

A look back:

Two Years of Worldwide Sales



Hypothesis Testing: Methodology

Kruskal-Wallis

- A non-parametric method*
 - * Does not assume a normal distribution of the residuals
- Compares two or more independent samples of equal or different sample sizes using medians to see if there is a **statistically significant interaction**..

A 'p-value' <.05% indicates statistical significance.

Tukey- Test

- Returns effect size
&
- Relative size

Relative size	Effect size	% of control group below the mean of experimental group
	0.0	50%
Small	0.2	58%
Medium	0.5	69%
Large	0.8	79%
	1.4	92%

Sales Data from
April 2012 – June 2014

- Discounts
- Staff
- Categories
- Regions

Results...

Discounts:

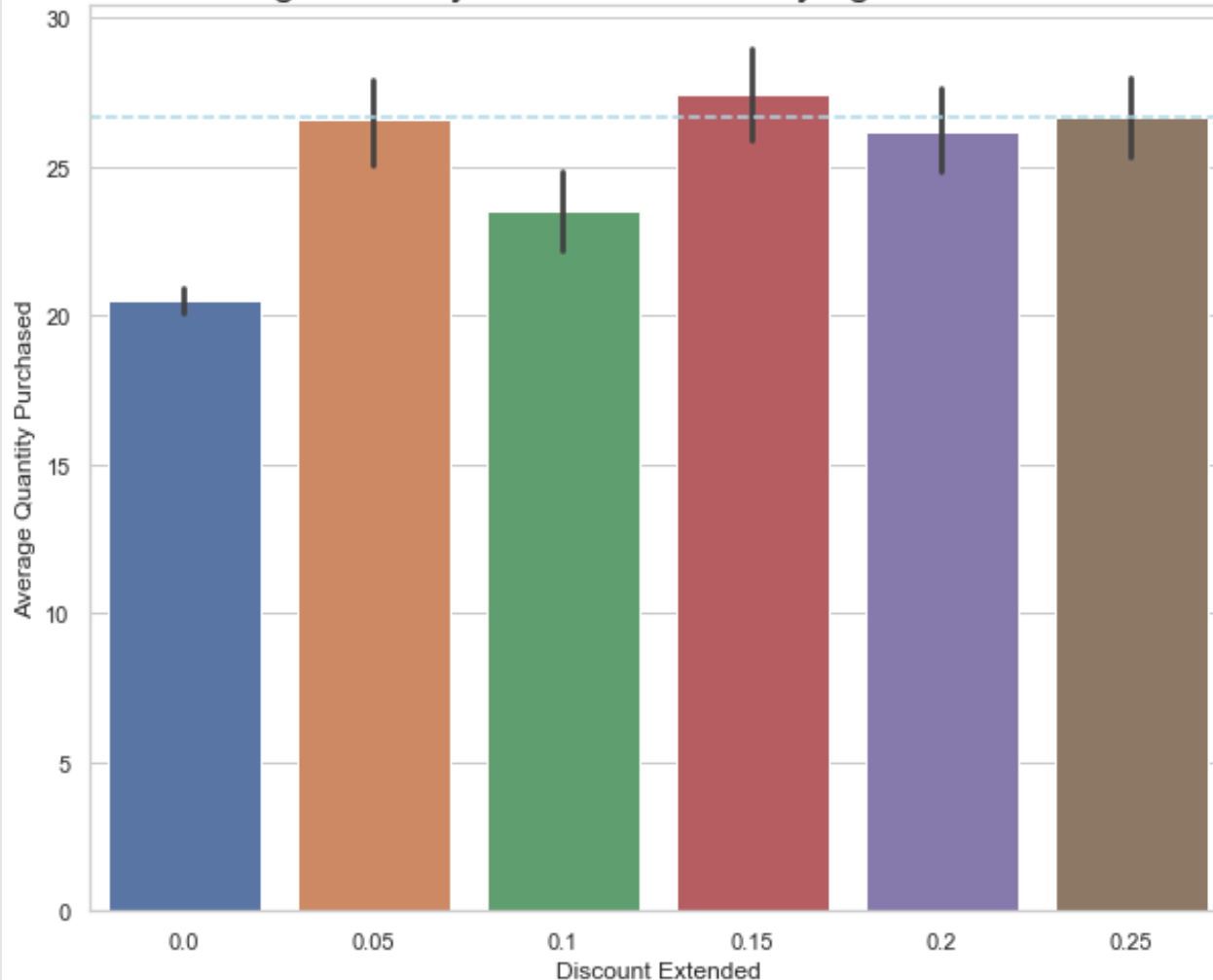
Question:

Does discount amount have a statistically significant effect on the quantity of a product in an order?

AND:

If so, at what level(s) of discount(s)?

Average Quantity Purchased at Varying Discount Levels



Answer:

Yes, these levels are:

Statistically
Equal

Discount	AvQty	Effect Size	Effect
5 %	27	.1982	Small
15 %	27	.454	Medium
20 %	26	.3751	Medium
25 %	27	.454	Medium

P-Value of .001 in comparison to no discount

Recommendation:

- Since the effects of higher discounts are equal to lower in terms of quantity purchased, offer the lower discounts more frequently to preserve profit margins.

Categories:

Question:

Do some product categories generate more revenue than others?

Answer:

Yes.

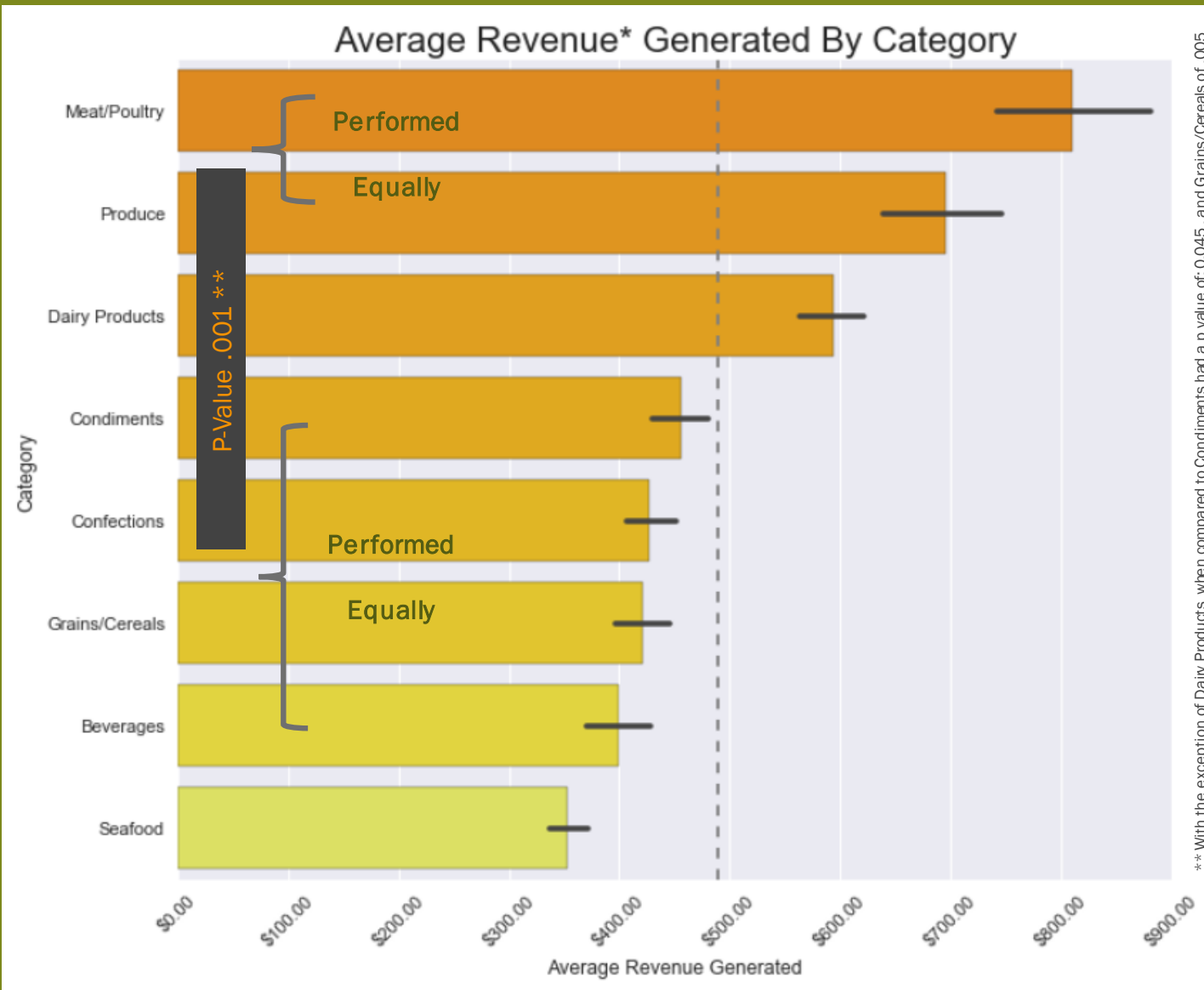
The top three are:

- Meat/Poultry
- Produce
- &
- Dairy



Recommendations:

- Maximize revenues with additional products that align with the higher revenue generating categories.
- Minimize product offerings in lesser generating categories



*Revenue is calculated by multiplying sales price and quantity, taking into account discounts.

Region:

Question:

Do certain regions generate more revenue than others?

AND:

Who are the top three?

Answer:

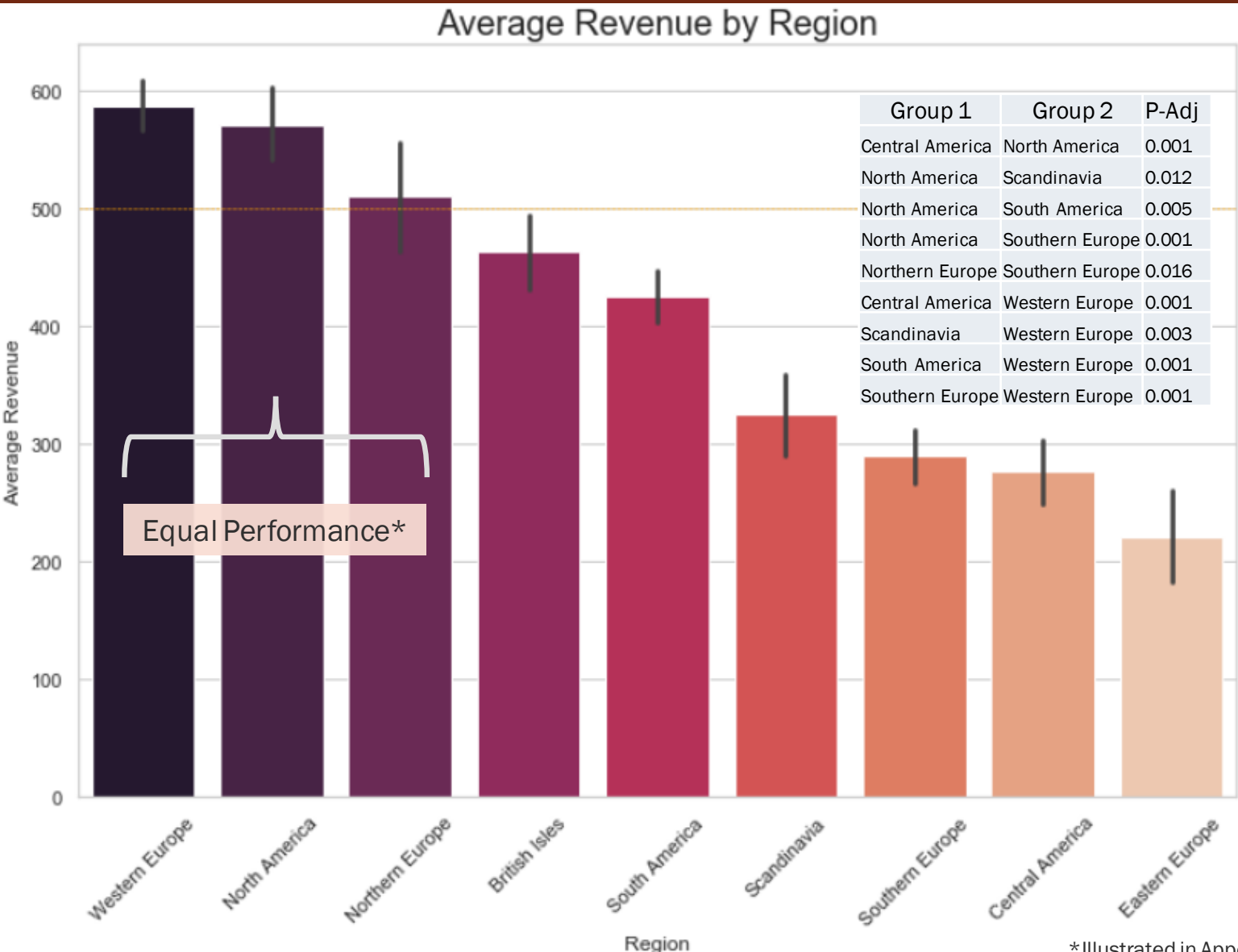
Yes. The top three are :
Western Europe, North America
... and
Northern Europe

P Value < .05 indicates a
statistical difference

Small sample sizes from Eastern Europe,
Scandinavia, Central America*

Recommendation:

- Explore best practices from regions that are top performers via additional market analysis.
- Additional analysis on underdeveloped regions (apply categorical and discount knowledge)



* Illustrated in Appendix

Sales Staff:

Question:

Do certain sales representatives generate more revenue than others?

AND:

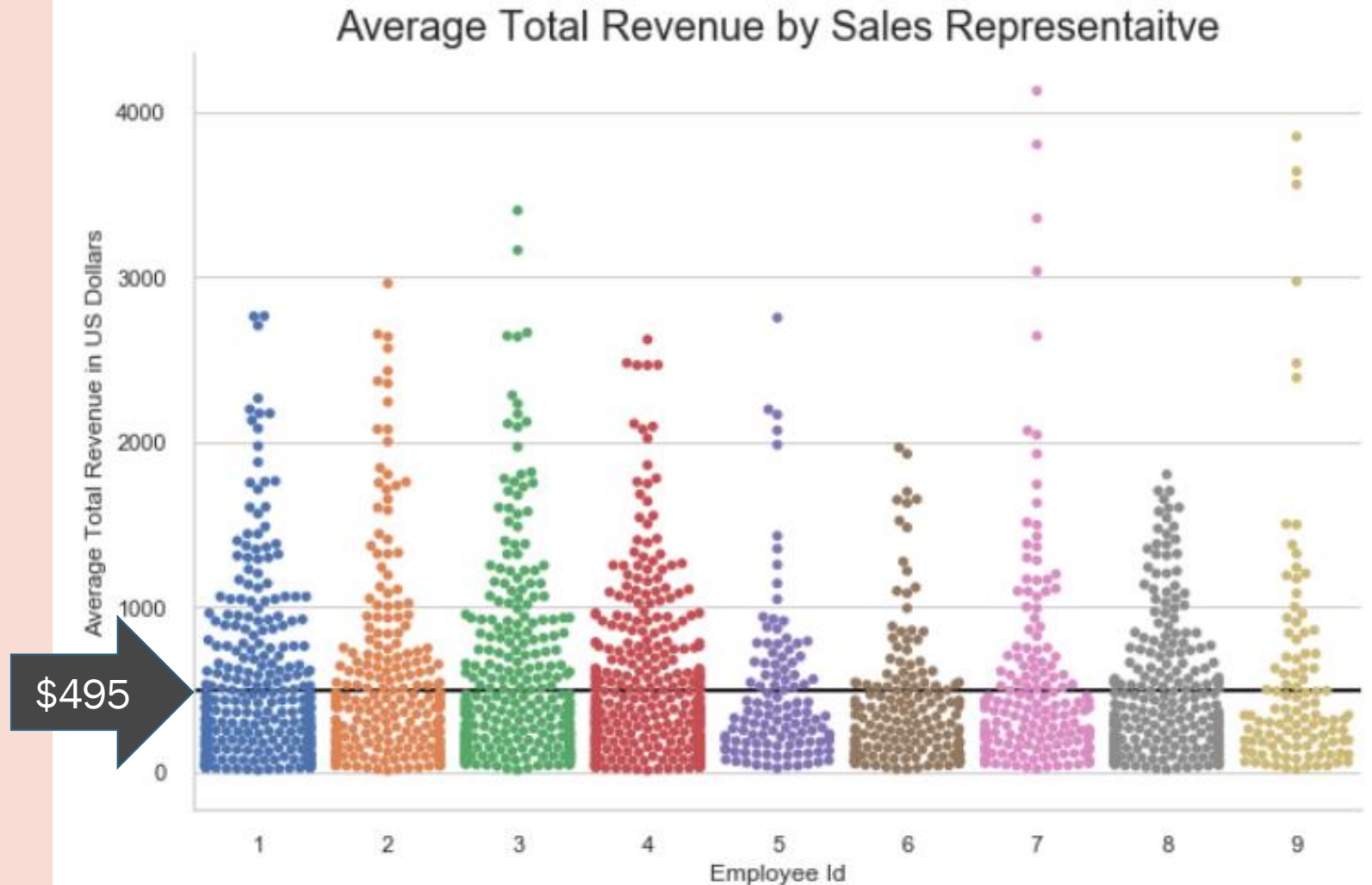
Who are the top sellers?

Answer:

All sales staff, regardless of location or title statistically generate equal revenue.

Recommendation:

- Build on knowledge of smaller discounts achieving larger quantities.
- Develop regional markets (via analysis - future work?)





Looking Forward:

Maximize Revenues

- Minimize discounts
- Focus on Revenue Generating Categories
- Develop Sales Staff, Underdeveloped Regions

Future Work:

- Market analysis for regions that need to be developed.

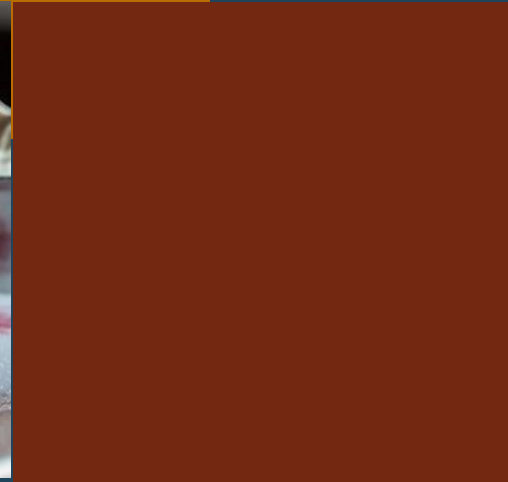
Examples:

- Regional category refinement
- Discount types and frequency
- Sales relationships





Thank You.



Appendix:



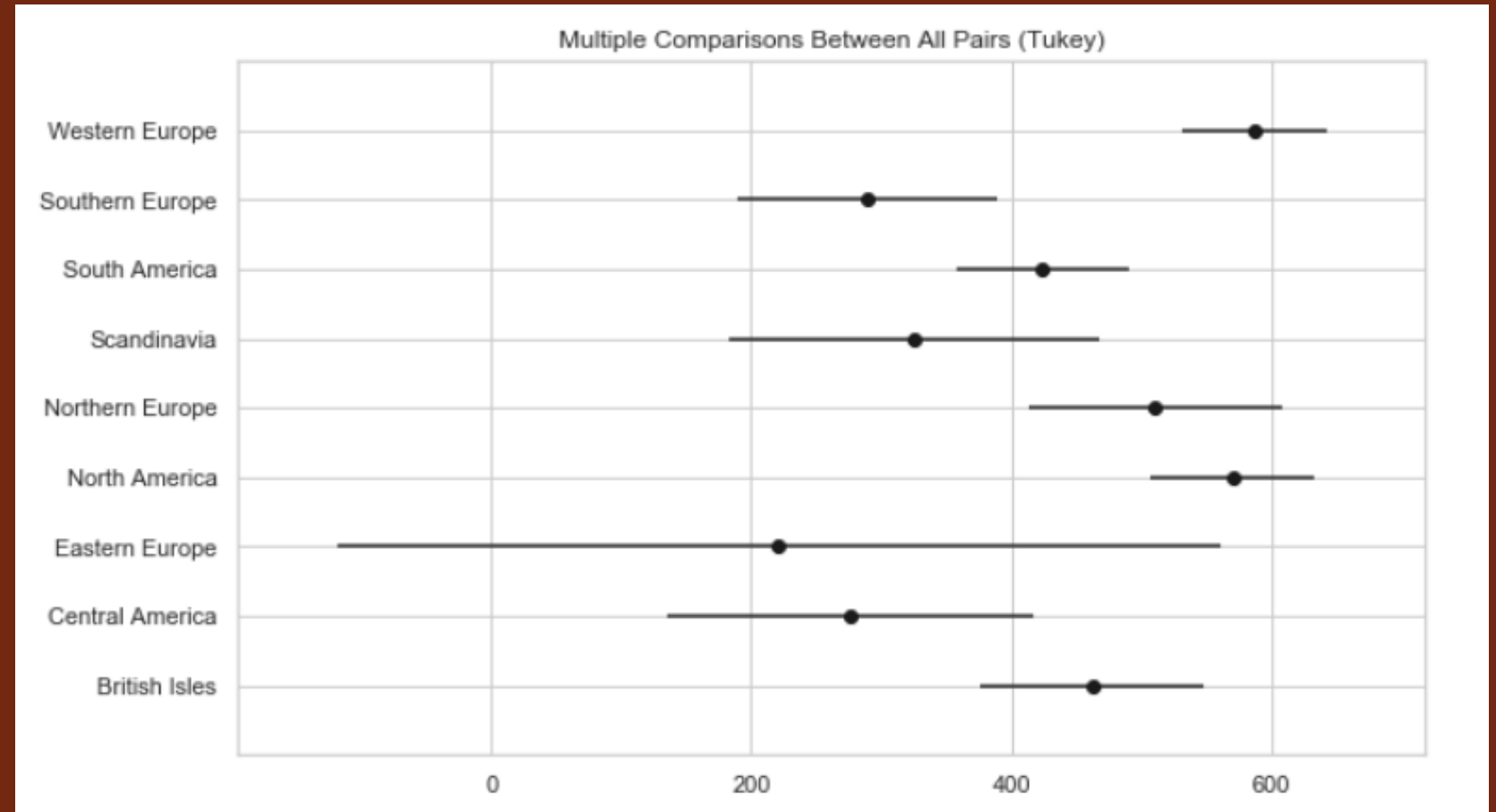
Region:

Appendix materials

Illustrates the difference in confidence intervals of Tukey test. Some regions that visibly look like they out perform others

N. & W. Europe, N. America Statistically Equal Performance

Region 1	Region 2	Adj P
North America	Northern Europe	0.9000
North America	Western Europe	0.9000
Northern Europe	Western Europe	0.7992

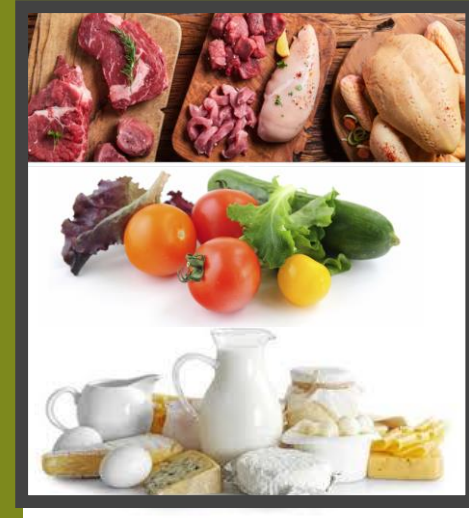


Categories:

Appendix Materials:

Group 1	Group 2	Adj - P	Effect	Reject Null Hypothesis: True
Beverages	Dairy Products	0.001	0.352	
Condiments	Dairy Products	0.045	0.277	
Confections	Dairy Products	0.001	0.341	
Dairy Products	Grains/Cereals	0.005	0.350	
Beverages	Meat/Poultry	0.001	0.596	
Condiments	Meat/Poultry	0.001	0.517	
Confections	Meat/Poultry	0.001	0.600	
Dairy Products	Meat/Poultry	0.001	0.311	
Grains/Cereals	Meat/Poultry	0.001	0.564	
Beverages	Produce	0.001	0.521	
Condiments	Produce	0.001	0.490	
Confections	Produce	0.001	0.560	
Grains/Cereals	Produce	0.001	0.571	
Dairy Products	Seafood	0.001	0.525	
Meat/Poultry	Seafood	0.001	0.755	
Produce	Seafood	0.001	0.798	

Group 1	Group 2	MeanDiff	Adj - P	Reject Null Hypothesis: False
Beverages	Condiments	55.7712	0.9	
Beverages	Confections	27.0669	0.9	
Beverages	Grains/Cereals	21.4034	0.9	
Beverages	Seafood	-46.1557	0.9	
Condiments	Confections	-28.7043	0.9	
Condiments	Grains/Cereals	-34.3678	0.9	
Condiments	Seafood	-101.927	0.3439	
Confections	Grains/Cereals	-5.6635	0.9	
Confections	Seafood	-73.2226	0.6099	
Dairy Products	Produce	102.0142	0.5181	
Grains/Cereals	Seafood	-67.5591	0.831	
Meat/Poultry	Produce	-114.9365	0.5359	





Background:

Worldwide Provisioner
Of Fine Foods

- *77 products, 8 Categories*
- *9 Sales Staff serving 9 Regions Globally*

Statistical Hypothesis Testing Evaluation
Sales from April 2012 – June 2014

- *Discounts*
- *Sales Staff*
- *Sales by Category*
- *Regional Sales*

