appropriate moisture content for reporting.

Oil content

Oil content is determined by Bruker MPA II NIRs, calibrated from results obtained using ISO 659 'Oilseeds – determination of oil content (reference method)' method. Oil is extracted from ground seed on either a Foss Soxtec™ 2050 or 8000 extraction system using hexane for four hours. The sample is reground and extracted for two hours. The sample is again ground and extracted for a further two hours. The results are reported as a percentage of the whole seed at 6% moisture.

Protein content

Protein content is determined on whole seed by Bruker MPA II NIRs, calibrated from samples analysed by the LECO elemental analyser using AOF 4-3.3 'Protein, crude, of meals (combustion)' method. Results are reported as percent protein (nitrogen × 6.25) in oil-free meal at 10% moisture.

Glucosinolate content

Total glucosinolate content is determined by Bruker MPA II NIRs, calibrated by obtaining results using method AOF 4-1.22 'Glucosinolate content, glucose method, canola and rapeseed'. The method involves an enzymatic hydrolysis to release glucose followed by a colorimetric reaction and determination by a UV-Vis spectrophotometer. The method has compared favourably with the high performance liquid chromatography methodology of the American Oil Chemists' Society (AOCS) with the added advantage of speed and economy. Results are reported as μmoles glucosinolates/gram in oil-free meal at 10% moisture.

Fatty acid composition

Fatty acid composition involves methylation of fatty acids with a methanolic solution of potassium hydroxide. The method is based on International Olive Council, COI/T.20/Doc. No. 33 'Determination of fatty acid methyl esters by gas chromatography'. The methyl esters are then separated on a gas chromatograph using a BPX70 capillary column. Fatty acids are reported as a percentage of the total fatty acids in the oil portion of the seed.

Iodine values

Iodine values are calculated from the fatty acid profile using AOCS Cd 1c-85 'Calculated iodine value'.

Test weight

Test weight is a volumetric grain weight measured using a Franklin chondrometer and reported as kilograms/hectolitre.

Chlorophyll content

Chlorophyll content is determined using AOCS method Ak 2-92 'Determination of chlorophyll content in rapeseed/canola'. Ground canola seed is placed in a mechanical microgrinder with solvent for one hour. The sample is then filtered and the solutions's absorbance is determined on a UV-Vis spectrophotometer at 625 nm, 665 nm and 705 nm. Results are reported as mg/kg in whole seed as received.

References

Australian Oilseeds Federation *Section 1: Quality Standards, Technical Information & Typical Analysis 2018/19* Issue 18, 1 August 2019.