MORNING MUNCHIES

Data Analisys for Breakfast Bliss Corp.

Agenda

1. **Cereal Market Analysis:** Exploring the current landscape, consumer preferences, and caloric content by brand.
2. **Health Implications:** Investigating Sodium to Potassium ratios across brands.
3. **Data–Driven Cluster Analysis:** Understanding cereal categories through feature importance, correlation, and cluster estimation.
4. **Key Insights & Opportunities:** Highlighting findings from the analysis and potential market opportunities.
5. **Recommendations & Conclusion:** Providing actionable marketing suggestions and summarizing key takeaways.

Understanding Our Data

Overview
- Features: 66 in total (59 numerical)
- Samples: 180 valid cereal entries post-cleaning
- Brands: Quaker, Post, Kellogg, General Mills, Nabisco
- Dominated by correlated features

Feature Insights
- Key nutrients: Calories, Protein, Fiber, Carbs, Vitamins, Minerals
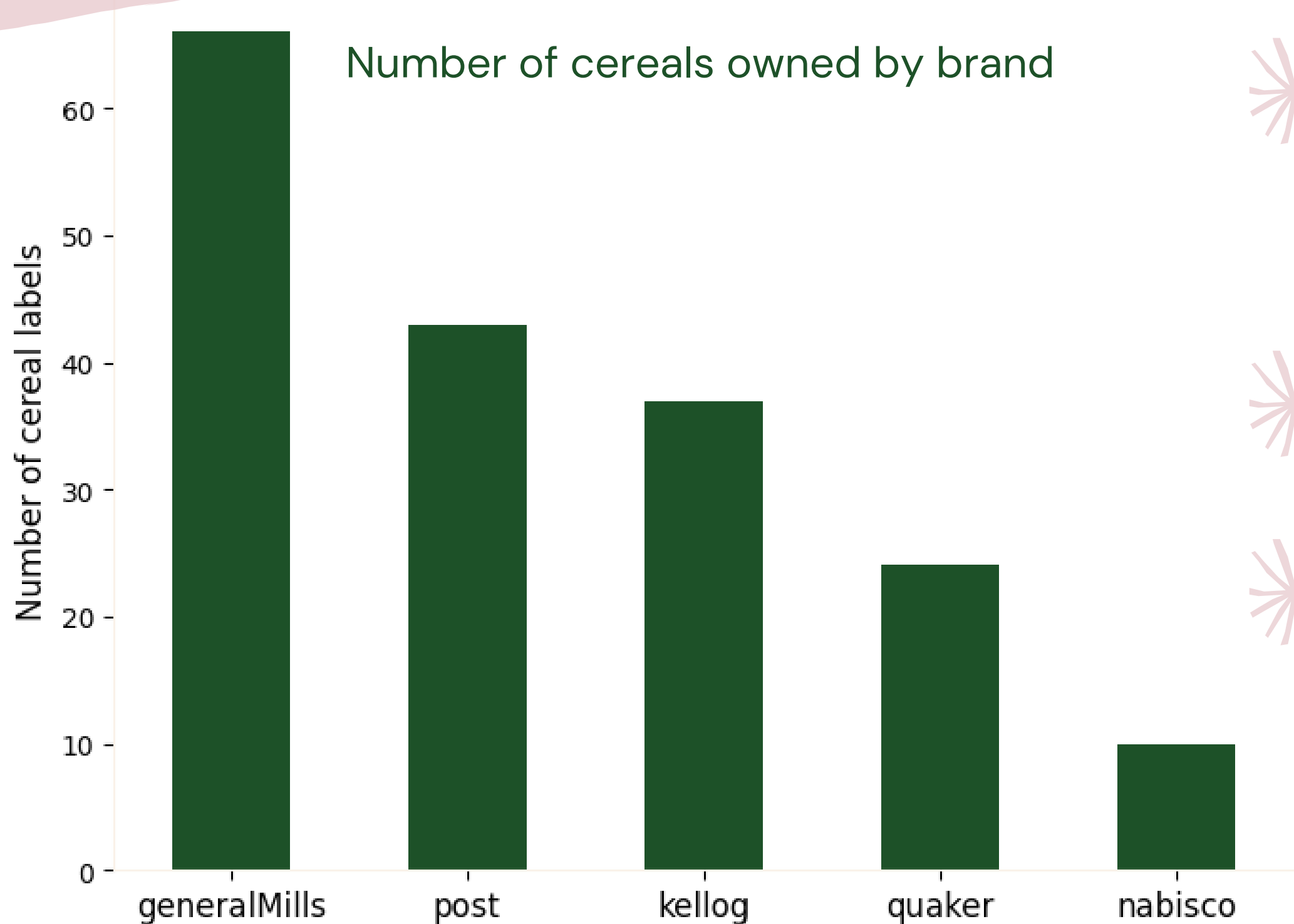- Other information: Brands, Names, Rankings, etc.

Sample Highlights
- Initially 185, 5 removed due to data cleaning
- Broad representation of market leaders

Overall size

180 samples

General Mills Leads in Cereal Variety. Surpassing Kellogg

Number of cereals owned by brand

Despite Kellogg's broad **market presence**, it only contributes about 20% of the total cereal variety, half of that offered by General Mills.

General Mills leads the chart with **37%** of the total cereal labels.

Post, while not the most recognized, exhibits **strong competition** with 24% of the total cereal types, surpassing Kellogg, Quaker, and Nabisco.

Number of cereal labels

generalMills post kellog quaker nabisco

Cereal Ranking Reveals a Preference for 8.5, Indicating Overall Satisfaction

Rank count and distribution
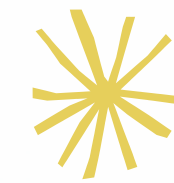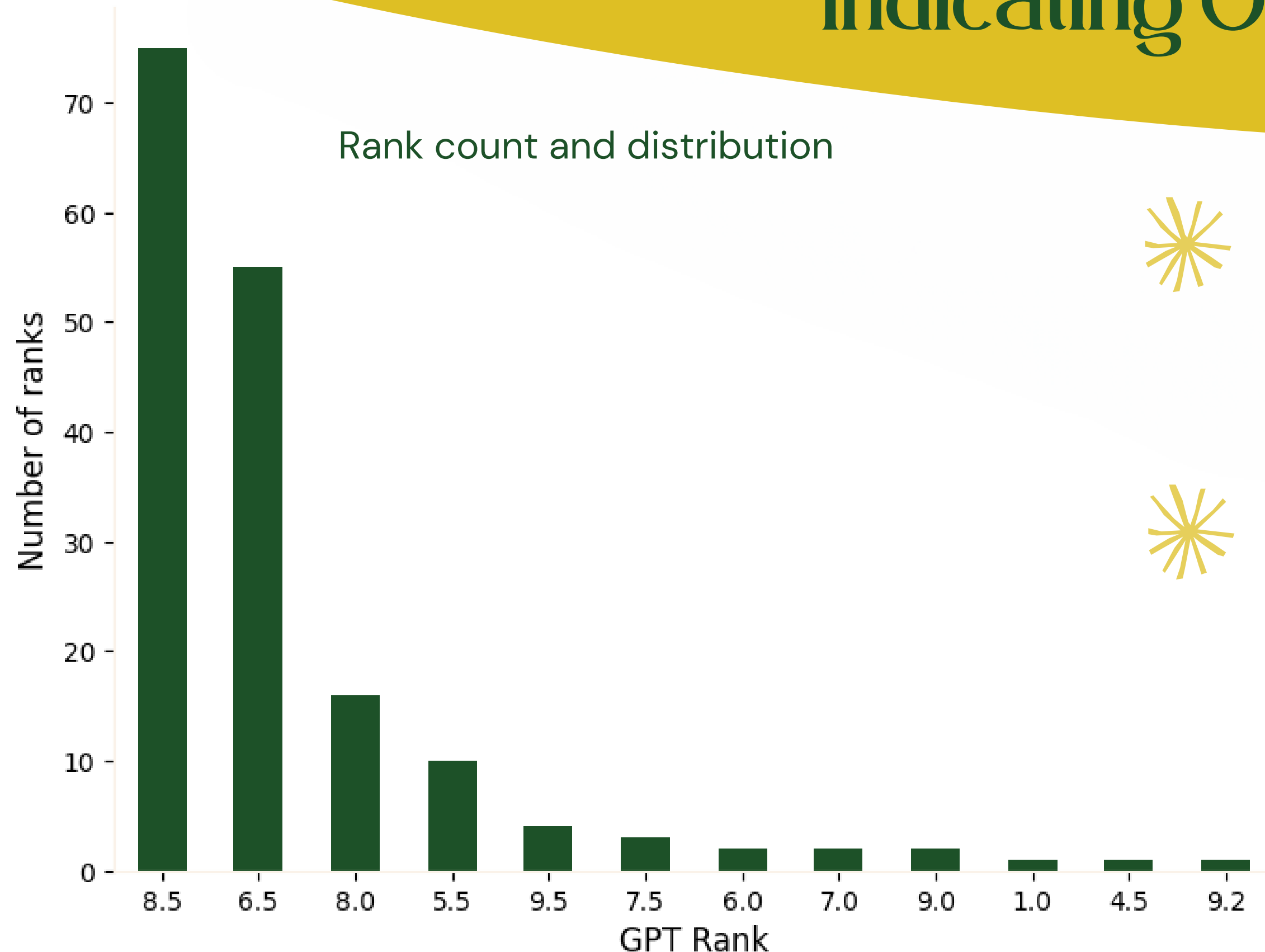
An analysis of cereal ranks reveals a clear preference with **a mode at 8.5**, indicating that consumers generally find these cereals appealing, as demonstrated by 75 cereals receiving this rating.
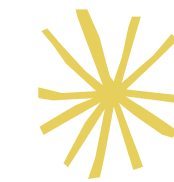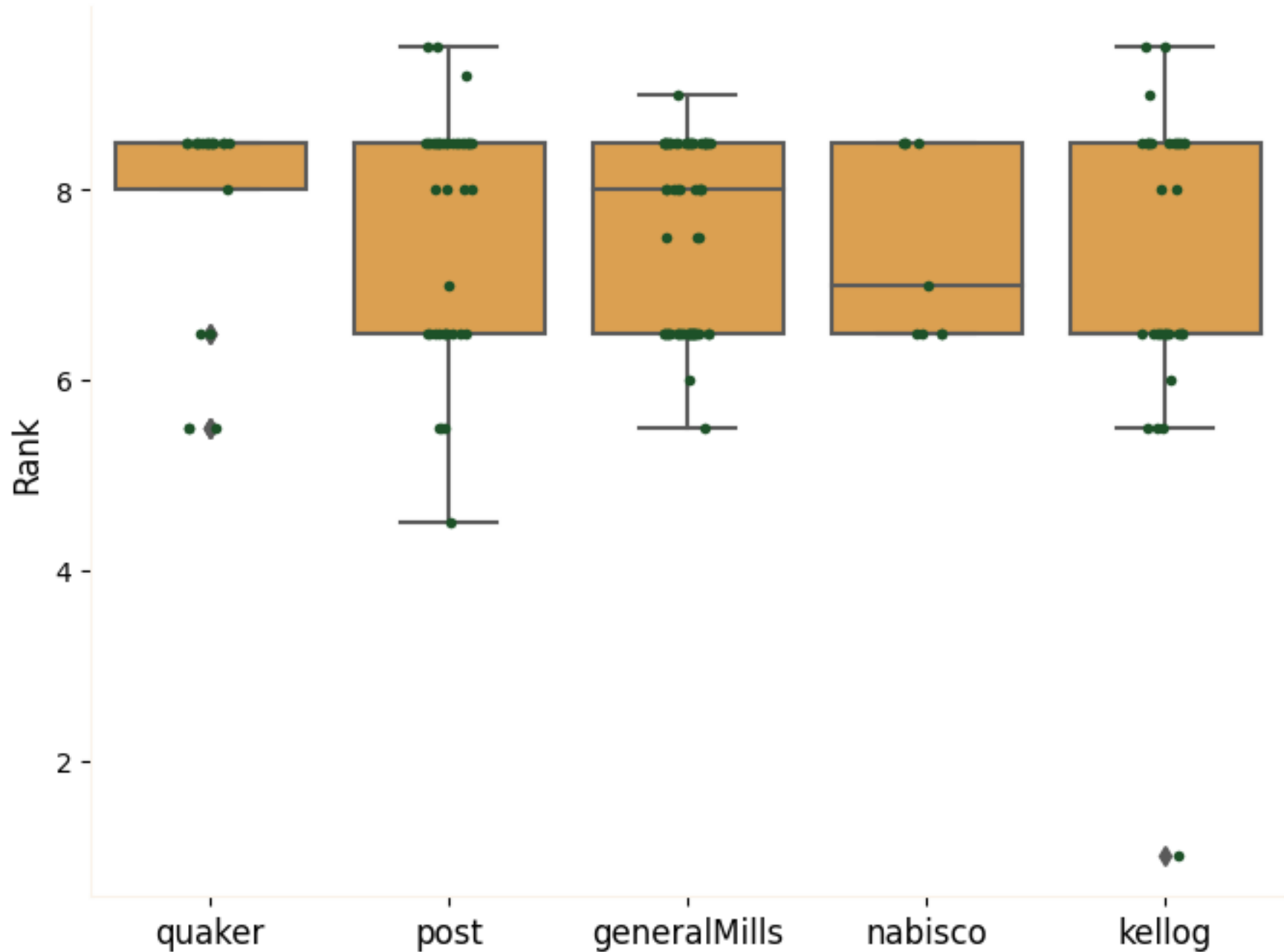
On the other hand, a **significant portion of the dataset also received a 6.5 score**, suggesting a range of satisfactory but less favorable experiences.

Quaker Surpasses Competitors with Highest Mean Rank

Yet Kellog Exhibits Greater Variation

Rank distribution among brands

Quaker leads with an **average rating** of 7.9, but Kellog, at 7.3, shows a larger **standard deviation** of 1.6. This suggests Quaker consistently meets customer expectations, while Kellog's cereals result in varied experiences.

Even though most brands **hover** around a 7 to 8 **average rating**, it's the **variation in ratings** that reveals nuanced consumer satisfaction insights.

Quaker Cereals: Highest Mean Calories, Yet Lower Variation

Calories distribution by brand

Quaker **leads** with the **highest average** calories (485.3) per serving.

General Mills shows the largest calorie variation with a **standard deviation** of 375.7.

Kellog and Nabisco offer lower-calorie alternatives, **averaging** around 250 calories. This reveals a **correlation** between brand, product variety, and caloric content, hinting at complex market dynamics.

Kellog and General Mills: Brands with Concerningly High Sodium to Potassium Ratio

Na to K distribution by brand
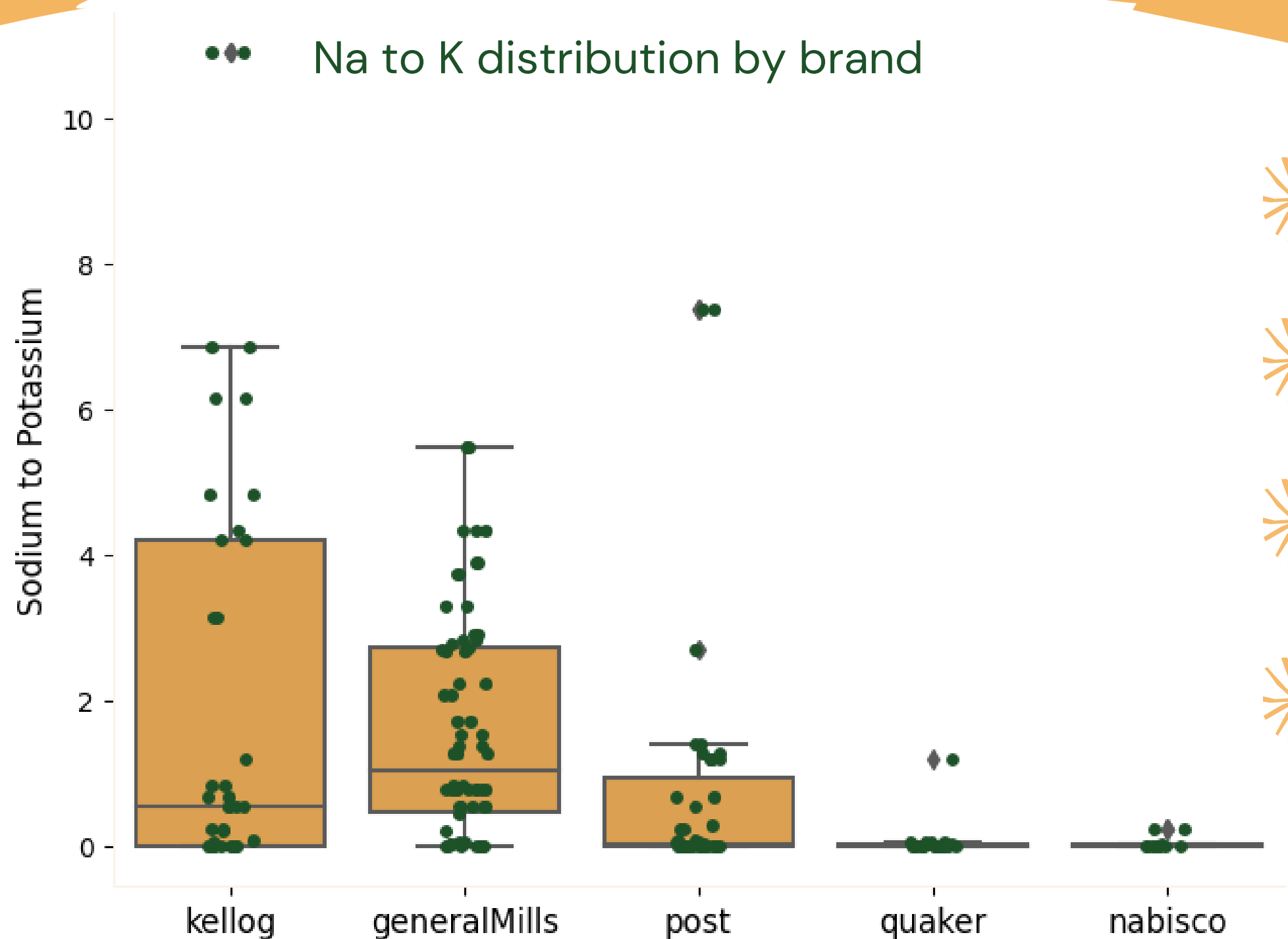
Kellog leads with a high Sodium to Potassium **ratio** (avg: 2.3), followed by General Mills (avg: 1.6).

Post, Quaker, and Nabisco present significantly **lower ratios**, enhancing their health appeal.
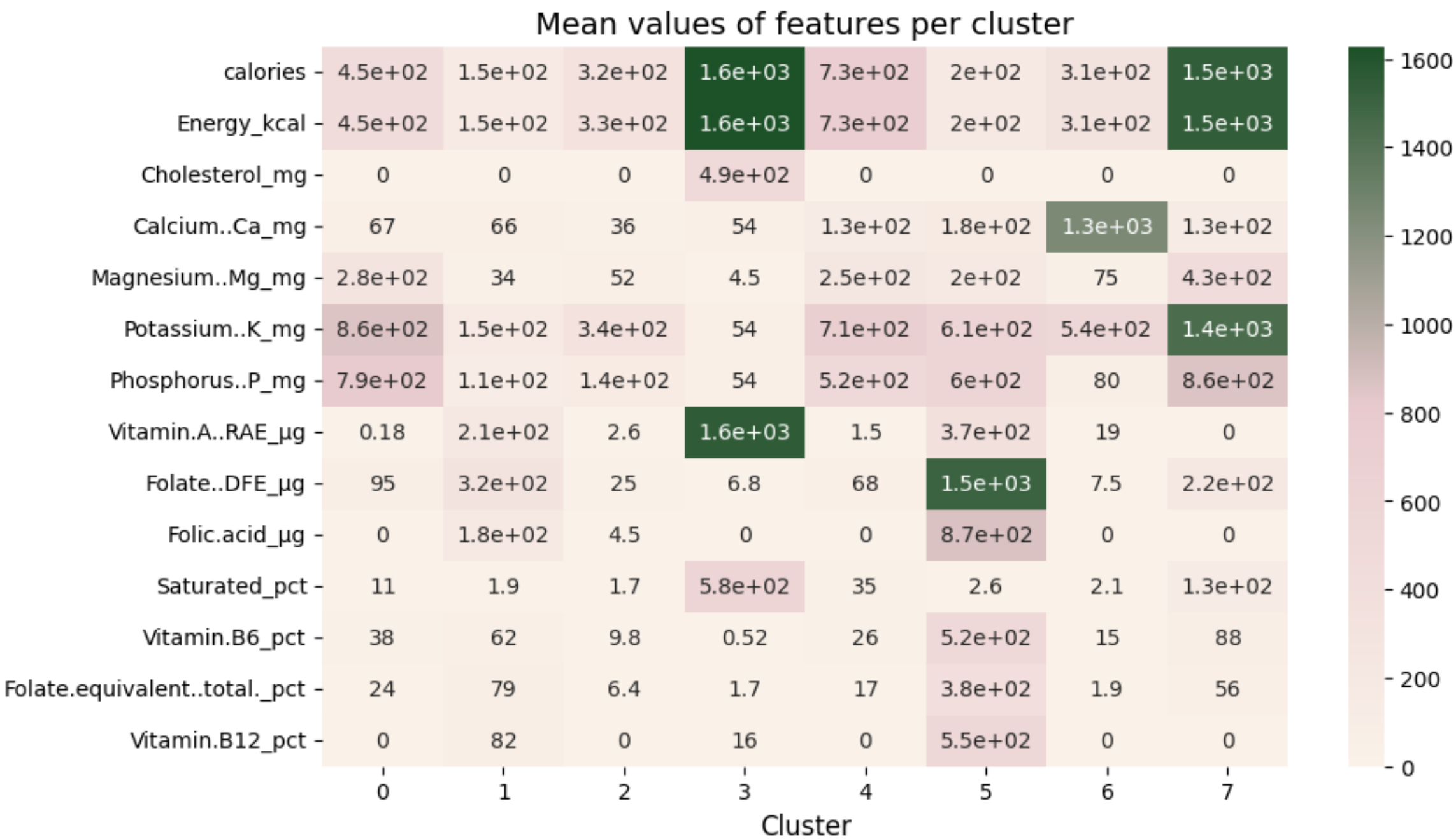
Notably, Kellog's **high variability** (std: 3.1) suggests diverse nutritional profiles.

Brands with high Sodium to Potassium ratios could potentially **influence** health risks such as hypertension and cardiovascular diseases.
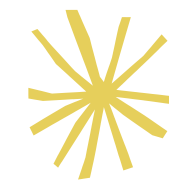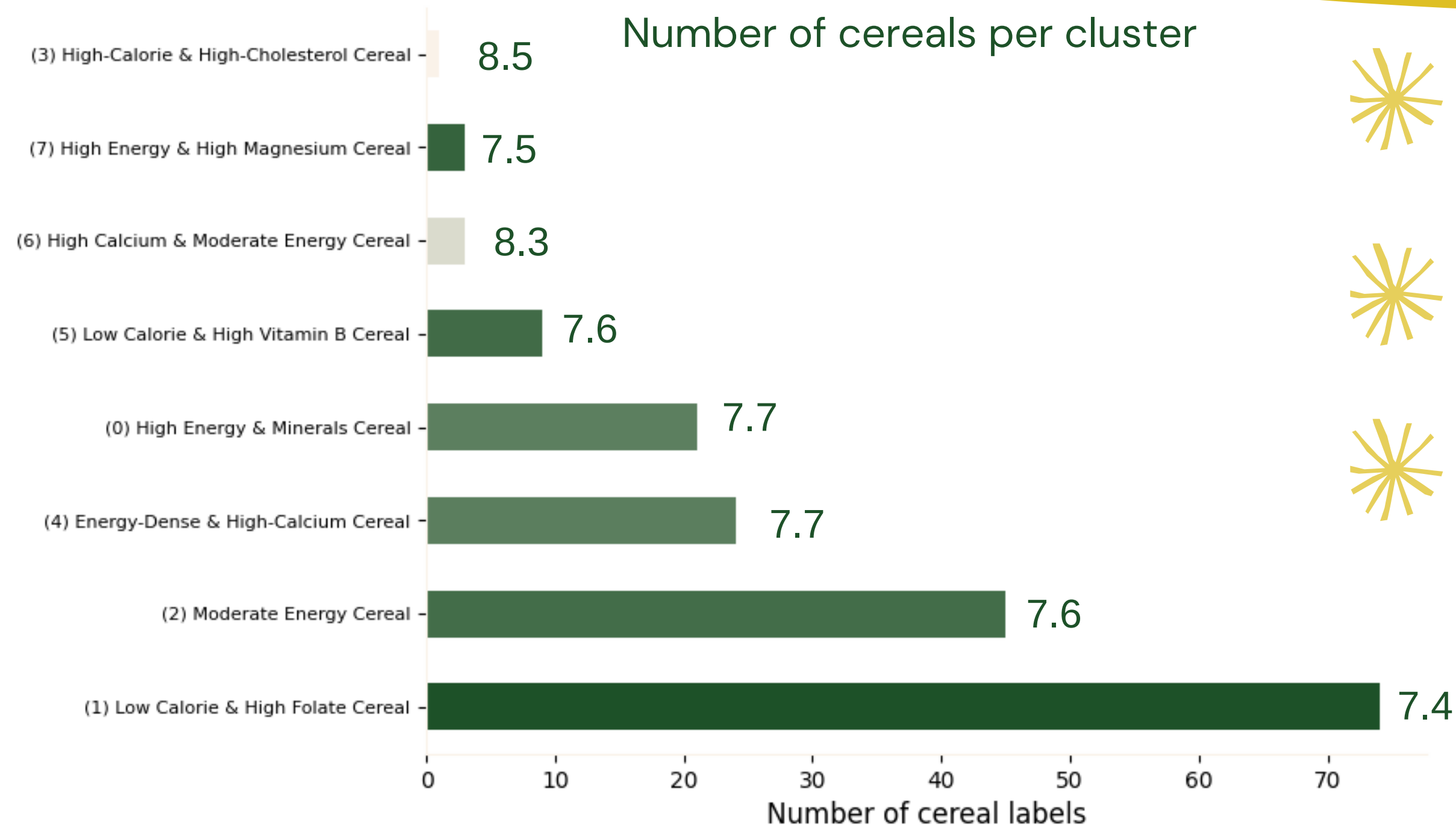
Identifying Nutritional Profiles: 8 Distinct Clusters Unveiled

Mean values of features per cluster

	0	1	2	3	4	5	6	7
calories	4.5e+02	1.5e+02	3.2e+02	1.6e+03	7.3e+02	2e+02	3.1e+02	1.5e+03
Energy_kcal	4.5e+02	1.5e+02	3.3e+02	1.6e+03	7.3e+02	2e+02	3.1e+02	1.5e+03
Cholesterol_mg	0	0	0	4.9e+02	0	0	0	0
Calcium..Ca_mg	67	66	36	54	1.3e+02	1.8e+02	1.3e+03	1.3e+02
Magnesium..Mg_mg	2.8e+02	34	52	4.5	2.5e+02	2e+02	75	4.3e+02
Potassium..K_mg	8.6e+02	1.5e+02	3.4e+02	54	7.1e+02	6.1e+02	5.4e+02	1.4e+03
Phosphorus..P_mg	7.9e+02	1.1e+02	1.4e+02	54	5.2e+02	6e+02	80	8.6e+02
Vitamin.A..RAE_µg	0.18	2.1e+02	2.6	1.6e+03	1.5	3.7e+02	19	0
Folate..DFE_µg	95	3.2e+02	25	6.8	68	1.5e+03	7.5	2.2e+02
Folic.acid_µg	0	1.8e+02	4.5	0	0	8.7e+02	0	0
Saturated_pct	11	1.9	1.7	5.8e+02	35	2.6	2.1	1.3e+02
Vitamin.B6_pct	38	62	9.8	0.52	26	5.2e+02	15	88
Folate.equivalent..total._pct	24	79	6.4	1.7	17	3.8e+02	1.9	56
Vitamin.B12_pct	0	82	0	16	0	5.5e+02	0	0

Cluster

✳ **Utilizing elbow method**, we discerned 8 distinct clusters, each embodying unique dietary profiles.

✳ Each cluster can be distinguished by its **mean** nutritional values – a clear reflection of varied dietary content among cereals.

✳ Clusters 3 and 7 stand out for extremely high **mean values** in multiple nutritional parameters, indicating particularly calorie–dense cereals.

✳ Nutritional diversity within clusters suggests **distinct dietary strategies** adopted by cereal manufacturers.

Consumer Preference Across Nutritional Clusters

Size Doesn't Equal Appealups based on the clusters

Number of cereals per cluster

Cluster	Value
(3) High-Calorie & High-Cholesterol Cereal	8.5
(7) High Energy & High Magnesium Cereal	7.5
(6) High Calcium & Moderate Energy Cereal	8.3
(5) Low Calorie & High Vitamin B Cereal	7.6
(0) High Energy & Minerals Cereal	7.7
(4) Energy-Dense & High-Calcium Cereal	7.7
(2) Moderate Energy Cereal	7.6
(1) Low Calorie & High Folate Cereal	7.4

Number of cereal labels

The largest cluster 1 carries the **lowest average ranking** (7.4), demonstrating size isn't synonymous with popularity.
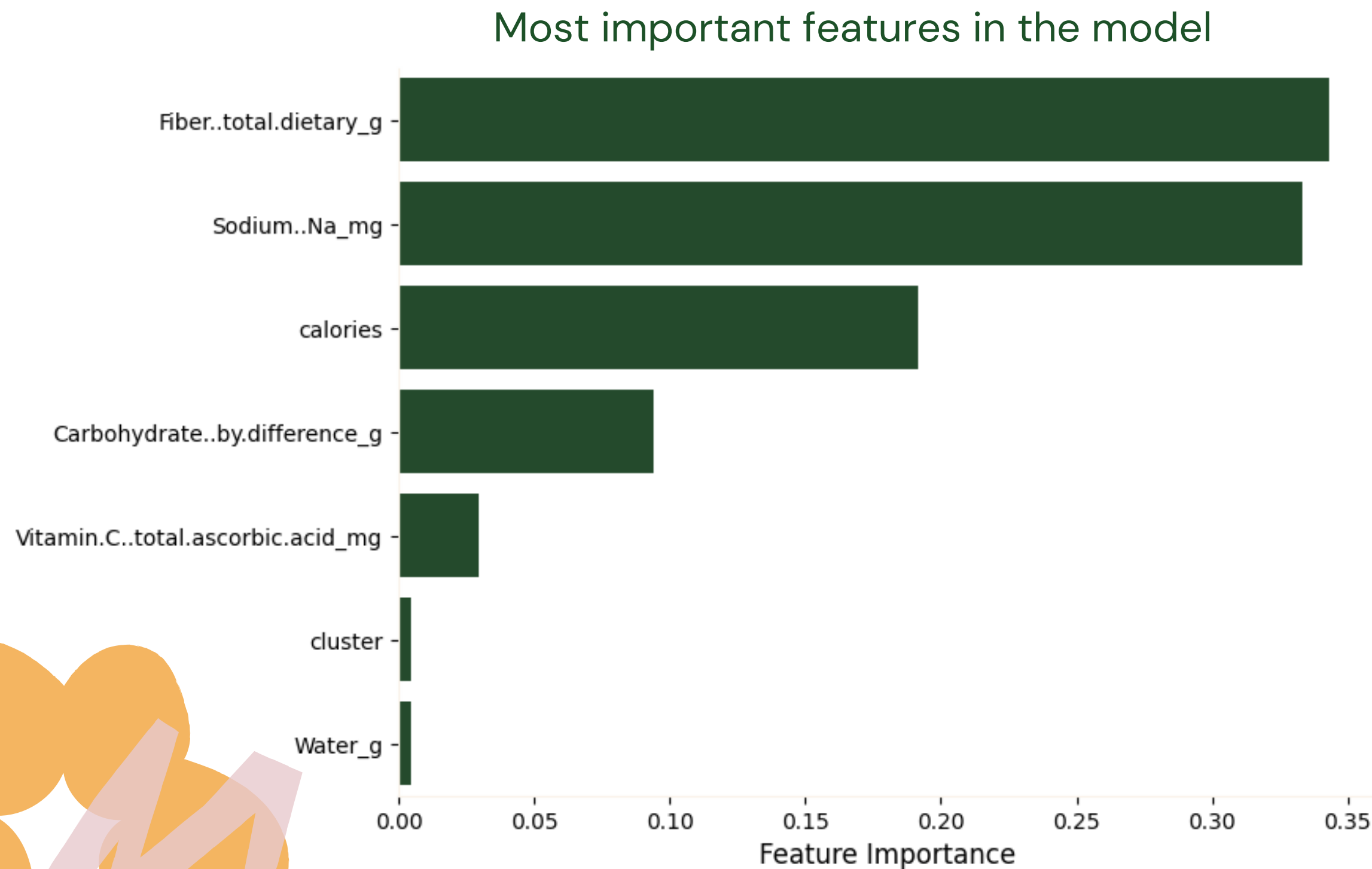
Clusters 6 and 3 secure **highest rankings** (8.3 and 8.5 respectively) albeit with limited samples, suggesting niche appeal.

Despite **average ranks** of 7.7, clusters 4 and 0 are well represented in the dataset, hinting at balanced consumer preferences.

Key Drivers of Cereal Ranking: Fiber, Sodium, and Calories Lead the Pack

Most important features in the model

'Fiber..total.dietary_g', 'Sodium..Na_mg', and 'calories' surfaced as the **top 3** determinants of cereal ranking.
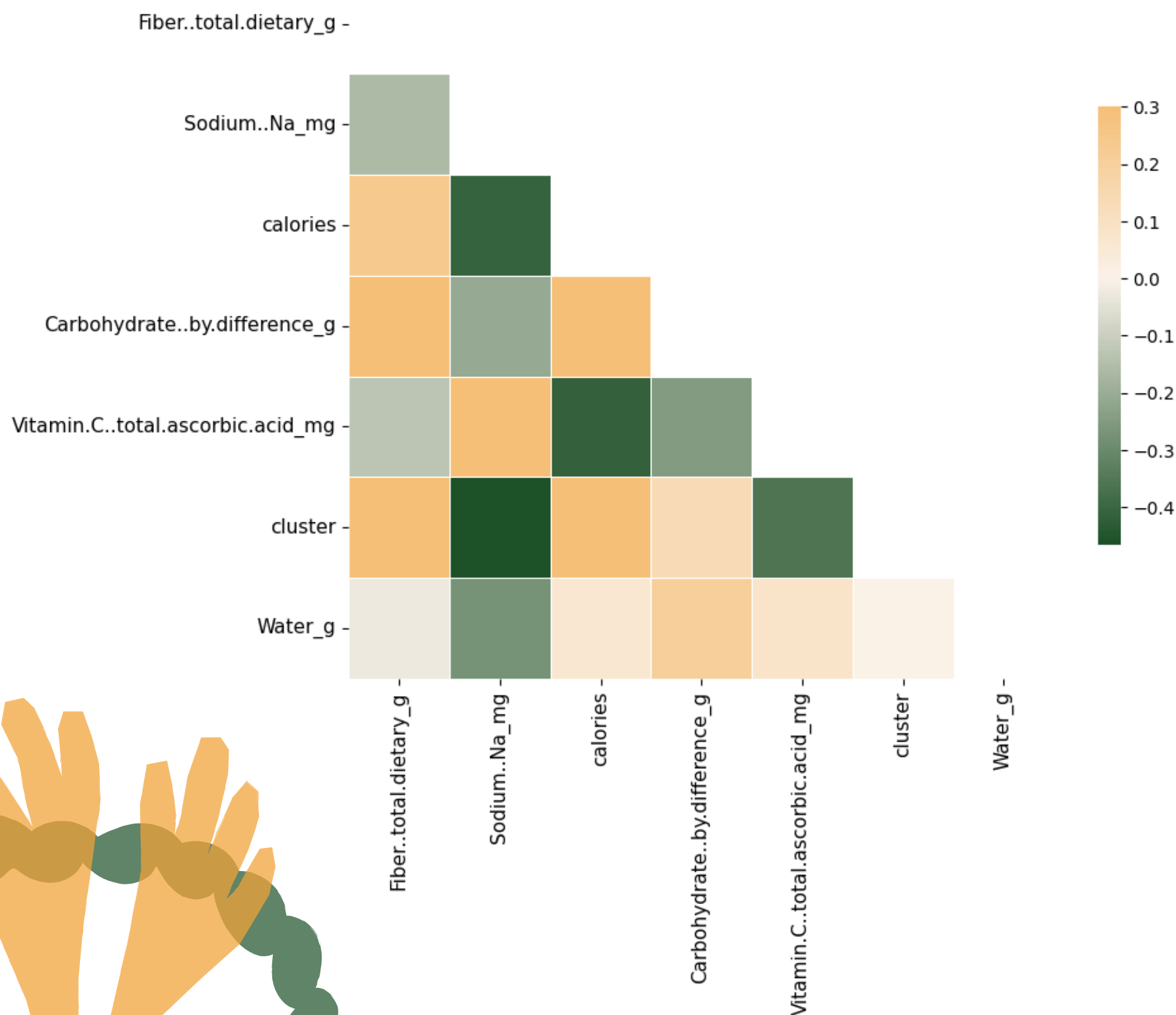
High fiber content (>5g/serving) and low sodium content (<200mg/serving) contribute to **higher ranking**, likely due to health preferences.

Calorie content is also influential, with cereals <=146 calories/serving favored, reflecting **consumer interest** in health and weight management.

Interrelationships Among Key Features: A Correlation Heatmap

Fiber is **positively correlated** with calories and carbohydrates but shows a negative correlation with sodium and Vitamin C.

Sodium **negatively correlates** with calories and carbohydrates but has a positive correlation with Vitamin C.

This analysis further confirms the significant role these nutrients play in cereal **ranking and underscores** the need for their careful consideration in cereal formulation.

Data-driven Insights

Product Density

- General Mills & Quaker cereals show high protein & fiber density
- Kellog's Corn Flakes, Honey Crunch, and Post's Honey Bunches high in carbohydrates

Cereal Clusters

- Eight distinct cereal clusters identified
- Market gaps found for high fiber and high protein cereals

Nutrient Ratios

- Kellogg's cereals have the highest Sodium to Potassium ratio, linked to cardiovascular risks
- Post cereals show the highest Carbohydrate to Fiber ratio, impacting blood sugar management

Cereal Ranking

Dietary fiber, Sodium, and Calories identified as influential in cereal ranking

White Space Opportunities

✳ **Innovate** in energy-dense, high-calcium, and high-mineral cereal segments

✳ Consider high-fiber and high-protein cereals to **differentiate from competitors**

✳ **Improve quality & variety** of low-calorie, high-folate cereals

✳ **Introduce** high-calcium & moderate energy

Marketing Recommendations

* Leverage product **density** and consumer health trends

* Position cereals in **strategic clusters** based on nutritional profiles

* Optimize nutrient ratios and **highlight important** features in marketing

* Conduct consumer **taste tests** and **gather feedback** for product refinement

Conclusion

1. **Data-driven analysis** provides **robust foundation** for strategic decisions
2. Identified cereal **clusters** reveal consumer **preferences** and **market gaps**
3. Nutritional features crucial for cereal ranking offer **differentiation** opportunities
4. Morning Munchies has **potential to resonate** with health-conscious consumers
5. A **consumer-centric, data-informed** approach to cereal production and marketing is key
6. Continued market monitoring, consumer feedback, and flexible strategies essential for **long-term success**