

## INTRODUCTION

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1. In June 2015, Global Dairy Trade (GDT) began public consultation on “Next Steps for Growth”, a programme of improvements to strengthen its independence, transparency and liquidity.
2. This programme included a proposal to extend the current grouping of product specifications to create larger product groups based on milk components.
3. With the proposal supported by the GDT Advisory Board and in by stakeholder survey, the GDT Trading Event Rules were revised in September 2015 to enable the new approach to be implemented (refer announcements dated 21 August and 17 September 2015 on the GDT Website).
4. The software changes required to implement the extended grouping approach have been completed and are ready for sellers to implement.
5. Fonterra confirmed it would adopt and implement the Cream Group functionality through a phased approach which started from Trading Event 165 on 1 June 2016. The first phase implemented the cream grouping for contracts 4 to 6. The second phase extended the cream grouping to contracts 1 to 3 from Trading Event 169 on 2 August 2016.

## KEY MESSAGES

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6. Product grouping is a method by which the auction system allows sellers to specify supply ranges at both a product group and product level, rather than specify a fixed supply for each individual product. This enables bidders to bid on the specific product they require and the auction mechanism to aggregate all the bids into a larger product group to determine the best allocation of supply to the products in strongest demand.
7. The idea of aggregating products into larger groups of demand and supply is not new to GDT - in fact, grouping has been a key feature of GDT since its launch in July 2008.
8. The introduction of a Cream Group therefore represented an extension of existing practice rather than a new concept.
9. The Cream Group introduced benefits for both buyers and sellers:
  - 9.1. Improved liquidity by enabling GDT bidders of AMF and butter to change their bid quantities with less impact on prices;
  - 9.2. Lower price volatility, through individual demand fluctuations being smoothed out in a larger group.
  - 9.3. Improved security of supply through buyers having greater assurance of being able to access the products they bring demand for (within the Cream Group)
  - 9.4. Product allocations are more responsive to market demand, through flexibility to sell to where demand is strongest;
10. All price and quantity information currently provided before and after each trading event continued to be provided – this includes AMF and butter prices which continued to be published.
11. GDT provides additional information to ensure bidders and financial market participants have full visibility of cream supply and other relevant information.
12. The fundamentals of the GDT Events auction remained unchanged:
  - 12.1. Winning prices are still determined by the matching of bidding demand against available supply;
  - 12.2. The round-by-round process to arrive at the winning prices continues to be managed by a software system under the control of the Trading Manager;
  - 12.3. Sellers continue to take no part in the auction process other than entering their supply data during the week prior to the trading event;
  - 12.4. The process by which GDT bidders enter their bids during a trading event remains unchanged – bidders continue to view announced prices and bid on the specific products they wish to purchase.

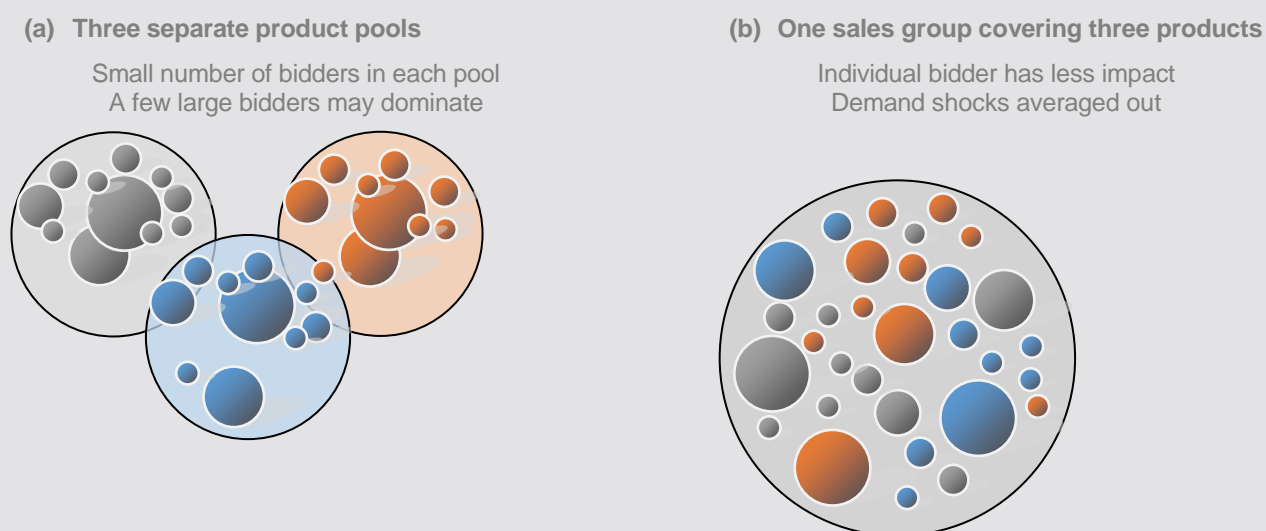
## STRUCTURE OF THE PAPER

13. The best way to understand the Cream Group is to first understand how the current grouping approach works. The following begins by reviewing GDT's current approach to grouping.
14. Subsequent sections describe how the Cream Group works, illustrate possible impacts on auction outcomes, and outline additional information available for each Trading Event.

## Current Approach to Grouping

15. The grouping approach provides sellers with the facility to identify certain product specifications as belonging in the same "sales group".
16. Each sales group is defined by the seller name, product group, source region, and contract period. For example, Fonterra-AMF-NZ/AU-Contract 2 is a sales group, while the Contract 3 version (Fonterra-AMF-NZ/AU-Contract 3) is a separate sales group. For ease of reference, this paper refers to sales groups using shortened names such as AMF-C2 and AMF-C3 sales groups. Similarly, Fonterra-butter-NZ-Contract 2 is referred to as the butter-C2 sales group.
17. The auction system then allows sellers to specify minimum and maximum supply ranges at both a sales group and product specification level, rather than setting a fixed quantity for each product specification.
18. This enables bidders to bid on the specific product they require and the auction mechanism to aggregate all the bids into a larger product group to determine the best allocation of supply to the products in strongest demand.
19. The grouping approach has been utilised for nearly all product groups and by nearly all sellers. For example, in the case of SMP each seller has specified between two and five product specifications (such as low heat, medium heat etc.) as belonging to their respective SMP sales groups.
20. In each case, the effect is to create a larger group of both demand and supply that deepens liquidity and improves the efficiency and robustness of the auction process in discovering market based clearing prices.
21. Figure 1 illustrates the difference between three separately managed products versus the case where they are aggregated into a single sales group.

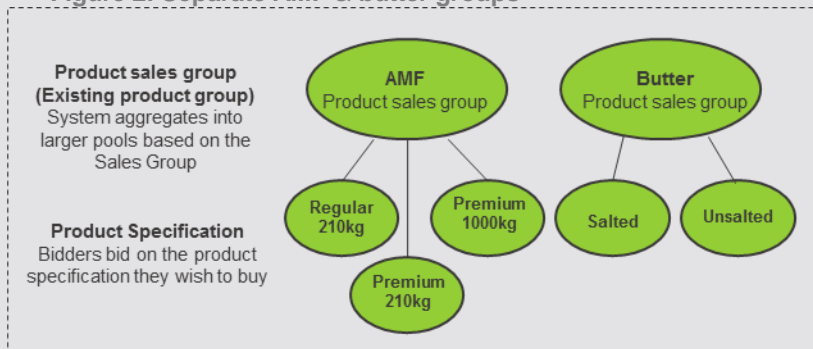
**Figure 1: Illustration of three products aggregated to one sales group**



## HOW THE CURRENT GROUPING APPROACH WORKS

22. Figure 2 illustrates the approach available prior to the Cream Group introduction. It shows where the AMF group with three product specifications (a regular product and two premium versions), and an entirely separate butter group with two product specifications (salted and unsalted versions).

**Figure 2: Separate AMF & butter groups**



23. For each sales group, the approach operates as follows:
- 23.1. Prior to the start of each trading event, as part of the regular pre-event publication process, the seller specifies the minimum and maximum supply quantities available in total for the sales group and individually for each product specification:
    - 23.1.1. For example, the minimum/maximum supply range for the sales group could be 900 – 1000 MT, while the minimum/maximum range for each product specification could be 0 – 1000 MT;
    - 23.1.2. This would indicate the seller has no preference as to which specification is sold, provided the total sold quantity is between 900 - 1000 MT;
  - 23.2. The seller also sets any price differentials required for the higher specification products. For example, the seller may require that the AMF Premium products achieve a defined price premium above the AMF Regular product;
  - 23.3. Once the trading event is open, bidders enter their MT bid quantities during each bidding round against the particular product specifications they wish to buy at the announced price for that round;
  - 23.4. After the end of each round, the auction system aggregates the bids received across the relevant product specifications to derive total demand for the sales group:
    - 23.4.1. "Oversubscribed" status occurs when demand is greater than maximum supply;
    - 23.4.2. "Undersubscribed" status occurs when demand is less than minimum supply;
    - 23.4.3. "Subscribed" status occurs when the product or sales group is neither under- or over-subscribed;
  - 23.5. If the sales group is oversubscribed, the system will seek to assign the same price increment to each product specification so as to maintain price relativity between product specifications:
    - 23.5.1. Sometimes this is prevented by the product specification being undersubscribed or due to another constraint;
    - 23.5.2. Cases can also arise where the sales group is not oversubscribed but one or more individual product specifications remain oversubscribed, which will then trigger price increments of various sizes on one or more products;
  - 23.6. The above continues round by round (with bidders adjusting their bids) until no product specification or sales group is oversubscribed and no bidder has ability to alter their bids.
24. The quantity sold on each product specification is determined by the relative strength of bidding demand for each specification, subject to the total sold quantity lying within the sales group's minimum/maximum supply range.
25. The following example illustrates the above process for the AMF-C2 and butter-C2 sales groups in Trading Event 132, held on 20 January 2015.

## EXAMPLE: Trading Event 132

26. Table 1 shows for Trading Event 132 that Fonterra set the AMF-C2 minimum/maximum supply range at 1200 – 1300 MT, and the supply range for each product specification at 0 – 1300 MT.
27. These settings indicate that Fonterra had no preference as to the quantity of each specification sold, provided the total sold quantity adds to between 1200 - 1300 MT.
28. The middle panel of Table 1 reports the results of the first bidding round. This shows the three product specifications received a wide variation of bids, ranging from a low of 125 MT on Premium 1000kg bins through to more than 1,300 MT on Premium 210kg drums, resulting in that product being oversubscribed.
29. The AMF-C2 sales group was also oversubscribed due to total demand of 1,929 MT being greater than the maximum supply of 1,300 MT.
30. Due to the sales group being oversubscribed, the auction system assigned the same \$125 price increase to each product specification, thereby maintaining the price relativities as reflected in the starting prices (not shown).
31. The right-side panel provides the final results following the close of the trading event after multiple bidding rounds. This shows the sold quantities distributed across the three product specifications to achieve a total sold quantity of 1,226 MT, within the desired 1200 – 1300 MT supply range.
32. In this example, nearly three-quarters of the sold quantity was in the Premium 210kg drum specification. This proportion varies significantly from trading event to trading event, with each of the three specifications at times accounting for more than half of the total sold quantity.

Table 1: Key values for AMF-C2 in Trading Event 132

	Pre-Event Supply Data		Round 1 Bidding Results			Final Results		
	Minimum Supply (MT)	Maximum Supply (MT)	Bids Received (MT)	Subscription Status	Price Increase for Next Round	Sold Quantity (MT)	Winning Prices (USD/MT)	Price vs. Previous Event
AMF Regular 210kg drum	0	1300	426	Subscribed	\$125	315	4,255	-4.7%
Premium 210kg drum	0	1300	1,378	Oversubscribed	\$125	891	4,300	-5.3%
Premium 1000kg bin	0	1300	125	Subscribed	\$125	20	4,355	n.a.
AMF-C2 Sales Group	1200	1300	1,929	Oversubscribed	n.a.	1,226	4,289	-5.1%

33. A similar process also occurs for the butter-C2 sales group, with the mix of sold quantity between the salted and unsalted specifications varying significantly over time.

Table 2: Key values for butter-C2 in Trading Event 132

	Pre-Event Supply Data		Round 1 Bidding Results			Final Results		
	Minimum Supply (MT)	Maximum Supply (MT)	Bids Received (MT)	Subscription Status	Price Increase for Next Round	Sold Quantity (MT)	Winning Prices (USD/MT)	Price vs. Previous Event
Butter Salted 25kg	0	750	54	Subscribed	\$140	17	3,605	0.8%
Unsalted 25kg	0	750	1,213	Oversubscribed	\$140	729	3,605	0.8%
Butter-C2 Sales Group	700	750	1,267	Oversubscribed	n.a.	746	3,605	0.8%

## Extension to Cream Group

### BACKGROUND

34. AMF and butter both consist of milkfat and water. The majority of AMF and butter sold on GDT is for shipment two or more months following the Trading Event, and so has not been manufactured at the time of the trading event.
35. Although sellers may have flexibility to produce either AMF or butter, the existing grouping approach requires sellers to predict AMF and butter demand so as to determine the optimal mix of offer quantities.

36. The difficulty with this approach is that the level of bidding demand is highly variable and cannot be accurately predicted. This is illustrated in Figure 3 where the first round demand/supply ratios for AMF-C2 and butter-C2 sales groups during 2014 - 15 were highly variable from trading event to trading event and also often move in opposite directions to each other.

**Figure 3: First Round Demand/Supply Ratios for AMF-C2 and butter-C2 sales groups**



37. Table 3 provides summary statistics showing 30% – 40% volatility in the first round demand/supply ratios, low serial correlation (implying low predictability from trading event to trading event), and only 20% cross correlation between AMF and butter demand. Equivalent statistics are also reported for the percentage change in the AMF and butter Contract 2 price indices.

**Table 3: Volatility statistics, 2014 - 2015<sup>1</sup>**

	AMF-C2	Butter-C2
<b>Round 1 Demand/Supply Ratio</b>		
Coefficient of Variation	31%	36%
Serial Correlation	4%	42%
Cross Correlation	20%	
<b>Percentage Price Change</b>		
Standard Deviation	9%	8%
Serial Correlation	12%	9%
Cross Correlation	54%	

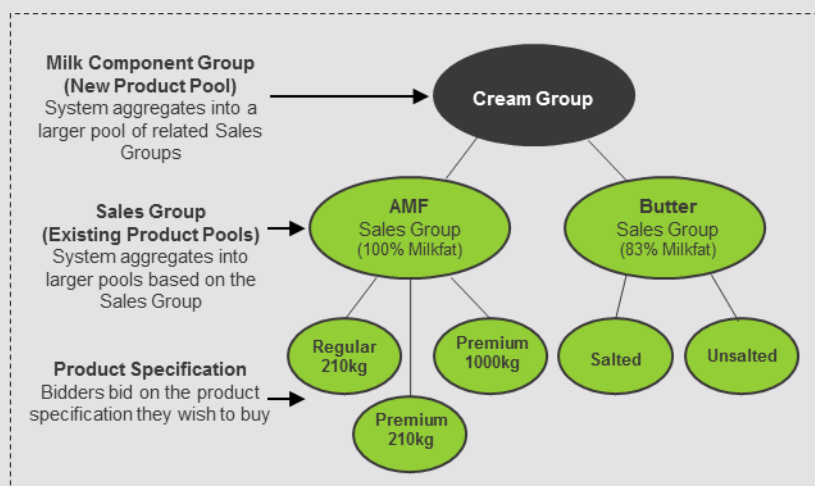
38. It is for these reasons that AMF and butter are viewed as appropriate candidates to apply further grouping.

## HOW THE CREAM GROUPING APPROACH WORKS

39. Figure 4 illustrates the Cream Group as a further aggregation of demand and supply into a higher level milk component group. For example, the AMF-C2 and butter-C2 sales groups would aggregate into Contract 2 Cream Group (referred to as Cream-C2).
40. The key difference between the separate AMF and Butter grouping system and the Cream Group, is the need to take into account that AMF is approximately 100% milkfat whereas butter is around 83% milkfat and 17% water. Hence, the two product types have different 'utilisation rates'. In other respects, Cream Group grouping is analogous to sales group grouping.

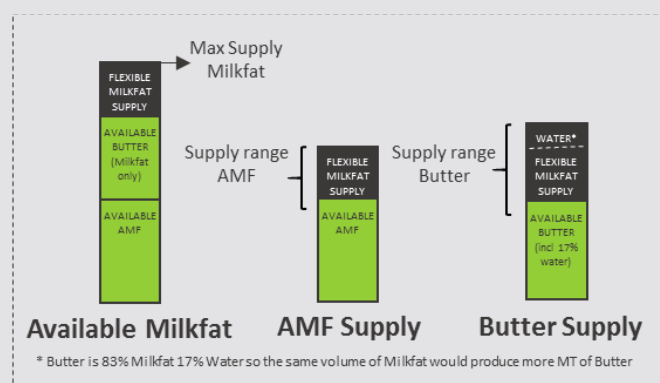
<sup>1</sup> Coefficient of Variation is the standard deviation divided by average value. Serial correlation is the correlation between current period and previous period data value. Cross correlation is the correlation between AMF and butter value in the same period.

**Figure 4: Aggregation of AMF and butter into Cream Group**



41. The Cream Group operates as follows:

**Figure 5: Supply ranges for milkfat, AMF and butter**

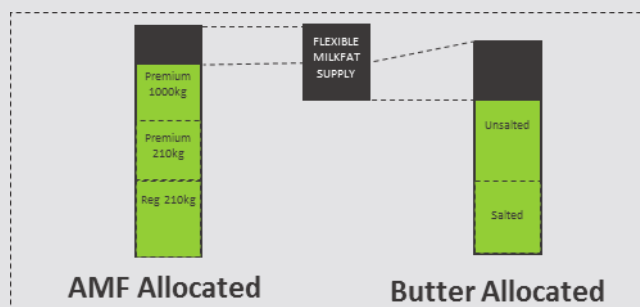


- 41.1. Prior to the start of each trading event, each seller utilising the new group (Fonterra initially) provides additional data specifying the minimum/maximum supply range for milkfat in each contract period;
- 41.2. The relevant sellers also specifies wider supply ranges for AMF and butter products to reflect its available level of sales flexibility between the two product types;
- 41.3. Analogous to the product price premiums for sales group grouping, sellers also specify variable costs for AMF and butter to enable the auction system to calculate equivalent milkfat marginal returns per product;
- 41.4. During the trading event, bidders continue to view the existing bidding screens and continue to enter their MT bid quantities against the particular product specifications they wish to buy at the announced price for that product;
- 41.5. After the end of each bidding round, the auction system aggregates the bids received across AMF and butter to derive the total demand for milkfat, taking into account that each MT of AMF requires 1 MT of milkfat whereas each MT of butter requires only 0.83 MT of milkfat;
- 41.6. If the Cream Group is oversubscribed, the system seeks to set price increments for AMF and butter products to progressively bring their milkfat values into equivalence;
  - 41.6.1. In cases where milkfat equivalence already applies, the system seeks to set price increments to maintain milkfat equivalence – for example, a \$100 increment to the milkfat price would imply a \$100 increment to AMF prices but only a \$83 increment to butter prices (due to butter comprising 83% milkfat);
  - 41.6.2. Sometimes the price increments deviate because the product spec or sales group is undersubscribed or due to another constraint;



41.7. The above continues round by round (with bidders adjusting their bids) until no product specification, sales group or Cream Group is oversubscribed and no bidder has ability to alter their bids.

**Figure 6: Allocation of flexible milkfat to AMF and butter**



42. The result of this process is that the quantity sold on each of AMF and butter is determined by the relative strength of bidding demand for each specification, subject to satisfying the various minimum and maximum supply constraints.

## LIMITS TO SUPPLY FLEXIBILITY

43. A key feature of the current grouping approach is that sellers generally are able to allow 100% flexibility in how sold quantities are distributed between the product specifications, as reflected in the 0 – 1,300 MT supply range for AMF products in the example discussed above.
44. An important practical difference with a Cream Group is that sellers are unlikely to ever have 100% production flexibility between AMF and butter.
45. Particularly for the shorter contract periods, sellers need to limit the degree of supply flexibility to ensure outcomes meet both production constraints and customer needs.
46. Table 4 illustrates how the Cream Group affects the sales group supply ranges at various levels of flexibility:
  - 46.1. The left panel shows simplified supply ranges of 900 – 1,000 MT for each of AMF and butter under current systems without a Cream Group:
    - 46.1.1. Note the typical setting where the minimum supply quantities have been set at 10% below their corresponding maximum supply quantities;
    - 46.1.2. Note also that 1,000 MT of each of AMF and butter represents 1,830 MT of milkfat (of which 1,000 MT derives from AMF and 830 MT from the 1,000 MT of butter)
  - 46.2. The middle panel shows the case of a Cream Group with 100% flexibility:
    - 46.2.1. Under this scenario the minimum supply quantities for AMF and butter are set to zero, allowing the full supply of milkfat to be sold either entirely as AMF or sold entirely as butter or some combination of the two;
    - 46.2.2. The maximum supply quantities for AMF and butter reflect that 1,830 MT of milkfat may be converted into a maximum of 1,830 MT of AMF, or converted into a maximum of 2,200 MT ( $\cong 1,830/0.83$ ) of butter;
  - 46.3. The right-side panel shows the case of a Cream Group with 50% flexibility:
    - 46.3.1. Under this scenario, the AMF and butter minimum supplies are set to 500 MT, 50% below their original 1,000 MT maximum supply quantities;
    - 46.3.2. After allowing for the milkfat required to meet the minimum supply requirements, the remaining milkfat is available for allocation either entirely to AMF (maximum supply of 1,420 MT) or entirely to butter (maximum supply of 1,600 MT) or some combination of the two.

Table 4: Comparison of Supply Ranges at varying levels of flexibility

	Before the Cream Group		Cream Group with 100%flex		Cream Group with 50%flex	
	Minimum Supply (MT)	Maximum Supply (MT)	Minimum Supply (MT)	Maximum Supply (MT)	Minimum Supply (MT)	Maximum Supply (MT)
AMF	900	1000	0	1830	500	1420
Butter	900	1000	0	2200	500	1600
Milkfat	n.a.	n.a.	1650	1830	1650	1830

## CHANGES TO BIDDING WEBSITE

47. The software changes required to implement the new grouping approach did not affect the design or structure of the Bidding Website.
48. GDT bidders do not see any changes to the bid submission page and they continue to enter bids on the AMF and butter products they wish to purchase.
49. The main visible change were introduced on the pre-event page where the minimum and maximum supply ranges for AMF and butter are available to bidders.
50. During trading events, bidders may also have noticed a tendency for the round-by-round price increments for AMF and butter to move in a correlated fashion (though not in all cases).

## ADDITIONAL PRE AND POST EVENT INFORMATION

51. GDT continues to provide all price and quantity information currently provided before and after each trading event.
52. GDT also provides additional information to ensure bidders and financial market participants have full visibility of milkfat supply and other relevant information. This includes a table showing how the level of supply flexibility is expected to vary across the season.
53. All new data made available to bidders through the GDT Information Website is publicly available to financial market participants via the NZX Dairy Derivatives Market.
54. Prior to each trading event, GDT provides additional information on:
  - 54.1. Minimum and maximum supply quantities of milkfat (for each contract period);
  - 54.2. Minimum supply quantities for AMF and butter (the GDT and NZX websites currently provide only the maximum supply quantities, commonly referred to as the offer quantities); and
  - 54.3. Forecast of milkfat supply (similar format to current forecasts for other products).
55. Through the GDT Insight subscription service GDT also provides a milkfat reconciliation table. This table provides the total quantity of milkfat sold, milkfat offer quantities and the actual quantities of AMF and butter sold.

Table 5: Example of milkfat reconciliation table

Fonterra	1	2	3	4	5	6
<b>Product Sold (MT)</b>						
AMF	-	1,304	899	500	243	125
Butter	-	850	532	274	75	50
<b>Milkfat utilised (MT)</b>						
AMF	-	1,304	899	500	243	125
Butter	-	703	440	227	62	41
Total Milkfat utilised	-	2,007	1,339	727	305	166
<b>Milkfat quantities offered (MT)</b>						
Milkfat maximum supply	-	2,103	1,355	777	333	212
Milkfat Minimum supply	-	1,893	1,219	700	299	160



## DEMAND SUPPLY RATIOS

56. Implementation also required a technical adjustment to avoid double counting of available supply in the calculation of the AMF and butter Demand/Supply Ratios.
57. This was necessary because the maximum supply quantities for AMF and butter would otherwise overstate the total available supply from a milkfat perspective. Hence, the Supply number used in the Demand/Supply Ratio needed to be scaled to reflect the aggregate quantity of milkfat available.
58. This change was provided for in the September revision of the GDT Trading Event rules (refer Rule C5.16).

## Impacts on Trading Event Outcomes

59. This section provides two examples to illustrate how a Cream Group may result in different price outcomes compared to the current system.
60. The first example illustrates a case where the AMF price would have been higher and butter price would have been lower under a Cream Group, while the second example illustrates a case where the reverse outcome would have occurred.
61. The second example also illustrates a case where allowing 25% supply flexibility would have been insufficient to bring the AMF and butter prices into full alignment on a milkfat equivalence basis.

### Example Application to Trading Event 132

62. Trading Event 132 (20 January 2015) is a good first example for illustrating the impacts of the Cream Group.
63. It is a case where the auction outcome resulted in a divergence of milkfat values between AMF and butter even though the event started from a position where prices from the previous trading event were almost exactly equal on a milkfat value basis.
64. In this example, we assume that the seller would have set supply flexibility at 25%. This would result in the AMF-C2 supply range widening from 1200 – 1300 MT to 980 – 1460 MT, and the butter-C2 supply range widening from 700 – 750 MT to 560 – 1130 MT.

Table 6: Trading Event 132 Supply Ranges with and without Cream Group

	Before the Cream Group		Cream Group with 25%flex	
	Minimum Supply (MT)	Maximum Supply (MT)	Minimum Supply (MT)	Maximum Supply (MT)
AMF - C2	1200	1300	980	1460
Butter - C2	700	750	560	1130
Milkfat - C2	n.a.	n.a.	1730	1920

65. Because the actual winning prices from Trading Event 132 resulted in the milkfat value represented by AMF falling below the milkfat value represented by butter, the impact of introducing a Cream Group will be to try correct this situation by raising the price of AMF and reducing the price of butter, thus closing milkfat differential between the two.
66. Table 7 below shows the following estimated impacts relative to Trading Event 132 actual outcomes. It is estimated that:
- 66.1. AMF-C2 average price would have been about 1.9% higher and sold quantity 174 MT lower;
- 66.2. Butter-C2 average price would have been about 4.4% lower and sold quantity 210 MT higher;
- 66.3. The total quantity of milkfat embodied in the AMF and butter sold quantities would be approximately unchanged at 1845 MT in each case with and without a Cream Group.

**Table 7: Estimated Price and Quantity Impacts of a Cream Group on Trading Event 132**

	Before the Cream Group		Cream Group with 25%flex		Estimated Impacts			
	Sold Quantity (MT)	Winning Price (USD/MT)	Sold Quantity (MT)	Winning Price (USD/MT)	Change in Quantity (MT)	Change in Price (USD/MT)	(%)	
AMF	1,226	4,289	1,052	4,371	-	174	82	1.9%
Butter	746	3,605	956	3,445	210	-	160	-4.4%
Milkfat	1,845	n.a.	1,845	n.a.	-	-	n.a.	n.a.

67. Note that the estimated sold quantities for AMF-C2 and butter-C2 both lie within their respective supply ranges, indicating that 25% flexibility was sufficient to achieve full equivalence of milkfat values.
68. For the reader interested in the details, Table 8 below provides further information on the assumed supply ranges and shows that the Cream Group would have been oversubscribed after the first bidding round, resulting in the price increases for round 2 consistent with relative milkfat utilization in AMF and butter products. This process proceeds round by round until the Cream Group ceases to be oversubscribed.

**Table 8: Trading Event 132 Estimated Result with a Cream Group and 25% Flexibility**

		Pre-Event Supply Data		Round 1 Bidding Results			Estimated Final Result		
		Minimum Supply (MT)	Maximum Supply (MT)	Bids Received (MT)	Subscription Status	Price Increase for Next Round	Sold Quantity (MT)	Winning Price (USD/MT)	Price vs. Previous Event
<b>AMF</b>	Regular 210kg drum	0	1460	426	Subscribed	\$145	270	4,315	-3.1%
	Premium 210kg drum	0	1460	1,378	Subscribed	\$145	764	4,390	-3.0%
	Premium 1000kg bin	0	1460	125	Subscribed	\$145	17	4,415	n.a.
	AMF-C2 Sales Group	980	1460	1,929	Oversubscribed	n.a.	1,052	4,371	-3.0%
<b>Butter</b>	Salted 25kg	0	1130	54	Subscribed	\$120	22	3,445	-3.7%
	Unsalted 25kg	0	1130	1,213	Oversubscribed	\$120	934	3,445	-3.7%
	Butter-C2 Sales Group	560	1130	1,267	Oversubscribed	n.a.	956	3,445	-3.7%
<b>Milkfat</b>	Contract 2	1730	1920	2,981	Oversubscribed	\$145	1,845	n.a.	

Note: Minimum and maximum supply numbers rounded to nearest 10 MT. Milkfat minimum supply set 10% below maximum supply.

## EXAMPLE: Application to Trading Event 150

69. The following illustrates that a Cream Group can also have the reverse outcome to the previous example, i.e. a lower AMF price and a higher butter price.
70. Trading Event 150 (20 October 2015) is also interesting because it illustrates a case where 25% supply flexibility would have been insufficient to achieve full equivalence of milkfat values.
71. This arises because prices moved from a 6% disparity in milkfat value in the previous trading event (TE149) in favour of butter, to the reverse of a 17% disparity in milkfat value in favour of AMF.
72. Trading Event 150 was also characterized by significantly higher offer quantity for butter relative to the previous example (up 67%, from 750 MT to 1250 MT). Although this had operated successfully for several months, the higher supply level reduced the safety margin to ensure market clearing in the face of large demand fluctuations. Trading Event 150 experienced a significant temporary drop in demand which resulted in the butter-C2 winning prices failing to rise above their respective starting prices.
73. The introduction of a Cream Group with 25% supply flexibility would have partially mitigated these issues as follows:
- 73.1. Butter prices would have increased above their starting prices during successive bidding rounds until the butter-C2 sales group became undersubscribed (after which the prices would have remain unchanged in subsequent rounds);
- 73.2. With the butter quantity constrained at its minimum supply, AMF prices would have continued to increase until the Cream Group ceased to be oversubscribed.
74. The estimated impacts relative to actual outcomes for Trading Event 150 are:
- 74.1. AMF-C2 average price 3.3% lower and sold quantity 257 MT higher;
- 74.2. Butter-C2 average price 3.4% higher and sold quantity 310 MT lower.

75. The net result would have been a remaining disparity in milkfat values of 10%, i.e. 25% flexibility would have significantly reduced the disparity (from 17% in favour of AMF to 10% in favour of AMF), but would have been insufficient to eliminate the disparity and achieve equivalence of milkfat values.

**Table 9: Estimated Impact of a Cream Group on Trading Event 150**

	Before the Cream Group		Cream Group with 25%flex		Estimated Impacts			
	Minimum Supply (MT)	Maximum Supply (MT)	Minimum Supply (MT)	Maximum Supply (MT)				
AMF - C2	1,350	1,450	1,090	1,710				
Butter - C2	1,150	1,250	940	1,690				
Milkfat - C2	n.a.	n.a.	2,240	2,490				
	Sold Quantity (MT)	Winning Price (USD/MT)	Sold Quantity (MT)	Winning Price (USD/MT)	Change in Quantity (MT)	Change in Price (USD/MT)	(%)	
AMF - C2	1,441	3,879	1,698	3,751	257	-	128	-3.3%
Butter - C2	1,250	2,620	940	2,709	-	310	89	3.4%
Milkfat - C2	2,479	n.a.	2,478	n.a.	-		n.a.	n.a.

## LONG TERM IMPACTS

76. The two examples discussed above illustrate how a Cream Group could result in different price outcomes compared to the current system.
77. However, the results need to be interpreted with caution, for two reasons:
- 77.1. Any change to the price and quantity outcome for one trading event is likely to spill-over to impact bidder demand and therefore pricing in subsequent trading events;
- 77.2. Also, GDT is only one part of the broader market and ultimately the market price will be determined by the balance of total market demand against total market supply.
78. Taking account of these factors would require fairly complex modelling and the accuracy of the results would be hindered by the lack of reliable estimates for the relevant demand and supply elasticities.
79. For these reasons the paper does not provide any evidence on the long term price impacts of a Cream Group.

## Concluding Comments

80. A key message of this paper has been that the introduction of a Cream Group represented a continuation and extension of grouping concepts that have always been central to GDT since its launch in 2008.
81. Nevertheless, a Cream Group did add some complexity to the mechanics of the auction processes, and this may make it more difficult for people to understand the full details of how the trading events operate.
82. It is important to note, however, that the fundamentals of the auction remained unchanged:
- 82.1. Winning prices are still determined by the matching of bidding demand against available supply;
- 82.2. The round-by-round process to arrive at the clearing prices continues to be managed by a software system under the control of the Trading Manager;
- 82.3. Sellers continue to take no part in the auction process other than entering their supply data during the week prior to the trading event.
83. The last comment is significant because it is critical to understand that the implementation of a Cream Group did not create an opportunity for sellers to become involved in the auction process.
84. On the contrary, one of the ancillary benefits of the new grouping approach was to transfer, from the seller to the auction system, the decision of how a seller's available milkfat supply is allocated between AMF and butter.
85. In terms of price impacts, the paper showed how a Cream Group could result in different price outcomes

compared to the current system.

86. The paper provided an example where the AMF or butter price could be higher compared to the current system and a counter example where the reverse outcome could occur.
87. However, the difficulty of modelling both dynamic effects across multiple trading events and the broader market adjustment factors makes it very difficult to assess the direction and magnitude of any long term price impacts that may arise from a Cream Group.
88. Instead, as discussed in the Introductory section, the Cream Group approach benefitted both buyers and sellers through improved liquidity, lower price volatility, improved security of supply and product allocations that are more responsive to market demand.