

BUAN 6337. 002

PREDICTIVE ANALYTICS WITH SAS

PROJECT REPORT ON

Milk Sales Analysis

STATISTICAL ANALYSIS OF MILK SALES DATA

As the Marketing analysts of DEANS brand in the Chicago office, we analyzed the sales of 8340 products in the year 2001. This report contains the insights we found from the given data. These insights help improve the sales of DEANS milk.

Number of Weeks: 52

Start Date of the Sales: January 1, 2001

End Date of the Sales: December 30, 2001

The following are the analysis and insights obtained from various models with the supporting data visualizations carried out on the given data.

LINEAR REGRESSION:

- For every large-sized flier sent out, the number of units sold is 5.653 more than the small sized flier. Thus large fliers are the better option here especially if their cost is not too high.
- Milk with 2% milkfat has 117 units more sales when compared to whole milk. 2% milkfat is usually bought for toddlers. This indicates that the target market does have a lot of new parents. This information is very important to build a new segmented marketing tactic or brand strategy.
- The product subcategory of DEANS milk such as milkshakes and non dairy drinks are bought in high number of units than milk sold. Lactose-free milk is bought in huge quantities (234 units more on average than other products based on linear regression coefficients). Such huge quantities can also be offered through bundling offers (promotions) to encourage more buying.

Price Elasticity of Demand

- We created an “effective price” variable for measuring price elasticity. From linear regression we found that, Increase in price of DEANS products by \$1 decreases the number of units sold per week by 20 units.
- **The price elasticity of demand on average is -0.85** (Calculation: $-20 \times 2.48 / 58.4$)
- *Thus, decrease in demand is not as high as increase in price. So there is scope for increasing prices as it may increase the total profits even though the number of units sold decreases.*
- This is a very important insight and should further be utilized to inspect which specific products have such inelastic demand to boost profits.
- Similarly, some products will also have elastic demand which will have scope for boosting profits by decrease in price.

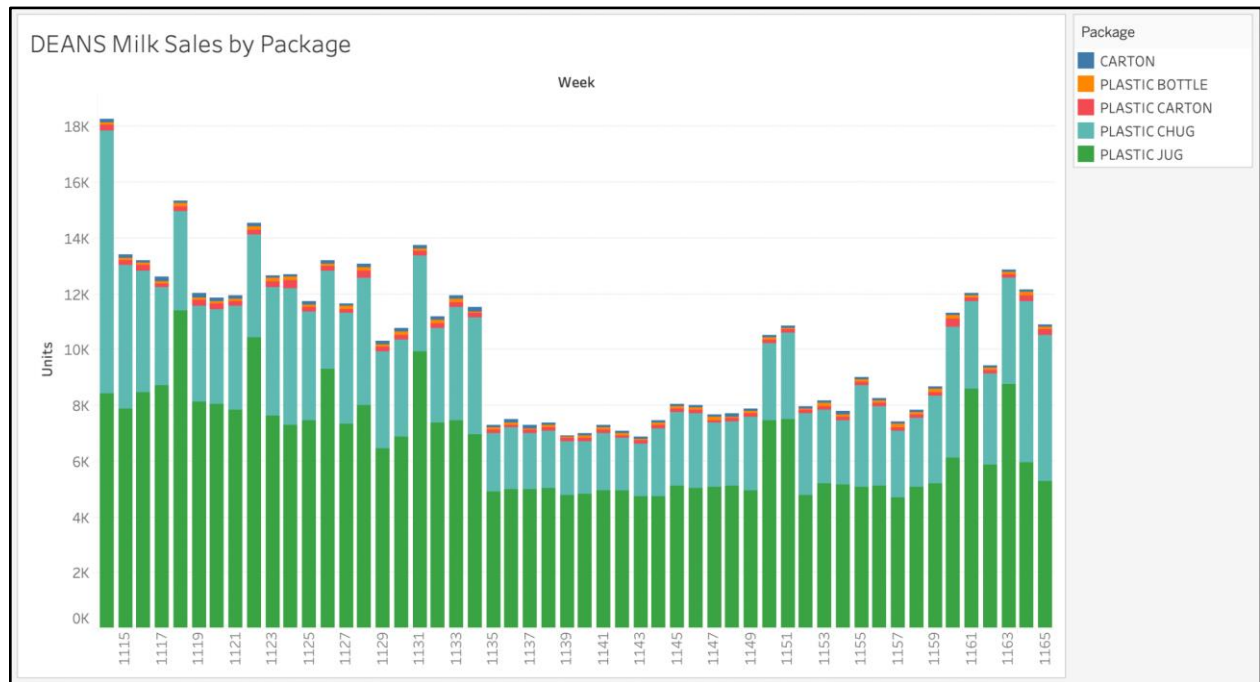
In-store Display Advertising

- Through regression, it was found that advertising on display about special deals increase the average units sold by 128 units.
- Thus, display advertising is a great method to boost profits in combination with adjusting the prices. Once we adjust prices of products based on the demand elasticity, in-store display should be used to bring in those high margins and revenue.

Variable Importance:

- Flier & Price Reduction have the highest impact of sales. They are boosting the sales a lot.
- Price of the product impact the sales a lot. This highlights how importance pricing is for DEANS.
- The fact that the package is plastic is negatively impacting the purchase decision of the customer. The company must work on more eco-friendly packages for the milk to cater to the fast growing environment-conscious customers.

Milk Sales by Package

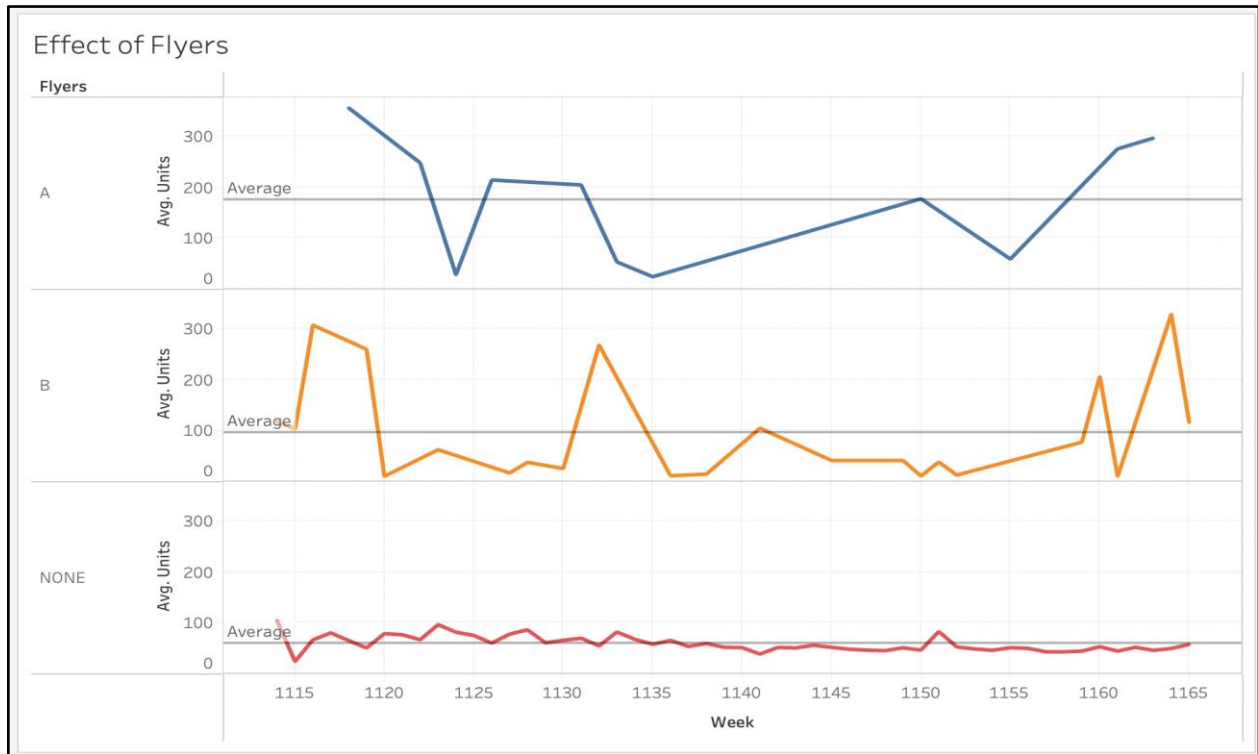


The negative coefficient implies that the plastic packaging of the product decreases the number of units that are being sold. Since there are no other options available for the product packaging, we do not have data on what material the customers prefer. Even though we have a negative coefficient, the visualization says the plastic packages are being sold more since they are the only options available on the market. But it implies that eco-friendly packaging needs to be adopted.

Effect of Flyers on Sales

A large-sized ad “A” has 69 units more Sales when there were no ads present.

A medium-sized ad “B” has 27 units more Sales when there were no ads present.

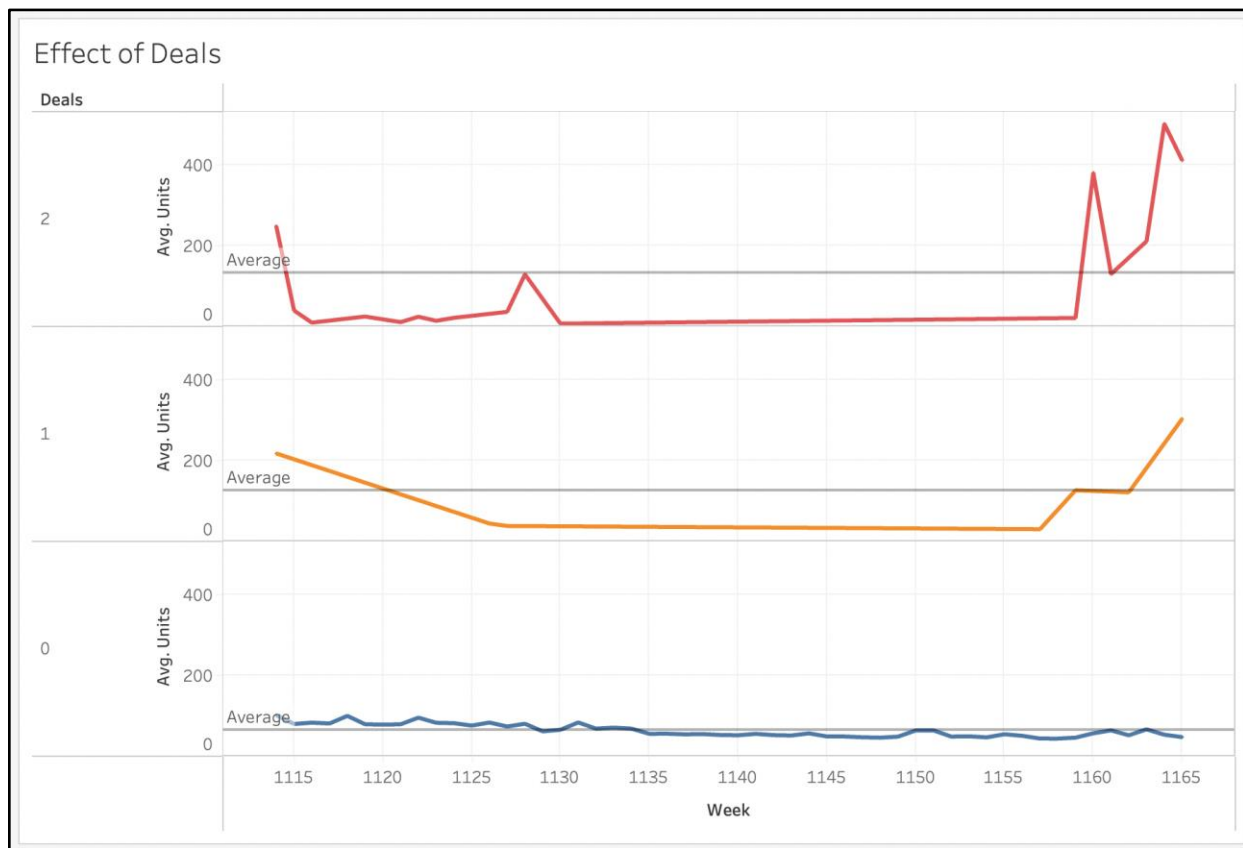


A large-sized flyer (A) has doubled the sales than that of a medium-sized flyer (B). The reason could be because the large-sized flyers are more attractive and catch customers' attention. Hence, our company should invest more in large-sized flyers to increase sales.

Effect of Deals on Sales:

Overall, Deals have no statistical significance on Sales throughout the year but during the Christmas season.

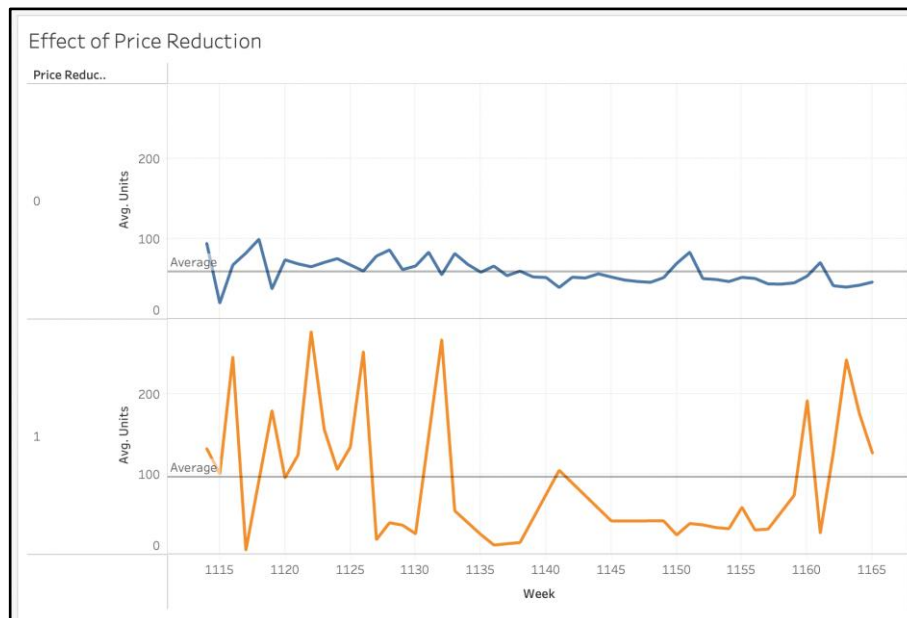
Hence, it is advisable to focus on Deals during the festive season to increase sales.



Effect of 5% Temporary Price Reduction on Sales

The price reduction has a negative effect on the Sales.

As you can see from the below graph 5% Temporary Price Reduction impacted the sales in a positive way as you can see the sales are almost around average every week compared to the regular price sales which is highly fluctuating.



Effect of Additives on Milk Sales

There are four types of milk based on the additives:

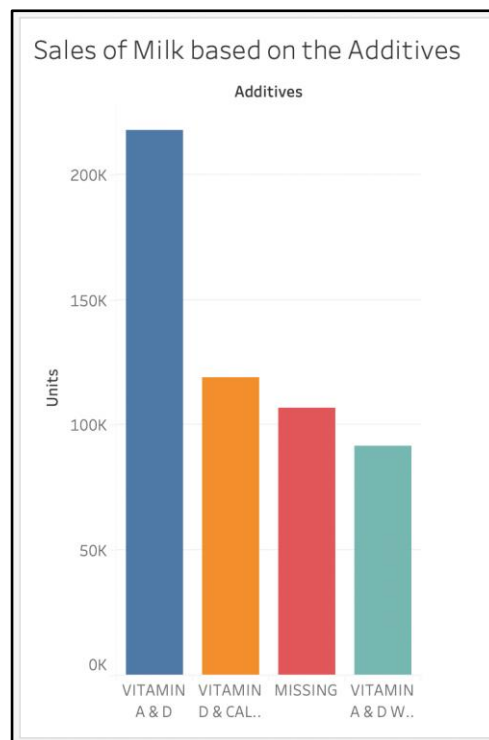
1. No Additives
2. Additives with Vitamin A and D
3. Additives with Vitamin A and D without Calcium
4. Additives with Vitamin A and D with Calcium

When there is no additive, the sales of milk are 27 units higher than when there are additives with Vitamin A and D with Calcium.

When the milk has additives with Vitamin A and D without Calcium, the sales of milk are 33 units lower than when there are additives with Vitamin A and D with Calcium.

Milk with additives with Vitamin A and D has no statistical significance on the milk Sales.

Hence, we can conclude that kinds of milk without additives are popular among the customers.



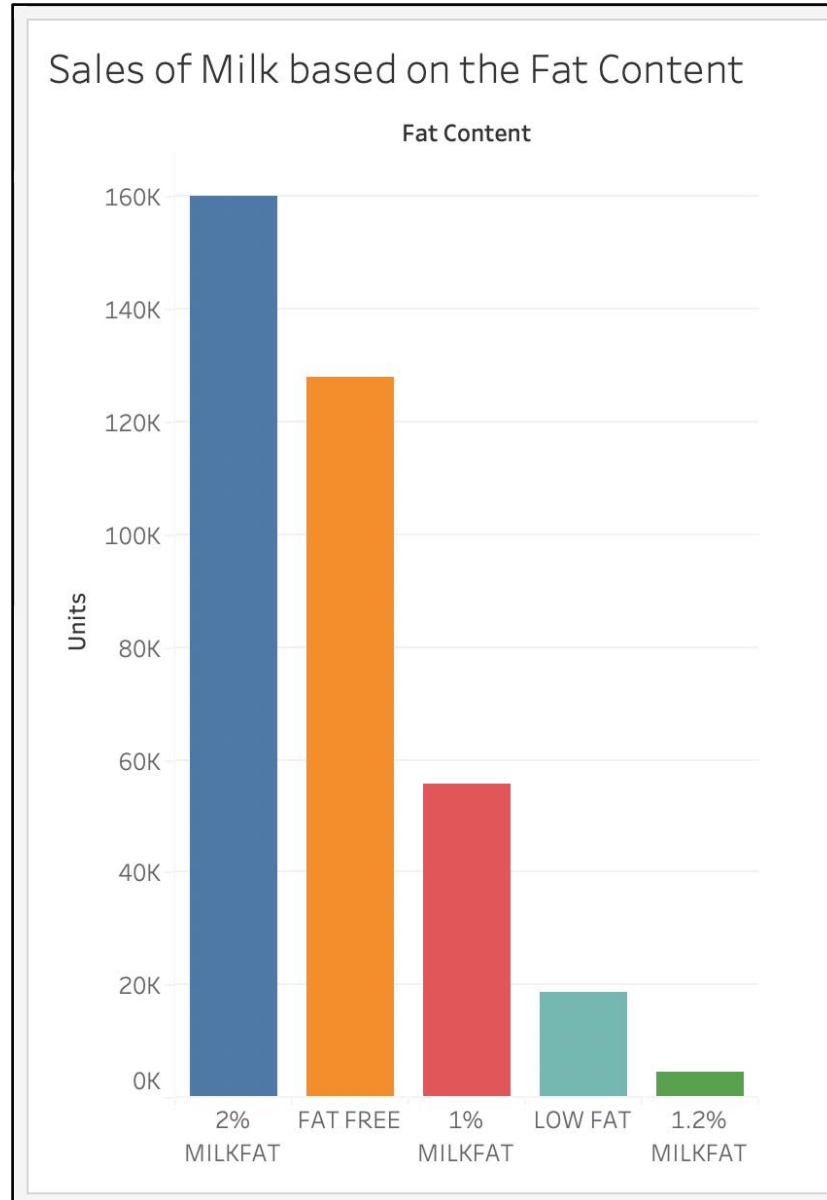
Effect of Fat Content of the Milk on Sales

Milk with 2% milkfat has 117 units more sales when compared to whole milk.

Milk with 1% milkfat has 108 units more sales when compared to whole milk.

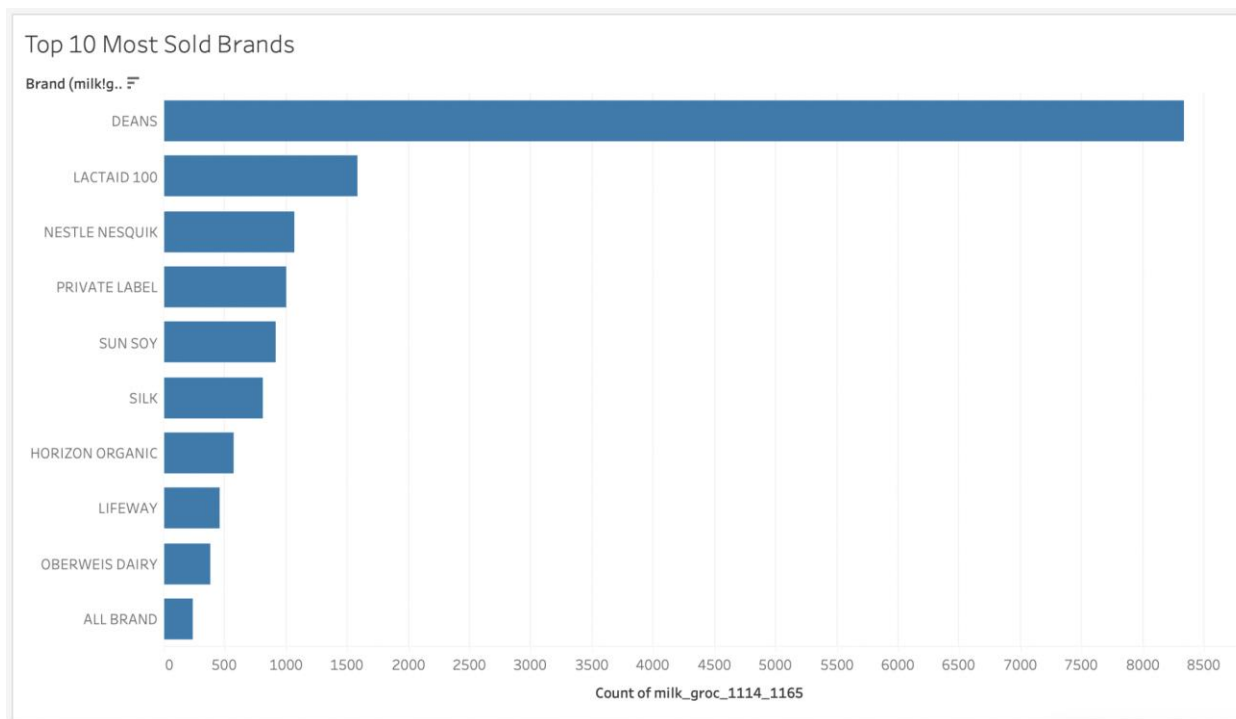
Fat-free milk fat has 74 units more sales than compared to whole milk.

Hence, milk with 2% milkfat and fat-free milk has similar sales. Hence, our company should focus on advertising these two variants of milk to increase sales.

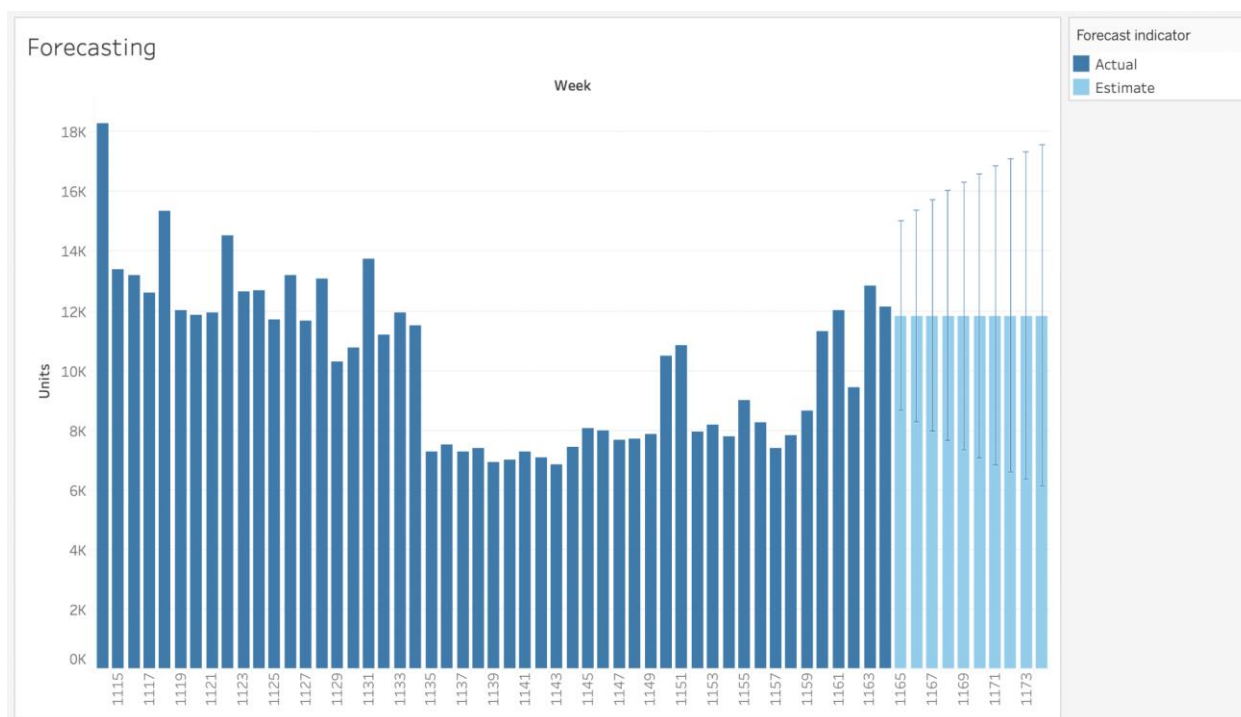


Competitors (Top Sold Brands)

As the barchart clearly shows, our top two competitors are LACTAID 100 and NESTLE NESQUIK. We study the marketing efforts of LACTAID 100 and NESTLE NESQUIK from the 2000 and 2001, and assess what could be changed and improved in the DEANS marketing promotions.



Time Series Analysis of Sales



Seasonality is seen which means we have non-stationary data. *The sales are higher during the beginning of the year and the end of the year, especially during the festive seasons like*

the New Year, Thanksgiving, Black Friday, and Christmas. The sales have dropped significantly during the non-festive seasons in the summer. The forecast has estimated that the sales will rise during the end of the year especially during the Thanksgiving Day and Christmas.

Most important variables from the data

From the regression analysis, we found out that the following variables are the most important. The type of milk that is lactose free, milk with 2% fat content, fat-free milk are the most important factors that play a big role in a customer's decision to buy the product. The last two variables that are about what material the packaging is made of is also a very important aspect that customers think about when making the purchasing decision. The fact that the package is plastic is negatively impacting the purchase decision of the customer. The company must work on more eco-friendly packages for the milk to cater to the fast-growing environment-conscious customers.

Variable	P-value	Significance	Impact
TYPE OF MILK_LACTOSE FREE	64.2381	Significant	Positive
FAT CONTENT_2% MILKFAT	44.7578	Significant	Positive
FAT CONTENT_FAT FREE	37.9238	Significant	Positive
PACKAGE_CARTON	-64.2865	Significant	Negative
PACKAGE_PLASTIC CHUG	-74.3843	Significant	Negative

Highest Revenue Markets

These 5 areas are the largest markets and represent 50% of total sales of all brands

Market Area	Total Sold Units
LOS ANGELES	327539
NEW YORK	311420
DALLAS, TX	179964
SAN FRANCISCO	173127
BOSTON	152244
NEW ENGLAND	151156
CHICAGO	141834
HOUSTON	140924
ATLANTA	130037
SACRAMENTO	118583
SACRAMENTO	118583
SOUTH CAROLINA	117104
WASHINGTON, DC	109976
PHILADELPHIA	109591
HARTFORD	104781

Further analysis should be done for these markets too.

Summary

Many of these points mentioned by us have clear and important actionable insights which should be executed. DEANS does have the potential to become the market leader.