final report

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The impact of retail sales volatility:

Lamb supply chain case study

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Executive Summary

This project investigates the impact of retail sales volatility on the cost structure of a red meat (lamb supplier). Cost savings in the order of 3% of total variable costs or $500,000 per annum are achievable.

The sales patterns of two USA retailers illustrates that retailers who adopt HI-LO promotion strategies experience high levels of sales volatility compared with those pursuing an every day lay pricing (EDLP) approach. High levels of sales volatility lead to demand forecasting challenges which in turn are translated down the supply chain to suppliers. In the Coles Supermarkets integrated supply chain any additional costs borne by the supplier – in this case CRF (Colac Otway) – are reflected in total product costs.

The analysis showed that Coles lamb forecasts at the product level are accurate within ±5% 10% of the time; within ±10% 25% of the time; within ±20% 46% of the time meaning that 54% of the time forecasts were over ±20%.

Suppliers such as CRF however need to manage within these constraints and still aim supply product as ordered to the retailer. In CRF's case product was supplied 73% of the time. Undersupply was prevalent with 3 products.

Vacuum packing is the main mechanism by which CRF is able to manage ordering volatility, with vacuum packed product ranging from 20-40% of product supplied. Vacuum packing however has a number of cost implications: higher packing and carton costs; labour and reworking, inventory costs, and increased capital expenditure.

The additional weekly and annual potential cost savings are summarised in the following table. This table, which is based on a typical week where 30% of product is vacuum packed, shows that annual cost savings of over $600,000 are achievable. Given that the company operates with annual variable costs of $20m per annum this equates to 3 % of the total variable costs.

	Additional costs		Percent
Item	Week	Annual	
packaging	5,550	288,600	44%
cartons	1,828	95,056	14%
labour	1,057	54,964	8%
reworking	1,145	59,540	9%
inventory	2,625	136,500	21%
capital	500	26,000	4%
Total	12,705	660,660	100%

This analysis suggests that if the system could be improved to the situation where (say) 5% of product is vacuum packed, providing a reasonable buffer, then cost savings of over $500,000 per annum could be realised.

1. Introduction

The MLA retail category management program highlighted the degree of volatility of red meat sales at retail level. Major and minor products exhibit enormous sales volatility as a result of price-based promotions, sub-optimal ordering systems, and suppliers/traders moving excess product by discounting. The experience was consistent across many markets such as South Korea, Japan, Australia and Taiwan. Similar results have been observed in the UK and Canada.

Discussions with both retailers and suppliers suggest that such volatility leads to significant added costs at the retail and supplier level.

The overall aim of the current project was to quantify the visible and hidden costs of retail sales volatility along the chain in the context of the lamb supply chain coordinated by CRF (Colac Otway).

The prime focus was on the domestic supply chain between CRF and Coles Supermarkets. However, the changing ownership and strategy within the Coles meat business led to a number of changes in the commercial priorities of the project. The main change in Coles thinking relates to forecast accuracy. One of the original aims of the project was to alert the retail customer to the need for improved forecast accuracy as inaccurate forecasts lead to supply chain inefficiencies. However, under the new strategy Coles has committed to forecast accuracy benchmarks and fully understands the impact of this. Hence it was more relevant to the current project to quantify costs to CRF under different forecast accuracy measures.

2. Objectives

The overall objective is to improve the efficiency of Australian red meat supply chains by identifying the causes and cost implications of, and possible solutions to, retail sales volatility.

In order to achieve this overall objective the following objectives will be met:

- To identify the magnitude of retail sales volatility under different retail strategies.
- To identify and quantify the full costs of retail sales volatility, especially to suppliers and primary producers.
- To assess the impact of retail sales volatility on primary producer suppliers.
- To develop strategies for retailers and suppliers to improve performance based on reduced sales volatility. The aim is to use the analysis to identify continuous improvement and process innovation opportunities by the further application of lean thinking flow principles as a result of reducing demand and supply volatility.

3. Method

The project is based on the analysis of three main data sources. The first is CRF data: (1) orders received from and sales to Coles Supermarkets and (2) internal cost data. The second is monthly sales data from a USA supermarket using an Every Day Low Price (EDLP) strategy. This is warehouse withdrawal data from a chain serving 90 stores in Western USA.

The third main data source is weekly and monthly retail sales data from a chain of 140 stores also in Western USA. This retailer employs a HI-LO promotion program with an emphasis on price-based promotions. The project was not able to access Coles retail sales data and hence access to USA data was valuable. Under new management Coles has announced a shift from HI-LO retailing to a EDLP type strategy branded Every Day Good Value. The two contrasting USA data sets thus provide some indication of the likely impact of the changed promotion strategy on Coles ordering volatility.

In addition to these three main data sources the project has also been able to draw on other domestic data from a regional retailer in Australia.

The outline of the report is as follows. Retail sales volatility is analysed in section 4 with the impact on forecast accuracy covered in section 5. Section 6 investigates the cost impact of inaccurate forecasts and the discussion of the implications and conclusions concludes the report in section 7.

4. Retail sales volatility

The overall picture on retail sales volatility is drawn from USA data. Retailer one is a regional supermarket chain with a typical HI-LO promotion strategy similar to Australian retailers. Retailer two is regional data from a national chain that adopts an EDLP strategy. The data has been modified for confidentiality purposes.

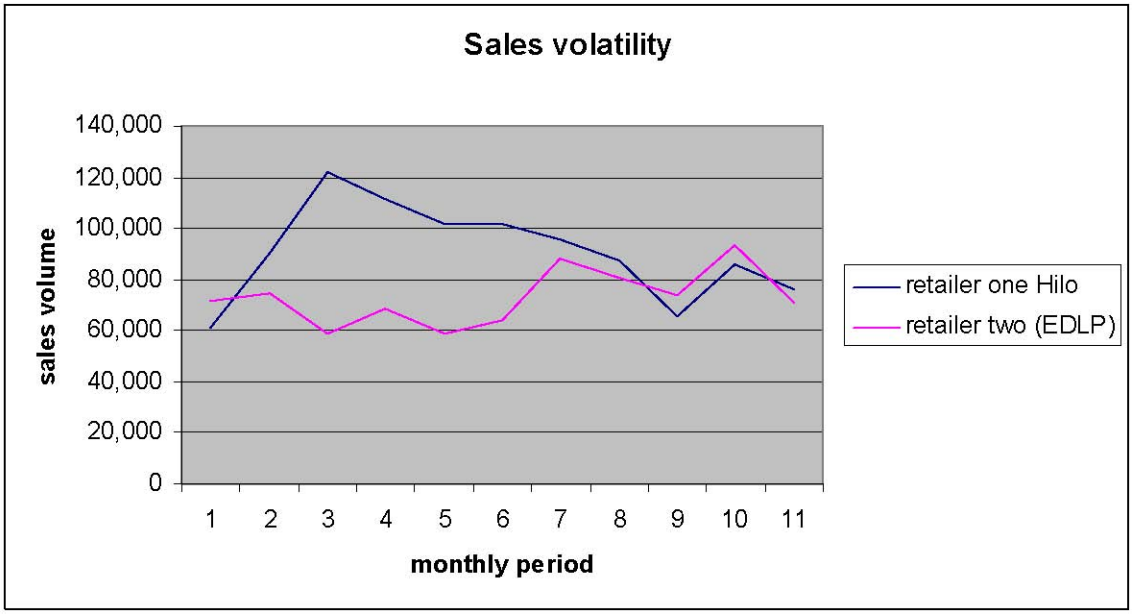
Graph one illustrates the monthly pattern of sale for the two retailers (the volumes have been adjusted so that each retailer is selling similar monthly volumes and the months do not correspond to identical months).

This graph highlights:

- The HI-LO retailer experiences higher levels of volatility around monthly sales patterns.
- We would expect this pattern to be more pronounced with the HILO retailer on a weekly basis – see graph seven for the HILO retailer's total weekly sales. This graph also highlights the increased level of sales volume – whilst the retailer's total sales may not vary as much the high level of volume volatility creates inefficiencies for both the retailer and supplier.
- HILO retailing does not appear to grow demand over time – in fact total sales have continued to slowly decline after the third month.
- EDLP promotion strategy on the other hand has resulted in modest but steady increases in total sales volume.
- Graphs two and three shows a similar pattern for two selected products – shoulder chops and leg roasts. Monthly sales volume is more volatile for the HILO retailer with

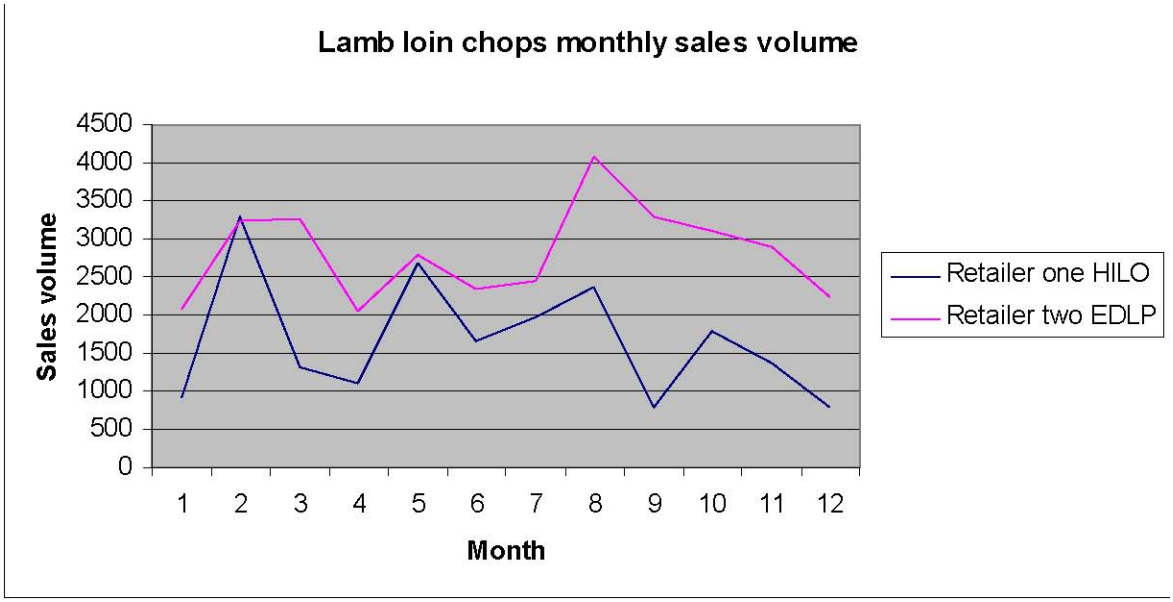
little growth or declining sales trend. The EDLP approach in contrast is more efficient for the supply chain and is associated with steady sales increase.

Graph one: Monthly sales for two USA retailers



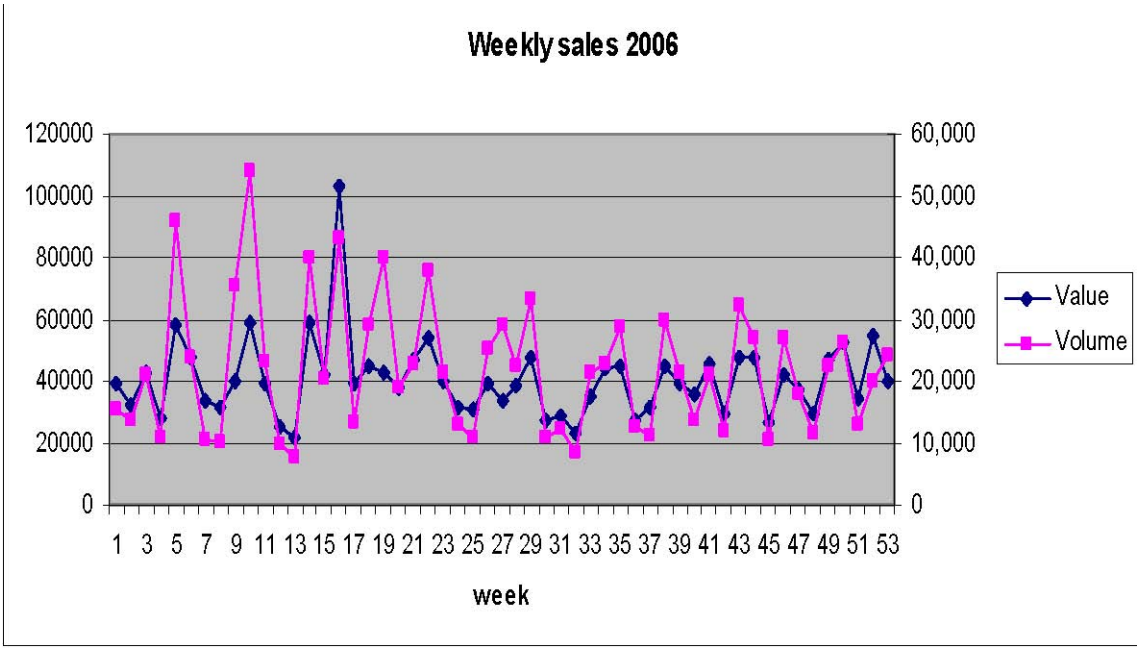
Graph two: Lamb shoulder chops monthly sales volume

Graph three: Loin chops monthly sales volume



Graph four illustrates the increased volatility for the total lamb category at the weekly level for the HI-LO retailer. The retailer typically alternates lamb promotions with other categories such as veal on a weekly basis and hence the volatility is exhibited on a weekly basis. This graph also highlights that volume volatility is more pronounced than value volatility. Price-based promotions need to move excessive volume in order to result in a significant value lift. However, suppliers and retailers need to forecast volumes and it is volume changes that lead to supply chain costs.

Graph four: Lamb category weekly sales volume and value, retailer one (HI-LO)



4.1 CRF sales volatility

The data in this section is drawn from CRF sales to its major supermarket customer. The ordering patterns are consistent with the sales volatility of a HI-LO retailer summarised in the section above. That is, total product ordered is reasonably consistent but this level of aggregation masks significant volatility at the individual product level on a weekly basis.

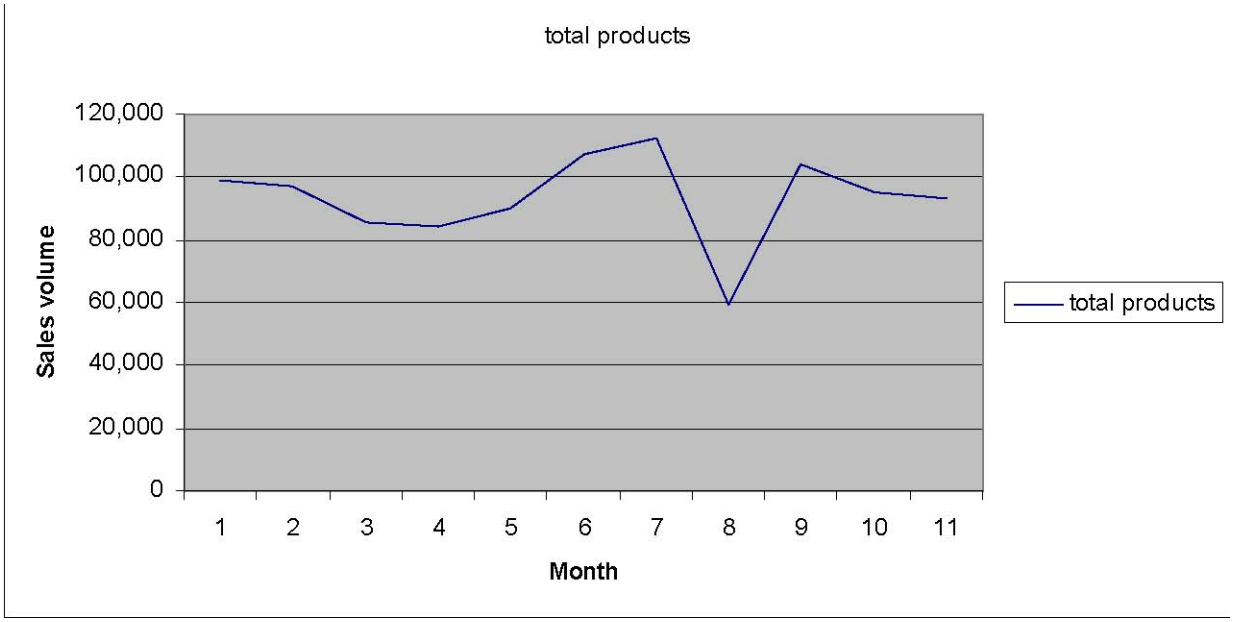
Table one and graph five shows the quantity ordered by week for ten products over the ten week period from the week commencing February 4 to the week commencing April 7. A number of these individual products are graphed in graphs six and seven.

- The overall or total level of product ordered is reasonably consistent with the exception of the significant drop in week 8.
- Prior to this week (8) orders had been increasing, suggesting that product may have been inventory in the retail chain with the resultant impact on orders in week 8.
- The level of volatility varies significantly by product – for example SRS405 and SRS404 exhibit much higher levels of volatility compared with SRS300 and SRS403.
- Even though only a ten-week period there is no indication that HI-LO retailing is leading to demand growth. There is a flat trend in overall lamb category orders.

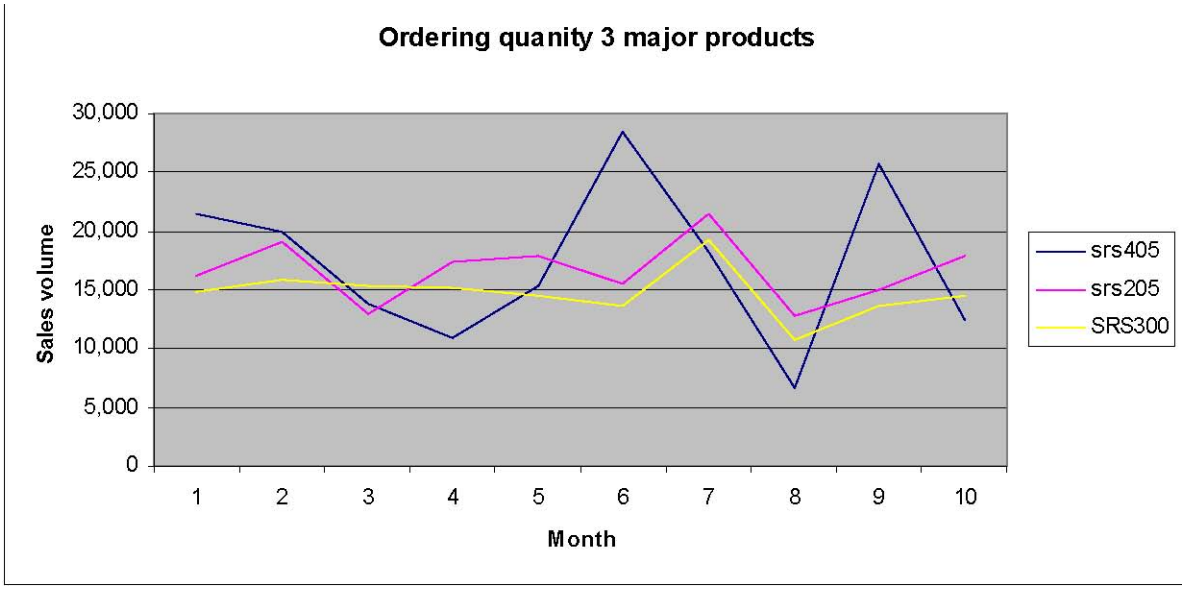
Table one: Ordered quantity – by product by week

	Week										
Product	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Average**
SRS118	8,391	6,258	8,319	5,836	7,491	7,311	11,279	2,216	5,791	7,621	7,051
SRS205	16,182	19,046	12,997	17,356	17,942	15,579	21,393	12,828	14,921	17,875	16,612
SRS108	6,228	6,559	8,897	6,584	3,940	6,825	8,805	5,272	5,934	8,604	6,765
SRS405	21,450	19,979	13,817	10,945	15,290	28,427	18,300	6,700	25,736	12,420	17,306
SRS404	10,744	10,337	6,635	5,586	7,767	14,271	9,855	3,300	13,284	6,380	8,816
SRS103	6,740	6,580	6,914	7,772	7,028	7,281	7,257	6,422	9,504	11,030	7,653
SRS301	6,736	4,836	5,334	5,889	6,486	5,903	6,474	4,366	4,896	4,954	5,587
SRS302	1,944	1,688	1,441	2,429	3,450	2,066	3,275	2,123	2,700	2,276	2,339
SRS300	14,843	15,878	15,340	15,113	14,464	13,703	19,228	10,727	13,584	14,435	14,732
SRS403	5,886	5,772	5,601	6,503	6,391	5,681	6,238	5,690	7,975	9,570	6,531
Total	*99,144*	*96,933*	*85,295*	*84,013*	*90,249*	*107,047*	*112,104*	*59,644*	*104,325*	*95,165*	*93,392*

Graph five: ordered quantity for total of ten products



Graph six: ordered quantity for three major products



Graph seven: ordered quantity for four medium products

5. Forecast accuracy

This section analyses the forecasts received by CRF from Coles and is based on CRF data. The overall conclusion is clear: HO-LO retailing with the emphasis on price-based promotions leads to volatile sales and accurate forecasts are well nigh impossible under such a regime.

Table two summarises the forecast accuracy of ten products over a ten week period (from the weeks commencing February 4 to April 7.) In this table negative forecast accuracy means that the product was under-forecasted and the orders exceeded forecast. Graph eight illustrates the overall forecast accuracy and graph nine for four selected products.

The main points from the table and graphs are:

- Across the range of products, forecast accuracy was ±5% for 3 weeks out of the ten; within 10% for 7 weeks out of ten; within 20% for 9 weeks with week seven the product ordered was over 40% more than forecast.

Not surprisingly, at an individual product level forecast accuracy was significantly less. At the individual product level forecast accuracy was within ±– 5% on 10 out of 100 observations (10 products times 10 weeks) within ±10% 25% of the time; within ±20% 46% of the time meaning that 54% of the time forecasts were over ±20% and in managerially not actionable.

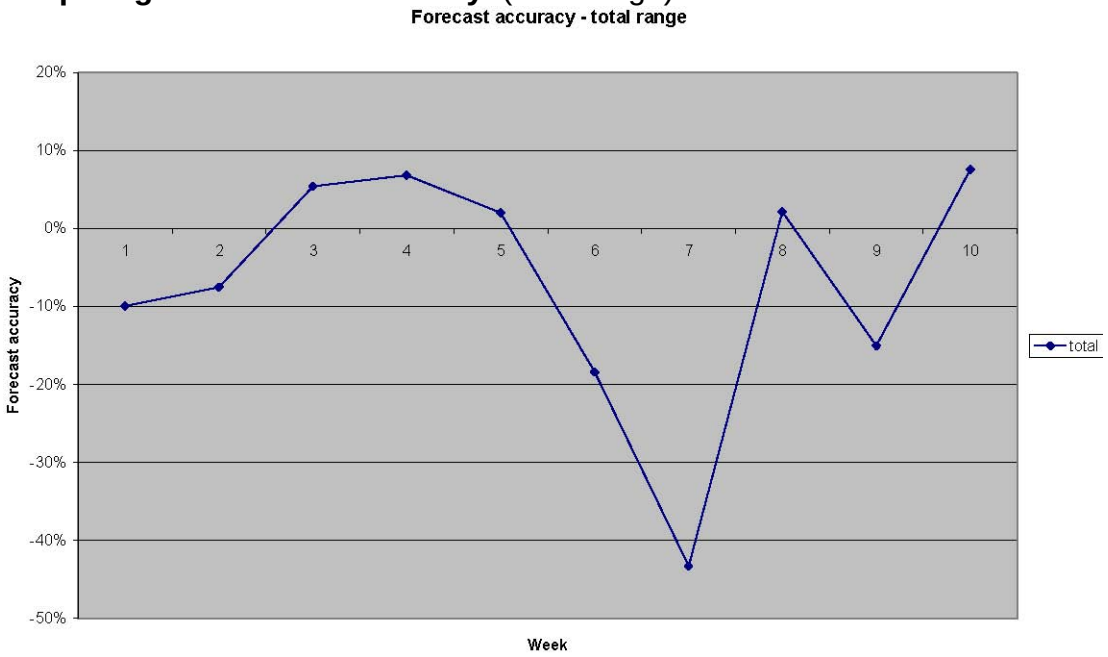
- Sometimes weeks with overall high levels of forecast accuracy had extremely high levels of inaccuracy at the individual product level.
- For example, week 8 was one of the most accurate weeks overall, with actual orders within 2% of forecast. However, some products were significantly under-forecasted (SRS118 and SRS108) whilst SRS301 was over-forecasted. Week 5 tells a similar story.
- Even in the most accurate week from an individual product perspective (week 4) forecast accuracy ranged from -23% (under-forecasted for SRS403) to 31% (over-forecasted for product SRS404).
- Forecasts were more often less than ordered: 61 times versus 39 times for under-forecast. The major differences were also under-forecasted product. For example, product SRS118 in weeks 7 and 8 actual orders were more than double forecast.
- Persistent forecast errors were also observed with some products. SRS403 for example was under-forecast for each of the ten weeks; SRS118 was under-forecast for 8 of the 10 weeks. SRS301 on the other hand was over-forecasted for 9 weeks and SRS205 for 7 of the 10 weeks.

Table two: forecast accuracy

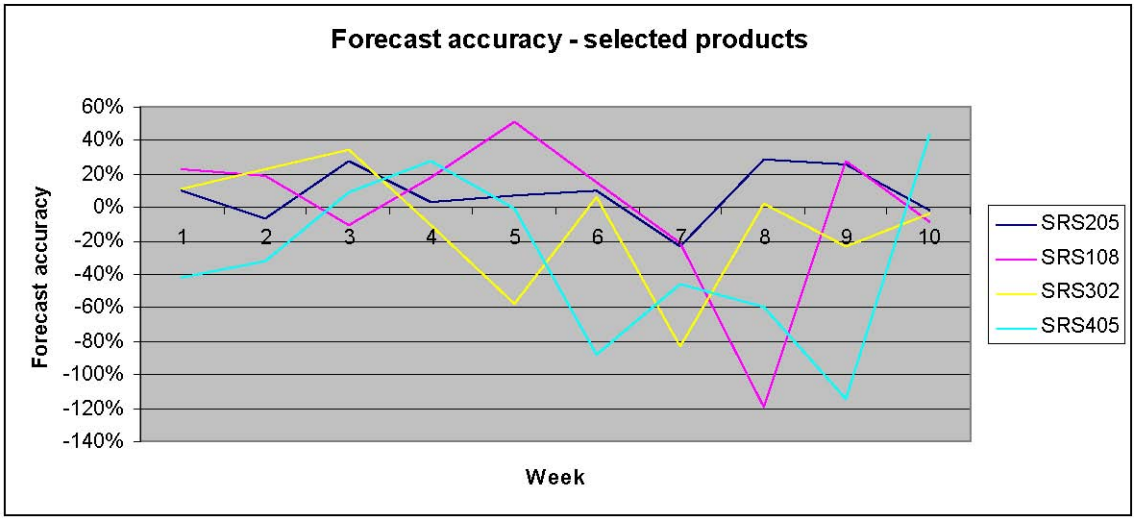
(Ten products for a ten week period)

	Week									
Product	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
SRS118	-32%	1%	-31%	8%	-11%	-14%	-125%	-269%	-6%	-12%
SRS205	10%	-6%	27%	3%	8%	10%	-23%	29%	25%	-2%
SRS108	23%	19%	-11%	18%	51%	15%	-21%	-120%	27%	-8%
SRS405	-42%	-32%	9%	28%	-1%	-88%	-46%	-60%	-114%	43%
SRS404	-34%	-28%	18%	31%	3%	-77%	-48%	-83%	-37%	46%
SRS103	-5%	-3%	-8%	-21%	-10%	-14%	-40%	-7%	-49%	-72%
SRS301	14%	38%	32%	25%	17%	3%	-11%	64%	19%	39%
SRS302	11%	23%	34%	-11%	-58%	6%	-83%	2%	-23%	-4%
SRS300	-14%	-22%	-18%	-16%	-11%	11%	-55%	-12%	12%	6%
SRS403	-11%	-9%	-6%	-23%	-21%	-7%	-49%	-35%	-50%	-84%
Total	-10%	-7%	5%	7%	2%	-18%	-43%	2%	-15%	8%

Graph eight: Forecast accuracy (total range)



Graph nine: Forecast accuracy (Selected products)



5.1 Forecast accuracy implications

In an environment characterised by such high levels of forecast inaccuracy the system requires some type of buffer or otherwise out-of-stocks or under-delivery will result. In the CRF case the vacuum packed product provides the coping mechanism. Vacuum packed product which can be stored provides the necessary inventory flexibility. Section 5.1.1 summarises the delivery accuracy and section 5.1.2 outlines the level of vacuum packed product. A later section investigates the cost of this buffer.

5.1.1 Delivery accuracy

Table three provides the product delivered as a percent of actual orders. The main points from this table are:

- Product was supplied as ordered (100-105%) on 57 occasions (out of a total of 100 or ten products by ten weeks).
- Product was over-supplied (more than 105%) on an additional 16 occasions meaning that product was under-supplied on 27 occasions.
- Under-supplied product was particularly noted with SRS118 which was under-supplied in each of the 10 weeks. Of the 17 other under-supplied weeks across the remaining 9 products, 5 were within 95% of ordered quantity.
- Three products were never under-supplied (SRS103, SRS 302 and SRS403); product SR300 was undersupplied in one week, and three products (SRS405, SRS404 and SRS301) were under-supplied in two weeks.
- Hence most under-delivery occurred with 3 products (SRS118, SRS205 and SRS108). As table one above shows the forecasting accuracy with these 3 products is not dramatically different from the other products suggesting another explanation.

Table three: delivery performance (Ten products for ten week period)

	Week									
Product	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
SRS118	49%	50%	44%	74%	57%	62%	70%	60%	78%	74%
SRS205	100%	100%	101%	100%	101%	97%	93%	79%	89%	100%
SRS108	101%	95%	101%	100%	75%	92%	89%	74%	95%	100%
SRS405	100%	100%	101%	101%	97%	86%	100%	153%	100%	100%
SRS404	101%	101%	100%	102%	52%	84%	101%	156%	100%	101%
SRS103	102%	102%	104%	103%	102%	103%	102%	101%	106%	101%
SRS301	101%	101%	101%	100%	101%	81%	101%	101%	95%	129%
SRS302	103%	120%	106%	102%	101%	122%	100%	101%	100%	101%
SRS300	101%	101%	101%	101%	91%	110%	104%	107%	112%	106%
SRS403	107%	103%	102%	107%	104%	129%	126%	106%	101%	101%

5.1.2 Vacuum packed product

Vacuum packing is the main mechanism by which CRF is able to manage ordering volatility and forecast inaccuracy. This section outlines the proportion of vacuum packed products across the ten week period (see table four and graph ten).

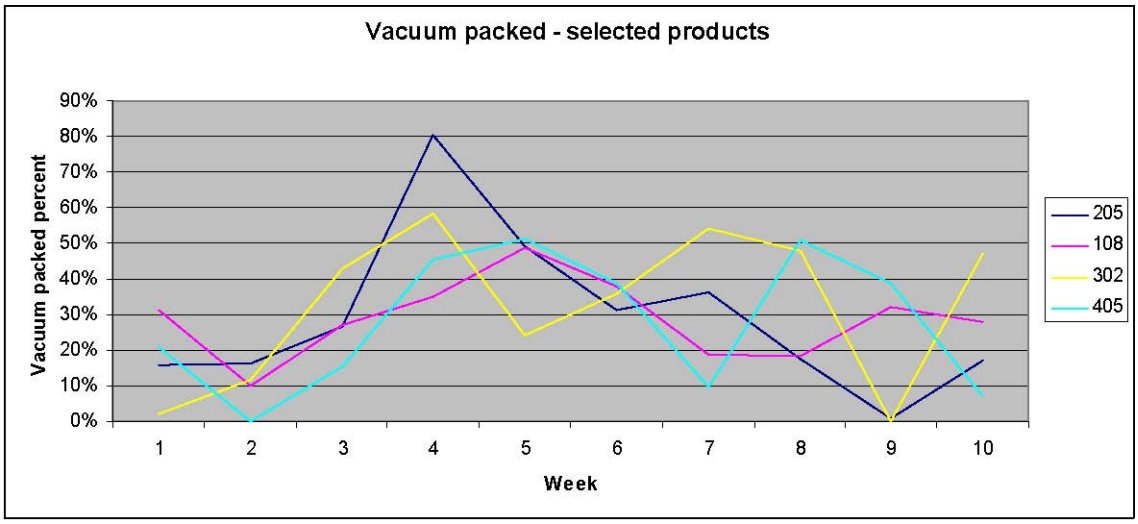
The main observations from this table are:

- In most weeks around 20% of product is supplied in vacuum packed form, highlighting the opportunities for significant productivity gains and cost reductions.
- The proportion of vacuum-packed product varies significantly from product to product. Product 103 for example exhibited low levels of vacuum-packed product whereas product 118 was typically supplied in this form half the time.
- Graph ten illustrates the situation with four selected products, again highlighting the level of volatility in the proportion of vacuum packed product from week to week. This is what would be expected in such a volatile day-to-day operating environment.

Table four: Proportion of product vacuum packed

	Week									
Product	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
SRV118	49%	50%	44%	74%	57%	62%	41%	60%	67%	74%
SRV205	16%	16%	27%	81%	49%	31%	36%	17%	1%	17%
SRV108	31%	10%	27%	35%	49%	38%	19%	18%	32%	28%
SRV405	21%	0%	16%	46%	51%	39%	10%	51%	39%	7%
SRV404	20%	5%	15%	48%	0%	37%	11%	51%	37%	0%
COL103	0%	0%	0%	7%	12%	13%	0%	0%	0%	0%
SRV301	21%	0%	5%	19%	22%	14%	19%	26%	2%	31%
SRV302	2%	12%	43%	58%	24%	36%	54%	48%	0%	47%
COL300	10%	1%	7%	10%	8%	28%	14%	18%	6%	11%
SRV403	8%	0%	0%	8%	6%	46%	41%	9%	2%	2%
Total	19.0%	8.0%	18.0%	40.0%	34.0%	37.0%	23.0%	23.0%	21.0%	17.0%

Graph ten: vacuum packed (selected products)



5.2. Ordering and forecasting correlation

This section investigates the correlations between sales volume, ordering volatility, forecast accuracy and the level of vacuum packed product. The section aims to answer questions such as: what impact does ordering volatility have on forecast accuracy, and is forecasting more accurate for high volume or low volume sales products?

5.2.1 Order volumes and forecast accuracy

The correlation between the volume of product ordered (table one) and forecast accuracy (table two) is -0.15 suggesting a relatively low correlation and that larger products tend to be under-forecasted. However, the over and under forecasts which are expressed in positive and negative terms tend to cancel each other out with this simple correlation.

The analysis was repeated with the removal of the negative signs thus addressing the forecast accuracy regardless of whether the forecast was over or under-forecast. In this instance the correlation was 0.52 indicating a much stronger but not highly significant correlation. Typically a correlation of 0.6 or greater is an indication of significance. The +0.52 correlation also shows that the larger products have less accurate forecasts.

This is not surprising and is consistent with HI-LO retailing: the larger products are subject to more promotional activity and hence greater sales volatility which is more difficult to forecast. The lack of accurate forecasts for major products clearly adds stress to the operations of both the retailer and the supplier.

5.2.2 Order volumes, forecasting and delivery performance

The correlation between product ordered (table one) and delivery performance (table three) was -0.05. This very low correlation indicates that delivery performance is the same (that is, very impressive) regardless of the quantity ordered. The negative sign means that delivery performance is slightly less (but still insignificant) for the larger products – again as would be expected.

The correlation between delivery performance and forecast accuracy is – 0.12. Again delivery performance is impressive regardless of forecast accuracy. The negative sign in this instance indicates that delivery performance is very slightly (but not significantly) less

when forecasts are inaccurate.

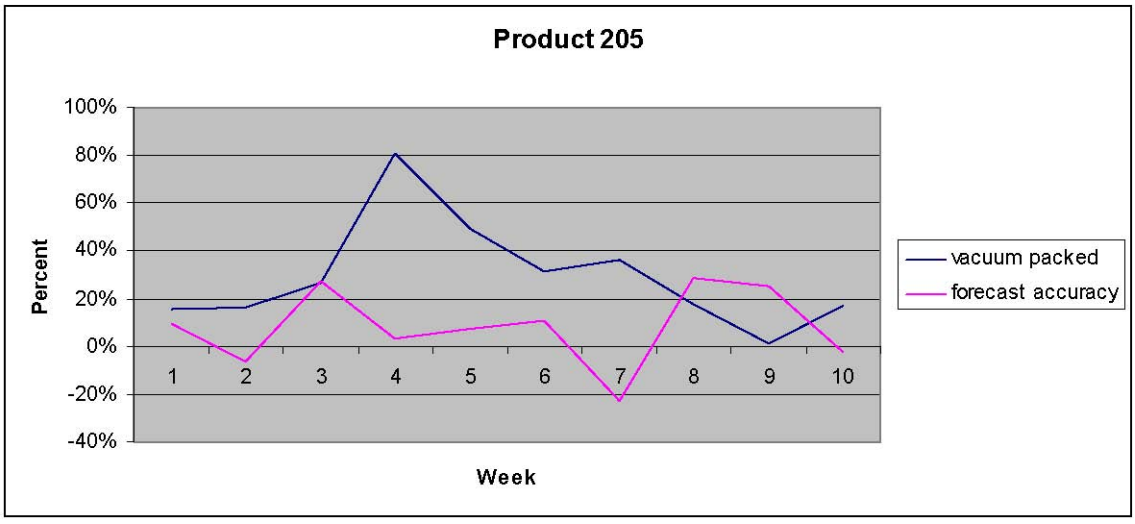
In essence these two correlations show that CRF has developed a system that meets high levels of delivery performance regardless of volumes ordered and forecast accuracy. This is the state-of-play with fresh food retailers and suppliers around the world. Later sections will address the cost implications of such systems with high delivery performance in the face of volatile orders and low forecast accuracy.

5.2.3 Ordering volumes, forecast accuracy and vacuum packed product

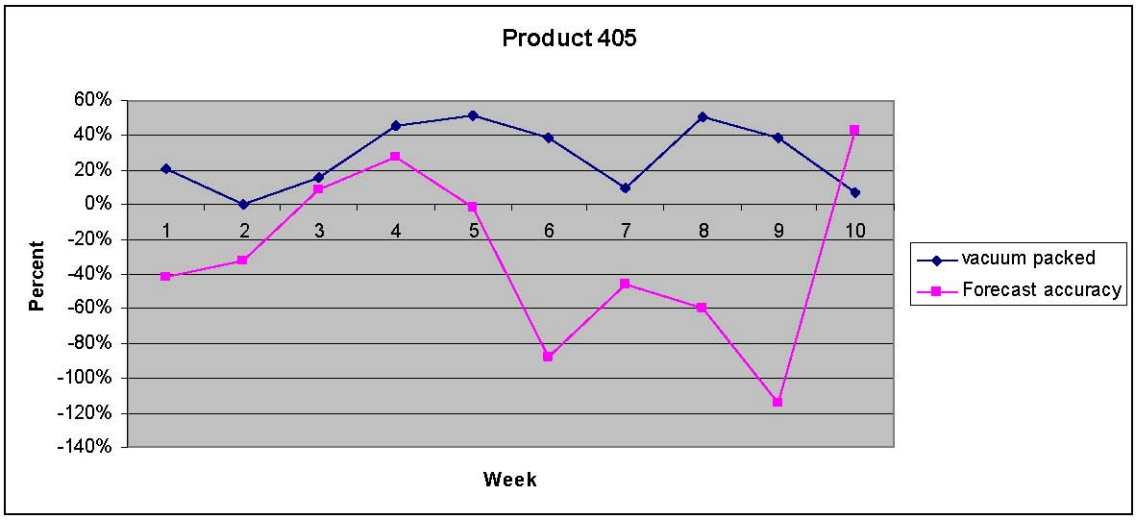
The correlations between vacuum packed products (table four) are:

- Product ordered = -0.07. This is a virtually non-existent correlation and shows that the level of vacuum packed product has no relationship with ordering quantity.
- Product supplied = -.23. This is also a non-significant correlation showing that delivery performance is high regardless of the level of vacuum packing. The negative sign means that lower levels of delivery performance are correlated with high levels of vacuum packing. This makes sense and suggests that the vacuum packed buffer is not able to manage the level of volatility in every case.
- Forecast accuracy = 0.14. Again a very small and non-significant correlation but with some suggestion that lower forecast accuracy leads to high levels of vacuum packing. With forecast accuracy there could be lagged effects with the level of vacuum packing taking 1-2 weeks to exhibit. Graphs eleven and twelve look at the level of vacuum packing and forecast accuracy for two products. There does not appear to be any clear correlation between forecast accuracy and the vacuum packing.

Graph eleven: Forecast accuracy and vacuum packed – product 205



Graph twelve: Forecast accuracy and vacuum packed – product 405



6. The cost impact of sales volatility

This section discusses the cost impact of retail sales volatility.

The cost impact of vacuum packed product is through a number of mechanisms including packaging, labour, line speed, inventory costs and capital expenditure. This section quantifies the additional costs at the individual expense level and then calculates the overall cost benefit from improved forecasts.

The calculations do not assess the impact on SRS but these would include unpacking labour costs and additional waste disposal costs. Packaging used for vacuum packing is 100% non-recyclable and therefore contributes to the carbon footprint of the lamb value chain.

6.1 Packaging

The increase in packaging costs from vacuum packed product is a result of the cost of vacuum packaging and increase in carton costs from less efficient carton space utilisation.

6.1.1 Vacuum packaging

Fresh product costs 6 cents/Kg in packaging costs based on $1.13 per carton and 18 K/carton. Vacuum packed product currently costs 26c/Kg or an increase of 20 cents/Kg or 433%.

For the ten products over the 10 week period and an average week of 90,000 Kg ordered and 20% (or 18,000 Kg) the increase 20 c/Kg packaging cost equates to $3,600 – up from $5,580 to $9,180.

Table five illustrates that packaging costs are doubled when 30% of product is vacuum packed. In a high vacuum packed week (40% of production) packaging costs increase by over $7,400 or 133%.

Table five: Packaging costs and vacuum packed product

Percent vacuum packed	Packaging cost	Increase	Percent increase
0	5,580	0	0%
10	7,440	1,860	33%
20	9,300	3,720	67%
30	11,160	5,580	100%
40	13,020	7,440	133%

6.1.2 Carton costs

With fresh product 28 pieces can be packed into each carton compared with 24 pieces with vacuum packed product – an increase of 17%. In addition cartons for vacuum packed product are 29% more expensive ($1.19 versus $0.92) due to an increased collar height.

Based on an average of 13,000 cartons per week the impact of vacuuming packing on carton costs is summarised in table six. Vacuum packing 30% of product leads to an additional carton cost of $1,828 per week or a 15% increase in packaging costs.

Table six: Carton costs and vacuum packed product

Percent vacuum packed	Cartons (total)	Vacuum packed cartons	Regular carton cost	Vacuum carton cost	Total carton cost	Incremental cost	Percent increase
0	13,000	0	11,960	0	11,960	0	0
10	13,217	1,517	10,764	1,805	12,569	609	5%
20	13,434	3,034	9,568	3,610	13,178	1,218	10%
30	13,651	4,551	8,372	5,416	13,788	1,828	15%
40	13,868	6,068	7,176	7,221	14,397	2,437	20%

6.2 Labour

Vacuum packed product is a labour intensive process and requires additional staff. Over the two vacuum packed lines this equates to an additional staff members per shift (or per 3,000 cartons). Total shift numbers increase from 130 to 131.

Based on hourly an average hourly rate $38.40 per person this equates to an annual cost of $55,000 (including on-costs) for the additional staff member.

6.3 Repacking costs

Repacking costs are based on a leaker rate of 2%. This is the volume of vacuum packed product that has to be repacked with additional packaging (and labour) costs. As the level of vacuum packed product increases the cost of leaker related products also increases. For example in a high week when 40% - or 36,000 Kg – of product is vacuum packed then a 2% leaker rate equates to almost 750 Kg of product that has to be reworked and repacked per week.

Table six summarises the additional packaging costs associated with leaker product per week. Whilst not excessive in the total cost structure of the business this is simply another source of waste that could easily be removed.

Additional labour costs are estimated at $1,000 per week for reworking leaker product.

Table six: Leaker product packaging costs

Percent vacuum packed	Reworked product (Kg)	Packaging cost ($)
0	0	0
10	186	48
20	372	97
30	558	145
40	744	193

6.4 Inventory costs

Inventory carrying costs include storage and finance costs.

Storage costs relate to product that is held over from one week to the next. Currently approximately 50% of vacuum packed product is held over. Each carton is charged at $1.75 per carton per week resulting in an additional weekly inventory cost of $2,625.

6.5 Capital expenditure

The vacuum packed operation limits management ability to speed up the line. Hence an additional vacuum packed line would be required to enable the line to operate at faster speeds. The investment required would be $200,000 implying an annual finance cost of $28,000 (assuming a required return on investment of 14% which is the opportunity cost of additional investment).

This equates to a weekly finance cost of approximately $500.

6.6 Overall cost impact

This section summarises the overall cost impact of vacuum packed product on the business. The cost savings from improved forecasts are then calculated.

The additional weekly and annual potential cost savings are summarised in table seven. This table is based on a typical week where 30% of product is vacuum packed. Annual cost savings of over $600,000 are achievable with almost half the potential cost savings based on packaging costs.

Weeks where 40% of product is vacuum packed add the equivalent of over $750,000 per annum in costs.

Given that the company operates with annual variable costs of $20m per annum this equates to 3.75% of the total variable costs.

Table seven: potential cost savings from accurate demand forecasting

	Additional costs		Percent
Item	*Week*	*Annual*	
packaging	5,550	288,600	44%
cartons	1,828	95,056	14%
labour	1,057	54,964	8%
reworking	1,145	59,540	9%
inventory	2,625	136,500	21%
capital	500	26,000	4%
Total	12,705	660,660	100%

This analysis suggests that if the system could be improved to the situation where (say) 5% of product is vacuum packed, providing a reasonable buffer then cost savings of over $500,000 per annum could be realised compared with the current situation where 30% of product is vacuum packed.

Overseas experience with retailers such as Wal-Mart and Tesco suggest that the solution is not just improved forecast accuracy, but rather a number of strategies whereby the retailer and supply work together on:

- o Inventory management
- o Promotion management: forecasting and evaluation
- o Brand development which leads to more stable growth patterns.