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PREDICTIVE ANALYTICS USING SAS

MARKET ANALYSIS ON CHOCOLATE
MILK SALES IN TEXAS

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To: Senior management Nestle S.A.

For: Market analysis on chocolate milk products in Texas

This report summarizes the market of chocolate milk products in Texas and provides recommendations on what Nestle can do to increase its current market share and impact in Texas.

Executive summary

The project report overviews the total market of chocolate milk in Texas. The report gives details on the market share, product sales, and the unique products of Nestle and its main competitor (Dean Foods Co) for chocolate milk products in three key markets (Dallas, Houston, and West Texas/New Mexico). Several regression models using store-level data have been generated to further understand the factors that can influence the number of units sold per store in the selected markets, including promotional methods (e.g., advertising, product display), product features (e.g., packaging, fat content, size), brand preferences, market location, and pricing. We further analyzed a specific type of product (Nestle skim chocolate milk) and provided several product-specific recommendations which could be used to improve the performance of the product in the above markets.

1. Texas chocolate milk product sales overview

From the datasets, we can get the overall market of chocolate milk in Texas. The market contains three main regions: Dallas, Houston, and West Texas/New Mexico. In general, 45 unique chocolate milk products were sold in the market from 8 vendors (Figure 1.1). The total units sold in 2001 were 414,612.

The typical promotional methods used in this market includes advertisement and coupon, in-store display and price reduction tag. The unit price (per product, could be of different volumes) ranges from \$0.4 - \$3.89, with private label products being the cheapest and Nestle being the most expensive. Because the range of packaging is between 0.5 - 8 pint, the unit price is normalized by volume for direct comparison. The unit price by volume (by pint) ranges from \$0.1 - \$1.72, with private label products being the cheapest and Dean Foods Co being the most expensive. The type of packaging includes carton, glass bottle, plastic bottle, plastic chug and plastic jug.

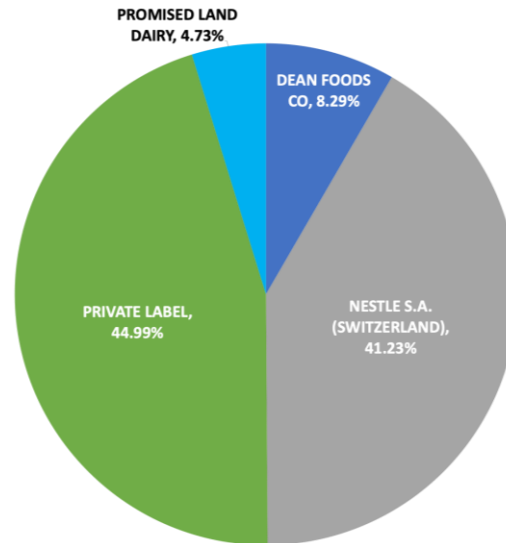


Figure 1.1. Chocolate milk vendors in Texas and market share (only shown companies with >1% market share).

Private label products have the largest market share(44.99%). Nestle S.A. has the highest market share (41.23%) for branded products. Dean Foods Co. has the third largest market share(8.29%) in this region and has the second largest market share for branded products.

Dean Foods Co. and Nestle S.A are main competitors for branded products. Table 1.1 shows a side-by-side comparison of the products and sales between Dean Foods Co. and Nestle S.A.

Table 1.1. Nestle S.A. vs Dean Foods Co

Vendor	Market share	Total units sold (Texas Market)	Unique products
Nestle S.A.	41.23%	170,958	5
Dean Foods Co	8.29%	34,376	12

2. Factors that influences chocolate milk sales in Texas

A general regression model was generated to understand factors that can influence chocolate milk units sold in a store. The dependent variable used here is units sold at each retail location (a chain). The independent variables include seasonality, different promotional methods (different scales of advertising, in-store product display, price reduction), product features (different packaging, fat content, size), choices of brands (Nestle, Dean Foods Co, Private labels and others), market location and pricing. Because the unit price is highly correlated with the product volume (larger the volume, higher the price), unit price per volume is used as a normalized variable to replace unit price and product volume. Unit price per volume is calculated as unit price divided by volume equivalent in pint.

Table 2.1. Factors influence chocolate milk sales in Texas

Model parameters			
Variable		Estimate	Standardized Estimate
Intercept		65.09**	0
Quarters (reference to quarter 4)	Q1	0.79**	0.02
	Q2	0.23	0.01
	Q3	0.97**	0.03
Feature (reference to no feature)	Large size ad	25.49**	0.21
	Retailer coupon or rebate	3.55*	0.01
	Mid-size ad	2.11**	0.02
	Small size ad	1.81**	0.01
Display (reference to major display)	No display	-39.12**	-0.11
	Minor display	-28.40**	-0.08
Price reduction flag (reference to $\geq 5\%$ price reduction)	< 5% price reduction	-1.95**	-0.04
Name of group (reference to PRIVATE LABEL)	DEAN FOODS CO	-6.04**	-0.15
	NESTLE S.A. (SWITZERLAND)	-0.74*	-0.02
	OTHER	-9.99**	-0.16
Package (reference to plastic jug)	Carton	-15.50**	-0.5
	Glass bottle	-10.33**	-0.15

	Plastic bottle	-13.43**	-0.44
	Plastic chug	-9.36**	-0.13
Type of milk (reference to skim)	Low fat	3.98**	0.08
	Reduced fat	4.00**	0.13
	Regular	10.02**	0.28
Market Name (reference to West Texas/New Mexico)	Dallas	-0.71**	-0.02
	Houston	-2.16**	-0.07
Unit price per volume		-3.42**	-0.07
Elasticity			
Mean units		11.13	
Mean unit price per volume		0.86	
Price elasticity		-0.26**	

** significant at 95% confidence level

* significant at 90% confidence level

Seasonality

The seasonal periods seem to play a role in the sales. Among all quarters, Q2 and Q4 are the worst periods in relation to unit sales. Compared to Q4, in Q1 the units sale increased by 0.79, in Q3 the unit sales per store increased by 0.97. The impact of seasonality can be estimated based on the standardized beta, where Q3 sales ~ Q1 sales > Q2 sales ~ Q4 sales.

Promotional methods

Presence of the brand in a store flier ad seems to play a role in the sales. Compared to no feature, large size ads increase the units sale by 25.49, retailer coupon or rebate only mildly increase the units sale by 3.55, mid-size ad increases the units sale by 2.11, and small size ads increase the units sale by 1.81. Impact on sales: Large size ads > mid-size ads > small size ads > coupons/rebate.

In-store display highlighting the fact that the brand or UPC is on a special deal seems to play a role in the sales. Having no display seems to negatively impact the unit sales the most. Compared to the major display, no display decreases the unit sales by 39.12, minor display decreases the

unit sales by 28.40. The impact of display can be estimated based on the standardized beta where major display > minor display > no display. This is obvious because it is easier to gain attention on a bigger in-store display compared to a smaller display.

Compared to $\geq 5\%$ price reduction, products without or with minor price reduction tag reduces the unit sold per store by 1.95.

Vendors

Nestle and Dean Foods Co are the main brand producers of the chocolate milk and have higher market shares compared to other brands ('Other'). Private label products are the other main player in the market due to the cheap price they offer. Compared to private label products, Nestle S.A (Switzerland) has 0.74 units lower sales per store and Dean Foods Co has 6.04 units lower sales per store. In terms of brand producers, Nestle is the market leader.

Product features

Among all packages, plastic jugs are the most preferred among the customers. Compared to jug, cartons decrease the units sold by 15.5, glass bottles decrease the units sold by 10.33, plastic bottles decrease the units sold by 13.43, plastic chug decrease the units sold by 9.36.

Among all milk types, skim milk is the least favorite among customers. Compared to skim milk, regular milk increases the units sold by 10.02, low fat milk increases the units sold by 3.98 and reduced fat milk increases the units sold by 4. The impact of each type of milk can be estimated based on the standardized beta, where regular milk > reduced fat = low fat > skim milk.

Market location

West Texas/New Mexico has the highest units sold per store. Dallas and Houston have comparable sales in each store, which is ~1-2 units less than in West Texas/New Mexico.

Price

With unit price per volume increasing by \$1, the sales per store go down by 3.42 units. Price elasticity is -0.26, meaning on average, customers are not very price sensitive towards chocolate milk products. This is not surprising because when chocolate milk is analyzed as a broad category (with all brands bundled together), there aren't many available substitutes, so a relatively inelastic behavior is expected.

General managerial insight

General strategies to increase the product sales include: 1) using promotional methods such as large size ads, major in-store display highlighting the product; 2) design products with more preferable packaging such as jug, using more regular milks; 3) allocating marketing investments proportionally according to the season and location.

3. Comparing Nestle sales with its main competitor Dean Food Co

As mentioned in Section 1 and Section 2, Nestle has the highest market share for chocolate milk for brand products, while Dean Foods Co offers a higher variety of products to customers. To compare the sales data between the two companies directly, regression models revealing the relationship between units sold per store and other product/promotion specific attributes were generated for each company. Because private label products also take a large share of the

market, although they don't carry a single brand, a regression model for private label is also included for comparison. The main discussion below will focus on Nestle and Dean Food Co only because the market segment for private label products are too different from Nestle and Dean Foods Co (e.g., private label products are generally targeting extremely price sensitive consumers).

Table 3.1. Nestle and Dean Foods Co sales comparison

Model parameters							
Variable		Nestle	Standardi zed Estimate	Dean Foods Co	Standardi zed Estimate	Private Label	Standardi zed Estimate
Intercept		64.23**	0	7.22**	0	49.23**	0
Quarters (reference to Q4)	Q1	0.12	0.01	0.44**	0.03	4.05**	0.07
	Q2	-0.15	-0.01	0.54**	0.04	0.51	0.01
	Q3	0.48**	0.03	0.37*	0.03	3.18**	0.05
Feature (reference to no feature)	Large size ad	11.28**	0.12	1.71**	0.03	29.80**	0.22
	Retailer coupon or rebate	NA	NA	2.49**	0.03	-3.72	-0.0038
	Mid-size ad	4.98**	0.1	0.72*	0.02	-6.68**	-0.03
	Small size ad	2.58**	0.04	-0.05	-0.00051	-4.62	-0.01

Display	No display	-58.80** (ref to major display)	-0.40	-0.08 (ref to minor display)	-0.00067	5.82 (ref to major display)	0.0034
	Minor display	-48.32** (ref to major display)	-0.33	Ref	Ref	14.26 (ref to major display)	0.01
	Major display	Ref	Ref	NA	NA	Ref	Ref
Price reduction flag (reference to $\geq 5\%$ price reduction)	< 5% price reduction	-0.38**	-0.02	-1.05**	-0.06	-10.33**	-0.12
Package	Carton	-1.96** (ref to plastic bottle)	-0.13	-4.98** (ref to plastic chug)	-0.41	-6.19** (ref to plastic jug)	-0.11
	Glass bottle	NA	NA	NA	NA	NA	NA
	Plastic bottle	Ref	Ref	-5.38** (ref to plastic chug)	-0.28	-8.28** (ref to plastic jug)	-0.16

	Plastic jug	NA	NA	NA	NA	Ref	Ref
	Plastic chug	NA	NA	Ref	Ref	NA	NA
Type of milk	Skim	Ref	Ref	NA	NA	NA	NA
	Low fat	NA	NA	2.54** (ref to regular)	0.2	-4.17** (ref to regular)	-0.07
	Reduced fat	4.04** (ref to skim)	0.25	1.89** (ref to regular)	0.16	-8.65** (ref to regular)	-0.09
	Regular	NA	NA	Ref	Ref	Ref	Ref
Market Name (reference to West Texas/New Mexico)	Dallas	0.64**	0.04	-0.57**	-0.04	-4.66**	-0.09
	Houston	2.58**	0.16	-0.80**	-0.07	-12.22**	-0.24
Unit price per volume		-0.20	-0.01	1.38	0.05	-25.44**	-0.20
Elasticity							
Mean units		8.63		5.57		21.13	
Mean price per volume		0.98		2.40		0.53	
Price elasticity		0 (-0.02) [#]		0 (0.59) [#]		-0.64**	

** significant at 95% confidence level

* significant at 90% confidence level

coefficient for price per volume not significantly different from 0, elasticity is not significant. Numeric number is included in parenthesis()

Seasonality

Sales in Nestle appear to be more seasonal than Dean Foods Co. since Nestle showed significantly higher sales in Q3, whereas Dean Foods Co. sales were relatively even across all quarters. Q4 is the worst season for Dean Foods Co.

Promotional methods

All types of features, except coupons (which were not available) were having a positive impact on Nestle's sales, with large sized ads showing the highest importance (highest standardized beta). Dean Foods Co. received responses via large-size ads, mid-size ads and coupons.

Compared to the major display, no display or minor display reduces Nestle's sales by ~50-60 units. Display didn't seem to impact Dean Foods' sales.

Price reduction tag of less than 5% or no price reduction reduces the sales by approximately 0.38 units for Nestle and 1.05 units for Dean Foods Co, compared to price reduction tag of more than 5%. It could be implied that Dean Foods Co customers are a little more price sensitive than Nestle's customers.

Product features

Nestle only uses cartons and plastic bottles for packaging. Products packed in cartons have significantly lower sales than products packed in plastic bottles. Dean Foods Co uses cartons, plastic bottles and plastic chugs for packaging, where plastic chugs are the preferred packaging and increase the units sold per store by ~5 units.

Nestle customers prefer reduced fat products over skim milk (likely due to the richer taste). Dean Foods Co doesn't offer skim milk products, but the customers show preference in low fat and reduced fat milk over regular milk, possibly due to health awareness.

Market location

Nestle has higher average sales per store in metropolitan areas such as Houston and Dallas, and lower sales per store in West Texas/New Mexico. Dean Foods Co. has the highest sales in West Texas/New Mexico, and has comparable sales in Houston and Dallas.

Price

For both Nestle and Dean Foods, with unit price per volume increasing by \$1, the sales don't change significantly, suggesting that customers for both brands are not very price sensitive. For this reason, the price elasticity calculated for Nestle and Dean Foods should be interpreted with caution as their coefficients for unit price per volume are not significantly different from 0. This is dramatically different from the behavior of private label products, where a \$1 increase in unit price per volume decreases the units sold per store by 25 units (10% increase in price reduces the sales by 6.4%).

General insight regarding the competition

Dean Foods Co has higher sales when they provide coupons than a large size ad, while Nestle doesn't provide any coupons. Nestle could try to experiment on coupons to customers to see if it can help increase sales. Dean Food Co provides its products packed in plastic chung and products in plastic chug have better sales than carton and plastic bottle. Nestle only provides two packing options, plastic bottle and carton. Nestle could try expanding its packing options. Although Nestle's skim milk doesn't have any competitor, reduced fat milk and low fat milk seems to have a broader audience, evidently by the higher sales of low fat by Dean Foods. Nestle must introduce a low fat milk to take shares from Dean Foods Co.

4. Nestle skim chocolate milk products

Nestle has five unique chocolate milk products. Two are made from skim milk, and three are made from reduced fat milk. Product property and sales data are listed in the table below:

Table 4.1. Unique chocolate milk products offered by Nestle

UPC	Description	Unit sold (Texas)
00-01-28000-58454	1 pint Skim	19776
00-01-28000-98216	4 pint Skim	10584
00-02-28000-24610	4 pint Reduced fat	36799
00-03-28000-24620	2 pint Reduced fat	36337
00-03-28000-24630	1 pint Reduced fat	67462

Among the five products, the skim milk products have a lower number of units sold compared to the reduced milk products. However, Nestle is the only vendor in Texas that produces chocolate milk using skim milk, which could be appealing to customers who pursue a low fat/healthy diet. Since Nestle already has the highest market share for branded products, this section will focus on how Nestle could increase the sales for its skim chocolate milk products.

We analyzed the store-level sales data for each product (UPC 00-01-28000-58454 and 00-01-28000-98216) in different regions using SAS proc panel regression. Regression models were generated to find the relationship between units sold and several marketing attributes (Model Units = Feature (for advertising), Display, Price reducing flag, unit price). The results are presented as follows.

UPC 00-01-28000-58454

For product UPC 00-01-28000-58454, features, display and unit price all have significant influences on units sold in the state-wide data. Price reduction flag (discount) doesn't seem to have an effect on the units sold (insignificant coefficient). In general, compared to no feature, small size ad increases the units sold by 1.36, mid-size ad increases the units sold by 1.48, large size ad increases the units sold by 2.62. Compared to no display, units sold increased by 9.5 in

minor display and 27.03 in major display. Price reduction flag has no significant influence on the units sold. With one dollar increase in unit price, sales reduces by 7.9 units. The state-wide price elasticity for this product is -1.43.

Each geographic location exhibits slight variations in the model. In the Dallas area, only mid-size and large-size ads have significant positive influences on units sold. There is no major display in stores in the Dallas area. The price elasticity is -1.29. In the Houston area, only mid-size ads have a significant positive influence on units sold. Price elasticity is -2.07. In West Texas, only major display has a significant positive impact on units sold. Price elasticity is -1.67.

Table 4.2. Summary for UPC 00-01-28000-58454, 1 pint package

Model parameter					
Variable		Texas	Dallas (4259 units sold)	Houston (10401 units sold)	West Texas (5116 units sold)
Intercept		10.70**	12.82**	13.88*	38.25**
Feature (reference to no feature)	Small size ad	1.36*	1.15	1.64	4.24
	Mid-size ad	1.48**	5.05**	5.08**	-1.02
	Large size ad	2.62**	2.58**	3.24	0.96
Display (reference to no display)	Minor display	9.50**	8.93**	NA	NA
	Major display	27.03**	NA	NA	28.95**

Price reduction flag (reference to < 5% price reduction)	≥ 5% price reduction	0.45	0.68	-1.76	-0.98
Unit price		-7.90**	-6.64**	-9.97*	-11.97**
Elasticity					
Mean units		6.72	6.25	6.27	8.48
Mean price		1.22	1.21	1.30	1.18
Price elasticity		-1.43**	-1.29**	-2.07**	-1.67**

** significant at 95% confidence level

* significant at 90% confidence level

Possible managerial actions on UPC 00-01-28000-58454

Investment on small size ads should be reduced for all regions in Texas. Spending on mid-size ads should continue in the Dallas and Houston area, but large size ads should only be considered in Dallas.

Display (minor and major) is showing a large positive impact on units sold. Areas that already have both display options in stores should continue the practice. Areas that currently don't have the product on display should consider experimenting on product display in local stores and decide on the product display strategy based on the results.

Price reduction doesn't seem to have much impact on units sold. It should not be considered as a general promotion strategy.

With current pricing, Houston customers are most price sensitive, followed by West Texas customers. Dallas customers are least price sensitive. Price shall be kept or increased lightly in the Dallas area. Price decrease in the Houston area and West Texas could be considered to drive up the sales, provided that there's net profit.

UPC 00-01-28000-98216

Product UPC 00-01-28000-98216 is the least favorite among Nestle's five chocolate milk products. Based on the model, only minor display has a significant positive impact on units sold in the state-wide data. Specifically, compared to no display, minor display increases the units sold by 2.68. All other attributes are insignificant at 90% confidence level, including the unit price. The state-wide price elasticity for this product is close to 0, suggesting little to no impact on demand.

Similar results are observed in each geographic region. In Houston, where there are the highest units sold, minor display seems to play a major role in boosting the sales. Interestingly, in West Texas, products with a >5% price reduction flag reduces units sold by 2.14. The influence of the price reduction flag is not captured in the state-wide model because the sample size in West Texas is too small. Because the unit price influence on sales is not significantly different from 0 across all regions, price elasticity cannot be calculated with precision (this product cannot be perfectly inelastic; the problem may arise from the lack of sales data for this product).

Table 4.3. Summary for UPC 00-01-28000-98216, 4 pint package

Model parameter					
Variable		Texas	Dallas (3753 units sold)	Houston (6589 units sold)	West Texas (242 units sold)
Intercept		6.03**	2.96	5.74	10.61
Feature (reference to no feature)	Small size ad	-0.10	-0.17	-0.53	NA
	Mid-size ad	0.36	0.68	0.22	-0.87
	Large size ad	NA	NA	NA	NA
Display (reference to no display)	Minor display	2.68**	NA	2.55**	NA
	Major display	NA	NA	NA	NA

Price reduction flag (reference to < 5% price reduction)	≥ 5% price reduction	0.36	0.46	0.45	-2.14**
Unit price		-0.0014	0.06	0.44	-2.27
Elasticity					
Mean units		4.12	4.25	4.15	2.22
Mean price		2.97	2.86	3.09	3.6
Price elasticity		0 (-0.001) [#]	0 (0.04) [#]	0 (0.33) [#]	0 (-3.35) [#]

** significant at 95% confidence level

* significant at 90% confidence level

coefficient for price per volume not significantly different from 0, elasticity is not significant. Numeric number is included in parentheses ()

Possible managerial actions on UPC 00-01-28000-98216

Display seems to have a significant positive impact on sales for this product and should be considered as a promotion strategy.

Due to the lack of significant variables, factors that can increase sales for similar products (other flavored milk) may be experimented. Although on average (model presented in section 2) for all milk products, package size increases by 1 pint, sales increase by 4.96, this is not the case for Nestle. Based on the Nestle model in section 3, package size increases by 1 pint, sales increases by only 0.45 units. In addition, other flavored milk products from Nestle (strawberry, banana, etc) are in smaller packages (1 pint to 3 pint). This 4 pint package may simply be too large. Considering its poor performance and lower unit price per pint compared to UPC 00-01-28000-58454 (lower net profit per pint), there is benefit in discontinuing supplying this product to the Texas market.

5. Conclusion

In this report, we summarized Nestle and its main competitor's performance on chocolate milk products in Texas. We have concluded that Nestle is the market leader and have derived factors with significant impact on sales from the regression models built based on the in-store transaction data, including seasonality, promotional methods, vendors, product features, market location and

price. Furthermore, we compared the sales of Nestle and Dean Foods Co, and understood that customers in both the companies have different preferences in the product itself and responded differently to the promotion methods, for which we have provided general insights of how Nestle can take advantage of the weakness of Dean Foods Co., and improve its market share by experimenting on different promotion strategies and product features. Nestle has a smaller market share in West Texas/New Mexico where Dean Foods Co has stronger sales. Nestle could learn from its competitor on customer preferences in West Texas/New Mexico and make region-specific strategies.

We further analyzed the sales of the five chocolate milk products from Nestle and built models for two skim milk products, UPC 00-01-28000-58454 (1 pint package) and UPC 00-01-28000-98216 (4 pint package) since skim chocolate milk is the least favorite among the customers. This is an important point to be noted by the company so that modification in strategies towards its least and best selling products could be made. Strategically, Nestle should keep the skim chocolate milk line since it is the only company in the market who offers this type of product. Several possible managerial actions were recommended in the report, including experimenting on different promotional methods based on the location for UPC 00-01-28000-58454, and discontinuing production of UPC 00-01-28000-58454.