



National bulk milk cell count (BMCC) statistics

2000 to 2019



John Morton
Jemora Pty Ltd

John Morton

18th April 2021

**Jemora Pty Ltd
PO Box 2277
Geelong VIC 3220
0407 092 558
(03) 52 982 082**

CONTENTS

<i>Contents</i>	1
<i>Executive summary</i>	2
<i>Aims</i>	3
<i>Materials and methods</i>	3
Data sources and data management	3
Data validation	6
Analyses	7
<i>Results</i>	8
Distributions of annual average BMCCs	8
Distributions of annual average BMCCs by region	12
Arithmetic and geometric means	16
Accounting for suppliers leaving the industry	17
<i>Reference</i>	19
<i>Appendix 1</i>	20
<i>Appendix 2</i>	28
<i>Appendix 3</i>	30

EXECUTIVE SUMMARY

The primary objective of this work was to calculate the percentages of suppliers whose annual average BMCC in 2019 were, respectively, $\leq 250,000$ cells per mL and $>400,000$ cells per mL. These were also calculated for all years from 2000, including by region. Arithmetic and geometric mean BMCCs were also calculated for each year.

Methods are documented in detail, so that the same methods can be used in future years.

In 2019, 86.1% of suppliers had an annual average BMCC $\leq 250,000$ cells per mL and 1.1% of suppliers had an annual average BMCC $>400,000$ cells per mL. By region, percentages of suppliers with annual average BMCC $\leq 250,000$ cells per mL varied from 71% to 91%.

Nationally, BMCCs generally increased from 2000 to 2011 but declined markedly since then. Percentages of suppliers whose annual average BMCCs were, respectively, $\leq 250,000$ cells per mL and $>400,000$ cells per mL improved steadily over this period. For comparison to 2019, in 2011, 60.4% of suppliers had an annual average BMCC $\leq 250,000$ cells per mL (86.1% in 2019) and 4.3% of suppliers had an annual average BMCC $>400,000$ cells per mL (1.1% in 2019). Arithmetic and geometric mean BMCCs also improved steadily over this period.

Further analyses showed that the decline in BMCCs from 2011 to 2016 nationally is not explained by suppliers ceasing dairying having higher BMCCs than those staying in dairying. However there is some limited evidence that the improvements in national BMCCs in 2017 and 2018 may have been, in part, because suppliers that ceased dairying in late 2016 or during 2017 had higher BMCCs than those staying in dairying.

The primary objective of this work was to calculate the percentages of suppliers whose annual average BMCCs in 2018 were, respectively, $\leq 250,000$ cells per mL and $> 400,000$ cells per mL. These were also calculated for all years from 2000, including by region. Arithmetic and geometric mean BMCCs were also calculated for each year.

MATERIALS AND METHODS

DATA SOURCES AND DATA MANAGEMENT

BMCC data for 2000 to 2012 had been previously supplied by Harris Park Group for a previous project (Morton 2012), and for calculation of national BMCC statistics for 2012.

These data were stored in a Microsoft Access database; this consisted of one table with the fields as detailed in Table 1.

Table 1. Fields for BMCC data from 2000 to 2012

Field	Explanation
Year	Calendar year of Date
FinYearEnd	Second year of the financial year that includes Date*
Month	Month of Date
Company2	Dairy processor
Factory	Factory within processor
Region	Region of supplier
SupplierID	Supplier identity
Name2	Supplier name
Date	Date associated with BMCC
BMCC	BMCC (thousands of cells per mL of milk)

*For example, if Date is on or between 1/7/2011 and 30/6/2012, FinYearEnd is 2012, and if Date is on of between 1/7/2012 and 30/6/2013, FinYearEnd is 2013.

BMCC data for 2013 had been supplied by ADHIS in a text format file consisting of the following fields:

- company
- factory
- supplier_id
- supplier_name
- record_date
- cell_count
- region

BMCC data for 2014 and 2015 were supplied by Dairy Australia in files in comma-separated values format with the following fields:

- Company
- Factory
- Region
- State
- Subregion
- SupplierID
- SupplierName
- NewCompany
- NewSupplierID
- NewSupplierName
- SupplyDate

BMCC data for 2016 and 2017 were supplied by Dairy Australia in files in comma-separated values format with the following fields:

- CompanyLongName
- Factory
- Region
- State
- SubRegion
- Supplierid
- Suppliername
- dateOfRecord
- BMCCvalue

BMCC data for 2018 and 2019 were supplied by DataGene in a file in comma-separated values format with the following fields:

- Factory
- Company
- Region
- State
- DARegion
- RDP
- SubRegion
- Supplier.ID
- Supplier.Name
- ABN
- Date.of.Record
- BMCC
- data.month (2019 only)

The source of region data was not clarified but appeared to have been added based on factory location data supplied to DataGene by Dairy Australia. For 2019, there were substantial numbers of records where region was not included in the dataset, instead being simply recorded as "VIC" (2,247 records) or "NA" (208,760 records). For these suppliers, region was assumed to be that recorded for the supplier's ABN by Dairy Australia.

These data were imported into Microsoft Excel. As some supplier names in the 2014 data included commas, these parsed incorrectly and were concatenated to correct this in Excel.

For data from 2013, Year, FinYearEnd and Month were added using the formulae detailed in Table 2.

Table 2. Fields added to data from 2013

Field	Excel formula
Year	=YEAR([Cell reference for Date])
FinYearEnd	=YEAR(DATE(YEAR([Cell reference for Date]),MONTH([Cell reference for Date])+6,1))
Month	=MONTH([Cell reference for Date])

NewCompany, NewSupplierID, and NewSupplierName were additional fields added in 2014 due to the diligent work of Dijana Mikkelsen from Dairy Australia in tracing suppliers whose 2014 data indicated that they may have changed companies during 2014. These fields stored details of their new company, supplier identity and name.

Suppliers were classified by region as detailed in Appendix 2.

The resulting files were then appended to the table (Bmcc data for analyses) in Access.

The Microsoft Access database containing this table was called National BMCC data.

Numbers of records by calendar year are shown in Table 3.

Table 3. Numbers of records by calendar year

Year	Total no. of records	No. records where BMCC was "NULL" or "NA"	No. records where BMCC value was 0 or missing
2000	409,800		
2001	538,033	4	
2002	554,879		
2003	532,293	1	
2004	407,220		
2005	527,871		
2006	492,993		
2007	471,498		
2008	362,136		
2009	343,747		
2010	350,522		
2011	353,736		
2012	350,895		
2013	328,314		
2014	382,908 ¹	658	316
2015	373,343		46
2016	367,677	3	
2017	373,649	14	10
2018	339,622 ²	6	1
2019	1,131,391 ³	131	699

¹ Date was not recorded for one record; this record was retained in analyses

² Date was not recorded for one further record; this record was excluded as 2019 data had been included in the dataset received and so the year of that record was uncertain

³ Date was not recorded for three records; this record was retained in analyses

Each record reported the BMCC for a particular combination of company/factory/supplier ID/date/BMCC result. It was not clear whether BMCC results were for single vats, single days, or averages for time periods.

Region may have been either the region where the herd was located or the region where the factory supplied by the herd was located.

DATA VALIDATION

The validity of the BMCC data from 2000 to 2010 had been assessed in detail in a previous project (Morton 2012). No additional validation was performed for data from subsequent years.

ANALYSES

Although calculations based on financial years would better reflect whole lactations for some herds, all analyses were performed for calendar years as the data were supplied by company for calendar years. To generate data for financial years, data from the same supplier from datasets for two successive calendar years must be linked. Supplier identity numbers for the same supplier are not always consistent between years (Morton 2012). These inconsistencies can be largely addressed using calendar year data but this would require substantial time inputs. The far simpler approach to analyse data for financial years is to request the data from companies for those periods. This approach is to be instigated, commencing for the financial year 2020-2021.

Within each calendar year, each company-supplier identity combination was deemed to be a unique supplier and herd regardless of supplier name, factory, state, region and subregion. This approach was not totally correct as previous data validation had identified that a small number of company-supplier identity combinations were allocated to different herds within the same calendar year. However, the impact on results of erroneously pooling data from multiple herds into a single 'herd' was probably small.

BMCC results recorded as 0 were removed; all other BMCC results were used in analyses.

For distributions by region, company-supplier identity-calendar year combinations with records from multiple regions were excluded.

Annual average BMCCs were calculated as unweighted arithmetic averages of all BMCC results for the supplier for each calendar year.

Average BMCC results were also calculated for all BMCC results pooled (ie disregarding supplier), by year. Both arithmetic and geometric means were calculated.

RESULTS

DISTRIBUTIONS OF ANNUAL AVERAGE BMCCS

Distributions of annual average BMCCs were summarised for all suppliers regardless of the number of the calendar months with BMCCs in the year (Table 4 and Figure 1), and also just using with BMCCs in at least 9 of the 12 calendar months in the year (Table 5 and Figure 2). The latter restriction would exclude some suppliers that changed companies within the calendar year, avoiding 'double counting' of these herds as multiple distinct suppliers. However, it would also exclude some suppliers that ceased dairying within the calendar year, and some herds that were newly established within the calendar year.

Table 4. Distribution of annual average BMCCs for suppliers by calendar year; all suppliers were included regardless of the number of the calendar months with BMCCs in the year

Year	Number of suppliers				Total	% ≤250	% >250 to ≤400	% >400
	≤250	>250 to 400	>400 to 1000	>1000				
2000	7,565	3,696	862	17	12,140	62.3%	30.4%	7.2%
2001	7,820	3,370	642	20	11,852	66.0%	28.4%	5.6%
2002	7,675	2,686	524	11	10,896	70.4%	24.7%	4.9%
2003	6,594	2,872	621	11	10,098	65.3%	28.4%	6.3%
2004	6,523	2,622	513	8	9,666	67.5%	27.1%	5.4%
2005	6,386	2,332	401	1	9,120	70.0%	25.6%	4.4%
2006	5,679	2,445	355	2	8,481	67.0%	28.8%	4.2%
2007	4,972	2,567	512	5	8,056	61.7%	31.9%	6.4%
2008	4,835	2,413	338	3	7,589	63.7%	31.8%	4.5%
2009	4,807	2,277	332	6	7,422	64.8%	30.7%	4.6%
2010	4,277	2,389	315	2	6,983	61.2%	34.2%	4.5%
2011	4,034	2,365	281	4	6,684	60.4%	35.4%	4.3%
2012	4,240	2,082	285	1	6,608	64.2%	31.5%	4.3%
2013	4,307	1,882	327	10	6,526	66.0%	28.8%	5.2%
2014	4,601	1,655	156	2	6,414	71.7%	25.8%	2.5%
2015	4,634	1,263	70	0	5,967	77.7%	21.2%	1.2%
2016	4,741	1,209	58	0	6,008	78.9%	20.1%	1.0%
2017	4,800	1,035	48	0	5,883	81.6%	17.6%	0.8%
2018	4,200	804	54	2	5,060	83.0%	15.9%	1.1%
2019	4,799	718	57	2	5,576	86.1%	12.9%	1.1%
Pooled	107,489	42,682	6,751	107	157,029	68.5%	27.2%	4.4%

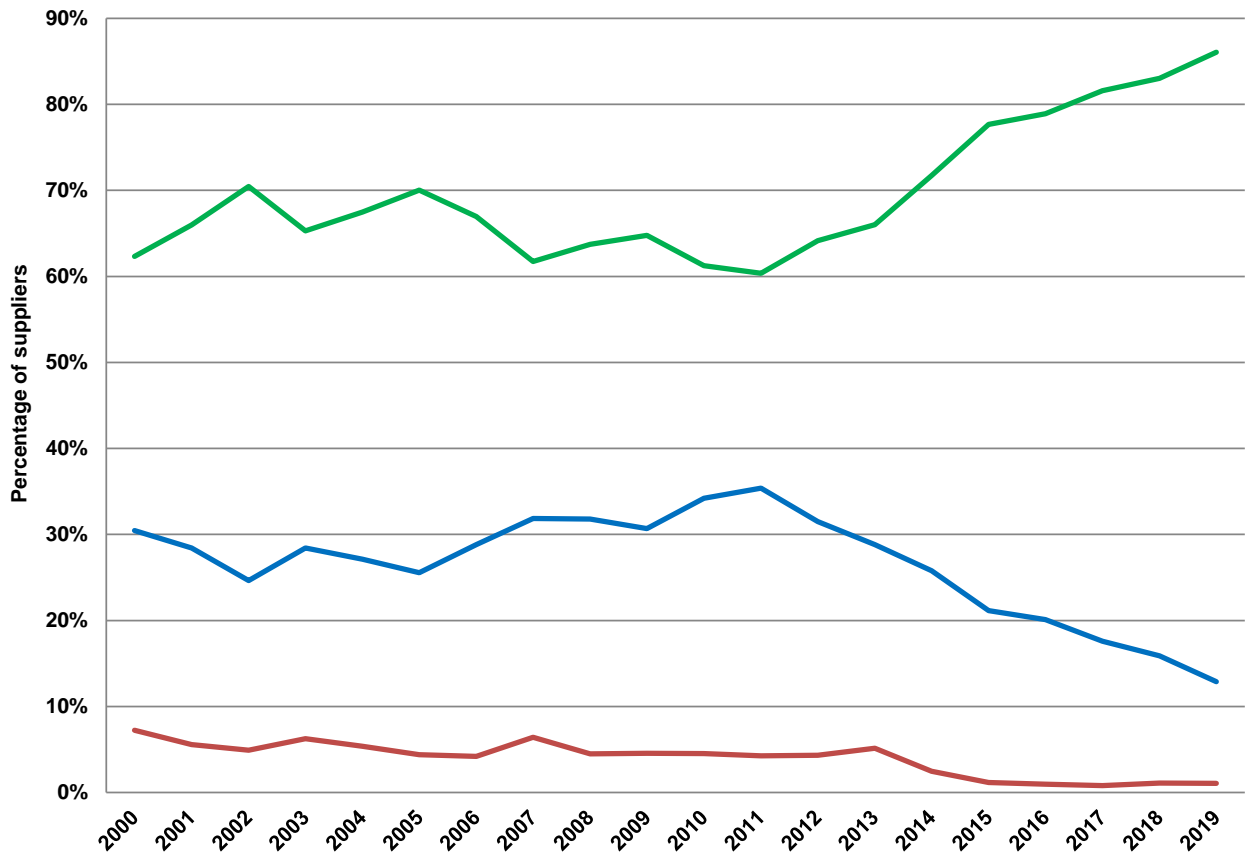


Figure 1: Percentages of suppliers with annual average BMCCs ≤250 (green line), >250 to ≤400 (blue line) and >400 (red line) by calendar year; all suppliers were included regardless of the number of the calendar months with BMCCs in the year

Table 5. Distribution of annual average BMCCs for suppliers by calendar year; only suppliers with BMCCs in at least 9 of the 12 calendar months in the year were included

Year	Number of suppliers				Total	% ≤250	% >250 to ≤400	% >400
	≤250	>250 to 400	>400 to 1000	>1000				
2000	6,731	3,220	703	10	10,664	63.1%	30.2%	6.7%
2001	6,620	2,867	475	7	9,969	66.4%	28.8%	4.8%
2002	7,072	2,404	413	8	9,897	71.5%	24.3%	4.3%
2003	5,870	2,484	429	6	8,789	66.8%	28.3%	4.9%
2004	5,862	2,270	357	1	8,490	69.0%	26.7%	4.2%
2005	5,604	2,051	287	0	7,942	70.6%	25.8%	3.6%
2006	5,090	2,159	251	0	7,500	67.9%	28.8%	3.3%
2007	4,368	2,189	343	1	6,901	63.3%	31.7%	5.0%
2008	4,192	2,134	252	0	6,578	63.7%	32.4%	3.8%
2009	4,142	1,975	233	1	6,351	65.2%	31.1%	3.7%
2010	3,747	2,116	240	1	6,104	61.4%	34.7%	3.9%
2011	3,648	2,117	209	2	5,976	61.0%	35.4%	3.5%
2012	3,728	1,847	212	0	5,787	64.4%	31.9%	3.7%
2013	3,707	1,619	208	2	5,536	67.0%	29.2%	3.8%
2014	3,892	1,389	118	1	5,400	72.1%	25.7%	2.2%
2015	4,184	1,116	32	0	5,332	78.5%	20.9%	0.6%
2016	3,960	986	22	0	4,968	79.7%	19.8%	0.4%
2017	3,744	859	20	0	4,623	81.0%	18.6%	0.4%
2018	3,042	610	21	0	3,673	82.8%	16.6%	0.6%
2019	3,295	511	13	0	3,819	86.3%	13.4%	0.3%
Pooled	92,498	36,923	4,838	40	134,299	68.9%	27.5%	3.6%

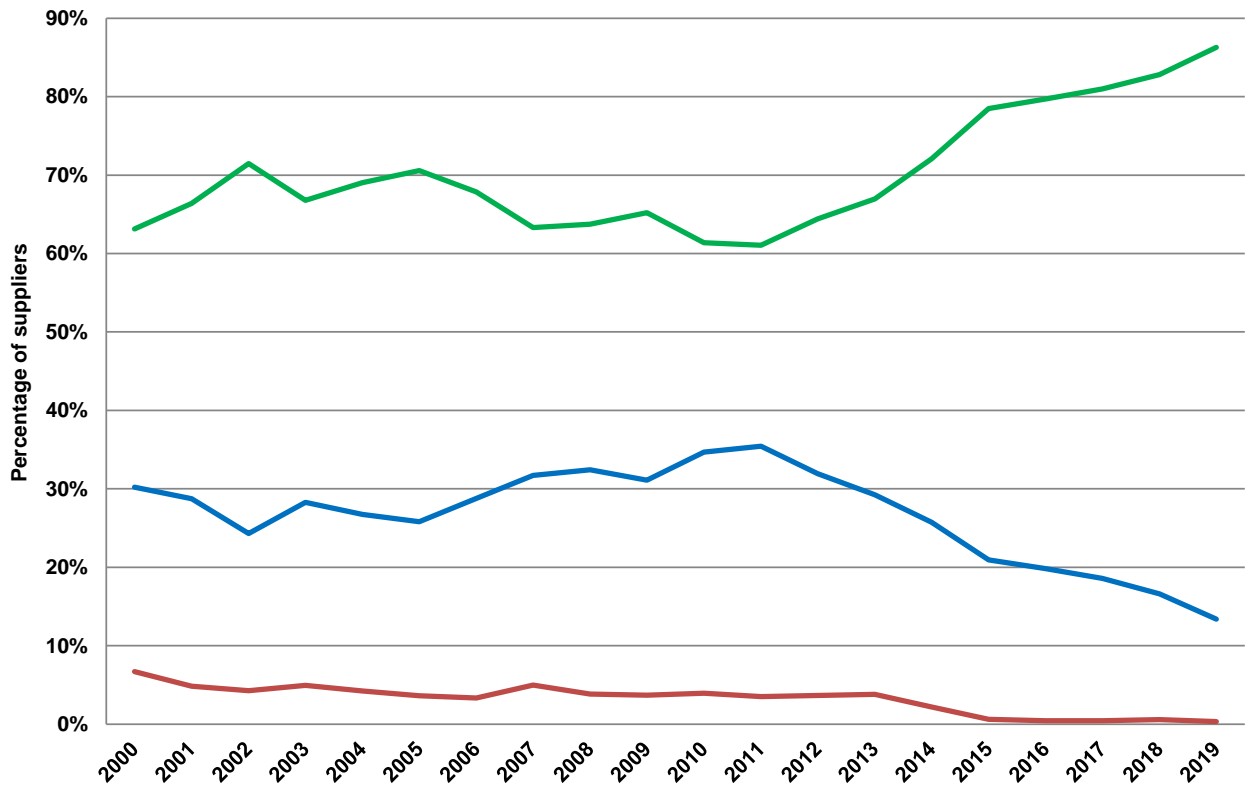
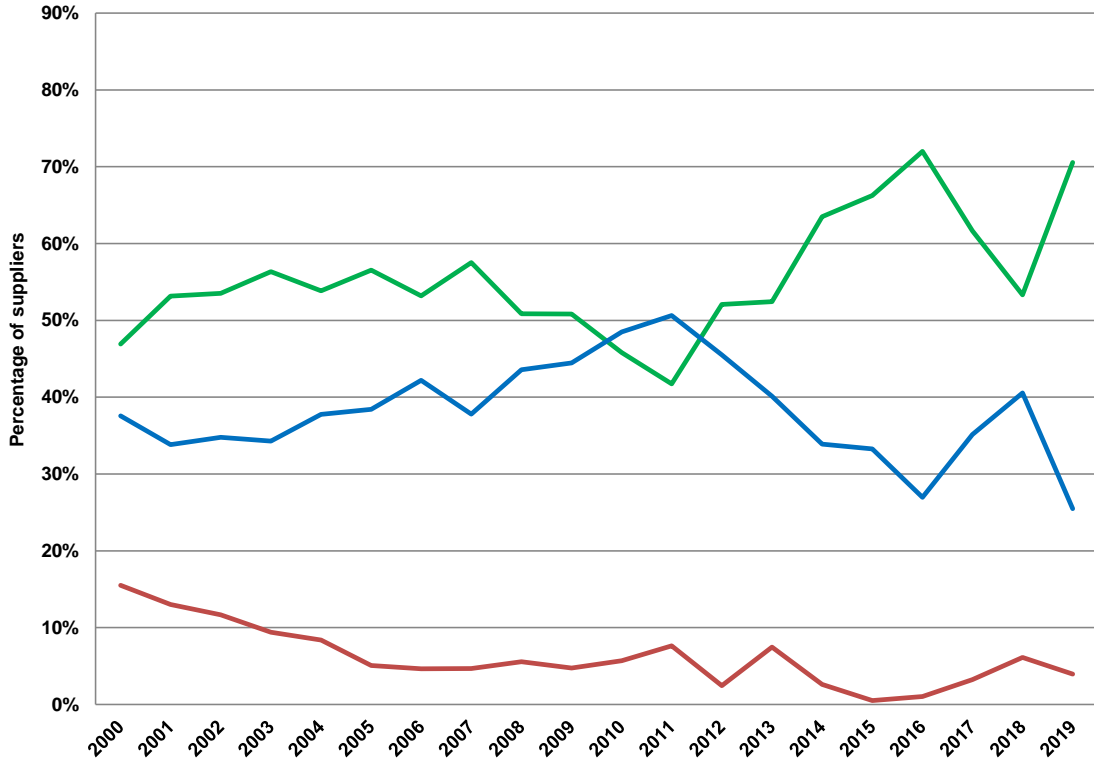


Figure 2: Percentages of suppliers with annual average BMCCs ≤250 (green line), >250 to ≤400 (blue line) and >400 (red line) by calendar year; only suppliers with BMCCs in at least 9 of the 12 calendar months in the year were included

DISTRIBUTIONS OF ANNUAL AVERAGE BMCCS BY REGION

Distributions of annual average BMCCs by region are shown in Figure 3 (below). Numbers and percentages are reported in Appendix 1.

Queensland



New South Wales

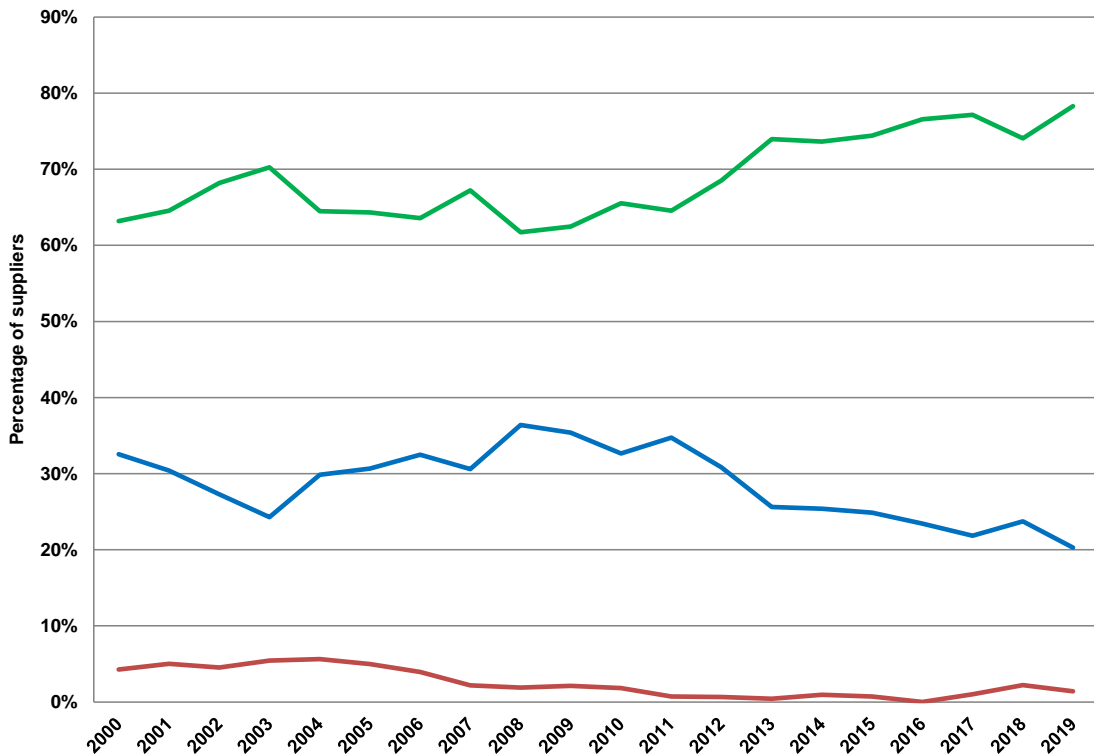
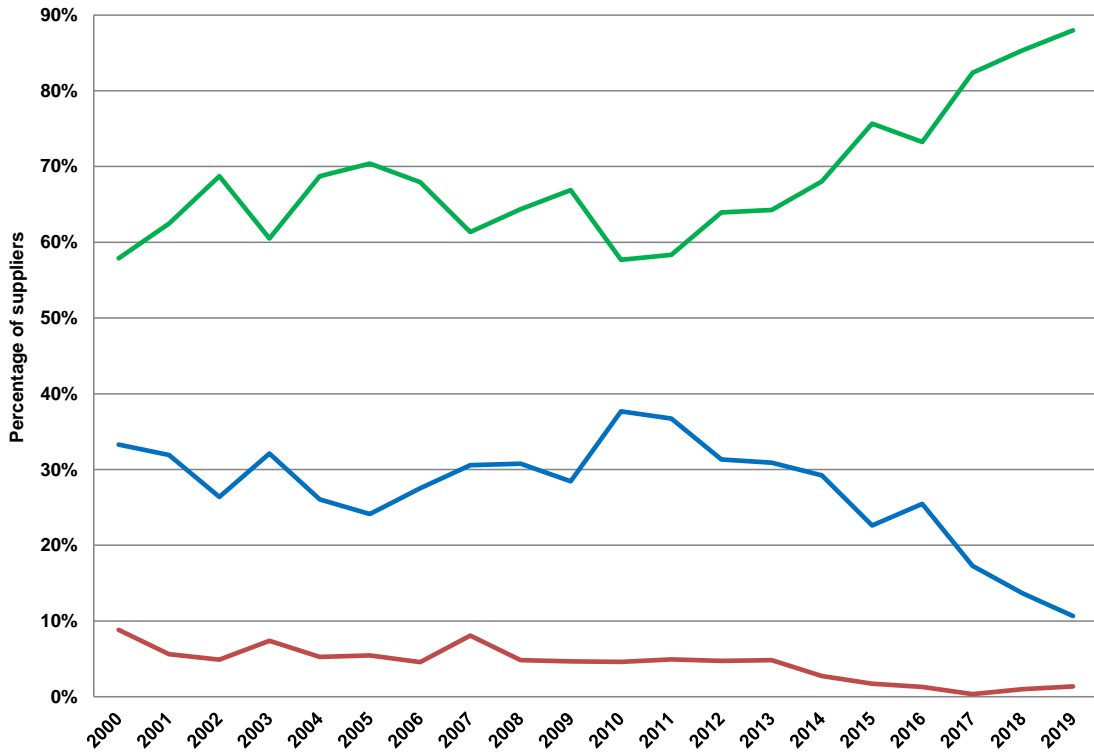


Figure 3: Percentages of suppliers with annual average BMCCs ≤250 (green line), >250 to ≤400 (blue line) and >400 (red line) by calendar year and region; all suppliers were included regardless of the number of the calendar months with BMCCs in the year

Northern Victoria



Gippsland

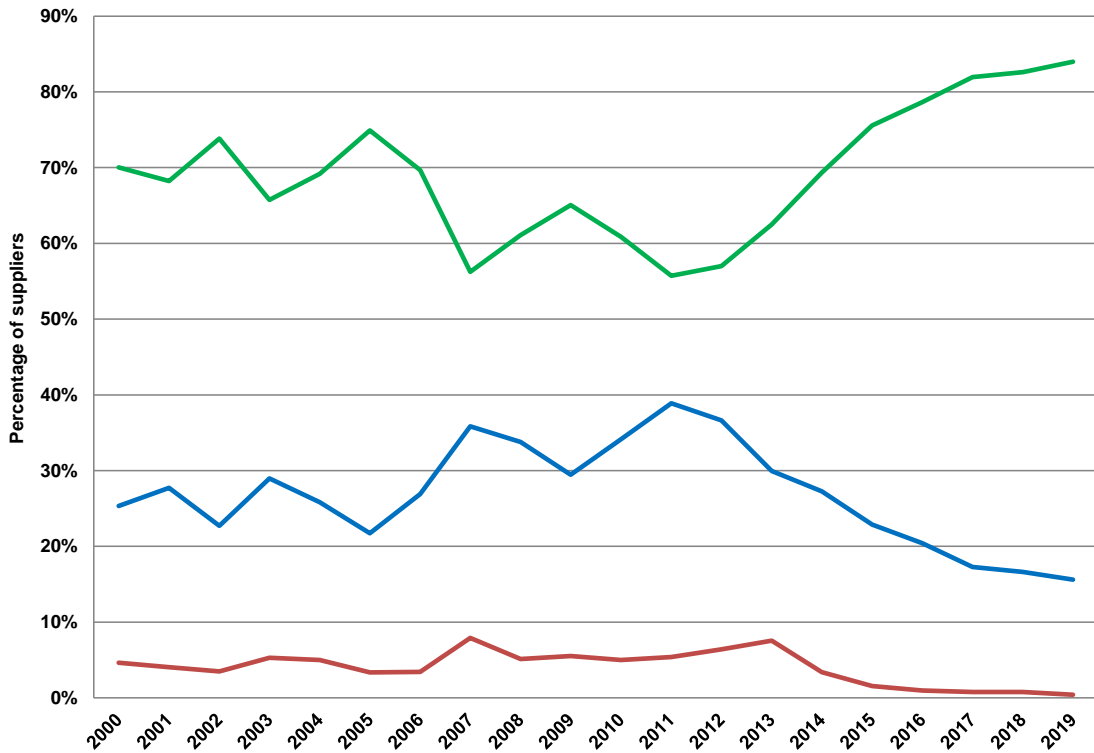
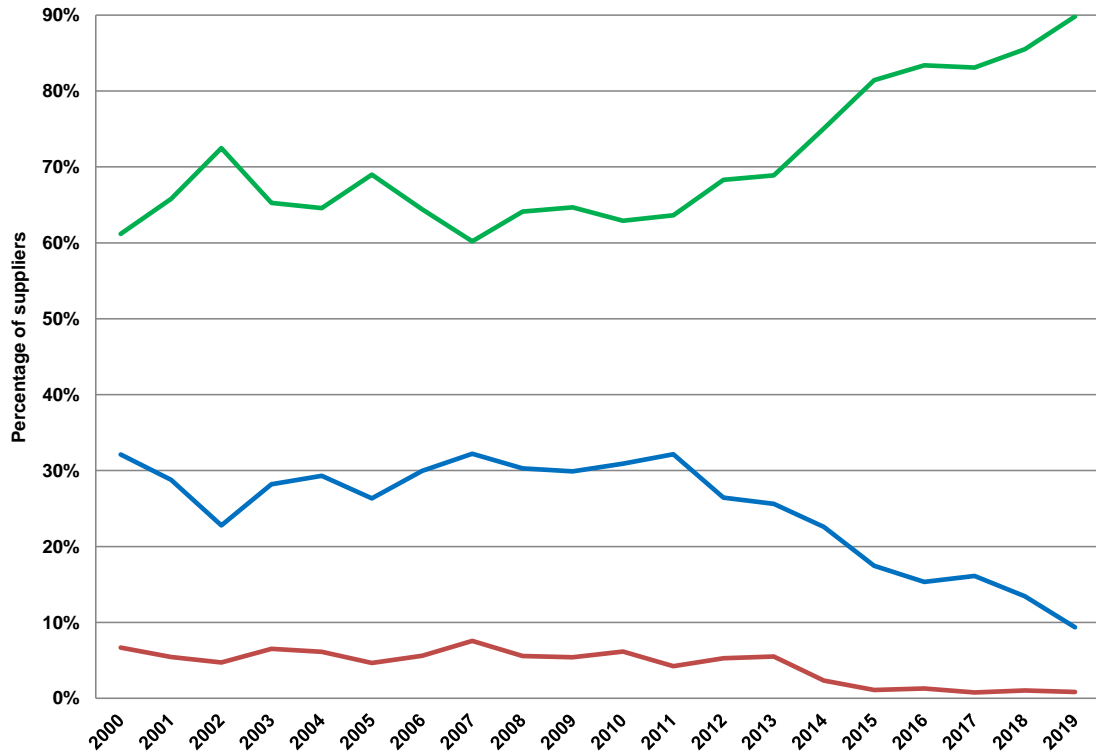


Figure 3 (cont) Percentages of suppliers with annual average BMCCs ≤250 (green line), >250 to ≤400 (blue line) and >400 (red line) by calendar year and region; all suppliers were included regardless of the number of the calendar months with BMCCs in the year

Southwest Victoria



Tasmania

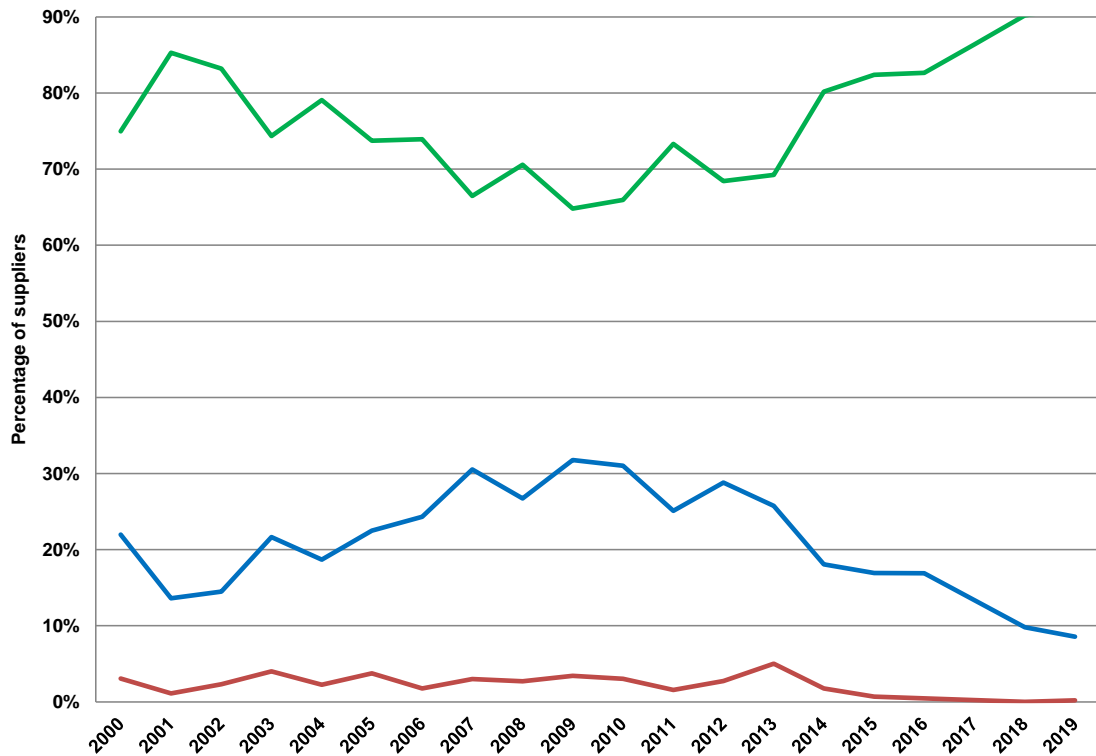
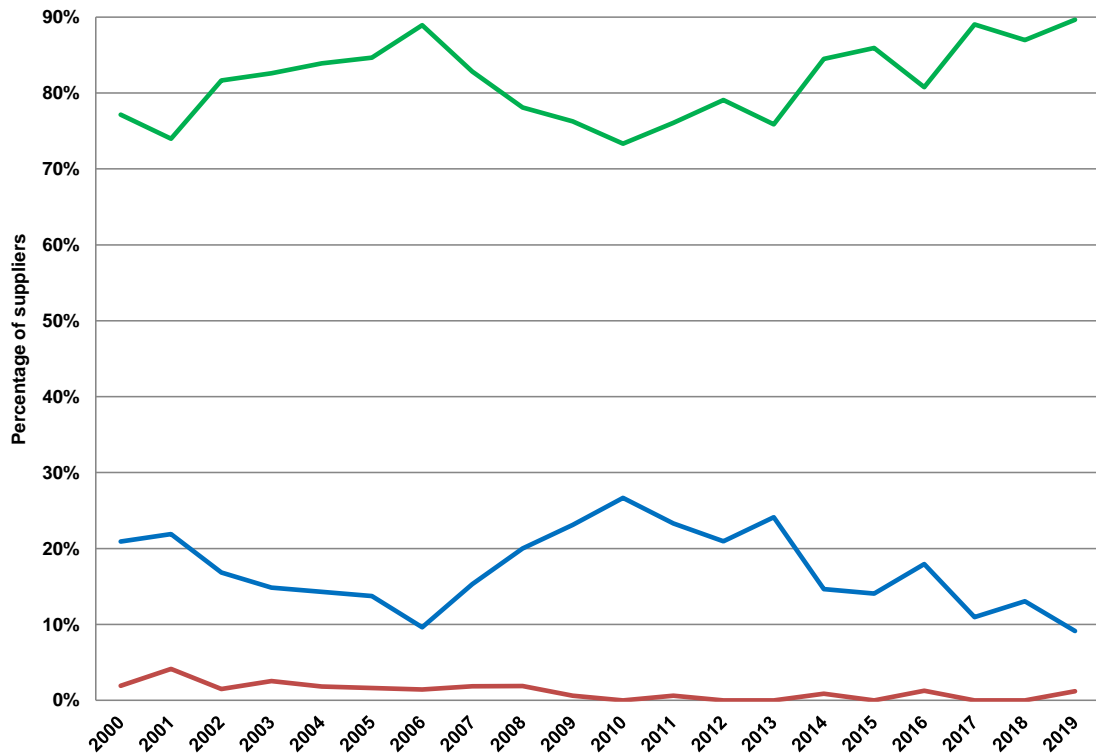


Figure 3 (cont) Percentages of suppliers with annual average BMCCs ≤250 (green line), >250 to ≤400 (blue line) and >400 (red line) by calendar year and region; all suppliers were included regardless of the number of the calendar months with BMCCs in the year

South Australia



Western Australia

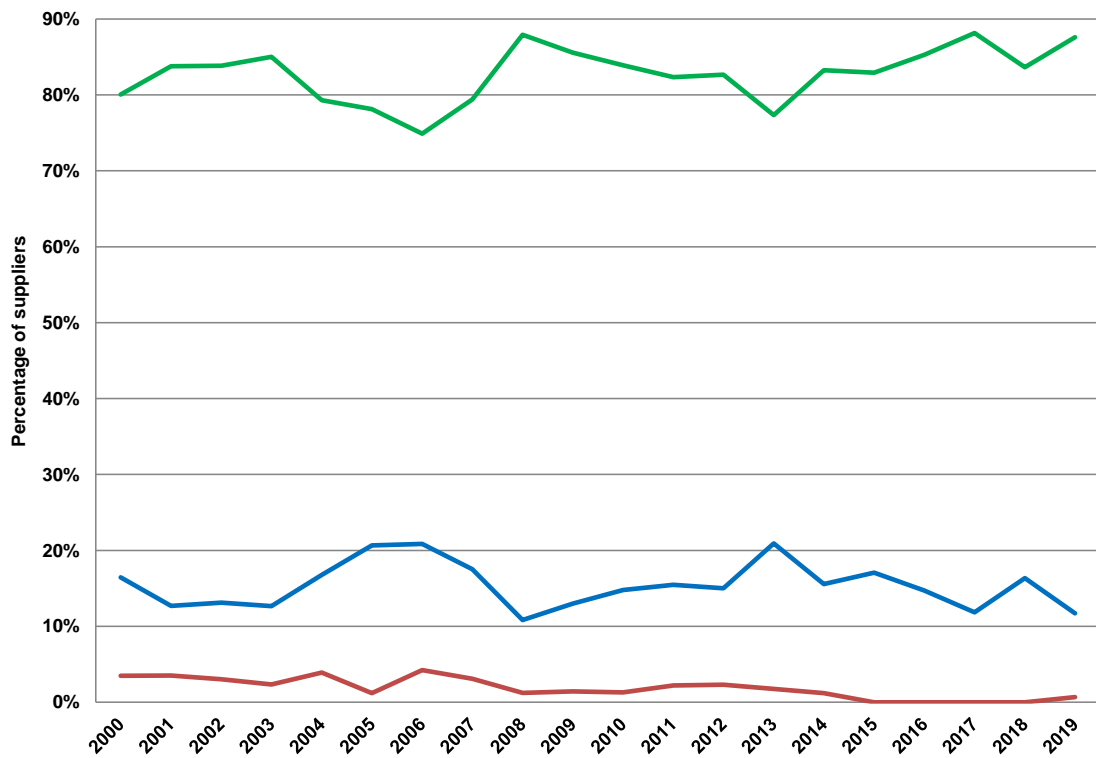


Figure 3 (cont) Percentages of suppliers with annual average BMCCs ≤250 (green line), >250 to ≤400 (blue line) and >400 (red line) by calendar year and region; all suppliers were included regardless of the number of the calendar months with BMCCs in the year

ARITHMETIC AND GEOMETRIC MEANS

Arithmetic and geometric means are shown in Table 6 and Figures 4 and 5, and standard deviations are shown in Table 6. The standard deviations are difficult to interpret as some of the BMCC data are probably aggregated. For example, some processors have probably provided means for 7-day periods (or 10-day periods, calendar months etc) for each supplier. Standard deviations would be expected to be less with aggregation of more bulk tank results into single means, relative to standard deviations of BMCCs for each sampling of bulk tanks. The former are then, in fact, standard deviations of means ie they describe the variation in means rather than the variation in BMCCs from single samplings of bulk tanks.

Table 6. Arithmetic and geometric means of all BMCC results pooled, by year

Year	Number of BMCC results	Arithmetic mean	Standard deviation	Geometric mean
2000	409,800	240.5	141.7	211.3
2001	538,029	215.1	113.1	191.7
2002	554,879	208.6	106.5	186.9
2003	532,292	219.0	118.8	195.2
2004	407,220	219.3	111.5	198.3
2005	527,871	212.1	101.2	191.9
2006	492,993	217.4	102.5	196.9
2007	471,498	226.0	116.9	203.2
2008	362,136	229.2	104.6	208.9
2009	343,747	229.2	108.6	208.2
2010	350,522	232.4	105.5	212.4
2011	353,736	232.0	102.2	212.5
2012	350,895	221.6	101.8	202.0
2013	328,314	219.0	106.9	198.5
2014	381,933	203.3	94.5	184.7
2015	371,297	195.9	85.8	178.8
2016	367,674	186.7	83.7	169.8
2017	373,625	190.9	87.2	173.4
2018	339,615	187.8	94.8	164.6
2019	1,130,561	173.7	84.8	155.9

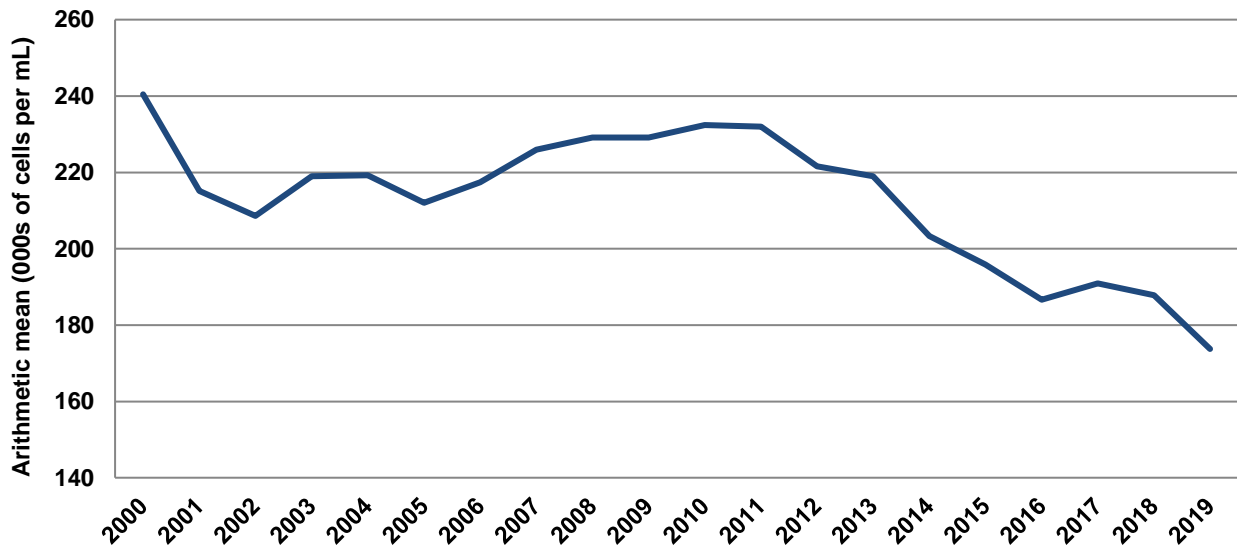


Figure 4: Arithmetic means of all BMCC results pooled, by year

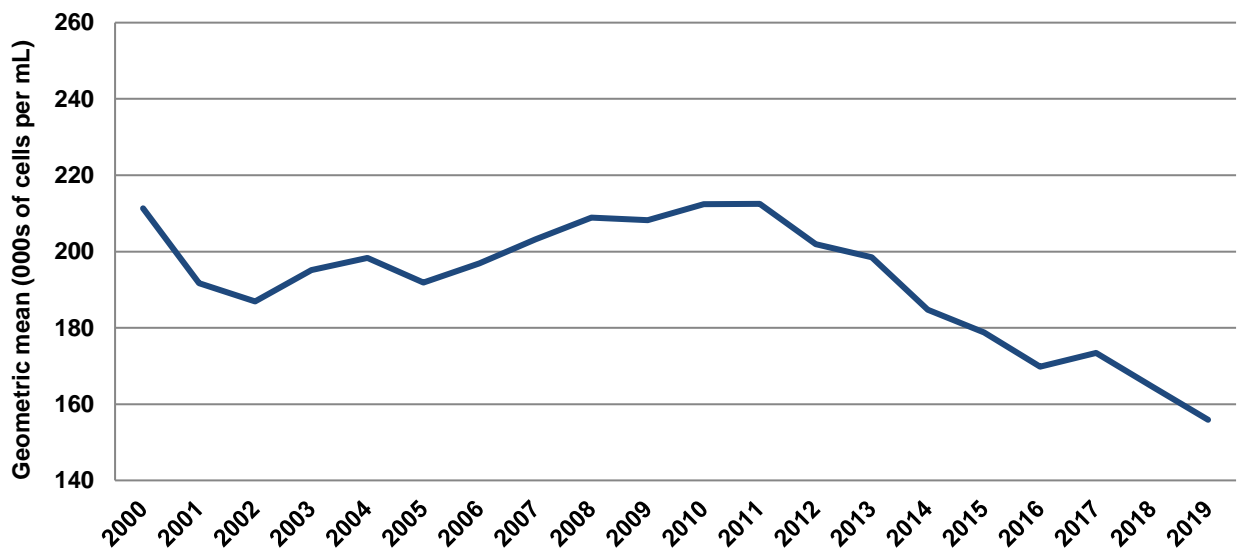


Figure 5: Geometric means of all BMCC results pooled, by year

ACCOUNTING FOR SUPPLIERS LEAVING THE INDUSTRY

The decline in BMCCs since 2011 nationally may have been partly or wholly because suppliers ceasing dairying had higher BMCCs. To explore this, BMCCs were compared over periods of 4 consecutive years using only suppliers with BMCCs in each of those years. Company names were inconsistent between years. This was corrected and each unique company name-supplier number combination was assumed to be the same herd. Only suppliers with BMCC results in at least 9 of the 12 months in each of the 4 calendar years were used.

Results are shown in Figures 6 and 7. Figure 6 shows percentages of suppliers whose annual average BMCC was ≤ 250 for 4-year periods commencing in each year from 2000 to 2019. For each 4-year period, only suppliers with BMCC results in each of the 4 years were included. The black dashed line shows percentages

of suppliers whose annual average BMCC was ≤ 250 for all suppliers within each year regardless of whether they were included in other years. Results for each 4-year period generally reflected those for all suppliers in each year with the possible exception of 2017. Results for means of annual average BMCCs by year were similar. These results show that the decline in BMCCs from 2011 to 2016 nationally is not explained by suppliers ceasing dairying having higher BMCCs than those staying in dairying. However these findings provide some limited evidence that the improvements in national BMCCs in 2017 and 2018 may have been, in part, because suppliers that ceased dairying in late 2016 or during 2017 had higher BMCCs than those staying in dairying. The results for herds with data in each of 2016 to 2019 (last 4-year line; purple) are unreliable as only 467 suppliers had data in all 4 years compared to 1,662 for 2015 to 2018 and greater numbers for earlier periods. This large reduction was largely due to company changes and herds changing companies between 2018 and 2019; it was not possible to match suppliers across companies.

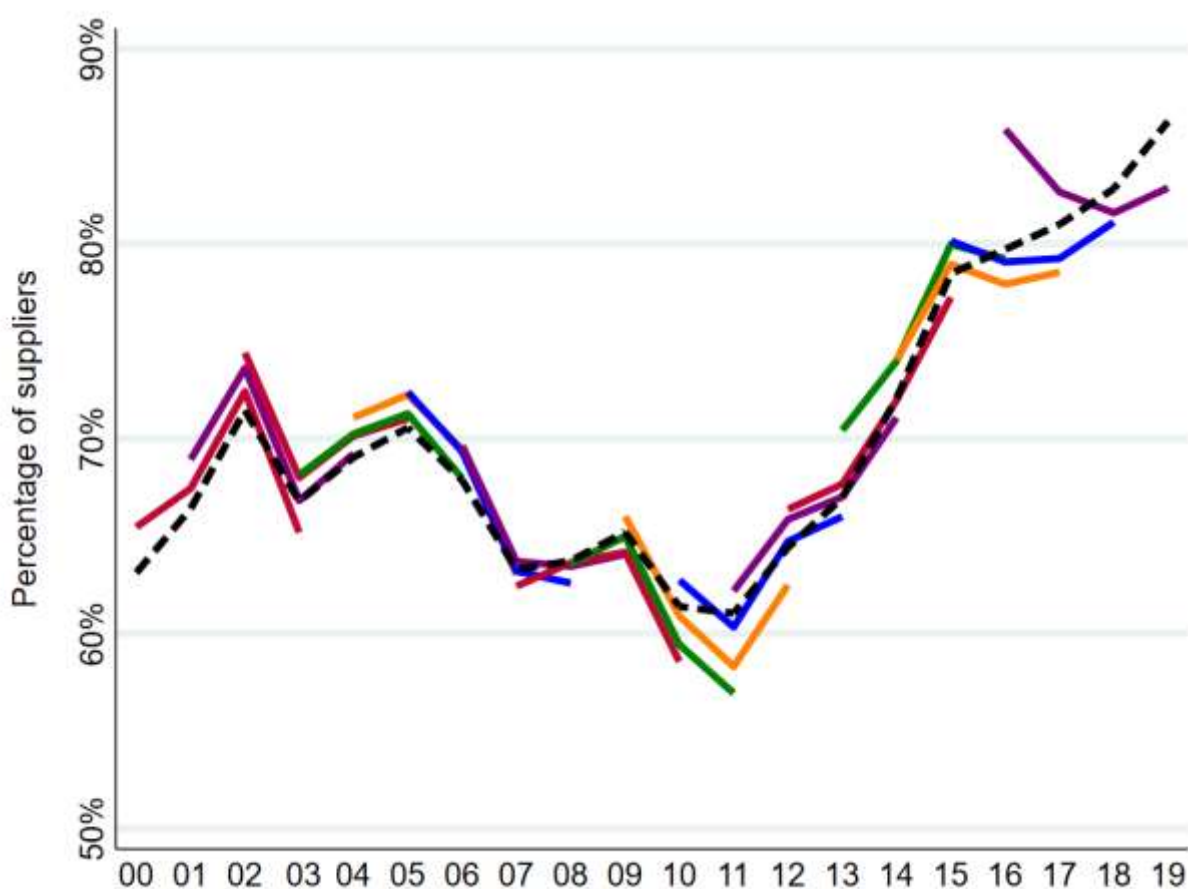


Figure 6: Percentages of suppliers whose annual average BMCC was ≤ 250 by year for 4-year periods commencing in each year from 2000 to 2019. For each 4-year period, only suppliers with BMCC results in each of the 4 years were included. Percentages for all suppliers in the year are also shown (black dashed line).

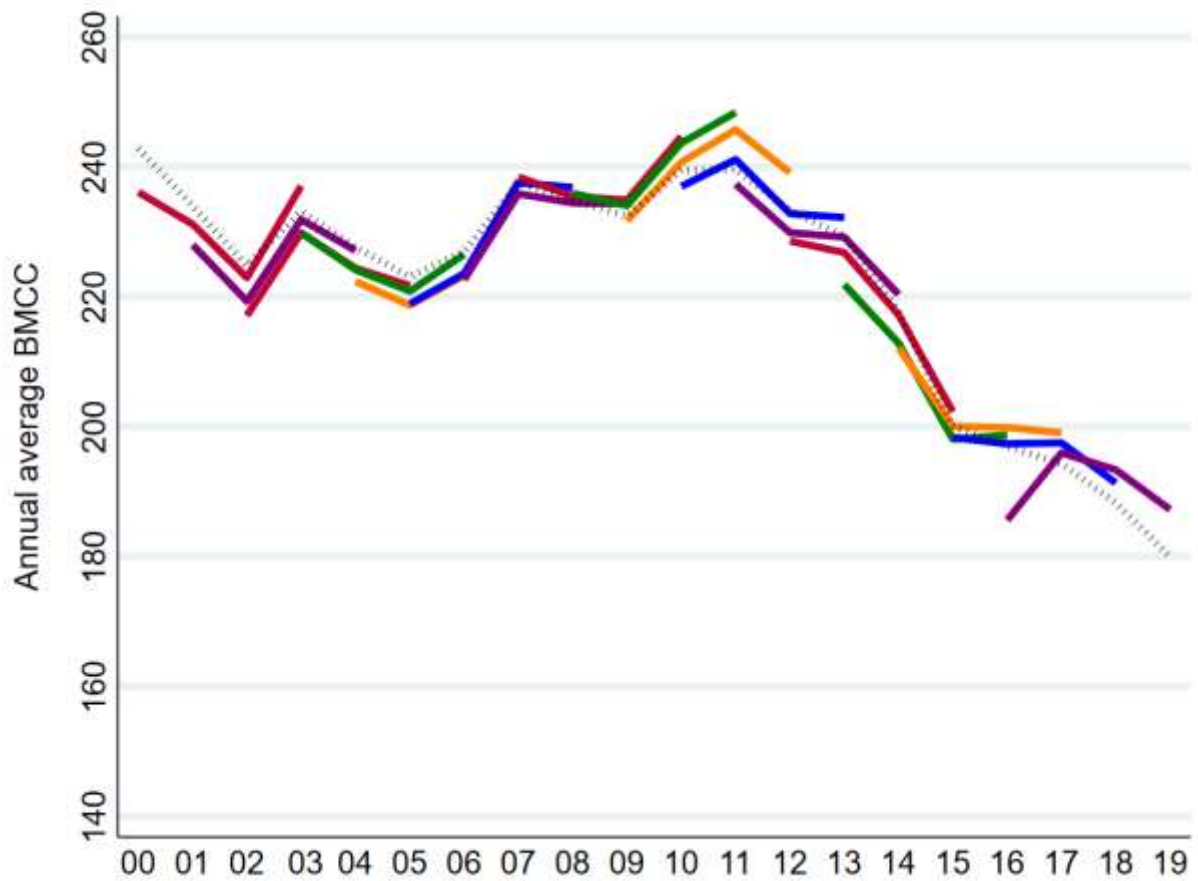


Figure 7: Means of annual average BMCCs by year for 4-year periods commencing in each year from 2000 to 2019. For each 4-year period, only suppliers with BMCC results in each of the 4 years were included. Means for all suppliers in the year are also shown (grey dashed line).

REFERENCE

Morton, John (2012) BMCC Data Analyses 2012; 6 July 2012

APPENDIX 1

Numbers and percentages of suppliers with annual average BMCCs ≤ 250 , >250 to ≤ 400 and >400 by calendar year and region; all suppliers were included regardless of the number of the calendar months with BMCCs in the year

Year	Number of suppliers				Total	% ≤ 250	% >250 to ≤ 400	% >400
	≤ 250	>250 to 400	>400 to 1000	>1000				
QUEENSLAND								
2000	696	557	219	11	1,483	46.9%	37.6%	15.5%
2001	698	444	160	11	1,313	53.2%	33.8%	13.0%
2002	637	414	132	7	1,190	53.5%	34.8%	11.7%
2003	623	379	101	3	1,106	56.3%	34.3%	9.4%
2004	552	387	83	3	1,025	53.9%	37.8%	8.4%
2005	524	356	47	0	927	56.5%	38.4%	5.1%
2006	425	337	37	0	799	53.2%	42.2%	4.6%
2007	417	274	34	0	725	57.5%	37.8%	4.7%
2008	320	274	35	0	629	50.9%	43.6%	5.6%
2009	311	272	29	0	612	50.8%	44.4%	4.7%
2010	273	289	34	0	596	45.8%	48.5%	5.7%
2011	235	285	43	0	563	41.7%	50.6%	7.6%
2012	278	243	13	0	534	52.1%	45.5%	2.4%
2013	260	199	36	1	496	52.4%	40.1%	7.5%
2014	339	181	14	0	534	63.5%	33.9%	2.6%
2015	267	134	2	0	403	66.3%	33.3%	0.5%
2016	275	103	4	0	382	72.0%	27.0%	1.0%
2017	172	98	9	0	279	61.6%	35.1%	3.2%
2018	96	73	10	1	180	53.3%	40.6%	6.1%
2019	249	90	14	0	353	70.5%	25.5%	4.0%
Pooled	7,398	5,299	1,042	37	13,776	53.7%	38.5%	7.8%

Year	Number of suppliers				Total	% ≤250	% >250 to ≤400	% >400
	≤250	>250 to 400	>400 to 1000	>1000				
NEW SOUTH WALES								
2000	621	320	42	0	983	63.2%	32.6%	4.3%
2001	900	424	70	0	1,394	64.6%	30.4%	5.0%
2002	855	342	55	2	1,254	68.2%	27.3%	4.5%
2003	503	174	39	0	716	70.3%	24.3%	5.4%
2004	605	280	51	2	938	64.5%	29.9%	5.7%
2005	579	276	45	0	900	64.3%	30.7%	5.0%
2006	548	280	34	0	862	63.6%	32.5%	3.9%
2007	523	238	17	0	778	67.2%	30.6%	2.2%
2008	490	289	15	0	794	61.7%	36.4%	1.9%
2009	443	251	15	0	709	62.5%	35.4%	2.1%
2010	504	251	14	0	769	65.5%	32.6%	1.8%
2011	446	240	5	0	691	64.5%	34.7%	0.7%
2012	420	189	4	0	613	68.5%	30.8%	0.7%
2013	528	183	3	0	714	73.9%	25.6%	0.4%
2014	461	159	6	0	626	73.6%	25.4%	1.0%
2015	410	137	4	0	551	74.4%	24.9%	0.7%
2016	408	125	0	0	533	76.5%	23.5%	0.0%
2017	378	107	5	0	490	77.1%	21.8%	1.0%
2018	234	75	7	0	316	74.1%	23.7%	2.2%
2019	332	86	6	0	424	78.3%	20.3%	1.4%
Pooled	9,856	4,340	431	4	14,631	67.4%	29.7%	3.0%

Year	Number of suppliers				% ≤250	% >250 to ≤400	% >400	
	≤250	>250 to 400	>400 to 1000	>1000				Total
NORTHERN VICTORIA								
2000	1,802	1,036	271	4	3,113	57.9%	33.3%	8.8%
2001	1,801	920	159	3	2,883	62.5%	31.9%	5.6%
2002	1,890	725	133	2	2,750	68.7%	26.4%	4.9%
2003	1,607	853	192	4	2,656	60.5%	32.1%	7.4%
2004	1,691	641	128	1	2,461	68.7%	26.0%	5.2%
2005	1,701	583	132	0	2,416	70.4%	24.1%	5.5%
2006	1,535	622	102	1	2,260	67.9%	27.5%	4.6%
2007	1,313	654	168	5	2,140	61.4%	30.6%	8.1%
2008	1,182	565	87	2	1,836	64.4%	30.8%	4.8%
2009	1,148	488	78	2	1,716	66.9%	28.4%	4.7%
2010	888	580	71	0	1,539	57.7%	37.7%	4.6%
2011	863	543	73	0	1,479	58.4%	36.7%	4.9%
2012	919	450	68	0	1,437	64.0%	31.3%	4.7%
2013	1,000	481	74	1	1,556	64.3%	30.9%	4.8%
2014	1,064	457	42	1	1,564	68.0%	29.2%	2.7%
2015	1,054	315	24	0	1,393	75.7%	22.6%	1.7%
2016	1,012	352	18	0	1,382	73.2%	25.5%	1.3%
2017	1,145	240	5	0	1,390	82.4%	17.3%	0.4%
2018	1,102	176	13	0	1,291	85.4%	13.6%	1.0%
2019	1,031	125	16	0	1,172	88.0%	10.7%	1.4%
Pooled	24,717	10,681	1,838	26	37,262	66.3%	28.7%	5.0%

Year	Number of suppliers				Total	% ≤250	% >250 to ≤400	% >400
	≤250	>250 to 400	>400 to 1000	>1000				
GIPPSLAND								
2000	1,916	693	127	0	2,736	70.0%	25.3%	4.6%
2001	1,620	658	94	2	2,374	68.2%	27.7%	4.0%
2002	1,632	502	77	0	2,211	73.8%	22.7%	3.5%
2003	1,455	641	114	3	2,213	65.7%	29.0%	5.3%
2004	1,430	534	102	1	2,067	69.2%	25.8%	5.0%
2005	1,407	408	62	1	1,878	74.9%	21.7%	3.4%
2006	1,219	471	60	0	1,750	69.7%	26.9%	3.4%
2007	954	608	134	0	1,696	56.3%	35.8%	7.9%
2008	1,025	567	85	1	1,678	61.1%	33.8%	5.1%
2009	1,111	503	91	3	1,708	65.0%	29.4%	5.5%
2010	962	540	77	2	1,581	60.8%	34.2%	5.0%
2011	838	585	78	3	1,504	55.7%	38.9%	5.4%
2012	865	556	97	0	1,518	57.0%	36.6%	6.4%
2013	918	440	107	4	1,469	62.5%	30.0%	7.6%
2014	1,002	394	48	1	1,445	69.3%	27.3%	3.4%
2015	974	295	20	0	1,289	75.6%	22.9%	1.6%
2016	990	257	12	0	1,259	78.6%	20.4%	1.0%
2017	968	204	9	0	1,181	82.0%	17.3%	0.8%
2018	979	197	9	0	1,185	82.6%	16.6%	0.8%
2019	1,027	191	5	0	1,223	84.0%	15.6%	0.4%
Pooled	22,265	9,053	1,403	21	32,742	68.0%	27.6%	4.3%

Year	Number of suppliers				Total	% ≤250	% >250 to ≤400	% >400
	≤250	>250 to 400	>400 to 1000	>1000				
SOUTHWEST VICTORIA								
2000	1,506	791	163	2	2,462	61.2%	32.1%	6.7%
2001	1,389	608	113	2	2,112	65.8%	28.8%	5.4%
2002	1,451	456	95	0	2,002	72.5%	22.8%	4.7%
2003	1,310	566	130	1	2,007	65.3%	28.2%	6.5%
2004	1,234	560	116	1	1,911	64.6%	29.3%	6.1%
2005	1,275	487	86	0	1,848	69.0%	26.4%	4.7%
2006	1,150	535	99	1	1,785	64.4%	30.0%	5.6%
2007	1,056	565	133	0	1,754	60.2%	32.2%	7.6%
2008	1,102	521	96	0	1,719	64.1%	30.3%	5.6%
2009	1,192	551	99	1	1,843	64.7%	29.9%	5.4%
2010	1,042	512	102	0	1,656	62.9%	30.9%	6.2%
2011	1,051	531	69	1	1,652	63.6%	32.1%	4.2%
2012	1,114	431	85	1	1,631	68.3%	26.4%	5.3%
2013	1,073	399	85	1	1,558	68.9%	25.6%	5.5%
2014	1,116	336	35	0	1,487	75.1%	22.6%	2.4%
2015	1,162	249	16	0	1,427	81.4%	17.4%	1.1%
2016	1,228	226	19	0	1,473	83.4%	15.3%	1.3%
2017	1,169	227	11	0	1,407	83.1%	16.1%	0.8%
2018	1,151	181	13	1	1,346	85.5%	13.4%	1.0%
2019	1,190	124	10	1	1,325	89.8%	9.4%	0.8%
Pooled	22,771	8,732	1,565	12	33,080	68.8%	26.4%	4.8%

Year	Number of suppliers				Total	% ≤250	% >250 to ≤400	% >400
	≤250	>250 to 400	>400 to 1000	>1000				
TASMANIA								
2000	515	151	21	0	687	75.0%	22.0%	3.1%
2001	614	98	8	0	720	85.3%	13.6%	1.1%
2002	505	88	14	0	607	83.2%	14.5%	2.3%
2003	446	130	24	0	600	74.3%	21.7%	4.0%
2004	423	100	12	0	535	79.1%	18.7%	2.2%
2005	393	120	20	0	533	73.7%	22.5%	3.8%
2006	374	123	9	0	506	73.9%	24.3%	1.8%
2007	333	153	15	0	501	66.5%	30.5%	3.0%
2008	338	128	13	0	479	70.6%	26.7%	2.7%
2009	302	148	16	0	466	64.8%	31.8%	3.4%
2010	304	143	14	0	461	65.9%	31.0%	3.0%
2011	327	112	7	0	446	73.3%	25.1%	1.6%
2012	349	147	14	0	510	68.4%	28.8%	2.7%
2013	304	113	21	1	439	69.2%	25.7%	5.0%
2014	364	82	8	0	454	80.2%	18.1%	1.8%
2015	360	74	3	0	437	82.4%	16.9%	0.7%
2016	357	73	2	0	432	82.6%	16.9%	0.5%
2017	375	58	1	0	434	86.4%	13.4%	0.2%
2018	313	34	0	0	347	90.2%	9.8%	0.0%
2019	469	44	1	0	514	91.2%	8.6%	0.2%
Pooled	7,296	2,075	222	1	9,594	76.0%	21.6%	2.3%

Year	Number of suppliers				Total	% ≤250	% >250 to ≤400	% >400
	≤250	>250 to 400	>400 to 1000	>1000				
SOUTH AUSTRALIA								
2000	199	54	5	0	258	77.1%	20.9%	1.9%
2001	392	116	21	1	530	74.0%	21.9%	4.2%
2002	378	78	7	0	463	81.6%	16.8%	1.5%
2003	356	64	11	0	431	82.6%	14.8%	2.6%
2004	323	55	7	0	385	83.9%	14.3%	1.8%
2005	314	51	6	0	371	84.6%	13.7%	1.6%
2006	249	27	4	0	280	88.9%	9.6%	1.4%
2007	222	41	5	0	268	82.8%	15.3%	1.9%
2008	164	42	4	0	210	78.1%	20.0%	1.9%
2009	122	37	1	0	160	76.3%	23.1%	0.6%
2010	110	40	0	0	150	73.3%	26.7%	0.0%
2011	124	38	1	0	163	76.1%	23.3%	0.6%
2012	151	40	0	0	191	79.1%	20.9%	0.0%
2013	88	28	0	0	116	75.9%	24.1%	0.0%
2014	98	17	1	0	116	84.5%	14.7%	0.9%
2015	55	9	0	0	64	85.9%	14.1%	0.0%
2016	126	28	2	0	156	80.8%	17.9%	1.3%
2017	65	8	0	0	73	89.0%	11.0%	0.0%
2018	20	3	0	0	23	87.0%	13.0%	0.0%
2019	147	15	2	0	164	89.6%	9.1%	1.2%
Pooled	3,556	776	75	1	4,408	80.7%	17.6%	1.7%

Year	Number of suppliers				Total	% ≤250	% >250 to ≤400	% >400
	≤250	>250 to 400	>400 to 1000	>1000				
WESTERN AUSTRALIA								
2000	253	52	11	0	316	80.1%	16.5%	3.5%
2001	356	54	14	1	425	83.8%	12.7%	3.5%
2002	275	43	10	0	328	83.8%	13.1%	3.0%
2003	255	38	7	0	300	85.0%	12.7%	2.3%
2004	222	47	11	0	280	79.3%	16.8%	3.9%
2005	193	51	3	0	247	78.1%	20.6%	1.2%
2006	176	49	10	0	235	74.9%	20.9%	4.3%
2007	154	34	6	0	194	79.4%	17.5%	3.1%
2008	211	26	3	0	240	87.9%	10.8%	1.3%
2009	178	27	3	0	208	85.6%	13.0%	1.4%
2010	193	34	3	0	230	83.9%	14.8%	1.3%
2011	149	28	4	0	181	82.3%	15.5%	2.2%
2012	143	26	4	0	173	82.7%	15.0%	2.3%
2013	133	36	1	2	172	77.3%	20.9%	1.7%
2014	139	26	2	0	167	83.2%	15.6%	1.2%
2015	136	28	0	0	164	82.9%	17.1%	0.0%
2016	139	24	0	0	163	85.3%	14.7%	0.0%
2017	119	16	0	0	135	88.1%	11.9%	0.0%
2018	46	9	0	0	55	83.6%	16.4%	0.0%
2019	127	17	0	1	145	87.6%	11.7%	0.7%
Pooled	3,470	648	92	3	4,213	82.4%	15.4%	2.3%

APPENDIX 2

CLASSIFICATION OF SUPPLIERS BY REGION

For 2019, each supplier's region was allocated based on their company, factory, region and ABN as supplied, as detailed in the table below.

Company	Factory	Region as supplied	Region as allocated ¹	No. records
ACM	East	GIPPSLAND	GIPPSLAND	16,114
ACM	Kyabram	NORTHERN VICTORIA	NORTHERN VICTORIA	40,737
ACM	Tasmania	TASMANIA	TASMANIA	660
ACM	West	WESTERN VICTORIA	SOUTHWEST VICTORIA	21,289
ADFC	Allansford	West Victoria	SOUTHWEST VICTORIA	16,474
ADFC	Cobram	Northern Victoria	NORTHERN VICTORIA	13,472
ADFC	Leongatha	NA		3,000
Bega Cheese	Bega	NEW SOUTH WALES	NEW SOUTH WALES	18,386
Bega Cheese	Bega Koroit	NA		50,161
Bega Cheese	Bega Maffra	NA		24,496
Brownes Food Operations Pty Ltd	Balcatta Site	Perth	WESTERN AUSTRALIA	16,344
Bulla Dairy Foods	Colac	Western Victoria	SOUTHWEST VICTORIA	24,371
Bulla Dairy Foods	Darnum Park	NA		6,110
Bulla Dairy Foods	Tatura	NORTHERN VICTORIA	NORTHERN VICTORIA	13,203
Burra Foods	Korumburra	GIPPSLAND	GIPPSLAND	53,155
Cadbury	Burnie	Northern Tasmania	TASMANIA	11,157
DFMC	FNQ	NA		1,560
DFMC	NSW	NEW SOUTH WALES	NEW SOUTH WALES	1,501
DFMC	SA	NA		571
DFMC	SEQ	NA		1,362
DFMC	VIC	VIC	VIC	867
Fonterra	East	GIPPSLAND	GIPPSLAND	43,511
Fonterra	North	NORTHERN VICTORIA	NORTHERN VICTORIA	25,831
Fonterra	South	Northern Tasmania	TASMANIA	49,169
Fonterra	West	WESTERN VICTORIA	SOUTHWEST VICTORIA	56,543
Freedom Foods	Shepparton	NA		19,889
Kyvalley Dairy Group	Kyabram	NORTHERN VICTORIA	NORTHERN VICTORIA	5,325
LION	KI	NA		275
LION	NSW	NEW SOUTH WALES	NEW SOUTH WALES	734
LION	SA	NA		715
LION	SEQ	NA		345
LION	TAS	NA		2,229
LION	VIC	VIC	VIC	1,373
LION	WA	WA	WESTERN AUSTRALIA	1,036
Lactalis	Bendigo	Central Victoria	NORTHERN VICTORIA	5,522
Lactalis	Brisbane	Queensland	QUEENSLAND	24,887
Lactalis	Clarence Gardens	South East	SOUTH AUSTRALIA	3,755

Lactalis	Gippsland	Gippsland	GIPPSLAND	24,649
Lactalis	NSW	NEW SOUTH WALES	NEW SOUTH WALES	11,101
Lactalis	Nambour	Nambour	QUEENSLAND	6,092
Lactalis	Nambour	Queensland	QUEENSLAND	6,092
Lactalis	Northern Vic	NORTHERN VICTORIA	NORTHERN VICTORIA	22,304
Lactalis	Rockhampton	Queensland	QUEENSLAND	5,506
Lactalis	Tasmania	TASMANIA	TASMANIA	1,489
Lactalis	VIC	VIC		7
Lactalis	WA	WA	WESTERN AUSTRALIA	17,734
Lactalis	Western Vic	WESTERN VICTORIA	SOUTHWEST VICTORIA	2,731
Lactalis Woolworths	Brisbane	Queensland	QUEENSLAND	100
Lactalis Woolworths	Clarence Gardens	South East	SOUTH AUSTRALIA	1,098
Lactalis Woolworths	NSW	NEW SOUTH WALES	NEW SOUTH WALES	2,380
Lactalis Woolworths	Nambour	Nambour	QUEENSLAND	1,040
Lactalis Woolworths	Nambour	Queensland	QUEENSLAND	1,040
Milk Department	Coles	NA		5,145
Norco	A2 Raleigh	NEW SOUTH WALES	NEW SOUTH WALES	1,030
Norco	Brancourt Manufacturing P/L - Hexham	NEW SOUTH WALES	NEW SOUTH WALES	43
Norco	Jersey Milk - Labrador	QUEENSLAND	QUEENSLAND	361
Norco	Lion (National Foods) - Penrith	NA		341
Norco	Lismore Ice Cream - Lismore	NEW SOUTH WALES	NEW SOUTH WALES	269
Norco	Murray Goulburn - Erskine Park	NA		6
Norco	Nepean River Dairy Pty Ltd - Sydney	NA		140
Norco	Norco Milk - Labrador	QUEENSLAND	QUEENSLAND	21,375
Norco	Norco Milk - Raleigh	NEW SOUTH WALES	NEW SOUTH WALES	11,393
Norco	Parmalat - Brisbane	Brisbane	QUEENSLAND	1,346
Norco	Parmalat - Lidcombe	NA		1
Norco	Parmalat - Nambour	Nambour	QUEENSLAND	1,830
Norco	Parmalat - Rockhampton	Rockhampton	QUEENSLAND	236
Norco	Real Dairies Pty Ltd	NA		33
Norco	Richmond Dairies - Casino	NA		50
Norco	Unresolved tanker code	NA		1
Riverina Fresh	North	NORTHERN VICTORIA	NORTHERN VICTORIA	5,538
Saputo	Allansford	West Victoria	SOUTHWEST VICTORIA	73,061
Saputo	Gippsland	Gippsland	GIPPSLAND	101,012
Saputo	NSW	NEW SOUTH WALES	NEW SOUTH WALES	24,900
Saputo	North	NORTHERN VICTORIA	NORTHERN VICTORIA	51,997
Saputo	SA	NA		15,081
Saputo	Tasmania	TASMANIA	TASMANIA	40,443
Saputo	West	WESTERN VICTORIA	SOUTHWEST VICTORIA	19,018
Tatura Milk	Tatura Milk	NA		52,692
UDC	Penola	NA		24,557
Pooled				1,131,391

¹Where region supplied was "NA" or "VIC", region was assumed to be that recorded for the supplier's ABN by Dairy Australia.

APPENDIX 3

SOURCES OF BMCC DATA IN 2017, 2018 AND 2019

Numbers of suppliers (unique company-supplier identity combinations) with BMCC records by company for 2017, 2018 and 2019 are detailed in the table below.

Company name (as recorded in supplied data)	No. of suppliers		
	2017	2018	2019
ACM		300	375
ACM Australian Consolidated Milk Pty Ltd	207		
ADFC		118	175
Australian Dairy Farmers Co-operative	119		
Bega Cheese		367	414
Bega Cheese Limited	196		
Brownes Food Operations Pty Ltd		55	54
Brownes Foods Operations Pty Ltd	53		
Bulla		116	
Bulla Dairy Foods			184
Burra Foods			216
Burra Foods Pty Ltd	212	215	
CADBURY		46	47
Cadbury Scheweppes Pty Ltd	43		
Camperdown Dairy	1		
Dairy Farmers	236		
DFMC			187
Fonterra		1069	839
Fonterra Brands (Australia) Pty Ltd	1142		
Freedom Foods			72
Fresh Cheese Co (Mamma Lucia)	4		
Ky Valley Dairy		14	
Kyvalley Dairy Group			23
Lactalis			625
Lactalis Woolworths			16
LION			233
Lion Dairy & Drinks	194		
Longwarry Food Park			
Milk Department			34
MURRAY GOULBURN		1168	
Murray Goulburn Co-operative Co Ltd	1701		
NORCO		205	217
Norco Co-operative Ltd	226		
PANTALICA		7	
Pantalica Company Limited	7		
PARMALAT		566	
Parmalat Australia Ltd	623		
Parmalat Woolworths		1	

Riverina Fresh	21	23	22
Saputo			1487
TATURA MILK		300	243
Tatura Milk Industries Ltd	294		
UDC			113
Warrnambool Cheese & Butter Factory Co Ltd	604		
Warrnambool Cheese and Butter Factory Company Holdings Ltd		490	
<hr/> Pooled	<hr/> 5,883	<hr/> 5,060	<hr/> 5,576