Predictive Analytics

Conagra Foods

Report 3

Report 3

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Background and Context

Conagra Brands: Unveiling Growth Opportunities for GARDEIN in the Thriving US Meat Substitute Market

This analysis delves into the sales distribution of Conagra Brands' product portfolio, specifically focusing on the meat substitute category across various geographical regions and timeframes. Within this growing market segment, top performers include established brands like Morningstar Farms, Beyond Meat, Impossible Foods, GARDEIN, and private label options.

Our primary objective is to identify strategic approaches to enhance revenue generation for the GARDEIN brand**.**

The Booming US Meat Substitute Landscape:

The United States meat substitute industry is flourishing, fuelled by a confluence of factors:

- Rising Consumer Demand: Consumers are increasingly opting for plant-based alternatives due to health concerns, environmental considerations, ethical reasons, and a desire for variety in their diets.
- Innovation and Expansion: Leading brands like GARDEIN are constantly innovating, offering new and improved meat substitute products that mimic the taste and texture of meat. This, coupled with expanding distribution channels, is making these options more accessible to a wider audience.

Consumer Trends

The meat substitute industry is experiencing a boom, driven by several key consumer trends:

1. Health and Wellness: Consumers are increasingly health-conscious and seeking out plant-based alternatives perceived as healthier than traditional meat products. This can be due to factors like lower saturated fat content, higher fibre content, and potential cholesterol benefits.

2. Environmental Concerns: There's growing awareness of the environmental impact of animal agriculture, including greenhouse gas emissions, water usage, and deforestation. Consumers concerned about sustainability are turning to meat substitutes as an eco-friendlier option.

3. Ethical Considerations: Animal welfare concerns are motivating many consumers to reduce or eliminate meat consumption. Meat substitutes offer an alternative that aligns with their values.

4. Dietary Preferences: The rise of vegetarian, vegan, and flexitarian diets is creating a larger market for meat substitutes. Flexitarians, who primarily eat meat but occasionally choose plant-based alternatives, represent a significant portion of this growing market.

5. Taste and Texture: Advancements in food technology have led to the development of meat substitutes that closely resemble the taste and texture of real meat. This is crucial for attracting consumers who might otherwise be hesitant to switch from traditional meat products.

6. Convenience and Variety: Meat substitutes are becoming increasingly accessible in grocery stores and restaurants, making them a convenient option for busy consumers. Additionally, the variety of meat substitute products available has expanded significantly, offering consumers a wider range of choices to suit their taste preferences.

7. Price Sensitivity: While price remains a factor for some consumers, the cost of meat substitutes is becoming more competitive with traditional meat products. This is making them a more accessible option for a broader range of people.

Understanding these consumer trends is crucial for companies in the meat substitute industry. By developing products that cater to these evolving preferences, companies can capture a larger share of the growing market.

SWOT Analysis

Strengths:	**Weaknesses:**
1. Strong Brands 2. Innovation 3. Accessibility 4. Diverse Products 5. Quality Focus	1. Limited Player Dependence 2. Price Sensitivity 3. Lower Availability
Opportunities:	**Threats:**
1. Natural/Organic Growth 2. Product Line Expansion 3. Health & Wellness Trend 4. International Markets	1. Intense Competition 2. Consumer Price Sensitivity 3. Potential Health Concerns 4. Regulatory Shifts

Data Understanding

Data sorting tools were applied to the cleaned data. Firstly, the data were merged, and the null values were replaced by the mean/median. The file consists of 991780 rows and 75 columns. The merged data file used for the analysis and prediction is provided below:

Microsoft Excel Worksheet

Question 1

The GARDEIN meat substitute range has various ounces available in their range. Does the weight of the product influence the dollar sales of the product? Does it play an important factor in the buying decision for the customers? If it does, then which ounces should GARDEIN focus on to increase their sales?

For analysis we have considered,

Independent Variable: Dollar Sales

Dependent Variables: Total Ounces and Manufacturer Name

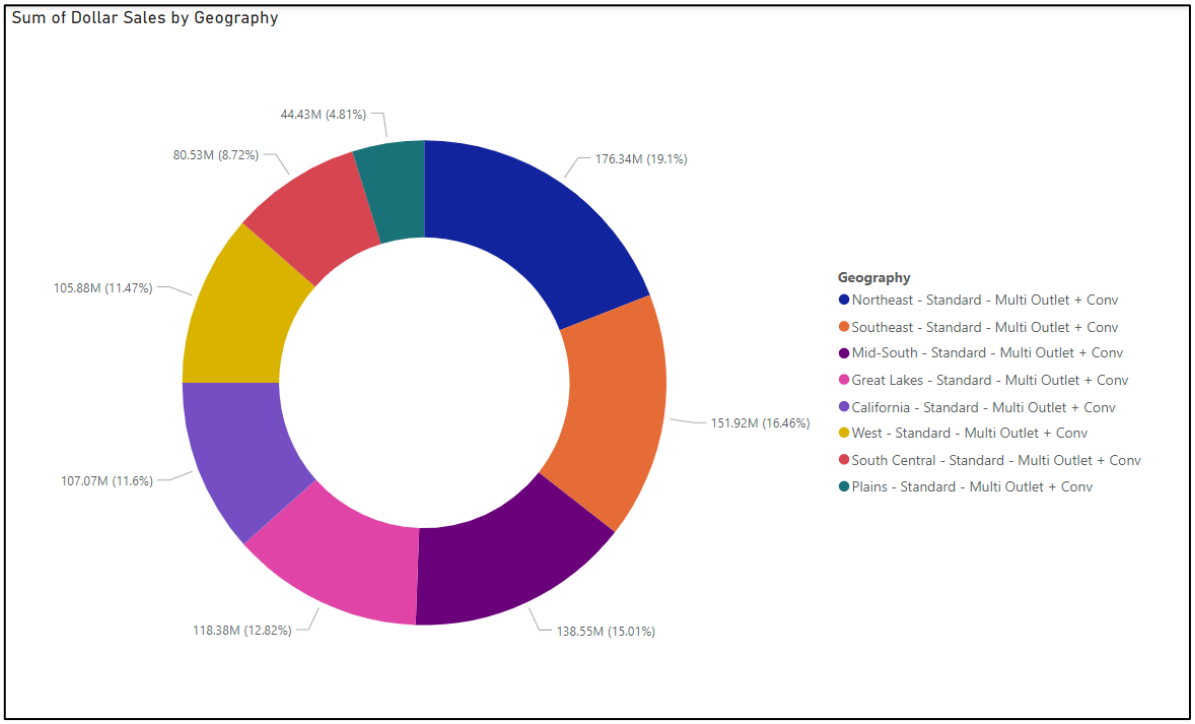
Hypothesis

We are considering Total Ounces and Manufacturer Name to conclude whether they play an important role in determining the Dollar Sales Amount. Because, if this is the case then recommendations and suggestions based on the results could be provided.

Visualizations

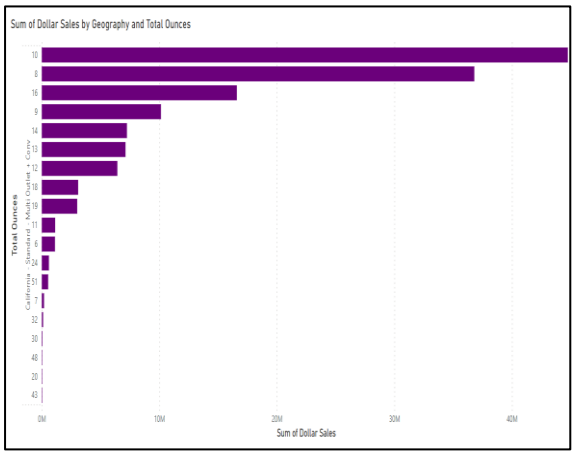
The ounces weight for the products sold under the meat substitute category by various manufacturers are different. Our focus is to help CONAGRA do better by helping recognize if the weight (ounces) contributes to determining whether the product will sell.

Figure 1 - Total Sales Based on Geography



The above figure shows the geography-based total sales of meat substitute products in the United States.

Figure 2 and 3 - California and Great Lakes



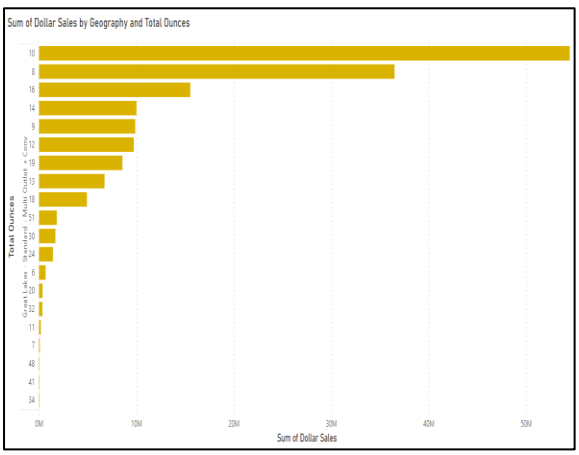
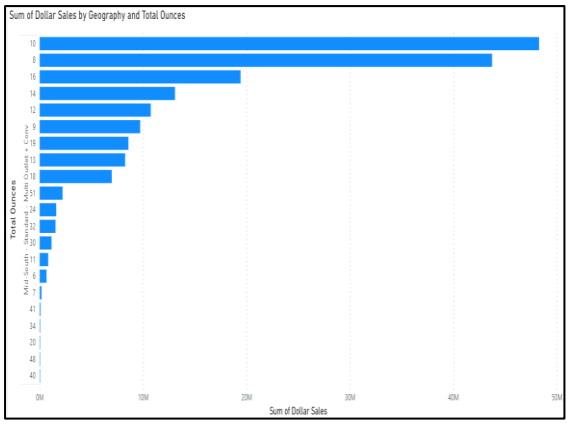


Figure 4 and 5 – Mid South and Northeast



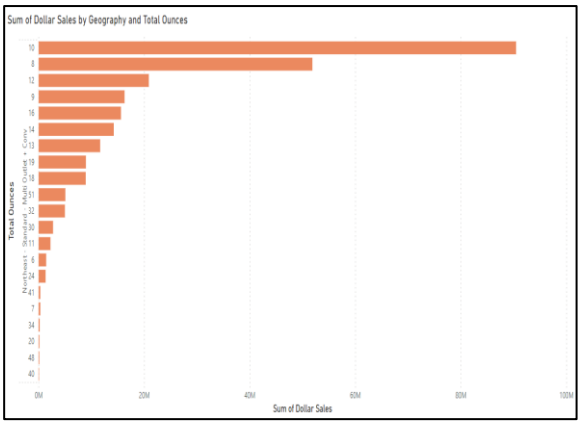
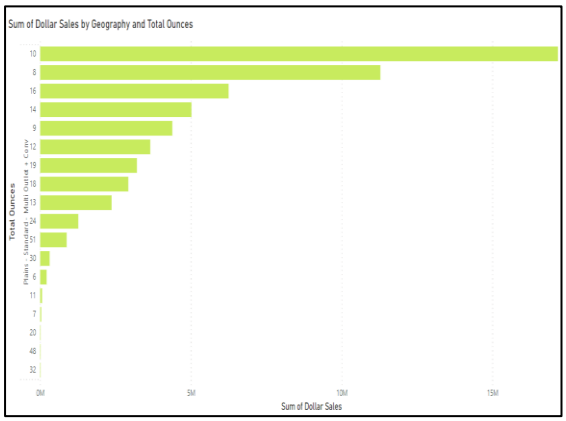


Figure 6 and 7 - Plains and South Central



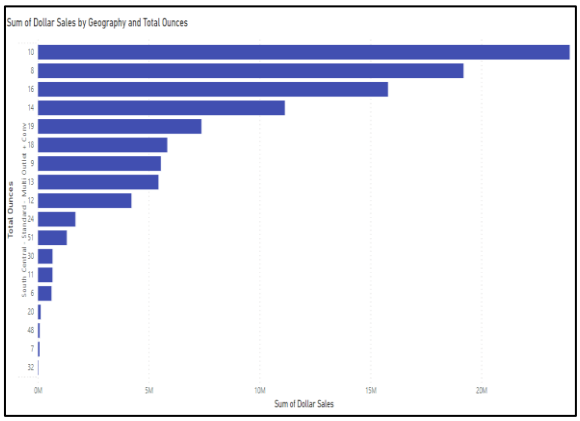
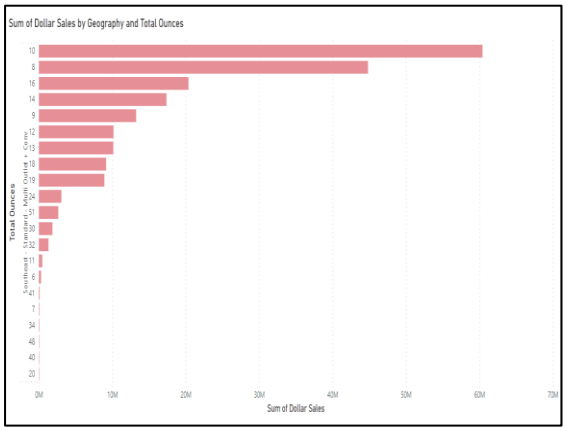
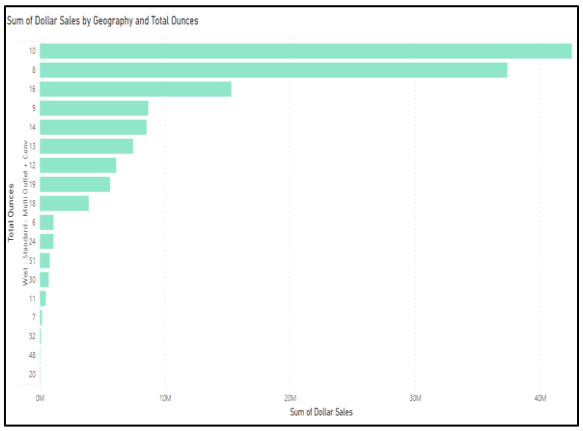


Figure 8 and 9 - Southeast and West





Conclusion:

The 8 figures above showcase the geography wise sales of meat substitute products. The most popular weighed product bought is 10 ounces. Followed by 8 ounces, 16 ounces and so on.

Regression Outputs

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	6952.06	81.14	85.675	< 0.0000000000000002	***
data2$GroupB	6065.43	193.15	31.403	< 0.0000000000000002	***
data2$GroupC	621.19	128.80	4.823	0.00000141	***
data2$GroupD	2303.33	129.88	17.735	< 0.0000000000000002	***
data2$GroupE	7737.12	140.42	55.098	< 0.0000000000000002	***
data2$Sales_GroupGroup 4	2511.59	151.02	16.631	< 0.0000000000000002	***
data2$GroupB:data2$Sales_GroupGroup 4	-11147.54	320.55	-34.777	< 0.0000000000000002	***
data2$GroupC:data2$Sales_GroupGroup 4	-4887.38	261.03	-18.724	< 0.0000000000000002	***
data2$GroupD:data2$Sales_GroupGroup 4	1978.57	236.36	8.371	< 0.0000000000000002	***
data2$GroupE:data2$Sales_GroupGroup 4	-68.28	243.00	-0.281	0.779	

Inference

Below are the inferences:

1. There is no evidence that geography wise the product weight preferences change. The most bought products have same weights throughout United States.
2. The most bought 8 products in 8 of these geographies along with their weight are as summarized below:

	California - Standard - Multi Outlet + Conv	Great Lakes - Standard - Multi Outlet + Conv	Mid-South - Standard - Multi Outlet + Conv	Northeast - Standard - Multi Outlet + Conv	Plains - Standard - Multi Outlet + Conv	South Central - Standard - Multi Outlet + Conv	Southeast - Standard - Multi Outlet + Conv	West - Standard - Multi Outlet + Conv
Top 8 ounces in the 8 geographies	10	10	10	10	10	10	10	10
	8	8	8	8	8	8	8	8
	16	16	16	12	16	16	16	16
	9	14	14	9	14	14	14	9
	14	9	12	16	9	19	9	14
	13	12	9	14	12	18	12	13
	12	19	19	13	19	9	13	12
	18	13	13	19	18	13	18	19

These are top selling products (ounces) in the meat substitute range throughout the United States. It is observed that GARDEIN range does not accommodate the substitutes having weights highlighted in yellow.

Based on the above analysis, we reject the NULL Hypothesis and state that

NOTE: The weights considered here are rounded off to whole numbers.

Recommendation 1

We suggest GARDEIN include meat substitute products with standard ounces between 8 to 30 ounces. According to our study and analysis, the meat substitute product's customers do not hesitate to buy products within the smaller ounces. Focusing on these weights is likely to increase the customer footfall for the GARDEIN range of products.

Also, we observed that the trend does not change based on Geography, the popular ounces i.e. between 8 to 30 are dominant all-over United States.

Question 2

Are flavors important for the sales of the GARDEIN meat substitute range? Do more flavors guarantee a higher sale? Does CONAGRA prefer variety in their meat substitute products? Then, though GARDEIN has a lot of variety in its product categories, how can GARDEIN improve its sales?

For analysis we have considered,

Independent Variable: Dollar Sales

Dependent Variables: Flavor and Manufacturer Name

Hypothesis

Several flavors are available in the meat substitute industry. The flavors differ based on the manufacturer. If Flavors matter in the sales, then how can CONAGRA benefit from this is the focus on the analysis.

Visualizations

The figure below illustrates the dollar wise sales of meat substitutes based on Flavor/Scent.

Figure 10 – Sum of Dollar Sales based on Flavor/Scent

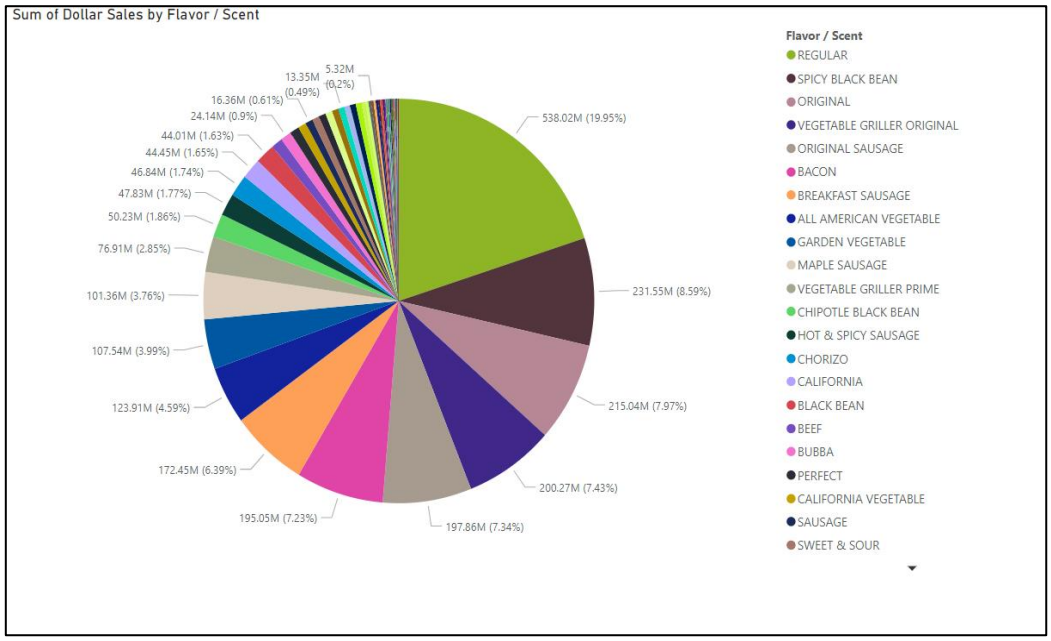
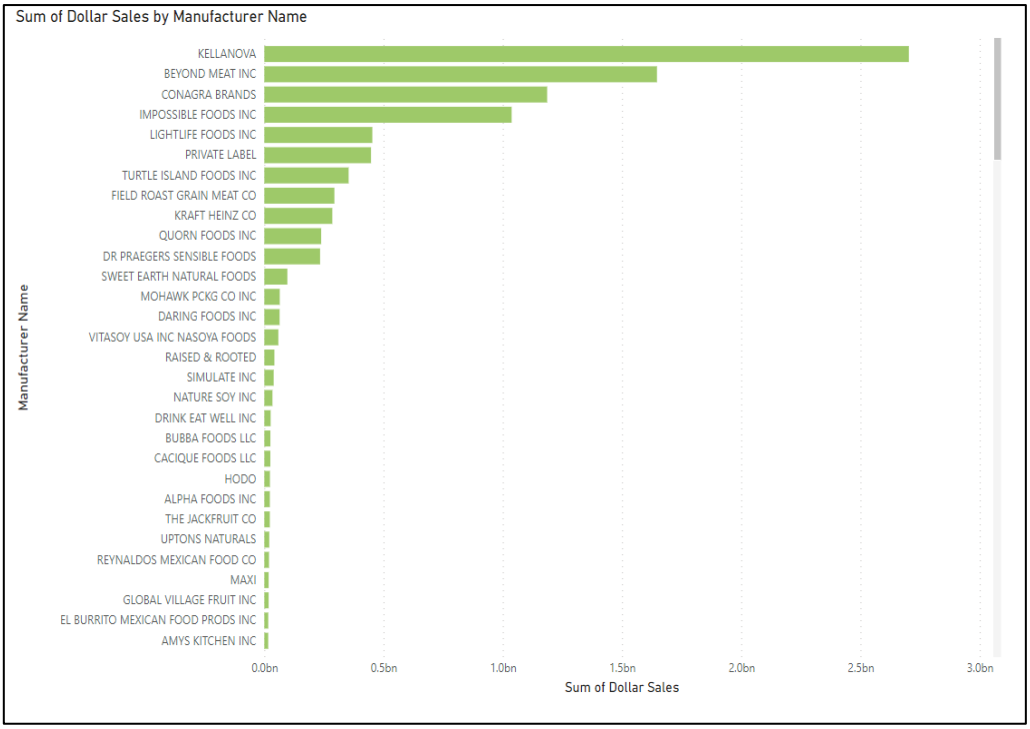
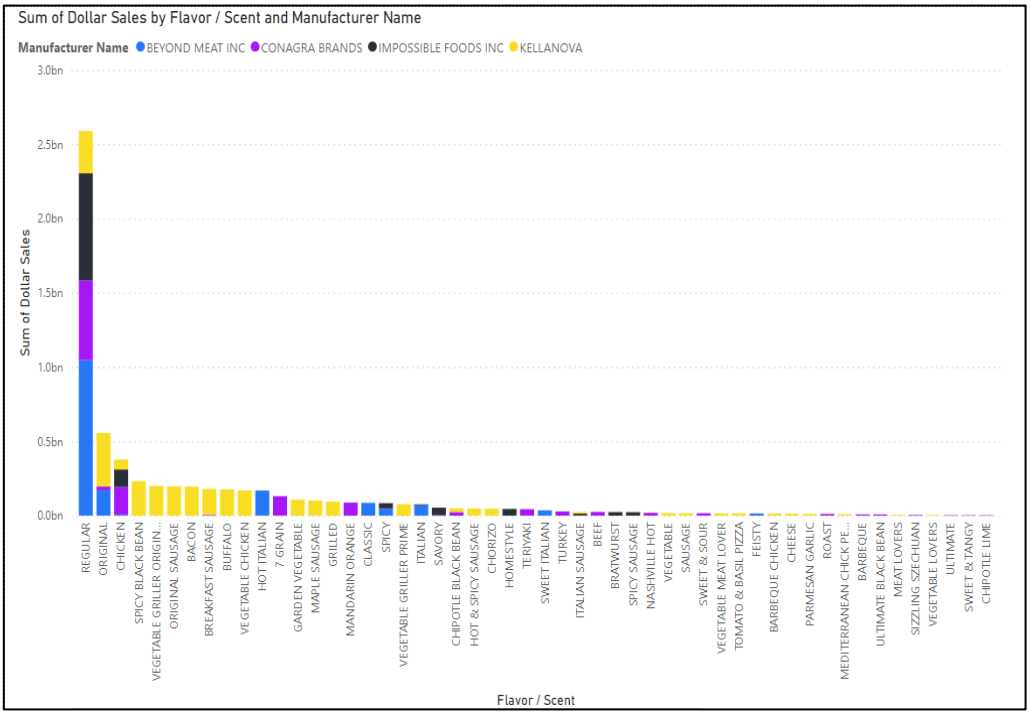


Figure 11 – Sum of Dollar Sales based on Manufacturer.



We see that most sales come from the top 4 Manufacturers namely: KELLANOVA, BEYOND MEAT INC, CONAGRA BRANDS and IMPOSSIBLE FOODS INC.

Figure 12 – Sum of Dollar Sales based on top 4 Manufacturers.



The top selling Flavors for these manufacturers are Regular, Original, Chicken, Spicy Black Bean, Vegetable Griller, Original Sausage and so on.

There are 106 Unique flavors available in the meat substitute industry. They are listed in excel below. The list has been derived by considering all records that have the Brand Name as GARDEIN:


Microsoft Excel Chart

Conclusion:

Out of the 106 flavors available in the meat substitute industry, 11 flavors are available in the GARDEIN range. The available flavors are mentioned below, they do not accommodate important flavors like bacon, breakfast sausage, cheese, falafel etc. that do contribute to comparatively higher sales.

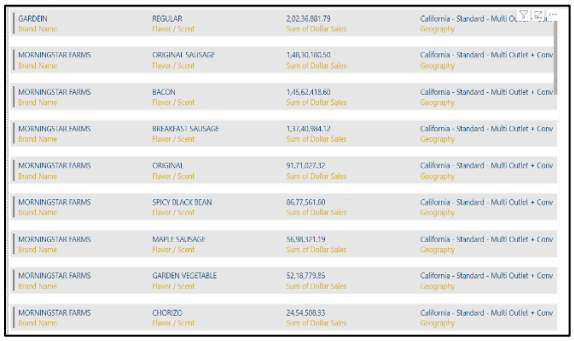
SR No	Flavors available in GARDEIN range
1	BEEF
2	CHIPOTLE BLACK BEAN
3	CLASSIC
4	GARDEN
5	HOMESTYLE
6	MAPLE SAUSAGE
7	ORIGINAL
8	REGULAR
9	SIZZLING SZECHUAN
10	SPICY
11	SWEET & SOUR

Regression Outputs

```
                                          Estimate Std. Error  t value             Pr(>|t|)
(Intercept)                                81303.2      444.4  182.949 < 0.0000000000000002 ***
data$GroupB                               -62366.7      996.5  -62.588 < 0.0000000000000002 ***
data$GroupC                               -60299.4      619.3  -97.375 < 0.0000000000000002 ***
data$GroupD                               -76948.0     1187.4  -64.801 < 0.0000000000000002 ***
data$GroupE                               -23910.6      532.0  -44.947 < 0.0000000000000002 ***
data$Group2CONAGRA BRANDS                 -75038.0      567.0 -132.352 < 0.0000000000000002 ***
data$Group2IMPOSSIBLE FOODS INC            33872.7     1018.9   33.244 < 0.0000000000000002 ***
data$Group2KELLANOVA                      -45237.2      516.7  -87.557 < 0.0000000000000002 ***
data$Group2LIGHTLIFE FOODS INC            -74751.4      492.4 -151.803 < 0.0000000000000002 ***
data$Group2Other                          -78240.9      450.3 -173.749 < 0.0000000000000002 ***
data$GroupB:data$Group2CONAGRA BRANDS      67456.9     1093.4   61.696 < 0.0000000000000002 ***
data$GroupC:data$Group2CONAGRA BRANDS      61033.1      879.5   69.398 < 0.0000000000000002 ***
data$GroupD:data$Group2CONAGRA BRANDS      90837.2     1265.8   71.763 < 0.0000000000000002 ***
data$GroupE:data$Group2CONAGRA BRANDS      40273.7      684.8   58.807 < 0.0000000000000002 ***
data$GroupB:data$Group2IMPOSSIBLE FOODS INC      NA         NA       NA                   NA
data$GroupC:data$Group2IMPOSSIBLE FOODS INC      NA         NA       NA                   NA
data$GroupD:data$Group2IMPOSSIBLE FOODS INC  15363.6     1539.3    9.981 < 0.0000000000000002 ***
data$GroupE:data$Group2IMPOSSIBLE FOODS INC -62749.8     1131.6  -55.454 < 0.0000000000000002 ***
data$GroupB:data$Group2KELLANOVA            55247.2     1076.9   51.300 < 0.0000000000000002 ***
data$GroupC:data$Group2KELLANOVA            49471.5      721.5   68.570 < 0.0000000000000002 ***
data$GroupD:data$Group2KELLANOVA            60271.4     1241.2   48.559 < 0.0000000000000002 ***
data$GroupE:data$Group2KELLANOVA            12593.2      633.9   19.865 < 0.0000000000000002 ***
data$GroupB:data$Group2LIGHTLIFE FOODS INC       NA         NA       NA                   NA
data$GroupC:data$Group2LIGHTLIFE FOODS INC   53752.8    14991.6    3.586             0.000336 ***
data$GroupD:data$Group2LIGHTLIFE FOODS INC   88188.0     1248.0   70.666 < 0.0000000000000002 ***
data$GroupE:data$Group2LIGHTLIFE FOODS INC   21798.0      766.6   28.434 < 0.0000000000000002 ***
data$GroupB:data$Group2Other                62460.4     1013.2   61.644 < 0.0000000000000002 ***
data$GroupC:data$Group2Other                61427.9      630.1   97.484 < 0.0000000000000002 ***
data$GroupD:data$Group2Other                78018.4     1193.5   65.368 < 0.0000000000000002 ***
data$GroupE:data$Group2Other                25532.7      549.0   46.505 < 0.0000000000000002 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

For better analysis of the problem, we have considered the top selling brand MORNING STAR FARMS and GARDEIN. We have analyzed the geography based favorite flavors.

Figure 13 – Top 9 flavours of California and Great Lakes.



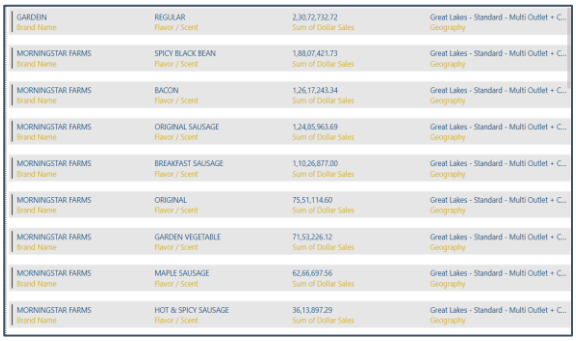
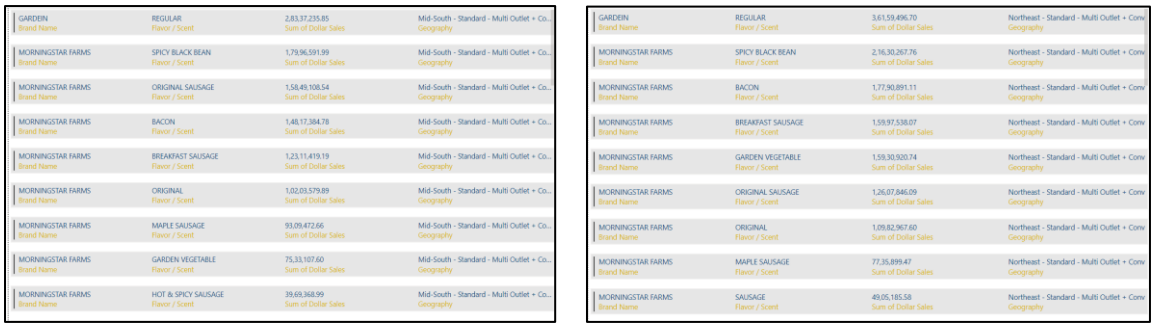


Figure 12 above shows the top 9 flavors preferred among GARDEIN and MORNINGSTAR FARMS in California and Great Lakes according to sum of dollar sales.

Figure 14 – Top 9 flavours of Mid-South and Northeast.

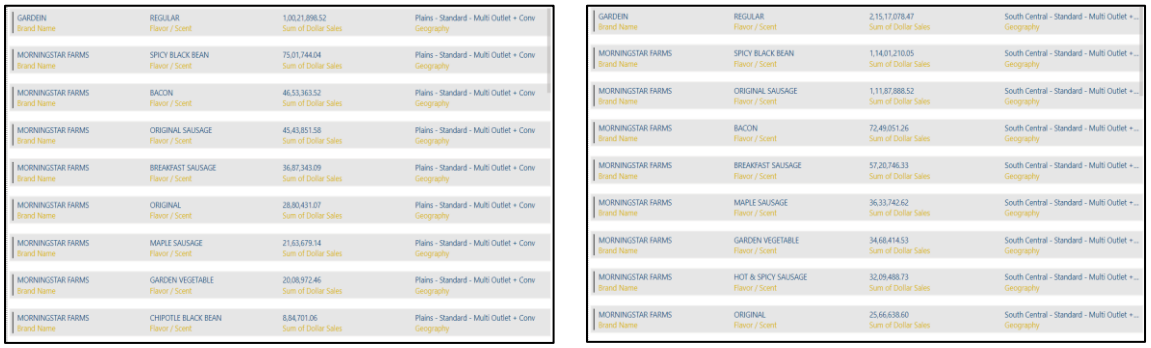


Brand Name	Flavor / Scent	Sum of Dollar Sales	Geography
GARDEIN	REGULAR	2,83,37,235.85	Mid-South - Standard - Multi Outlet + Co...
MORNINGSTAR FARMS	SPICY BLACK BEAN	1,79,96,591.99	Mid-South - Standard - Multi Outlet + Co...
MORNINGSTAR FARMS	ORIGINAL SAUSAGE	1,58,49,108.54	Mid-South - Standard - Multi Outlet + Co...
MORNINGSTAR FARMS	BACON	1,48,17,384.78	Mid-South - Standard - Multi Outlet + Co...
MORNINGSTAR FARMS	BREAKFAST SAUSAGE	1,23,11,419.19	Mid-South - Standard - Multi Outlet + Co...
MORNINGSTAR FARMS	ORIGINAL	1,02,03,579.89	Mid-South - Standard - Multi Outlet + Co...
MORNINGSTAR FARMS	MAPLE SAUSAGE	93,09,472.66	Mid-South - Standard - Multi Outlet + Co...
MORNINGSTAR FARMS	GARDEN VEGETABLE	75,33,107.60	Mid-South - Standard - Multi Outlet + Co...
MORNINGSTAR FARMS	HOT & SPICY SAUSAGE	39,69,368.99	Mid-South - Standard - Multi Outlet + Co...

Brand Name	Flavor / Scent	Sum of Dollar Sales	Geography
GARDEIN	REGULAR	3,61,59,496.70	Northeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	SPICY BLACK BEAN	2,16,30,267.76	Northeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	BACON	1,77,90,891.11	Northeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	BREAKFAST SAUSAGE	1,59,97,538.07	Northeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	GARDEN VEGETABLE	1,59,30,920.74	Northeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	ORIGINAL SAUSAGE	1,26,07,846.09	Northeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	ORIGINAL	1,09,82,967.60	Northeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	MAPLE SAUSAGE	77,35,899.47	Northeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	SAUSAGE	49,05,185.58	Northeast - Standard - Multi Outlet + Conv

Figure above shows the top 9 flavors preferred among GARDEIN and MORNINGSTAR FARMS in Mid-South and Northeast according to sum of dollar sales.

Figure 14 – Top 9 flavours of Plains-Standard and South Central.



Brand Name	Flavor / Scent	Sum of Dollar Sales	Geography
GARDEIN	REGULAR	1,00,21,898.52	Plains - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	SPICY BLACK BEAN	75,01,744.04	Plains - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	BACON	46,53,363.52	Plains - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	ORIGINAL SAUSAGE	45,43,851.58	Plains - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	BREAKFAST SAUSAGE	36,87,343.09	Plains - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	ORIGINAL	28,80,431.07	Plains - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	MAPLE SAUSAGE	21,63,679.14	Plains - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	GARDEN VEGETABLE	20,08,972.46	Plains - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	CHIPOTLE BLACK BEAN	8,84,701.06	Plains - Standard - Multi Outlet + Conv

Brand Name	Flavor / Scent	Sum of Dollar Sales	Geography
GARDEIN	REGULAR	2,15,17,078.47	South Central - Standard - Multi Outlet +...
MORNINGSTAR FARMS	SPICY BLACK BEAN	1,14,01,210.05	South Central - Standard - Multi Outlet +...
MORNINGSTAR FARMS	ORIGINAL SAUSAGE	1,11,87,888.52	South Central - Standard - Multi Outlet +...
MORNINGSTAR FARMS	BACON	72,49,051.26	South Central - Standard - Multi Outlet +...
MORNINGSTAR FARMS	BREAKFAST SAUSAGE	57,20,746.33	South Central - Standard - Multi Outlet +...
MORNINGSTAR FARMS	MAPLE SAUSAGE	36,33,742.62	South Central - Standard - Multi Outlet +...
MORNINGSTAR FARMS	GARDEN VEGETABLE	34,68,414.53	South Central - Standard - Multi Outlet +...
MORNINGSTAR FARMS	HOT & SPICY SAUSAGE	32,09,488.73	South Central - Standard - Multi Outlet +...
MORNINGSTAR FARMS	ORIGINAL	25,66,638.60	South Central - Standard - Multi Outlet +...

Figure above shows the top 9 flavors preferred among GARDEIN and MORNINGSTAR FARMS in Plains Standard and South Central according to sum of dollar sales.

Figure 15 – Top 9 flavours of Southeast and West-Standard.

Brand Name	Flavor / Scent	Sum of Dollar Sales	Geography
GARDEIN	REGULAR	3,98,22,960.52	Southeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	SPICY BLACK BEAN	1,72,77,931.39	Southeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	ORIGINAL SAUSAGE	1,51,17,760.66	Southeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	BACON	1,36,31,365.95	Southeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	BREAKFAST SAUSAGE	1,17,72,109.69	Southeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	MAPLE SAUSAGE	80,61,222.81	Southeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	ORIGINAL	75,86,231.77	Southeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	GARDEN VEGETABLE	70,29,768.84	Southeast - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	HOT & SPICY SAUSAGE	53,75,389.46	Southeast - Standard - Multi Outlet + Conv

Brand Name	Flavor / Scent	Sum of Dollar Sales	Geography
GARDEIN	REGULAR	1,98,03,083.64	West - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	SPICY BLACK BEAN	1,24,82,880.11	West - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	ORIGINAL SAUSAGE	1,23,05,065.66	West - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	BACON	1,22,02,520.92	West - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	BREAKFAST SAUSAGE	1,19,68,147.27	West - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	ORIGINAL	99,55,963.44	West - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	MAPLE SAUSAGE	72,44,491.14	West - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	GARDEN VEGETABLE	52,93,593.41	West - Standard - Multi Outlet + Conv
MORNINGSTAR FARMS	HOT & SPICY SAUSAGE	24,53,656.30	West - Standard - Multi Outlet + Conv

Figure above shows the top 9 flavors preferred among GARDEIN and MORNINGSTAR FARMS in Southeast and West-Standard according to sum of dollar sales.

Inference

From above all figures, it is **prominent** that the dollar sales of **GARDEIN's REGULAR** flavour is preferred all over the US though MORNING STAR is the number one selling brand (referred from Category 101). GARDEIN has multiple flavors that they offer including Beef, Chipotle Black Bean, Classic, Garden, Maple Sausage etc. But the flavors may not be enough to scale and acquire the meat substitute market of US.

Recommendation 2

It is observed that the US market explores different flavors. MORNING STAR has more flavors to make a mark compared to GARDEIN. GARDEIN can thus increase the number of flavors of their meat substitutes which would increase their revenue. Also, as Regular flavor offered by GARDEIN is the top selling flavor, GARDEIN can sample the products of various other flavors along with it to help customers try new and different flavors. If customers like it, they will buy the extended range of flavors in their next purchase.

Question 3

What is the significance of region and product form on influencing the dollar sales amount? Specifically, which combination of region and product form yields the highest dollar sales among the top 5 manufacturers displayed in Table 1??

Hypothesis

- Independent variables: Region/Geography and Form
- Dependent variable: Dollar Sales($)

The hypothesis suggests that Conagra Brands can optimize their sales performance by strategically aligning their focus on 'Patties/Links Forms' in the Mid, Southeast, and Northeast regions, leveraging competitors' strategies. Additionally, emphasizing 'Speciality Forms' in the South Central and West regions can further boost revenue. This strategic approach, based on the hypothesis, capitalizes on regional preferences and competitive dynamics to effectively optimize sales performance.

1. Summary Statistics

   Given the variety of 70 meat substitute forms, categorization into 4-5 groups is essential. Analyzing these categories about Manufacturer_Name and Region can reveal their influence on dollar sales. This approach facilitates a comprehensive understanding of the dynamics driving sales in the meat substitute market.

   Examined the market share of each manufacturer across the entire meat substitute market.

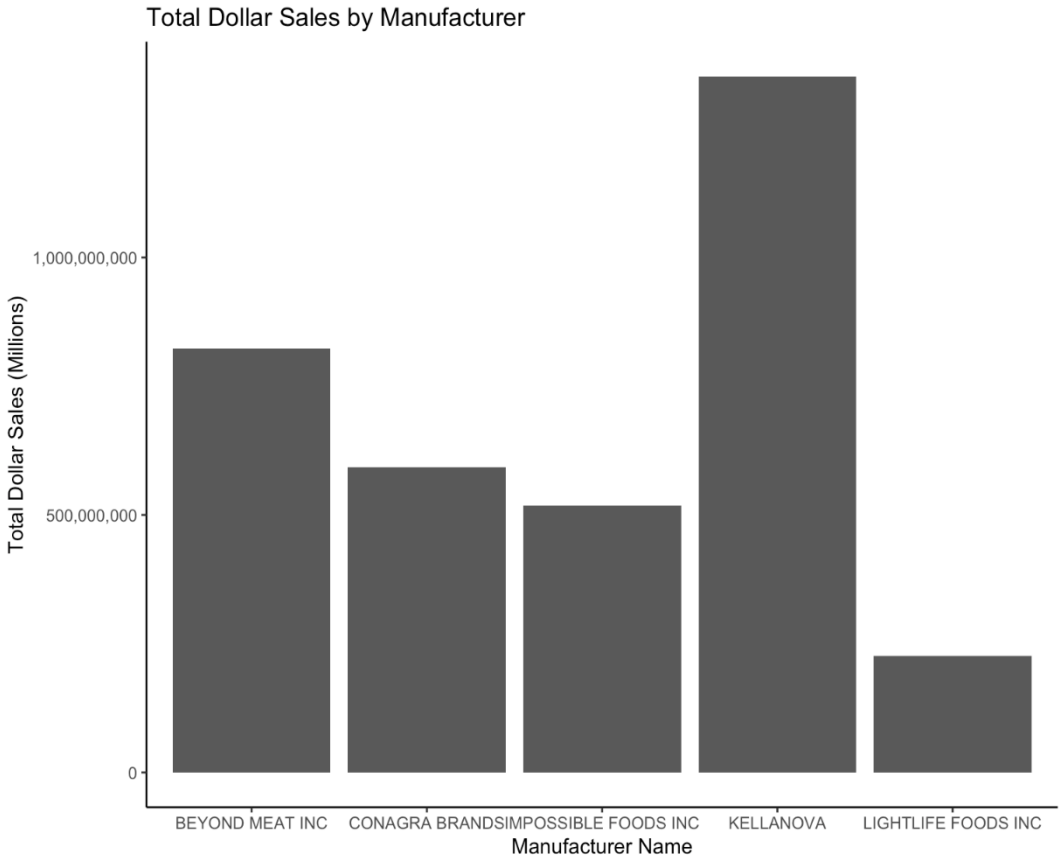
Figure 16

	Manufacturer_Name	Total_Dollar_Sales
0	KELLANOVA	1.351337e+09
1	BEYOND MEAT INC	8.232169e+08
2	CONAGRA BRANDS	5.929881e+08
3	IMPOSSIBLE FOODS INC	5.185040e+08
4	LIGHTLIFE FOODS INC	2.264603e+08
...	...	...
146	TMRW FOODS	3.004475e+02
147	MIRACLE FOODS CORP	5.127544e+01
148	MAMA MANCINIS	2.651963e+01
149	LIVING HARVEST INC	2.496949e+01
150	PEAS OF MIND LLC	2.480000e+00

151 rows × 2 columns

The analysis reveals that Kellanova dominates the Meat Substitute Category, commanding a substantial market share of 27.8%. Following closely is Beyond Meat with 16.9%, while Conagra Brands holds the third position with 12.2%. Impossible Foods and Lightlife Foods Inc. follow with 10.7% and 4.7% respectively.
The combined market share of these top 5 brands amounts to approximately 72.53% of the total market share. These brands significantly influence the Meat Substitute Category, reflecting their strong presence and impact on consumer preferences. Consequently, in further analysis, all manufacturers excluding Kellanova, Beyond Meat Inc., Conagra Brands, Impossible Foods Inc., and Lightlife Foods Inc. will be categorized as "OTHERS."
Understanding the dominance of these top brands provides valuable insights into market dynamics and competition within the Meat Substitute Category. It underscores the importance of strategic positioning and brand recognition in capturing market share and shaping consumer choices.

Figure 17 – Bar Graph for Manufacturer Name and Total Dollar Sales.



1) **Questions and Analysis**

What is the significance of region and product form on influencing the dollar sales amount? Specifically, which combination of region and product form yields the highest dollar sales among the top 5 manufacturers displayed in Table 1 (above)?

In the Meat Substitute Category, as shown in below Table 3 and 4, "Patties/links" Forms emerge as the dominant market force, commanding a substantial 52.8% share due to their widespread preference among consumers. "Other Forms" and "Speciality Forms" also hold competitive positions, contributing 12.0% and 10.2% respectively. While preferences may fluctuate over time, "Snackable Forms," "Sliced Cut forms," and "Structured Forms" collectively account for 24.9% of the market, suggesting untapped potential for further growth. Analyzing buyer distribution data indicates opportunities for these forms to capture additional market share, signaling a dynamic landscape where consumer preferences and product innovation play pivotal roles in shaping market dynamics. As trends evolve, understanding and adapting to shifting consumer preferences will be key for manufacturers seeking to maintain and expand their market presence in the competitive meat substitute industry.

Sliced/Cut Forms consists of

```
sliced_cut_forms = [
  "SLICE",
  "ULTRA THIN SLICE",
  "CHUNK",
  "DICED",
  "SLICED",
  "CRUMBLE",
  "SHREDDED",
  "SHREDS",
  "CUBE",
  "PIECE",
  "TIP",
  "WHOLE"
]
```

Structured Forms consists of

```
structured_forms = [
  "STRIP",
  "ROLL",
  "CAKE",
  "RIBS",
  "ROPE",
  "BINGS",
  "CUT",
  "CHUB",
  "BLOCK",
  "SPLIT ROPE"
]
```

Patties and Links consists of
patties_links = [
  "BREAKFAST SAUSAGE LINK",
  "BREAKFAST LINK",
  "SAUSAGE PATTY",
  "BREAKFAST SAUSAGE PATTY",
  "BREAKFAST PATTY",
  "BREAKFAST SAUSAGE ROLL",
  "BREAKFAST BITES",
  "DINNER SAUSAGE LINK",
  "DINNER LINK",
  "SAUSAGE PATTY",
  "LINK",
  "DINNER SAUSAGE LINK",
  "HOT DOG",
  "BURGER",
  "BURGER PATTY",
  "GROUND"
]

Snackable/Portable Forms consists of
snackable_forms = [
  "FINGER",
  "BITE",
  "POPPER",
  "FUN NUGGETS",
  "BAO BUN",
  "NUGGET",
  "STICK",
  "FRIES",
  "FRANK",
  "TENDERS",
  "WING",
  "STICK"
]

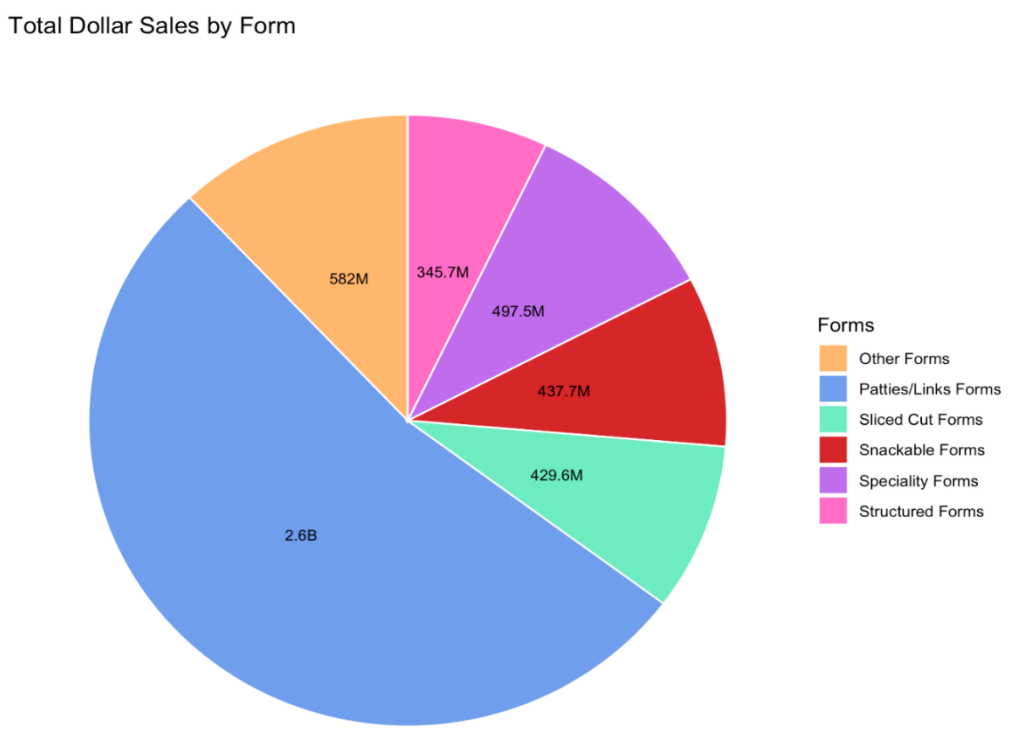
Specialty Forms consists of
specialty_forms = [
  "MEATBALL",
  "BREAKFAST SAUSAGE LINK",
  "DIPPER",
  "BAR",
  "MEAT LOAF",
  "GIZZARD",
  "TENDER",
  "RIBLET",
  "FILET",

```
  "ROAST",
  "POPCORN",
  "BREAST",
  "PULLED",
  "SAUSAGE",
  "LOAF"
]
```

Figure 18.

	Form	Total_Dollar_Sales
0	Patties/Links Forms	2.566116e+09
1	Other Forms	5.819574e+08
2	Speciality Forms	4.974908e+08
3	Snackable Forms	4.376678e+08
4	Sliced Cut Forms	4.295816e+08
5	Structured Forms	3.456503e+08

Figure 19 – Total Dollar Sales by form



Across various Manufacturer Names, as seen in below Table 5, 6 and 7 distinct Forms play crucial roles in contributing to Total Dollar Sales. Notably, "Patties/Links" Forms dominate sales for most manufacturers, except Conagra Brands, which prioritizes Speciality forms. Conagra's focus on Speciality forms positions "Patties/Links" as the second highest contributor, followed by Snackable and Structured Forms. Meanwhile, Sliced Cut Forms and Other Forms exhibit relatively equal and less substantial contributions. This highlights the nuanced strategies adopted by manufacturers in leveraging different product forms to drive sales within the competitive meat substitute market landscape.

Figure 20

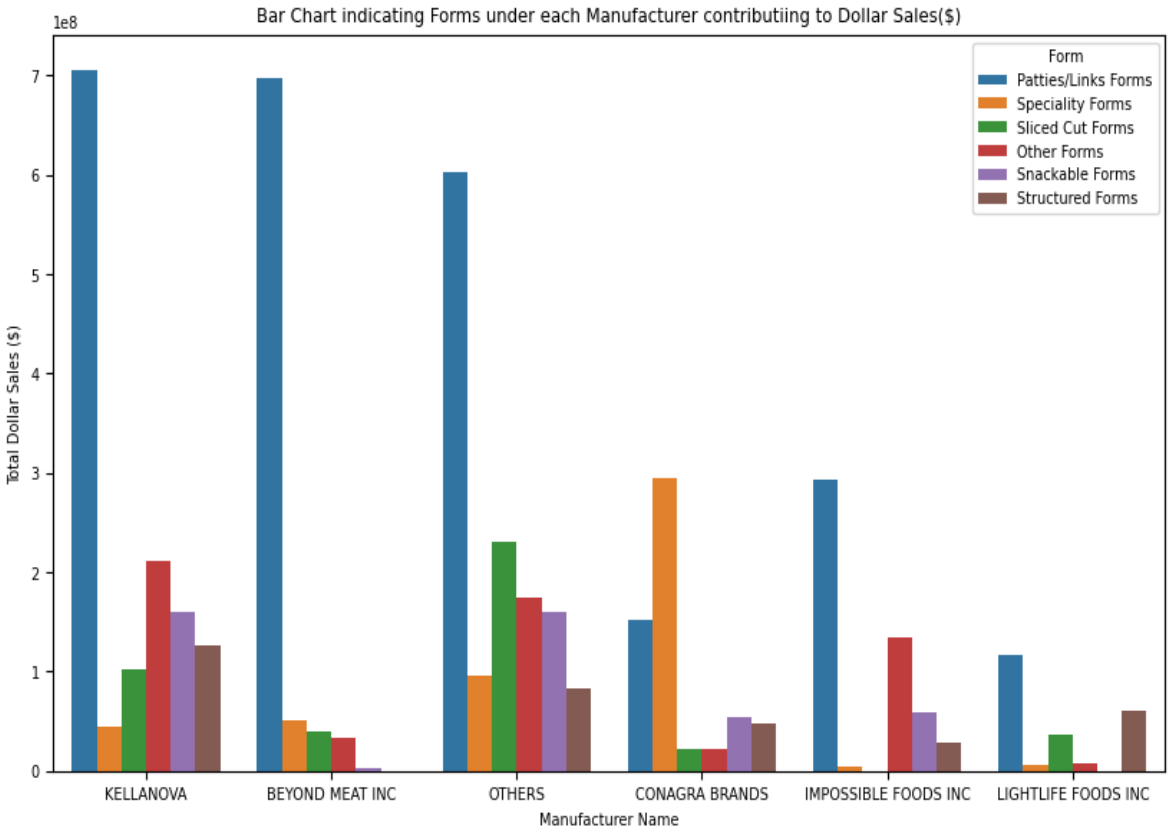
	Region	Manufacturer_Name	Form	Dollar_Sales
295126	California	CONAGRA BRANDS	Snackable Forms	1099.662195
559788	Great Lakes	OTHERS	Speciality Forms	4448.147986
478744	Plains	LIGHTLIFE FOODS INC	Structured Forms	236.119209
559736	California	OTHERS	Speciality Forms	2098.905174
78367	South Central	OTHERS	Patties/Links Forms	3579.556319
...	...	...	...	...
476947	West	OTHERS	Snackable Forms	7724.959425
476944	Southeast	OTHERS	Snackable Forms	4693.542668
476941	South Central	OTHERS	Snackable Forms	1576.056940
27117	Great Lakes	CONAGRA BRANDS	Sliced Cut Forms	3638.218654
991779	West	OTHERS	Other Forms	102.819827

824367 rows × 4 columns

Figure 21

	Manufacturer_Name	Form	Total_Dollar_Sales
0	KELLANOVA	Patties/Links Forms	7.057847e+08
1	BEYOND MEAT INC	Patties/Links Forms	6.965833e+08
2	OTHERS	Patties/Links Forms	6.026408e+08
3	CONAGRA BRANDS	Speciality Forms	2.954154e+08
4	IMPOSSIBLE FOODS INC	Patties/Links Forms	2.924214e+08
5	OTHERS	Sliced Cut Forms	2.298838e+08
6	KELLANOVA	Other Forms	2.106803e+08
7	OTHERS	Other Forms	1.751406e+08
8	KELLANOVA	Snackable Forms	1.607137e+08
9	OTHERS	Snackable Forms	1.593391e+08
10	CONAGRA BRANDS	Patties/Links Forms	1.527105e+08
11	IMPOSSIBLE FOODS INC	Other Forms	1.342130e+08
12	KELLANOVA	Structured Forms	1.269278e+08
13	LIGHTLIFE FOODS INC	Patties/Links Forms	1.159750e+08
14	KELLANOVA	Sliced Cut Forms	1.026506e+08
15	OTHERS	Speciality Forms	9.642480e+07
16	OTHERS	Structured Forms	8.252808e+07
17	LIGHTLIFE FOODS INC	Structured Forms	6.095697e+07
18	IMPOSSIBLE FOODS INC	Snackable Forms	5.948699e+07
19	CONAGRA BRANDS	Snackable Forms	5.438803e+07
20	BEYOND MEAT INC	Speciality Forms	5.111952e+07
21	CONAGRA BRANDS	Structured Forms	4.698008e+07

Figure 22

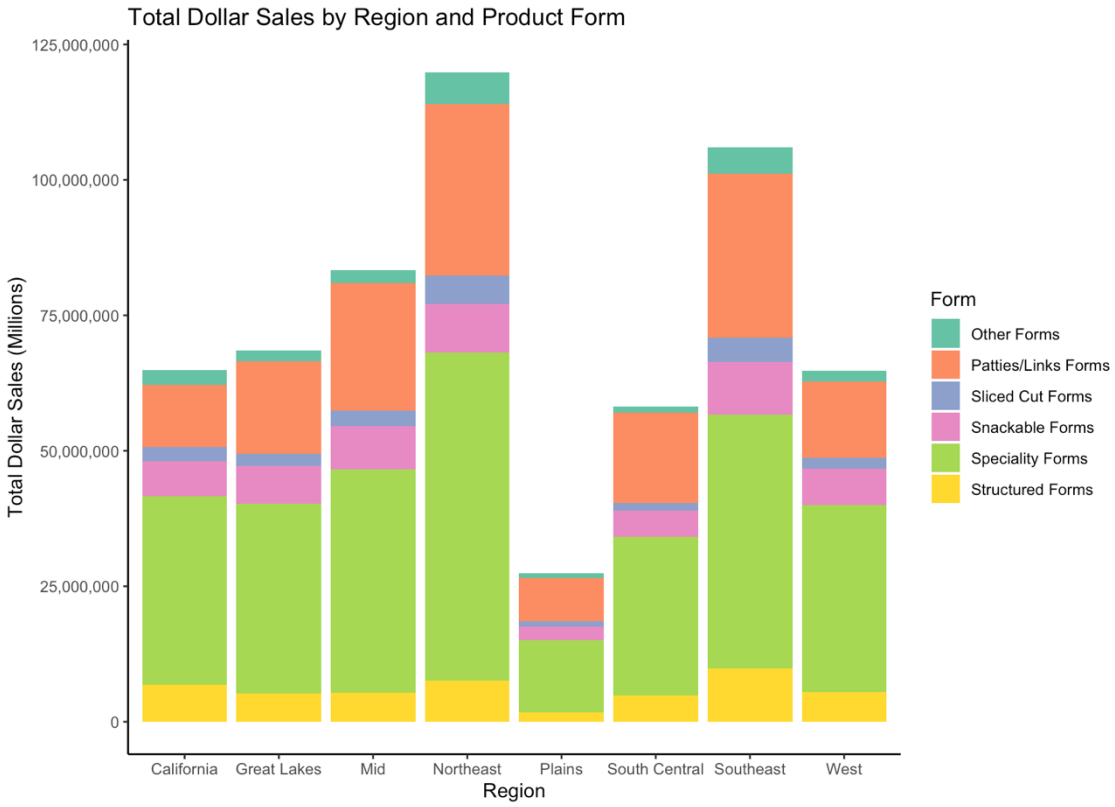


Based on the data from Table 8 and 9, it's evident that "Patties/Links Forms" consistently lead in sales across all regions of the US meat substitute market. Following closely are "Other Forms" and "Speciality Forms," indicating their competitive positions. "Snackable Forms," "Sliced Forms," and "Structured Forms" also contribute to sales but to a lesser extent. This underscores the importance of prioritizing "Patties/Links Forms" for brands seeking maximum Dollar Sales yield, particularly in major regions like "Northeast US," "Southeast US," and "Mid US" Regions. Aligning product strategies with regional preferences for these dominant forms can optimize sales performance and enhance market penetration. As consumer preferences evolve, continuous monitoring of regional sales trends will be crucial for brands to maintain their competitive edge in the dynamic meat substitute market landscape.

Figure 23

	Region	Form	Total_Dollar_Sales
0	Northeast	Patties/Links Forms	5.507786e+08
1	Southeast	Patties/Links Forms	3.973788e+08
2	Mid	Patties/Links Forms	3.559514e+08
3	California	Patties/Links Forms	3.502897e+08
4	Great Lakes	Patties/Links Forms	3.288925e+08
5	West	Patties/Links Forms	3.146688e+08
6	South Central	Patties/Links Forms	1.632056e+08
7	Northeast	Other Forms	1.300896e+08
8	Northeast	Speciality Forms	1.085906e+08
9	Plains	Patties/Links Forms	1.049503e+08
10	Southeast	Other Forms	8.555427e+07
11	Northeast	Snackable Forms	8.521949e+07
12	Great Lakes	Other Forms	8.096683e+07
13	Northeast	Sliced Cut Forms	8.074234e+07
14	Mid	Other Forms	7.972445e+07
15	Southeast	Speciality Forms	7.558737e+07
16	West	Other Forms	7.333850e+07
17	California	Other Forms	7.017219e+07
18	Northeast	Structured Forms	6.997302e+07
19	Mid	Speciality Forms	6.896353e+07
20	Great Lakes	Speciality Forms	6.727424e+07
21	Southeast	Snackable Forms	6.421740e+07
22	Southeast	Sliced Cut Forms	6.099408e+07
23	West	Sliced Cut Forms	6.092678e+07
24	California	Structured Forms	5.998149e+07
25	Great Lakes	Snackable Forms	5.969716e+07
26	Mid	Snackable Forms	5.852467e+07
27	Mid	Sliced Cut Forms	5.803170e+07
28	Great Lakes	Sliced Cut Forms	5.794388e+07
29	California	Snackable Forms	5.719324e+07
30	West	Speciality Forms	5.672331e+07
31	California	Sliced Cut Forms	5.622578e+07
32	California	Speciality Forms	5.610697e+07
33	West	Snackable Forms	5.597971e+07

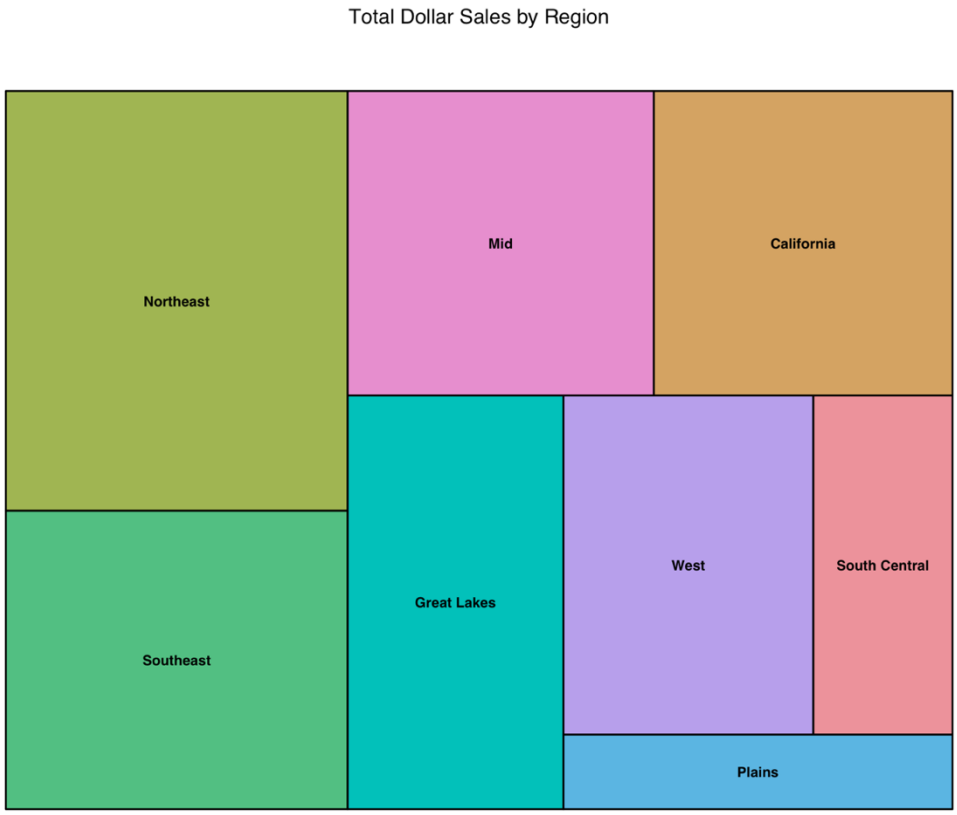
Figure 24



Regression Analysis: Determining the T-Statistic Values for Region-Dollar Sales Influence

```
                 Generalized Linear Model Regression Results
==============================================================================
Dep. Variable:     Total_Dollar_Sales   No. Observations:                    8
Model:                            GLM   Df Residuals:                        0
Model Family:                Gaussian   Df Model:                            7
Link Function:               Identity   Scale:                             inf
Method:                          IRLS   Log-Likelihood:                108.75
Date:                Wed, 17 Apr 2024   Deviance:                  7.2919e-13
Time:                        14:17:00   Pearson chi2:                7.29e-13
No. Iterations:                     1   Pseudo R-squ. (CS):             1.000
Covariance Type:            nonrobust
================================================================================================
                                   coef    std err          z      P>|z|      [0.025      0.975]
------------------------------------------------------------------------------------------------
Intercept                     6.5e+08        inf          0      1.000        -inf         inf
Region[T.Great Lakes]    -1.198e+07        inf         -0      1.000        -inf         inf
Region[T.Mid]             1.608e+07        inf          0      1.000        -inf         inf
Region[T.Northeast]       3.754e+08        inf          0      1.000        -inf         inf
Region[T.Plains]         -4.425e+08        inf         -0      1.000        -inf         inf
Region[T.South Central]  -3.126e+08        inf         -0      1.000        -inf         inf
Region[T.Southeast]       7.886e+07        inf          0      1.000        -inf         inf
Region[T.West]           -4.459e+07        inf         -0      1.000        -inf         inf
================================================================================================
```

Figure 25



Inference 3.1

Despite the insignificant p-value, indicating region's limited impact on Dollar Sales, Northeast, Southeast, and Mid US regions exhibit higher and positive coefficients in Table 10. This suggests potential for stronger sales performance in these regions for Conagra Meat Substitute products.

Recommendation 3.1

Prioritizing sales efforts in Northeast, Southeast, and Mid US regions can be advantageous for Conagra. Leveraging the positive coefficients observed in Table 10, focusing marketing and distribution strategies in these regions can enhance sales performance and market presence.

Figure 26 - Regression Analysis: Determining the T-Statistic Values for Region-Dollar Sales Influence

```
                 Generalized Linear Model Regression Results
==============================================================================
Dep. Variable:     Total_Dollar_Sales   No. Observations:                    6
Model:                            GLM   Df Residuals:                        0
Model Family:                Gaussian   Df Model:                            5
Link Function:               Identity   Scale:                             inf
Method:                          IRLS   Log-Likelihood:                 80.521
Date:                Wed, 17 Apr 2024   Deviance:                   7.7449e-13
Time:                        14:17:00   Pearson chi2:                 7.74e-13
No. Iterations:                     1   Pseudo R-squ. (CS):              1.000
Covariance Type:            nonrobust
================================================================================================
                                   coef    std err          z      P>|z|      [0.025      0.975]
------------------------------------------------------------------------------------------------
Intercept                     5.82e+08        inf          0      1.000        -inf         inf
Form[T.Patties/Links Forms]  1.984e+09        inf          0      1.000        -inf         inf
Form[T.Sliced Cut Forms]    -1.524e+08        inf         -0      1.000        -inf         inf
Form[T.Snackable Forms]     -1.443e+08        inf         -0      1.000        -inf         inf
Form[T.Speciality Forms]    -8.447e+07        inf         -0      1.000        -inf         inf
Form[T.Structured Forms]    -2.363e+08        inf         -0      1.000        -inf         inf
================================================================================================
```

1. How do region and product form affect dollar sales in the meat substitute market?

Observation:

When analyzing the combined impact of region and product form, certain combinations emerge as particularly influential. For example, certain regions exhibit a stronger preference for specific product forms, leading to varying sales patterns.

Conclusion: Despite potential insignificant p-values, the regression model reveals that forms such as "Patties/Links Forms" exhibit significant positive coefficient values, indicating their substantial contribution to Dollar Sales. Therefore, it is pivotal for brands in the Meat Substitute Category to prioritize these forms to maximize their Dollar Sales yield. Leveraging the insights from Table 11, focusing marketing and product development efforts on "Patties/Links Forms" can enhance sales performance and market competitiveness within the dynamic meat substitute industry landscape.

a. GLM Analysis : Form * Region ~ Total_Dollar_Sales for 'Kellanova' Manufacturer

Figure 27

Generalized Linear Model Regression Results

Dep. Variable:	Total_Dollar_Sales	No. Observations:	48
Model:	GLM	Df Residuals:	0
Model Family:	Gaussian	Df Model:	47
Link Function:	Identity	Scale:	inf
Method:	IRLS	Log-Likelihood:	720.89
Date:	Wed, 17 Apr 2024	Deviance:	2.5338e-13
Time:	14:17:00	Pearson chi2:	2.53e-13
No. Iterations:	1	Pseudo R-squ. (CS):	1.000
Covariance Type:	nonrobust		

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	2.054e+07	inf	0	1.000	-inf	inf
Form[T.Patties/Links Forms]	5.989e+07	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]	-9.194e+06	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]	-1.016e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]	-1.637e+07	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]	-2.476e+06	inf	-0	1.000	-inf	inf
Region[T.Great Lakes]	8.018e+06	inf	0	1.000	-inf	inf
Region[T.Mid]	9.881e+06	inf	0	1.000	-inf	inf
Region[T.Northeast]	3.107e+07	inf	0	1.000	-inf	inf
Region[T.Plains]	-8.202e+06	inf	-0	1.000	-inf	inf
Region[T.South Central]	-5.474e+06	inf	-0	1.000	-inf	inf
Region[T.Southeast]	1.014e+07	inf	0	1.000	-inf	inf
Region[T.West]	9.555e+05	inf	0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Great Lakes]	7.016e+06	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Great Lakes]	-4.798e+06	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Great Lakes]	-5.783e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Great Lakes]	-4.823e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Great Lakes]	-8.817e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Mid]	1.715e+07	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Mid]	-6.22e+06	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Mid]	-7.056e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Mid]	-8.288e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Mid]	-8.954e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Northeast]	2.083e+07	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Northeast]	-2.718e+07	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Northeast]	-1.72e+07	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Northeast]	-2.791e+07	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Northeast]	-2.652e+07	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Plains]	-3.611e+07	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Plains]	2.771e+06	inf	0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Plains]	-2.646e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Plains]	6.563e+06	inf	0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Plains]	-3.386e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.South Central]	-1.531e+07	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.South Central]	4.839e+06	inf	0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.South Central]	-1.256e+05	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.South Central]	5.219e+06	inf	0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.South Central]	-2.29e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Southeast]	1.92e+07	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Southeast]	-4.623e+06	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Southeast]	-5.366e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Southeast]	-6.149e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Southeast]	-1.138e+07	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.West]	3.211e+06	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.West]	7.324e+05	inf	0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.West]	-3.657e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.West]	2.744e+05	inf	0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.West]	-2.598e+06	inf	-0	1.000	-inf	inf

Conclusion: The GLM analysis for 'Kellanova' as the Manufacturer indicates a notable correlation between Form and Dollar Sales. Particularly, the form "Patties/Links Forms" demonstrates positive and higher coefficient values, suggesting its significance in driving Dollar Sales. Moreover, when considering region, this form maintains substantial coefficient values across all regions, with notable contributions observed in the Mid, Northeast, and Southeast regions. Therefore, prioritizing marketing efforts and product development strategies around "Patties/Links Forms" can potentially enhance Dollar Sales performance for 'Kellanova' within the meat substitute market landscape.

b. GLM Analysis : Form * Region ~ Total_Dollar_Sales for 'Beyond Meat.Inc' as the Manufacturer

Figure 28

Generalized Linear Model Regression Results

Dep. Variable:	Total_Dollar_Sales	No. Observations:	48
Model:	GLM	Df Residuals:	0
Model Family:	Gaussian	Df Model:	47
Link Function:	Identity	Scale:	inf
Method:	IRLS	Log-Likelihood:	697.59
Date:	Wed, 17 Apr 2024	Deviance:	6.6912e-13
Time:	14:17:01	Pearson chi2:	6.69e-13
No. Iterations:	1	Pseudo R-squ. (CS):	1.000
Covariance Type:	nonrobust		

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	1.843e+06	inf	0	1.000	-inf	inf
Form[T.Patties/Links Forms]	1.178e+08	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]	3.737e+06	inf	0	1.000	-inf	inf
Form[T.Snackable Forms]	-1.576e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]	5.511e+06	inf	0	1.000	-inf	inf
Form[T.Structured Forms]	-1.843e+06	inf	-0	1.000	-inf	inf
Region[T.Great Lakes]	2.446e+06	inf	0	1.000	-inf	inf
Region[T.Mid]	3.022e+06	inf	0	1.000	-inf	inf
Region[T.Northeast]	5.076e+06	inf	0	1.000	-inf	inf
Region[T.Plains]	-3.719e+05	inf	-0	1.000	-inf	inf
Region[T.South Central]	1.75e+06	inf	0	1.000	-inf	inf
Region[T.Southeast]	6.016e+06	inf	0	1.000	-inf	inf
Region[T.West]	-3.609e+04	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Great Lakes]	-4.33e+07	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Great Lakes]	-2.394e+06	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Great Lakes]	-2.152e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Great Lakes]	-3.502e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Great Lakes]	-2.447e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Mid]	-2.534e+07	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Mid]	-3.526e+06	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Mid]	-2.77e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Mid]	-3.178e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Mid]	-3.023e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Northeast]	3.058e+07	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Northeast]	-5.84e+06	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Northeast]	-4.958e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Northeast]	1.266e+06	inf	0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Northeast]	-5.077e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Plains]	-9.868e+07	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Plains]	-3.438e+06	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Plains]	2.88e+05	inf	0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Plains]	-5.398e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Plains]	3.711e+05	inf	0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.South Central]	-9.59e+07	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.South Central]	-4.442e+06	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.South Central]	-1.625e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.South Central]	-6.738e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.South Central]	-1.75e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Southeast]	-1.108e+07	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Southeast]	-3.304e+06	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Southeast]	-5.731e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Southeast]	-7.452e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Southeast]	-6.017e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.West]	-3.566e+07	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.West]	-2.16e+05	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.West]	3.769e+05	inf	0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.West]	-6.284e+05	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.West]	3.592e+04	inf	0	1.000	-inf	inf

Conclusion: The GLM analysis for 'Beyond Meat' as the Manufacturer shows a non-significant p-value for the correlation between Form and Dollar Sales. However, notable positive coefficient values are observed for forms such as Patty/Links, Speciality Forms, and Sliced Cut Forms. Moreover, region-specific analysis reveals significant contributions from the Northeast region for Patty/Links Forms and the Plains region for Structured Forms. This highlights the importance of regional focus in driving sales for specific form categories within the 'Beyond Meat' product line, suggesting opportunities for targeted marketing and distribution strategies to optimize sales performance.

c. GLM Analysis : Form ~ Total_Dollar_Sales for the top 5 Manufacturers

Figure 29

Generalised Linear Model Regression Results

Dep. Variable:	Total_Dollar_Sales	No. Observations:	48
Model:	GLM	Df Residuals:	0
Model Family:	Gaussian	Df Model:	47
Link Function:	Identity	Scale:	inf
Method:	IRLS	Log-Likelihood:	682.59
Date:	Wed, 17 Apr 2024	Deviance:	1.2498e-12
Time:	14:17:01	Pearson chi2:	1.25e-12
No. Iterations:	1	Pseudo R-squ. (CS):	1.000
Covariance Type:	nonrobust		

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	4.639e+07	inf	0	1.000	-inf	inf
Form[T.Patties/Links Forms]	2.302e+08	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]	-2.059e+07	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]	-1.147e+07	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]	1.427e+06	inf	0	1.000	-inf	inf
Form[T.Structured Forms]	-1.048e+07	inf	-0	1.000	-inf	inf
Region[T.Great Lakes]	7.783e+06	inf	0	1.000	-inf	inf
Region[T.Mid]	1.265e+07	inf	0	1.000	-inf	inf
Region[T.Northeast]	4.699e+07	inf	0	1.000	-inf	inf
Region[T.Plains]	-2.663e+07	inf	-0	1.000	-inf	inf
Region[T.South Central]	-2.032e+07	inf	-0	1.000	-inf	inf
Region[T.Southeast]	1.591e+07	inf	0	1.000	-inf	inf
Region[T.West]	-6.903e+05	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Great Lakes]	-3.88e+07	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Great Lakes]	-6.968e+06	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Great Lakes]	-5.045e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Great Lakes]	-5.442e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Great Lakes]	-8.483e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Mid]	-8.09e+06	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Mid]	-1.201e+07	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Mid]	-8.583e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Mid]	-5.175e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Mid]	-1.17e+07	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Northeast]	7.204e+07	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Northeast]	-3.515e+07	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Northeast]	-2.912e+07	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Northeast]	-1.056e+07	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Northeast]	-3.325e+07	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Plains]	-1.684e+08	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Plains]	1.06e+07	inf	0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Plains]	6.469e+06	inf	0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Plains]	-3.486e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Plains]	2.123e+06	inf	0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.South Central]	-1.298e+08	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.South Central]	1.237e+07	inf	0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.South Central]	9.601e+06	inf	0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.South Central]	8.632e+06	inf	0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.South Central]	4.126e+06	inf	0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Southeast]	1.91e+07	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Southeast]	-1.09e+07	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Southeast]	-8.974e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Southeast]	-1.884e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Southeast]	-1.41e+07	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.West]	-3.126e+07	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.West]	-3.441e+05	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.West]	-1.092e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.West]	7.512e+05	inf	0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.West]	1.419e+06	inf	0	1.000	-inf	inf

Conclusion: Despite the non-significant p-value, analysis across the top 5 manufacturers, including Conagra, reveals significant correlations between Form and Dollar Sales. The primary focus for these manufacturers lies on "Patties/Links Forms" and "Speciality Forms," with notable positive coefficient values. Regionally, the Mid, Northeast, and Southeast regions exhibit positive coefficient values, indicating their influence on Dollar Sales. Moreover, specific form-region combinations display significant contributions, such as "Patties/Links Forms" in the Northeast and Southeast regions, and "Speciality Forms" in the South Central and West regions. This underscores the importance of regional considerations in formulating marketing and distribution strategies to optimize sales performance for the top 5 manufacturers within the competitive meat substitute market landscape.

d. GLM Analysis : Form * Region ~ Total_Dollar_Sales for the top 5 Manufacturers

Figure 30

Generalised Linear Model Regression Results

Dep. Variable:	Total_Dollar_Sales	No. Observations:	48
Model:	GLM	Df Residuals:	0
Model Family:	Gaussian	Df Model:	47
Link Function:	Identity	Scale:	inf
Method:	IRLS	Log-Likelihood:	701.40
Date:	Wed, 17 Apr 2024	Deviance:	5.7083e-13
Time:	14:17:01	Pearson chi2:	5.71e-13
No. Iterations:	1	Pseudo R-squ. (CS):	1.000
Covariance Type:	nonrobust		

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	2.771e+06	inf	0	1.000	-inf	inf
Form[T.Patties/Links Forms]	8.674e+06	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]	-1.978e+05	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]	3.79e+06	inf	0	1.000	-inf	inf
Form[T.Speciality Forms]	3.196e+07	inf	0	1.000	-inf	inf
Form[T.Structured Forms]	4.061e+06	inf	0	1.000	-inf	inf
Region[T.Great Lakes]	-7.154e+05	inf	-0	1.000	-inf	inf
Region[T.Mid]	-3.059e+05	inf	-0	1.000	-inf	inf
Region[T.Northeast]	3.089e+06	inf	0	1.000	-inf	inf
Region[T.Plains]	-1.94e+06	inf	-0	1.000	-inf	inf
Region[T.South Central]	-1.659e+06	inf	-0	1.000	-inf	inf
Region[T.Southeast]	2.029e+06	inf	0	1.000	-inf	inf
Region[T.West]	-7.692e+05	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Great Lakes]	6.324e+06	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Great Lakes]	3.214e+05	inf	0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Great Lakes]	1.155e+06	inf	0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Great Lakes]	1e+06	inf	0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Great Lakes]	-8.945e+05	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Mid]	1.233e+07	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Mid]	5.849e+05	inf	0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Mid]	1.775e+06	inf	0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Mid]	6.765e+06	inf	0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Mid]	-1.126e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Northeast]	1.716e+07	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Northeast]	-5.074e+05	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Northeast]	-6.606e+05	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Northeast]	2.275e+07	inf	0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Northeast]	-2.321e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Plains]	-1.477e+06	inf	-0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Plains]	2.946e+05	inf	0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Plains]	-2.083e+06	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Plains]	-1.95e+07	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Plains]	-3.139e+06	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.South Central]	6.879e+06	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.South Central]	5.022e+05	inf	0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.South Central]	-8.063e+04	inf	-0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.South Central]	-3.837e+06	inf	-0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.South Central]	-2.619e+05	inf	-0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.Southeast]	1.687e+07	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.Southeast]	-1.345e+05	inf	-0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.Southeast]	1.168e+06	inf	0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.Southeast]	1.011e+07	inf	0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.Southeast]	9.185e+05	inf	0	1.000	-inf	inf
Form[T.Patties/Links Forms]:Region[T.West]	3.345e+06	inf	0	1.000	-inf	inf
Form[T.Sliced Cut Forms]:Region[T.West]	2.299e+05	inf	0	1.000	-inf	inf
Form[T.Snackable Forms]:Region[T.West]	8.975e+05	inf	0	1.000	-inf	inf
Form[T.Speciality Forms]:Region[T.West]	5.812e+05	inf	0	1.000	-inf	inf
Form[T.Structured Forms]:Region[T.West]	-5.77e+05	inf	-0	1.000	-inf	inf

Inference 3.2

Inference: For Conagra Brands, the analysis highlights a strategic focus on multiple forms within the meat substitute category. Specifically, Conagra emphasizes 'Patties/Links Forms,' 'Speciality Forms,' 'Snackable Forms,' and 'Structured Forms,' with a prime emphasis on 'Speciality Forms.'

Regional analysis reveals dynamic competition among various forms within each region:

- In the Northeast US, 'Patties/Links Forms' and 'Speciality Forms' compete closely.

- In the Southeast US, 'Patties/Links Forms,' 'Snackable Forms,' and 'Speciality Forms' exhibit significant competition within the same brand and region.

- The Mid US region sees competition among 'Patties/Links Forms,' 'Sliced Cut Forms,' 'Snackable Forms,' and 'Speciality Forms.'

- In the West US, 'Patties/Links Forms,' 'Sliced Cut Forms,' 'Snackable Forms,' and 'Speciality Forms' compete vigorously within the same brand and region.

Recommendation 3.2

Considering the form, region, and Dollar Sales dynamics across various brands, Conagra should prioritize 'Patties/Links Forms' in the Mid, Southeast, and Northeast US regions, aligning with competitors' regional optimization strategies. Additionally, highlighting 'Patties/Links Forms' as a primary offering in these regions could enhance sales revenue.

To further maximize sales revenue, Conagra can target 'Speciality Forms' in the South-Central US and West US regions, leveraging insights from the sales region trajectories of top competitors in the meat substitute category. This detailed approach to form and region-specific marketing strategies can effectively drive sales performance and market presence for Conagra within the competitive landscape.

Figure 31

```
Product Type
MEAT SUBSTITUTE                   560678
POULTRY SUBSTITUTE                108180
PLANT BASED SUBSTITUTE             74328
PLANT BASED CHICKEN SUBSTITUTE     32854
TOFU                               10567
TEMPEH                              8533
FISH SUBSTITUTE                     5966
SEAFOOD SUBSTITUTE                  5237
SEITAN                              4246
TOFU SUBSTITUTE                     4168
SOY SUBSTITUTE                      2455
PLANT BASED TURKEY SUBSTITUTE       2058
FALAFEL                             1653
BURGER                              1415
CHICKEN SUBSTITUTE                  1363
TEMPEH SUBSTITUTE                    334
SOY                                  281
VEGETABLE MEAT SUBSTITUTE             51
Name: count, dtype: int64
```

Question 4

What is the significance of product type and region influencing the dollar sales amount?

- Independent variables: Product Type/Region
- Dependent variable: Dollar Sales ($)

Hypothesis

The hypothesis suggests that GARDEIN can significantly enhance its sales performance by focusing on specific product categories that align with regional preferences and market demand. Specifically, expanding the 'Meat Substitute' and 'Plant Based Substitute' categories in the California region, leveraging the niche market for 'Fish Substitute' in the Great Lakes region, and capitalizing on the strong sales of 'Tofu' in the Southeast region. Additionally, addressing the broadly negative impacts observed in the Plains region by reassessing product strategies could mitigate losses and enhance overall sales performance.

Product Type Sales Data

Figure 32 - Regression Analysis: Dollar Sales Prediction Based on Product Type and Region

OLS Regression Results

Dep. Variable:	Dollar Sales	R-squared:	0.006
Model:	OLS	Adj. R-squared:	0.006
Method:	Least Squares	F-statistic:	273.2
Date:	Tue, 30 Apr 2024	Prob (F-statistic):	0.00
Time:	15:51:33	Log-Likelihood:	-9.0965e+06
No. Observations:	824367	AIC:	1.819e+07
Df Residuals:	824348	BIC:	1.819e+07
Df Model:	18		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
const	3.402e+13	7.08e+13	0.480	0.631	-1.05e+14	1.73e+14
BURGER	-3.402e+13	7.08e+13	-0.480	0.631	-1.73e+14	1.05e+14
CHICKEN SUBSTITUTE	-3.402e+13	7.08e+13	-0.480	0.631	-1.73e+14	1.05e+14
FALAFEL	-3.402e+13	7.08e+13	-0.480	0.631	-1.73e+14	1.05e+14
FISH SUBSTITUTE	-3.402e+13	7.08e+13	-0.480	0.631	-1.73e+14	1.05e+14
MEAT SUBSTITUTE	-3.402e+13	7.08e+13	-0.480	0.631	-1.73e+14	1.05e+14
PLANT BASED CHICKEN SUBSTITUTE	-3.402e+13	7.08e+13	-0.480	0.631	-1.73e+14	1.05e+14
PLANT BASED SUBSTITUTE	-3.402e+13	7.08e+13	-0.480	0.631	-1.73e+14	1.05e+14
PLANT BASED TURKEY SUBSTITUTE	-3.402e+13	7.08e+13	-0.480	0.631	-1.73e+14	1.05e+14
POULTRY SUBSTITUTE	-3.402e+13	7.08e+13	-0.480	0.631	-1.73e+14	1.05e+14
SEAFOOD SUBSTITUTE	-3.402e+13	7.08e+13	-0.480	0.631	-1.73e+14	1.05e+14

...

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[2] The smallest eigenvalue is 2.36e-21. This might indicate that there are strong multicollinearity problems or that the design matrix is singular.

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Inference 4.1.1

- The R-squared and adjusted R-squared values are both extremely low, measuring at 0.006. This suggests that the model explains only 0.6% of the variance in dollar sales, indicating a poor fit where the predictors do not effectively explain the changes in sales.

Despite this, the model's F-statistic is significant, suggesting that the model is statistically significant.

- However, all predictors, including the intercept, exhibit exceptionally large coefficients and standard errors, both in the range of ±3.402e+13. Such large values typically indicate severe multicollinearity or specification errors in the model. Moreover, the t-values and corresponding p-values are uniformly non-significant ($p > 0.05$) for all predictors.
- This uniformity, especially given the massive size of coefficients and standard errors, is highly unusual and suggests underlying issues with the data or model formulation. Consequently, due to the negative and very high coefficients, it is advisable to focus only on the Top 10 Product Types for further analysis and decision-making.

Figure 33-Regression Analysis Results for Product Type and Dollar Sales

OLS Regression Results

Dep. Variable:	Dollar Sales	R-squared:	0.006
Model:	OLS	Adj. R-squared:	0.006
Method:	Least Squares	F-statistic:	480.4
Date:	Tue, 30 Apr 2024	Prob (F-statistic):	0.00
Time:	15:51:42	Log-Likelihood:	-9.0966e+06
No. Observations:	824367	AIC:	1.819e+07
Df Residuals:	824356	BIC:	1.819e+07
Df Model:	10		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
const	1795.7761	152.997	11.737	0.000	1495.907	2095.645
MEAT SUBSTITUTE	4454.1269	154.303	28.866	0.000	4151.699	4756.555
POULTRY SUBSTITUTE	2911.0064	159.648	18.234	0.000	2598.102	3223.911
PLANT BASED SUBSTITUTE	5790.2893	162.587	35.613	0.000	5471.624	6108.954
PLANT BASED CHICKEN SUBSTITUTE	2555.1294	173.940	14.690	0.000	2214.213	2896.046
TOFU	1201.6419	211.415	5.684	0.000	787.276	1616.008
TEMPEH	3225.0108	223.093	14.456	0.000	2787.755	3662.266
FISH SUBSTITUTE	3317.8908	247.212	13.421	0.000	2833.364	3802.418
SEAFOOD SUBSTITUTE	-253.6341	257.609	-0.985	0.325	-758.539	251.271
SEITAN	-602.9888	276.383	-2.182	0.029	-1144.691	-61.287
TOFU SUBSTITUTE	-1105.6186	278.171	-3.975	0.000	-1650.825	-560.412
...						

Inference 4.1.1

- The model exhibits a very weak fit with an R-squared value of 0.006, indicating that only 0.6% of the variance in dollar sales is explained by the predictors.

- Product types like MEAT SUBSTITUTE, POULTRY SUBSTITUTE, and PLANT BASED SUBSTITUTE show positive coefficients, suggesting an increase in dollar sales. However, SEAFOOD SUBSTITUTE and TOFU SUBSTITUTE exhibit negative coefficients, with TOFU SUBSTITUTE being statistically significant ($p = 0.000$).

- Apart from SEAFOOD SUBSTITUTE, all predictors are statistically significant ($p < 0.05$), providing strong evidence against the null hypothesis for these coefficients.

Recommendation 4.1

Considering the positive sales impact and coefficients of various product types, Gardein should prioritize expanding and promoting their 'Meat Substitute' and 'Plant Based Substitute' lines. These products have substantial positive influence on dollar sales, particularly effective for boosting the brand's market presence and revenue.

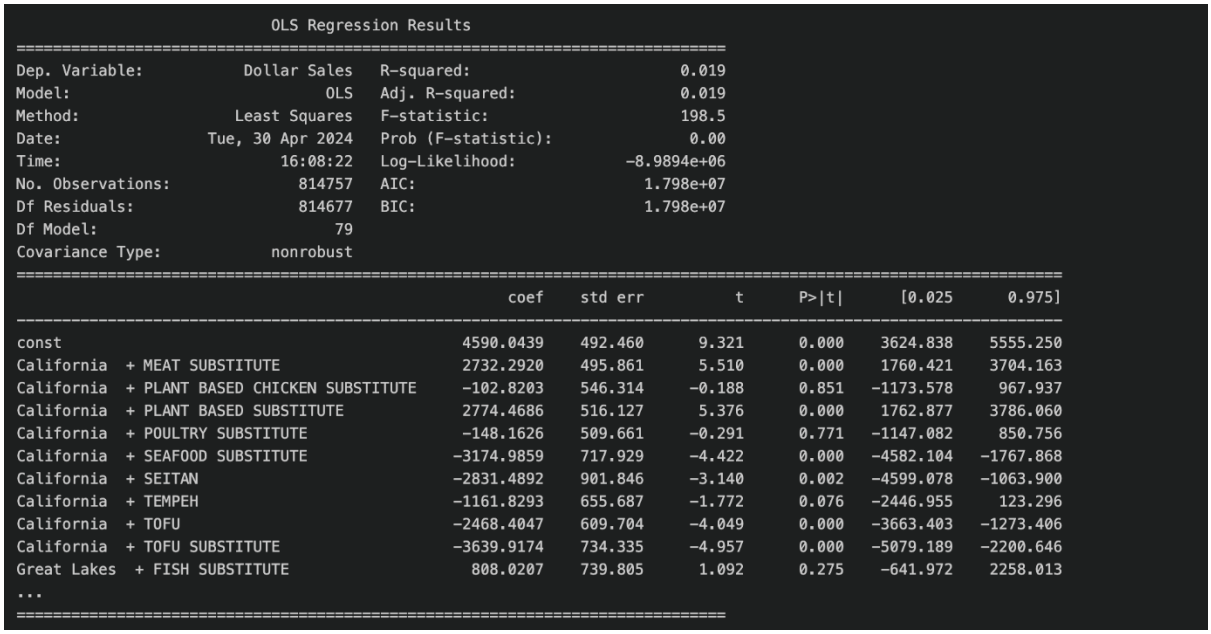
Additionally, Gardein should focus on enhancing the visibility and appeal of 'Poultry Substitute' and 'Plant Based Chicken Substitute' across all regions, leveraging these products' proven sales potential. Marketing efforts could include targeted campaigns and partnerships with retailers to improve shelf positioning and promotional displays, especially in high-traffic stores.

To address the negative sales impact of 'Seitan' and 'Tofu Substitute,' Gardein should consider a two-pronged approach:

1. Product Improvement: Evaluate consumer feedback and quality metrics to reformulate or rebrand these products, aiming to better align with consumer preferences and competitive offerings.

2. Strategic Phasing: If improvements do not yield the desired sales uplift, gradually phase out the weakest variants, reallocating resources to bolster the marketing and development of more successful products.

Figure 34 - Regression Analysis Summary for Dollar Sales Based on Product Type



OLS Regression Results

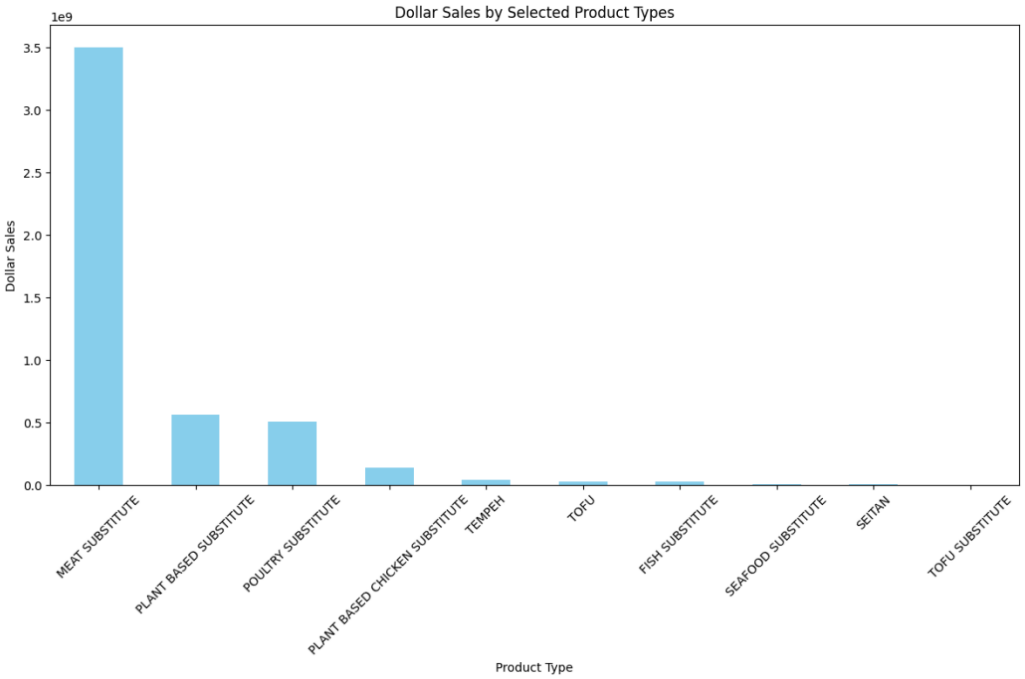
Dep. Variable:	Dollar Sales	R-squared:	0.019
Model:	OLS	Adj. R-squared:	0.019
Method:	Least Squares	F-statistic:	198.5
Date:	Tue, 30 Apr 2024	Prob (F-statistic):	0.00
Time:	16:08:22	Log-Likelihood:	-8.9894e+06
No. Observations:	814757	AIC:	1.798e+07
Df Residuals:	814677	BIC:	1.798e+07
Df Model:	79		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
const	4590.0439	492.460	9.321	0.000	3624.838	5555.250
California + MEAT SUBSTITUTE	2732.2920	495.861	5.510	0.000	1760.421	3704.163
California + PLANT BASED CHICKEN SUBSTITUTE	-102.8203	546.314	-0.188	0.851	-1173.578	967.937
California + PLANT BASED SUBSTITUTE	2774.4686	516.127	5.376	0.000	1762.877	3786.060
California + POULTRY SUBSTITUTE	-148.1626	509.661	-0.291	0.771	-1147.082	850.756
California + SEAFOOD SUBSTITUTE	-3174.9859	717.929	-4.422	0.000	-4582.104	-1767.868
California + SEITAN	-2831.4892	901.846	-3.140	0.002	-4599.078	-1063.900
California + TEMPEH	-1161.8293	655.687	-1.772	0.076	-2446.955	123.296
California + TOFU	-2468.4047	609.704	-4.049	0.000	-3663.403	-1273.406
California + TOFU SUBSTITUTE	-3639.9174	734.335	-4.957	0.000	-5079.189	-2200.646
Great Lakes + FISH SUBSTITUTE	808.0207	739.805	1.092	0.275	-641.972	2258.013
...						

Inference 4.2

- The model demonstrates a modest explanatory power with an R-squared value of 0.019, indicating that it explains only 1.9% of the variance in dollar sales.
- Positive coefficients are observed for product types like MEAT SUBSTITUTE and PLANT BASED SUBSTITUTE, suggesting sales boosts, while negative coefficients, notably in combinations like California + SEAFOOD SUBSTITUTE and TOFU SUBSTITUTE, imply sales reductions.
- Most predictors are statistically significant ($p < 0.05$), indicating reliable drivers of sales differences according to the model.

Figure 35



Recommendation 4.2

1. California Region:

Expand 'Meat Substitute' and 'Plant Based Substitute': These categories have shown strong positive coefficients in California, suggesting they are well-received and contribute significantly to sales. A targeted expansion and enhanced marketing in California could capitalize on this demand.

2. Great Lakes Region:

Leverage 'Fish Substitute' Strength: While not as strong as other regions, the positive coefficient for 'Fish Substitute' suggests a potential market niche that could be developed further in the Great Lakes area.

3. Northeast and Southeast Region:

Capitalize on 'Tofu' in the Southeast: With a strong positive coefficient, 'Tofu' sales in the Southeast are robust, indicating a successful market penetration that could be enhanced through targeted marketing and product availability.

4. Plains Region:

Address Broadly Negative Impacts: Almost all product categories show negative coefficients in the Plains region. This requires a strategic review to understand the market dynamics and possibly reposition GARDEIN products or intensify promotional activities to improve brand perception and product uptake.