



# Data Visualization

## Do's & Don'ts

Janis Gulbis









**Janis Gulbis**

Part of my job is to sit in the corner and look at ~~paintings~~ reports.

**~~Mr. Bean~~**





**Community Days**  
**May 16-7, 2019**

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**Why  
Analyze?**

**Why  
Visualize?**

**How?**



An hourglass with blue sand is placed on a beach of smooth, grey and tan pebbles. The hourglass is made of dark wood and has a glass bulb in the center. The sand is a vibrant blue, and it is captured in the middle of flowing from the top bulb to the bottom bulb. The background is a soft, out-of-focus sunset or sunrise over the ocean, with warm orange and yellow light reflecting on the water. A dark blue horizontal band is overlaid across the middle of the image, containing the text.

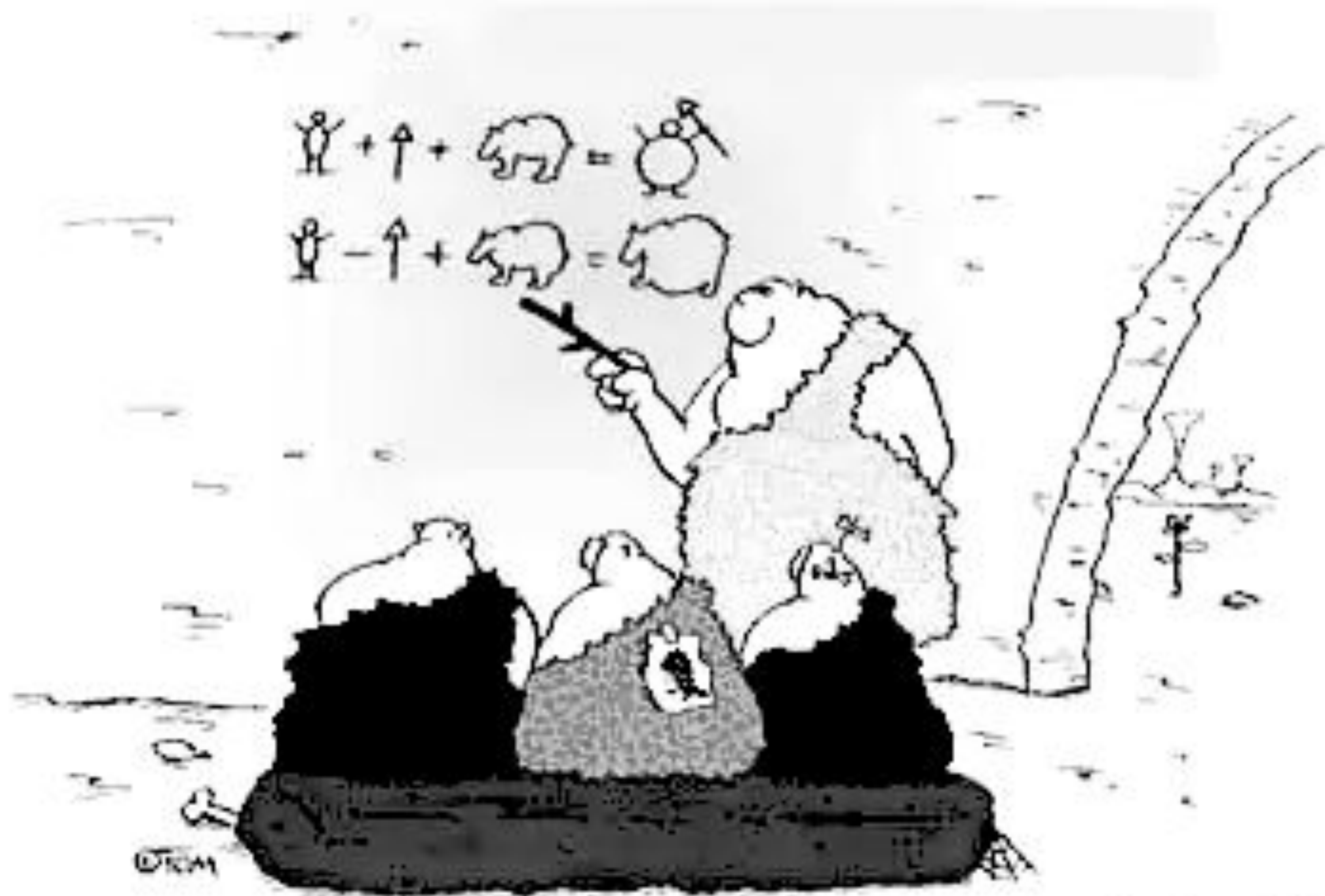
Where Did It All Start?







# Basic Stone-Age Survival Math





# Baboons Can Count Too





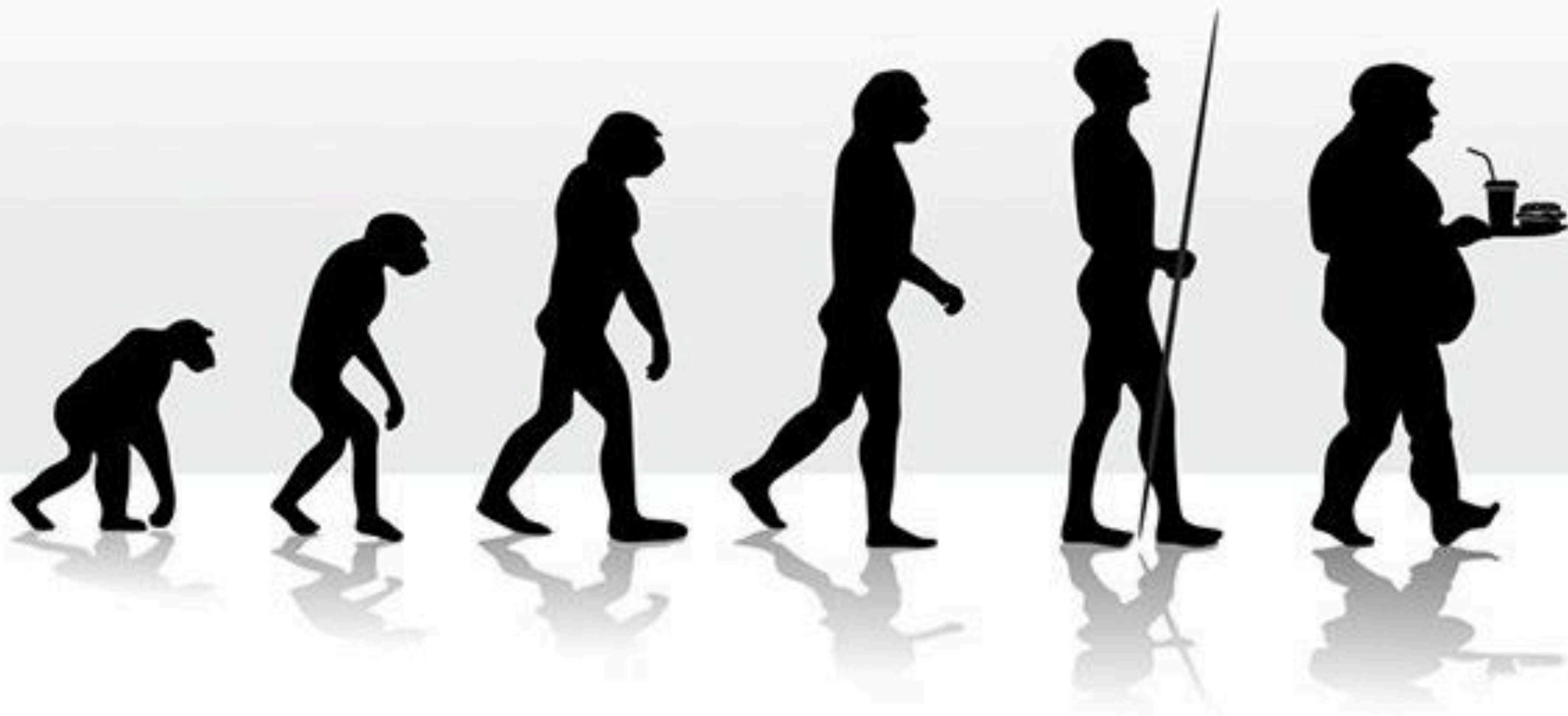
## RESULTS

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**67% of the time  
the baboons chose  
the fullest  
container...**









“

*You can't **improve** what you can't manage, you can't **manage** what you can't control, and you can't **control** what you don't **measure**.*

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**TOM DEMARKO**



| || ||| |||| ||||| T π π π π

1 2 3 4 5 6 7 8 9

π ≡ T

846

|||| — π = ||||

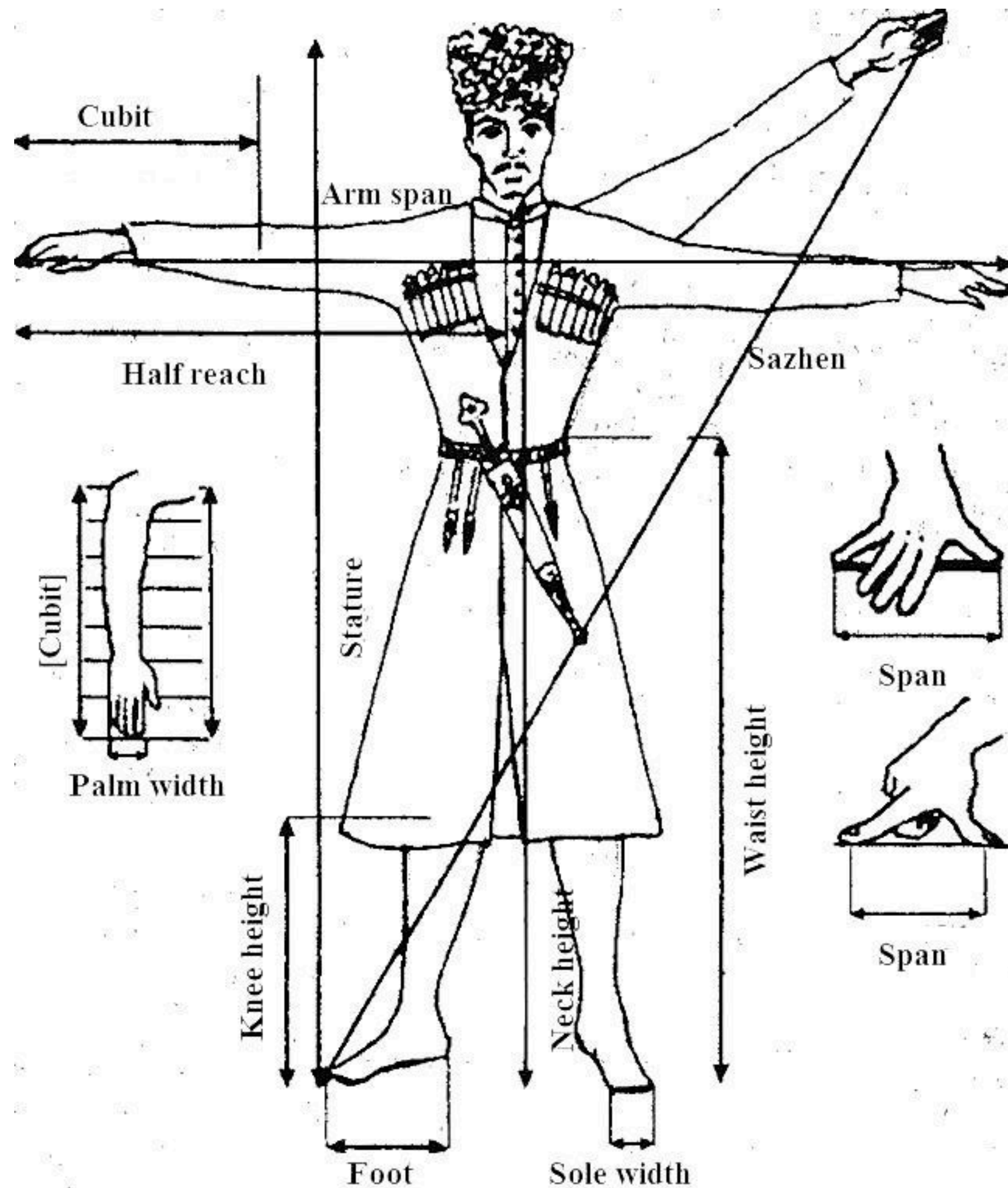
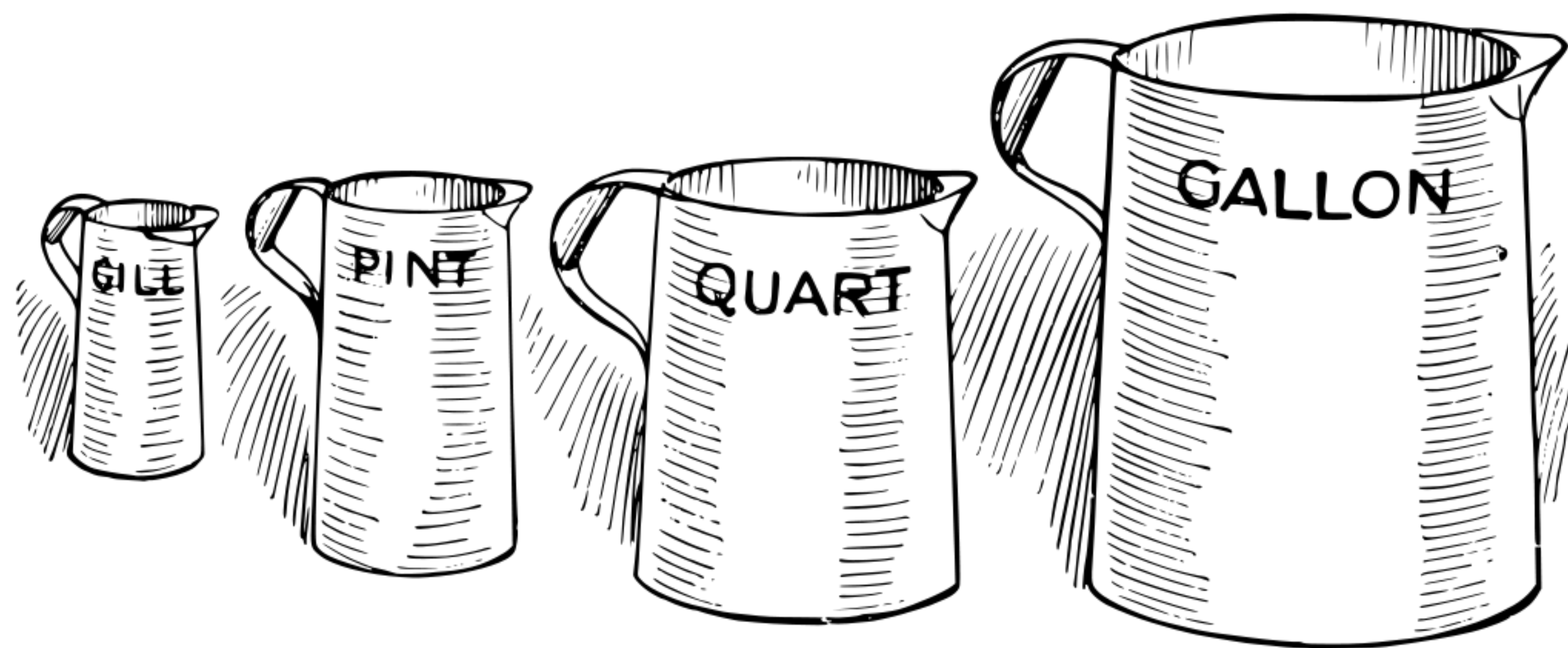
51,729

|| T ≡

2,063

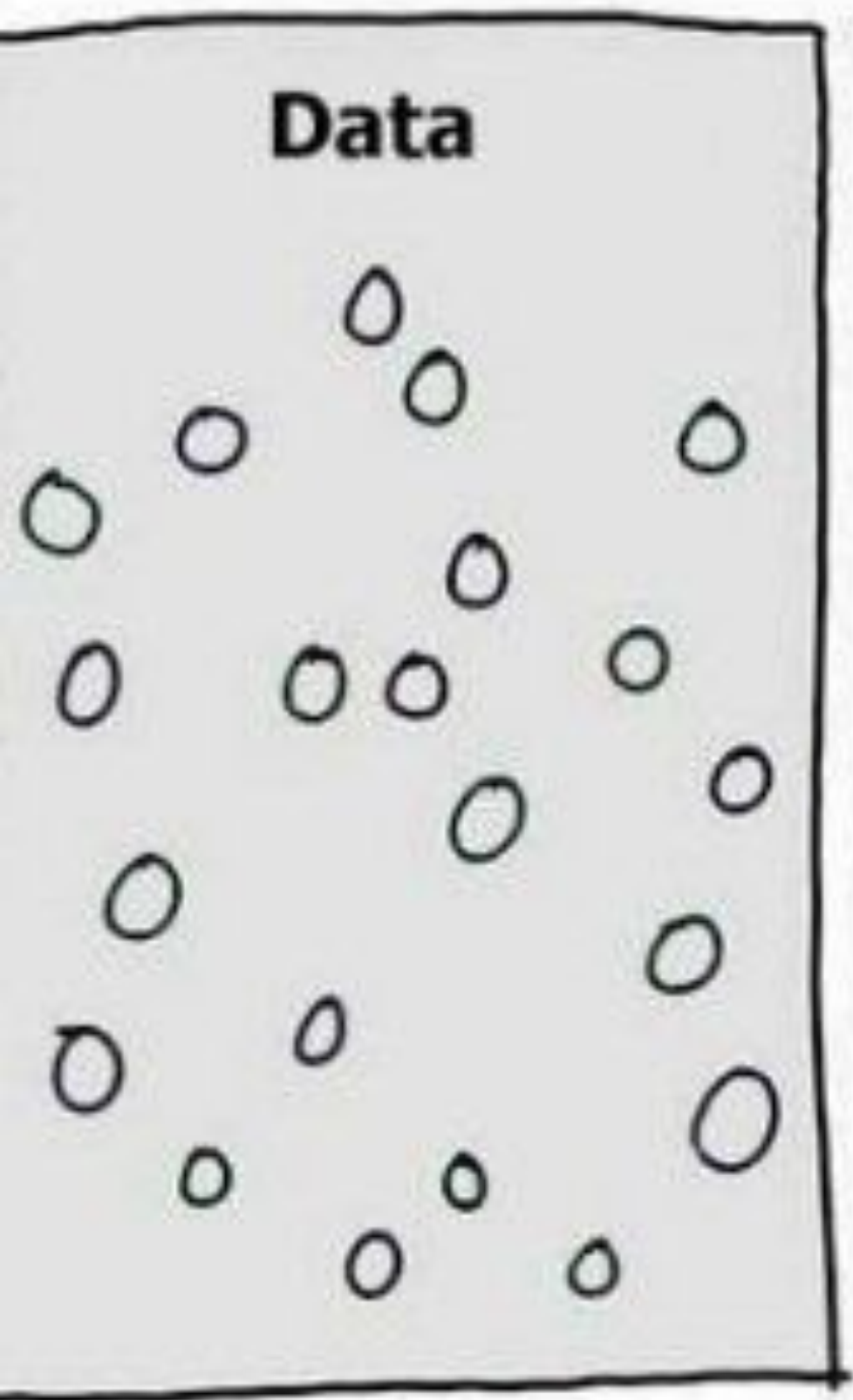
≡ ||| || ⊥ |||

940,278



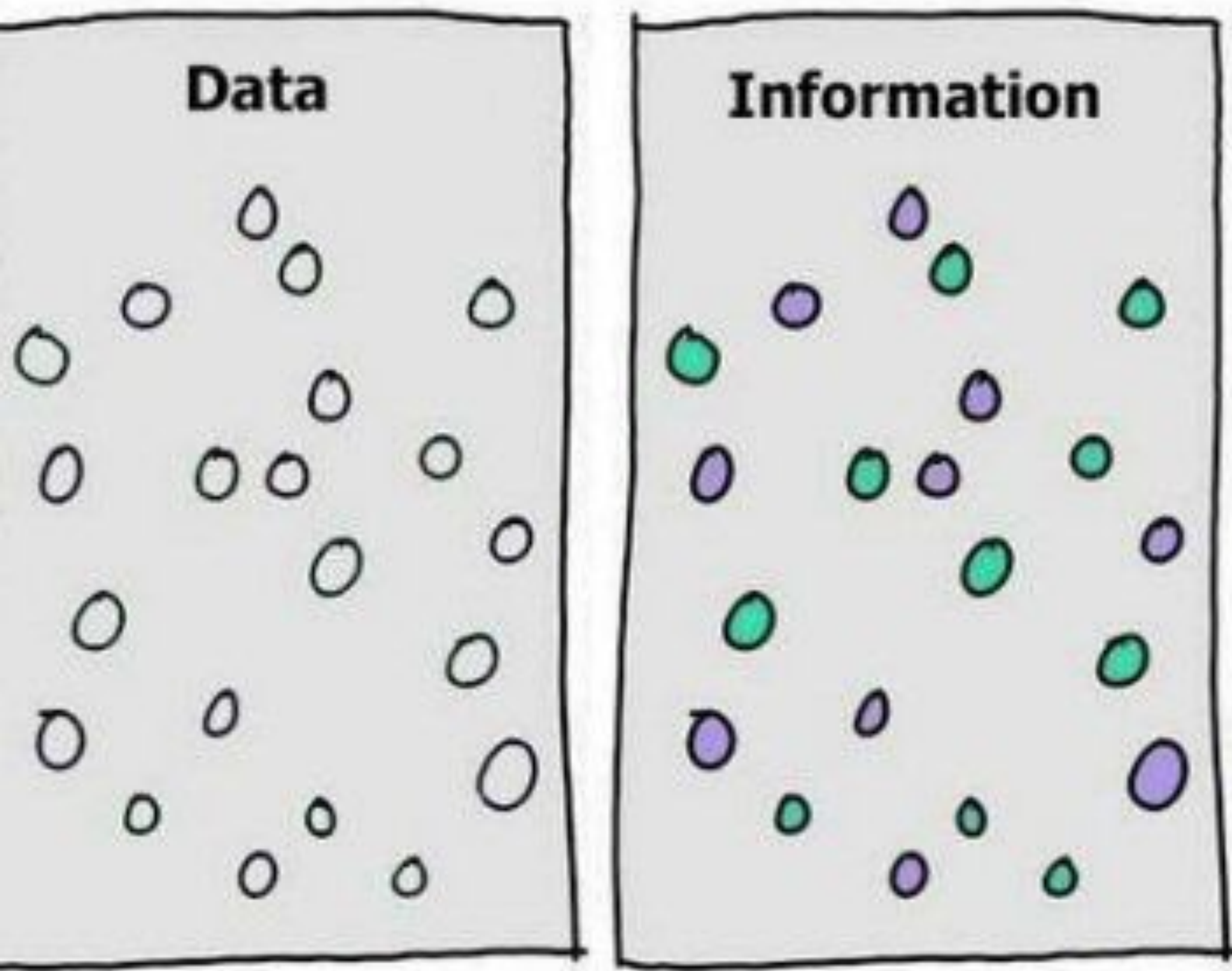


# From Data to Wisdom



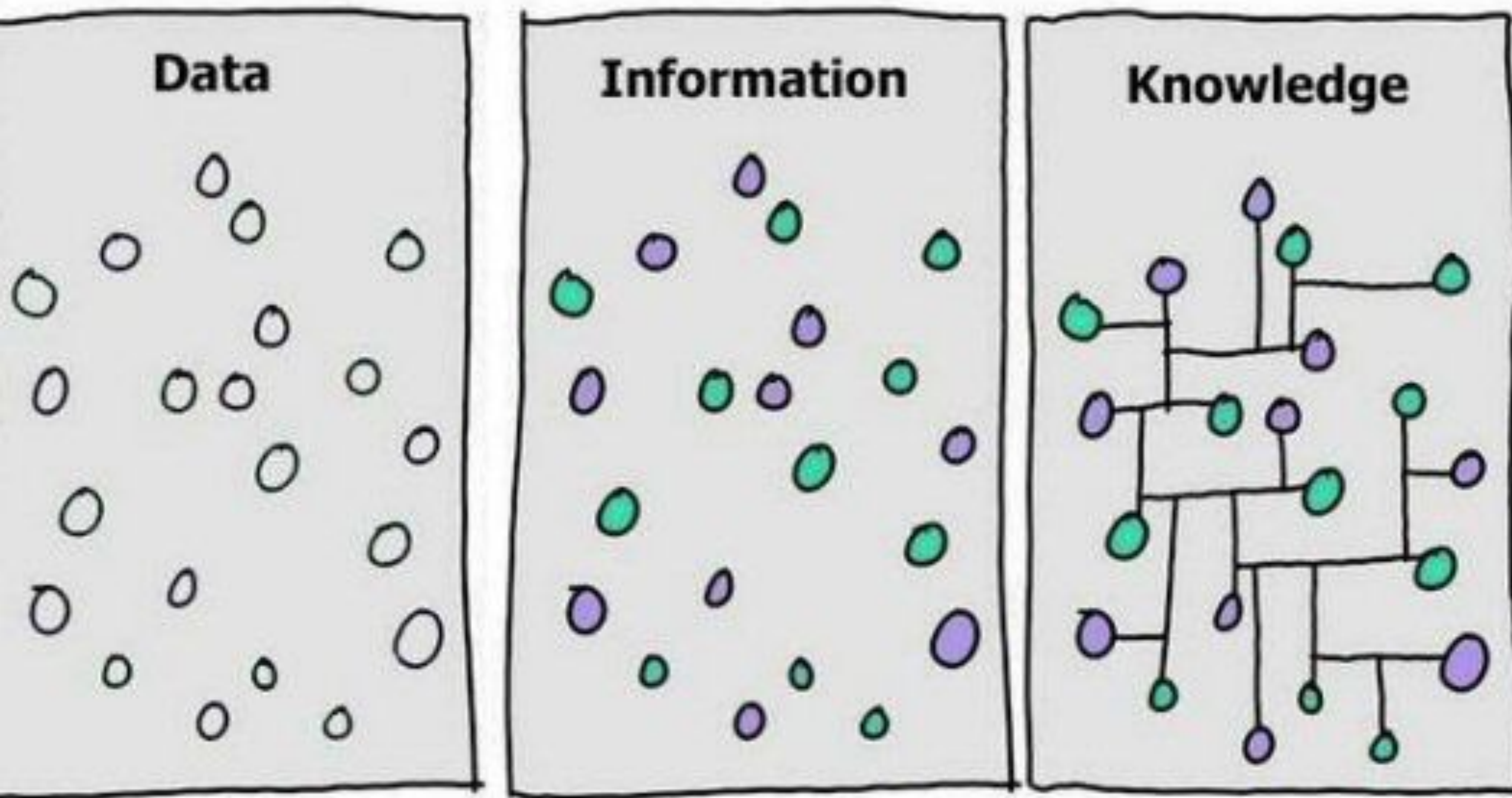


# From Data to Wisdom



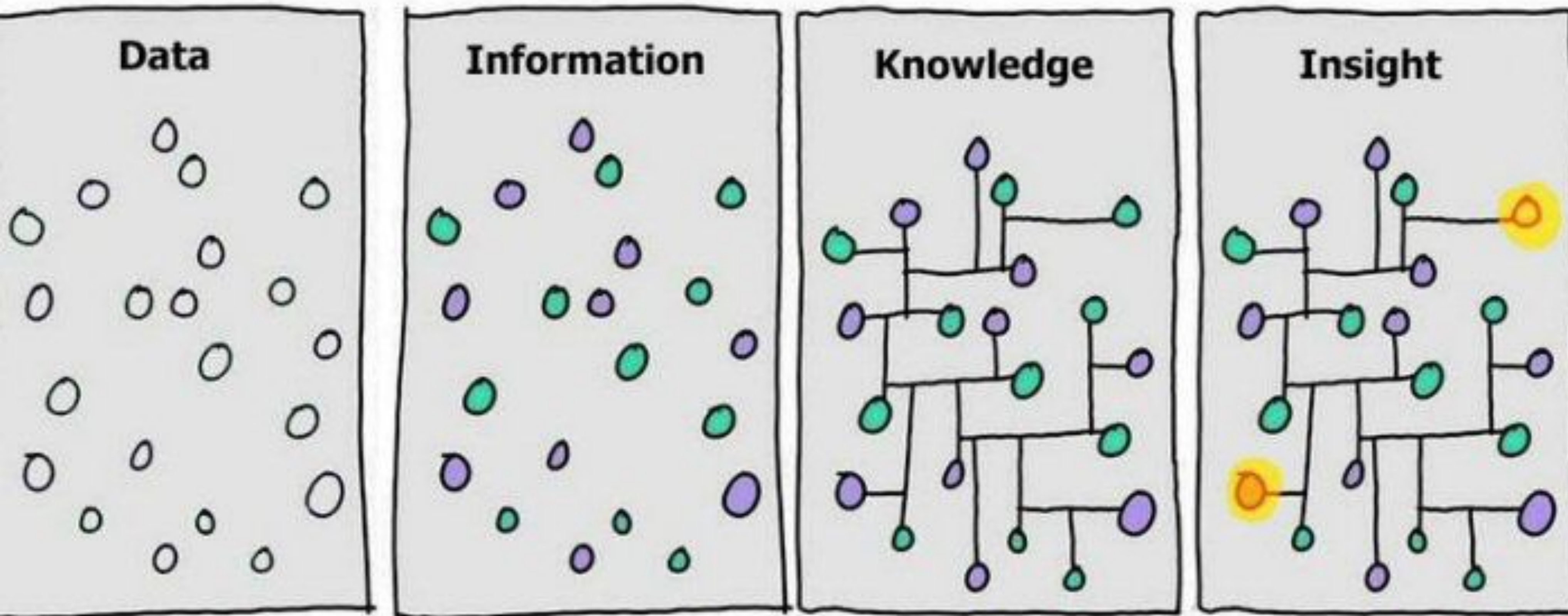


# From Data to Wisdom



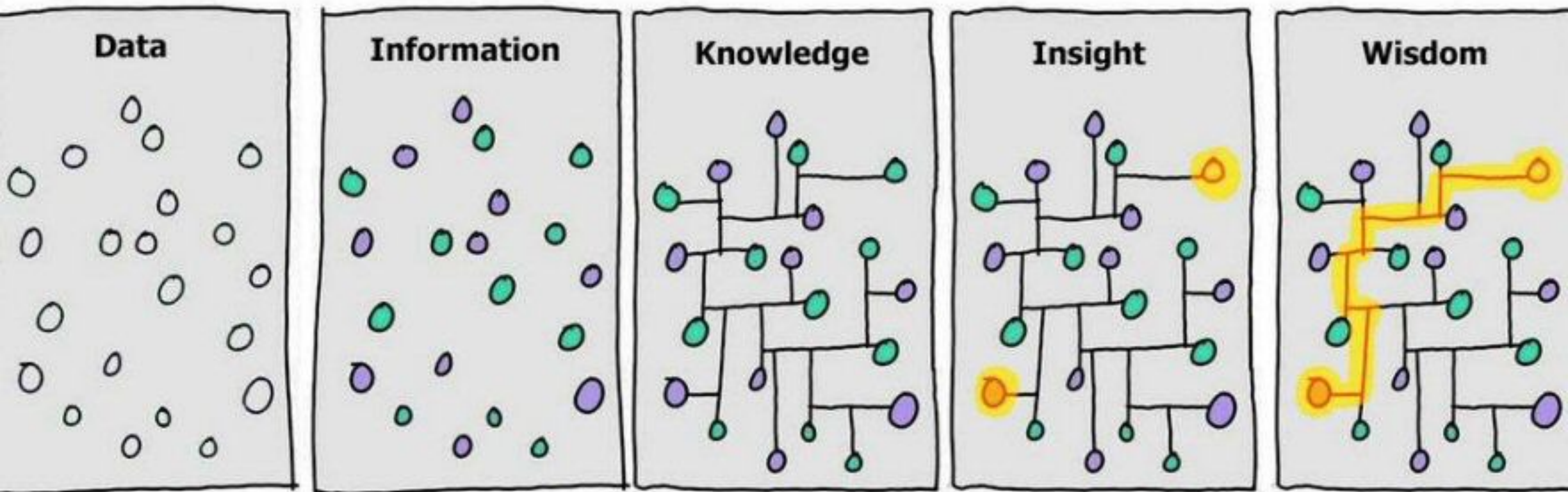


# From Data to Wisdom



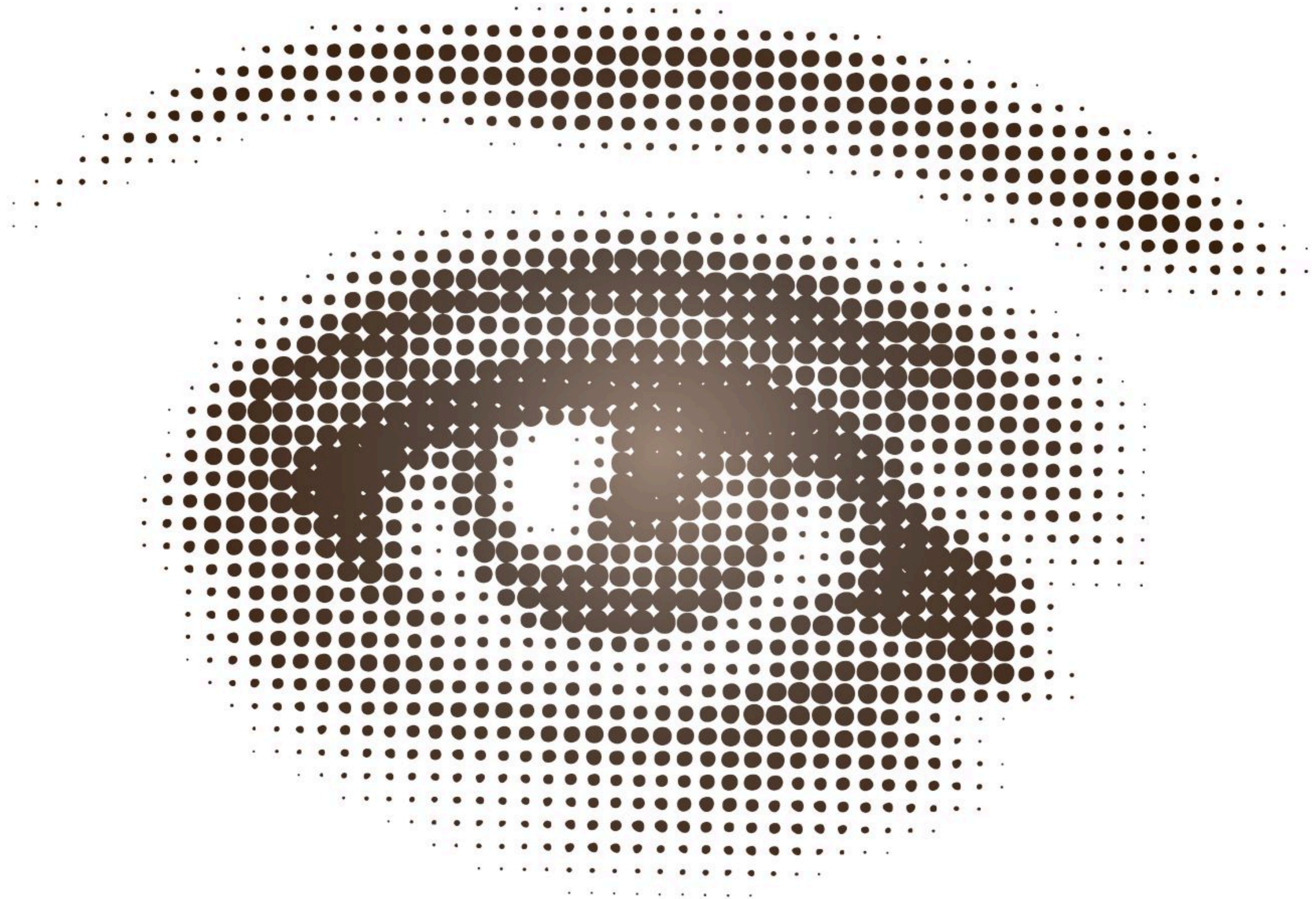


# From Data to Wisdom





# Visual Pattern Recognition





## FACTS

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**90% of information transmitted  
to the brain is visual.**



**FACTS**

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**Visualizations help us detect patterns, trends, and correlations.**



## FACTS

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**Visuals are more strongly  
tied to memory.**

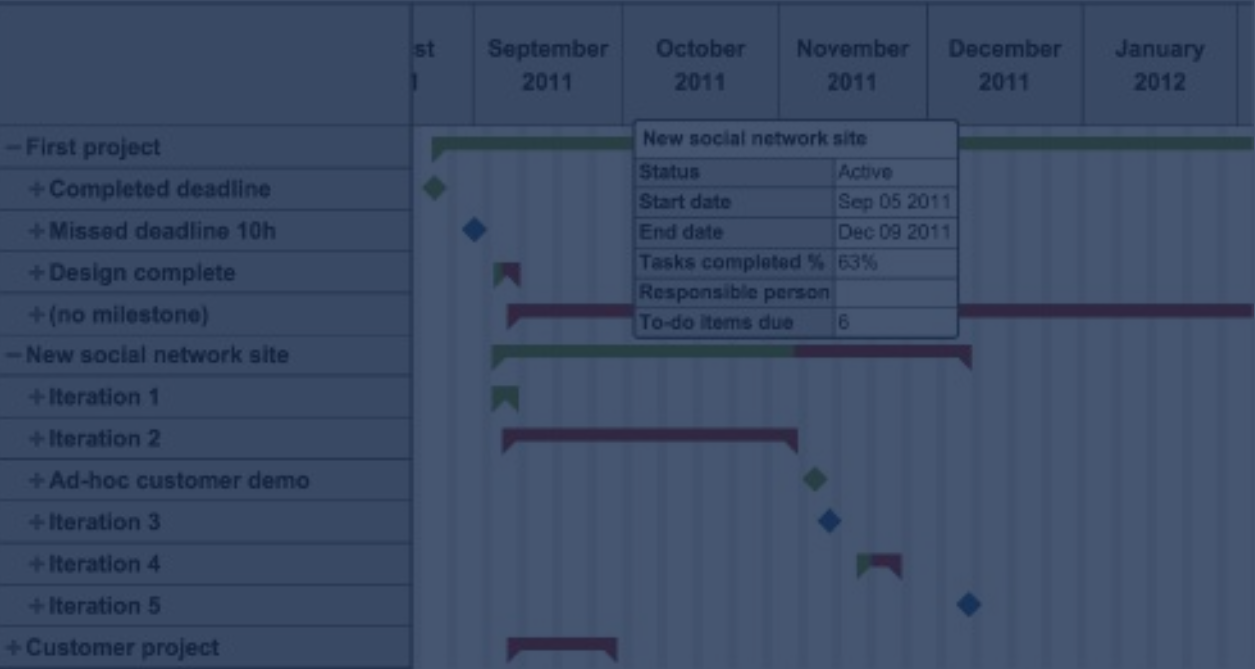
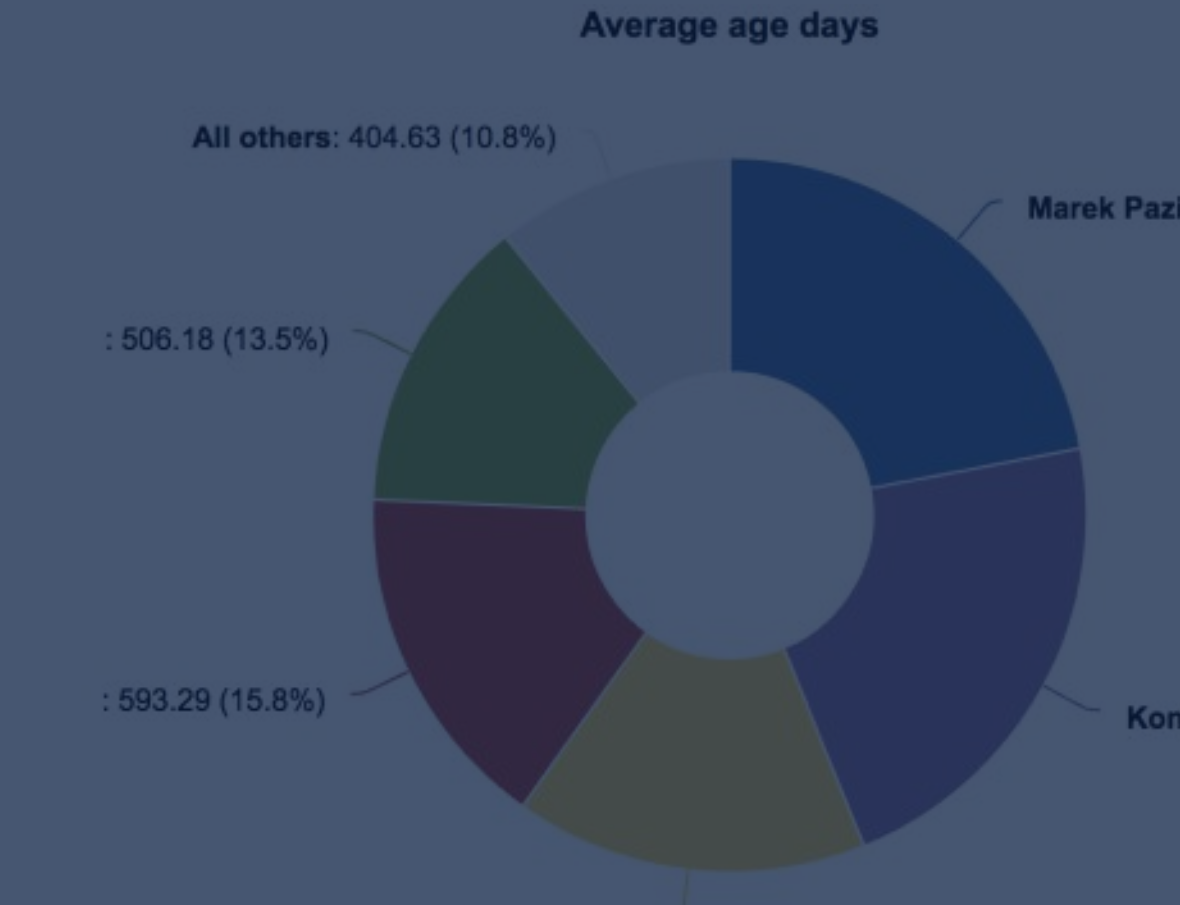
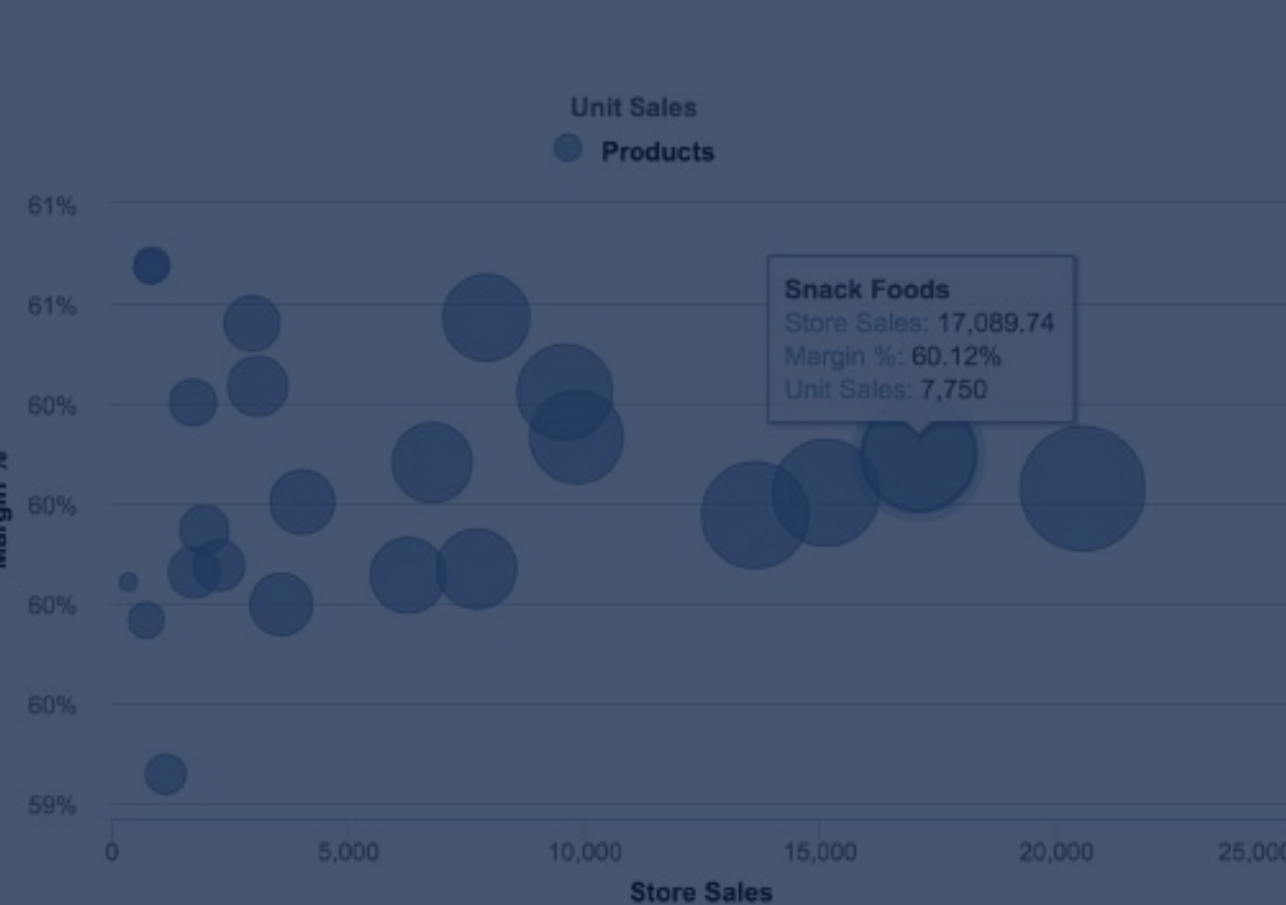
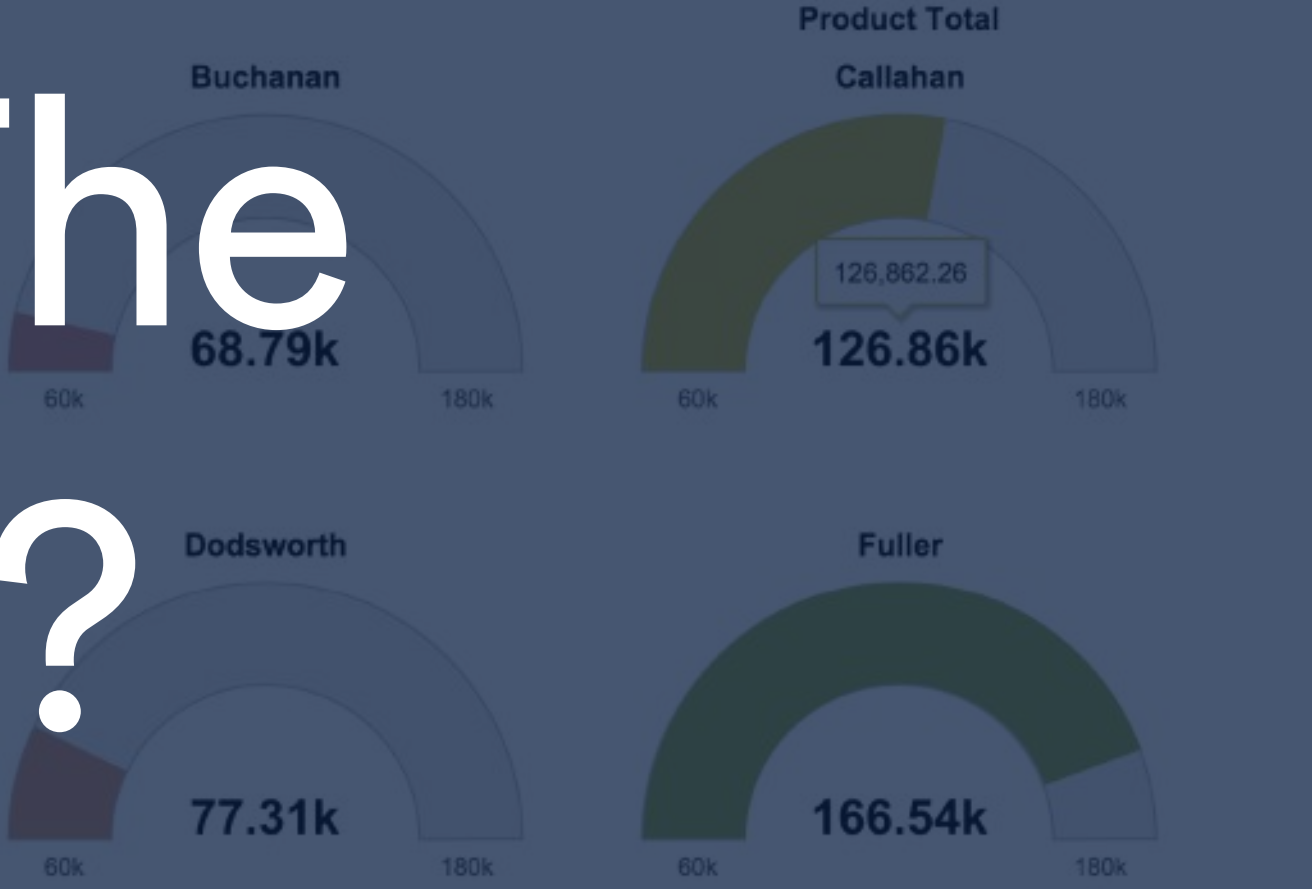
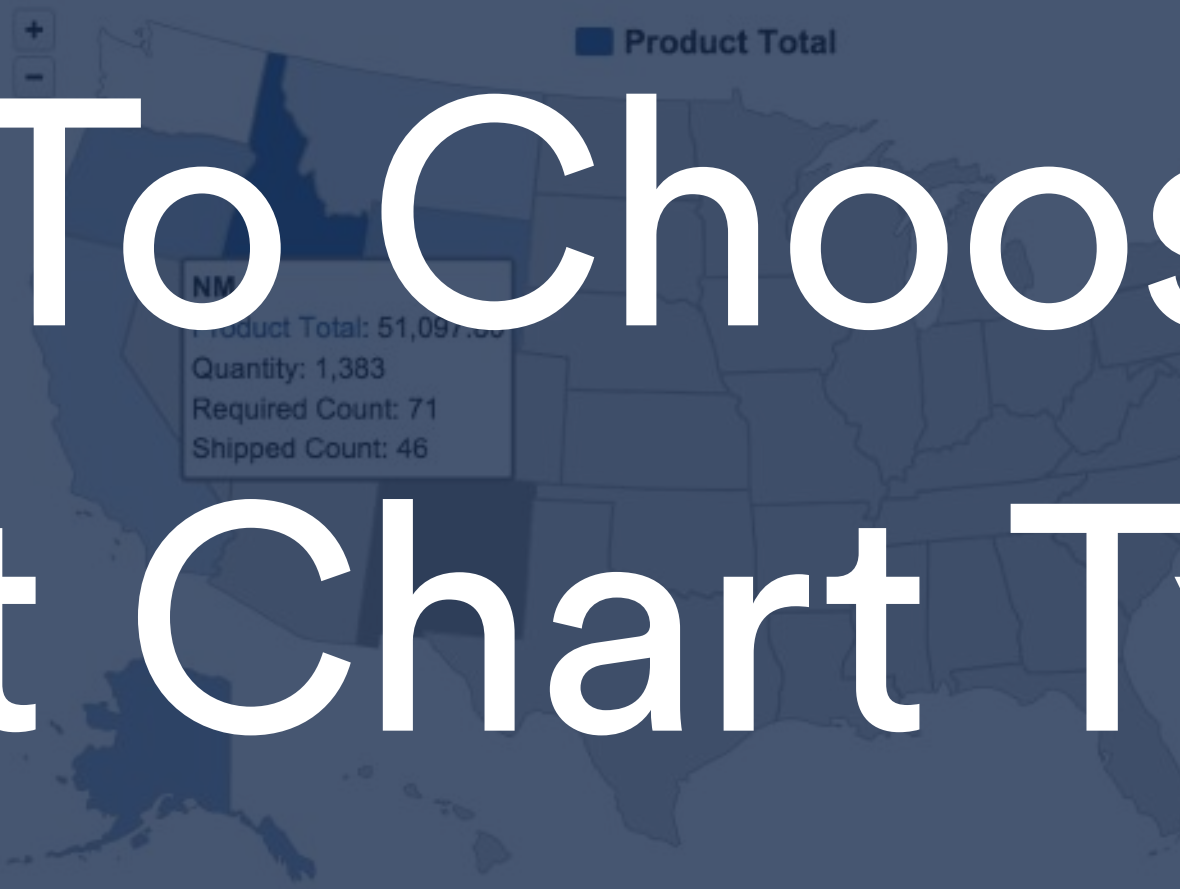
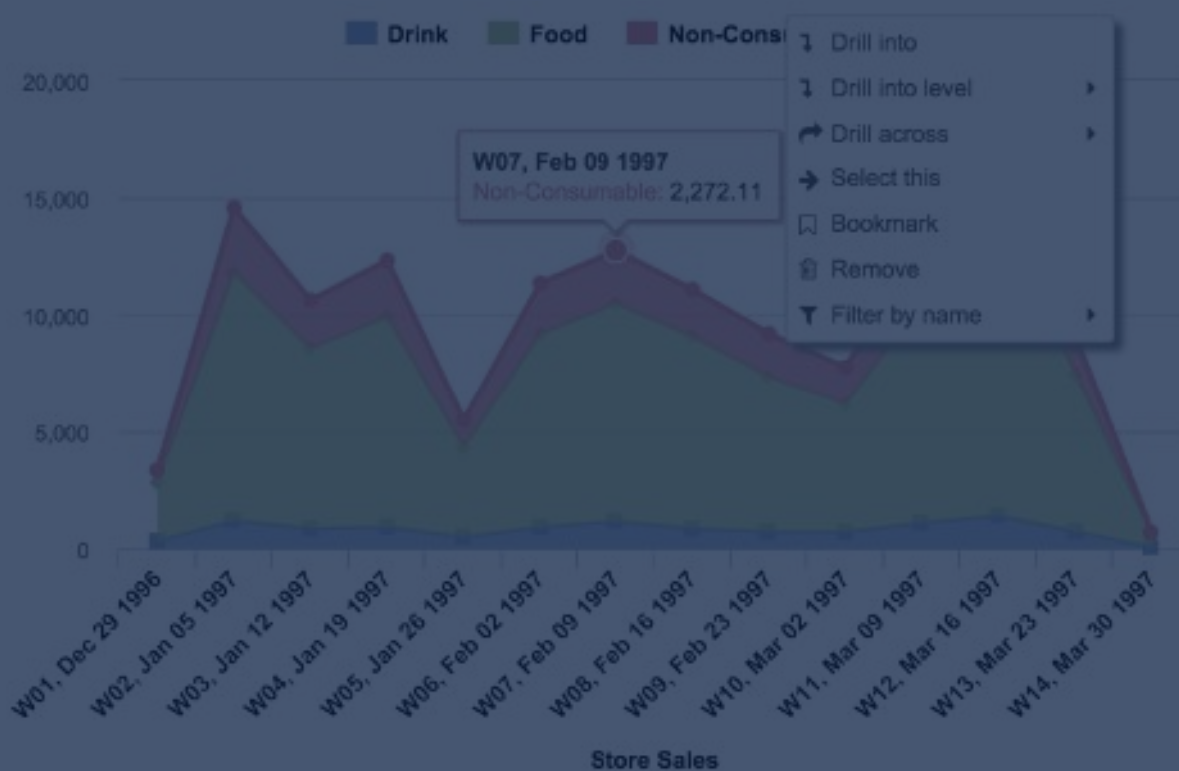
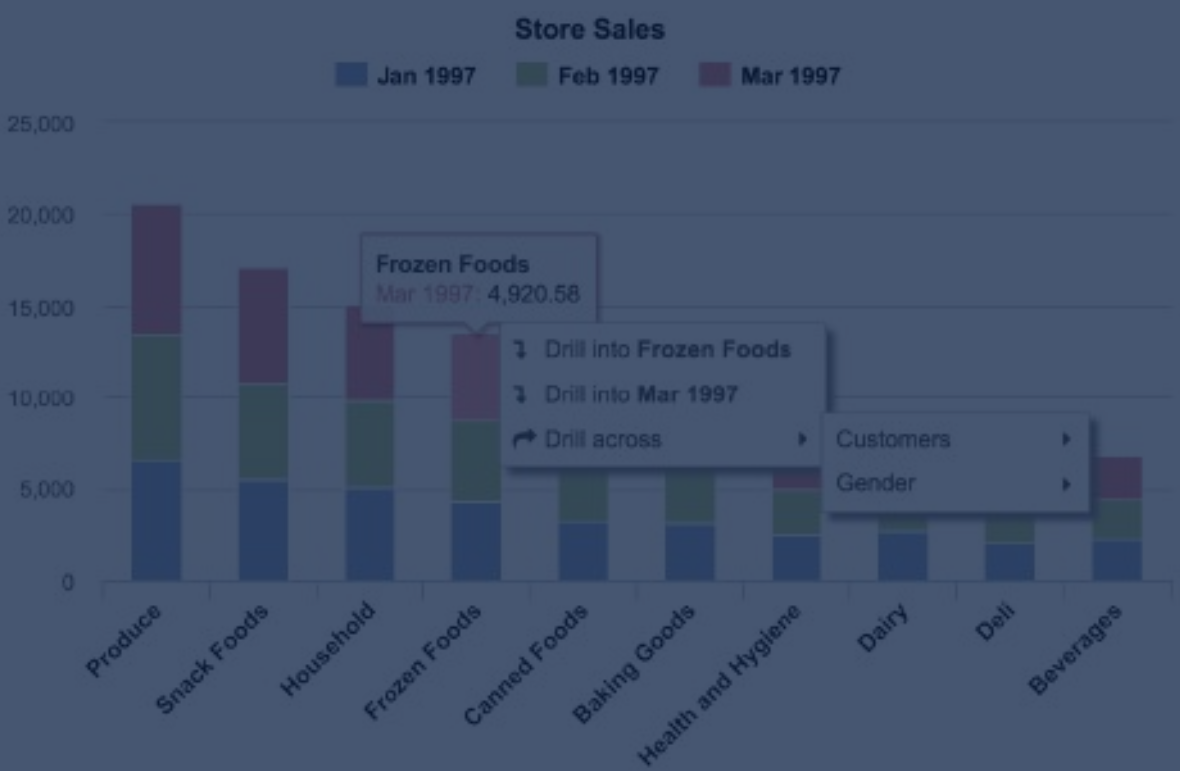
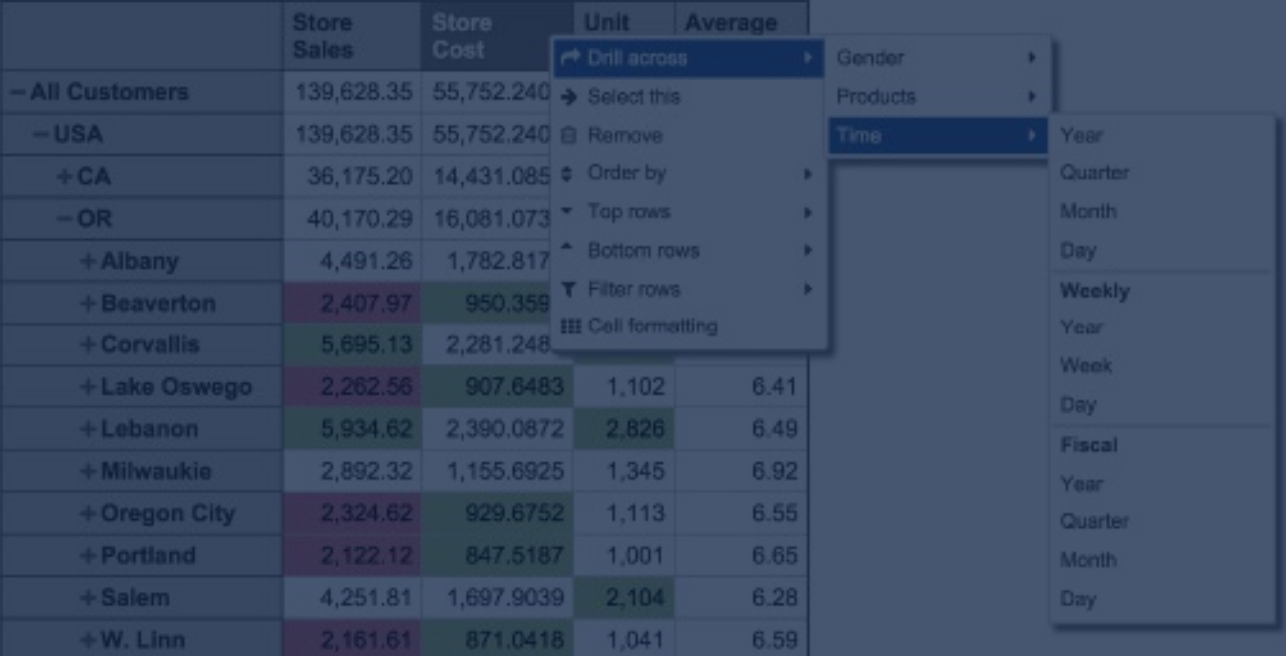


**FACTS**

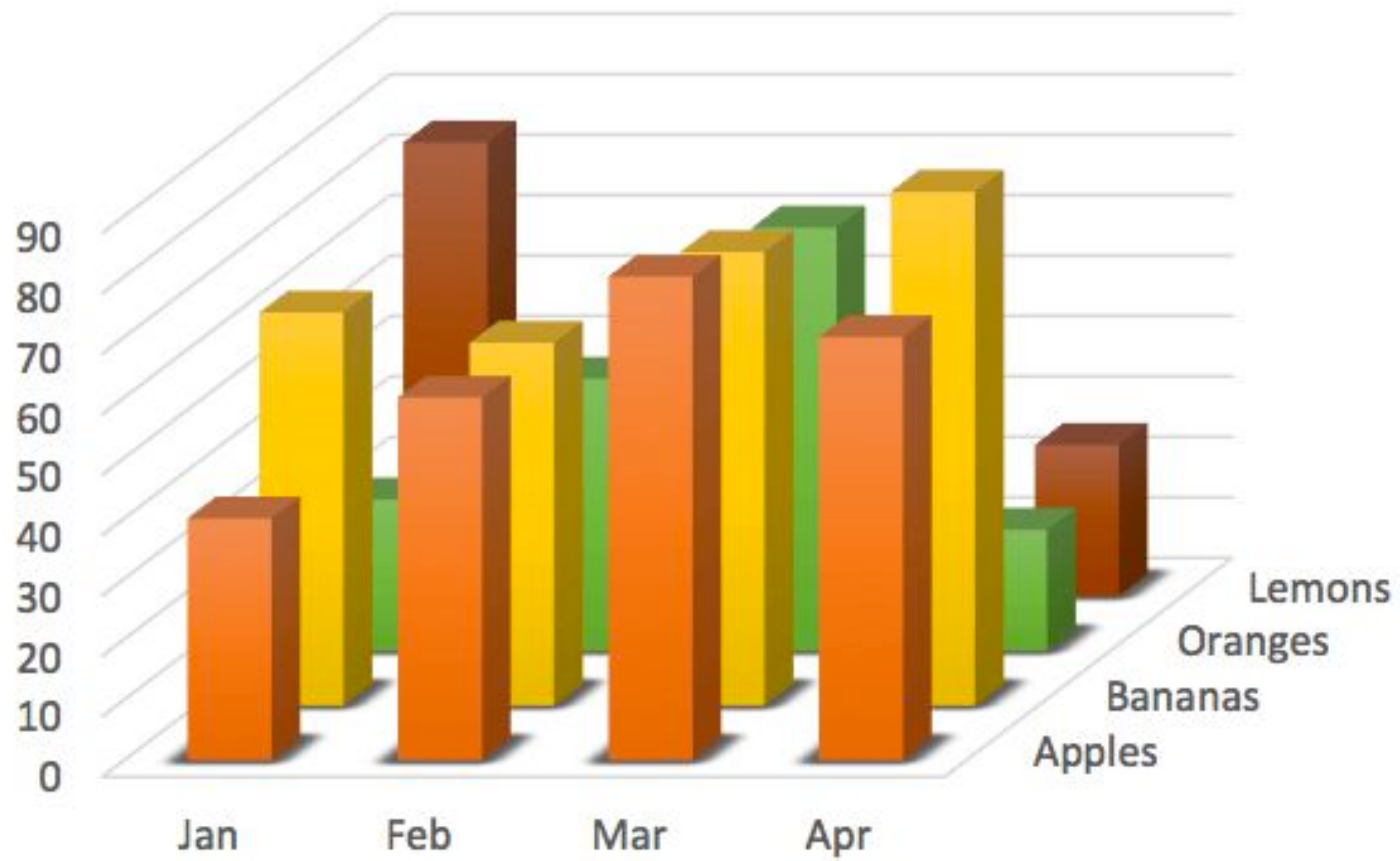
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**Visual content drives  
engagement.**



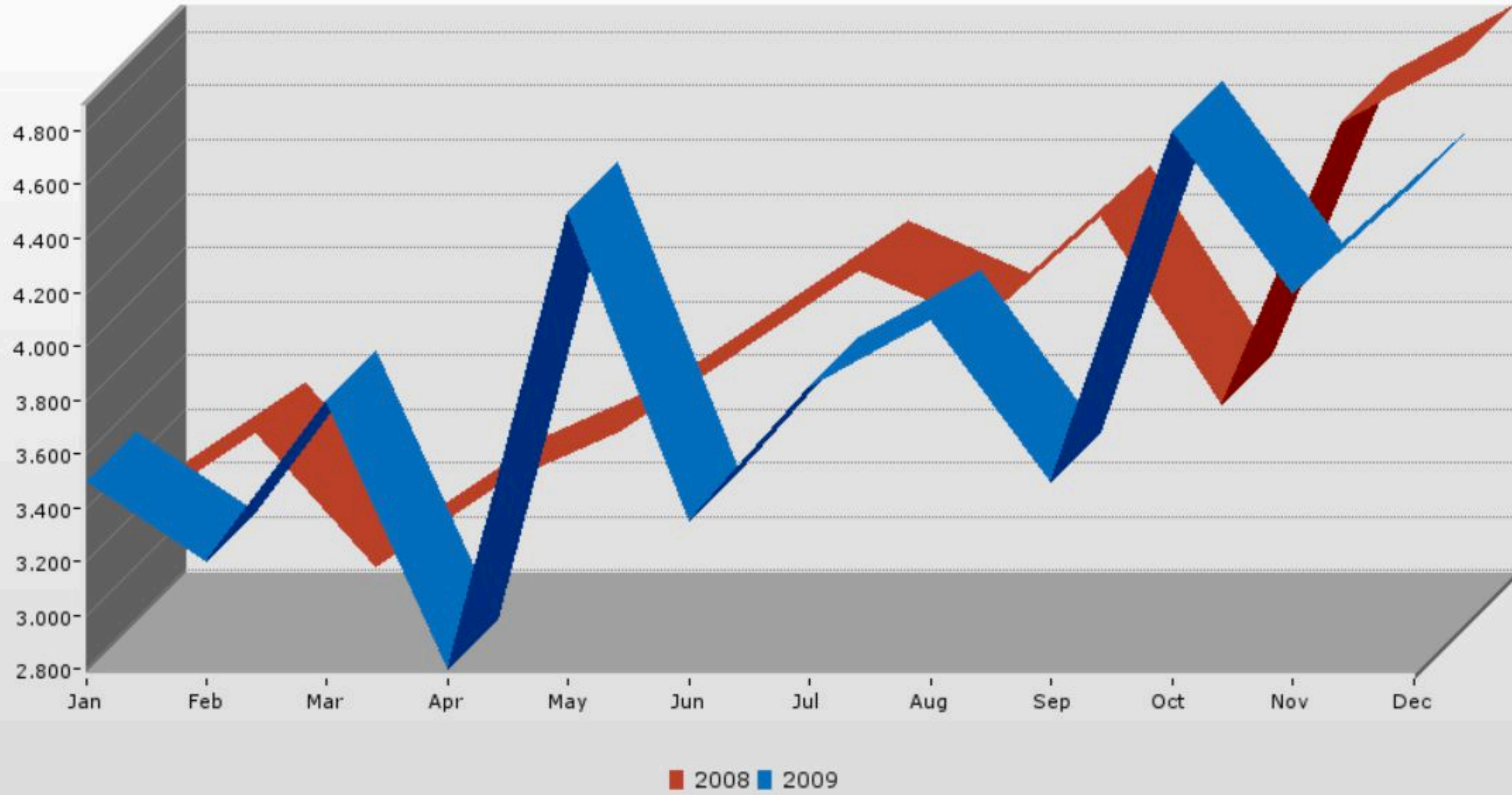






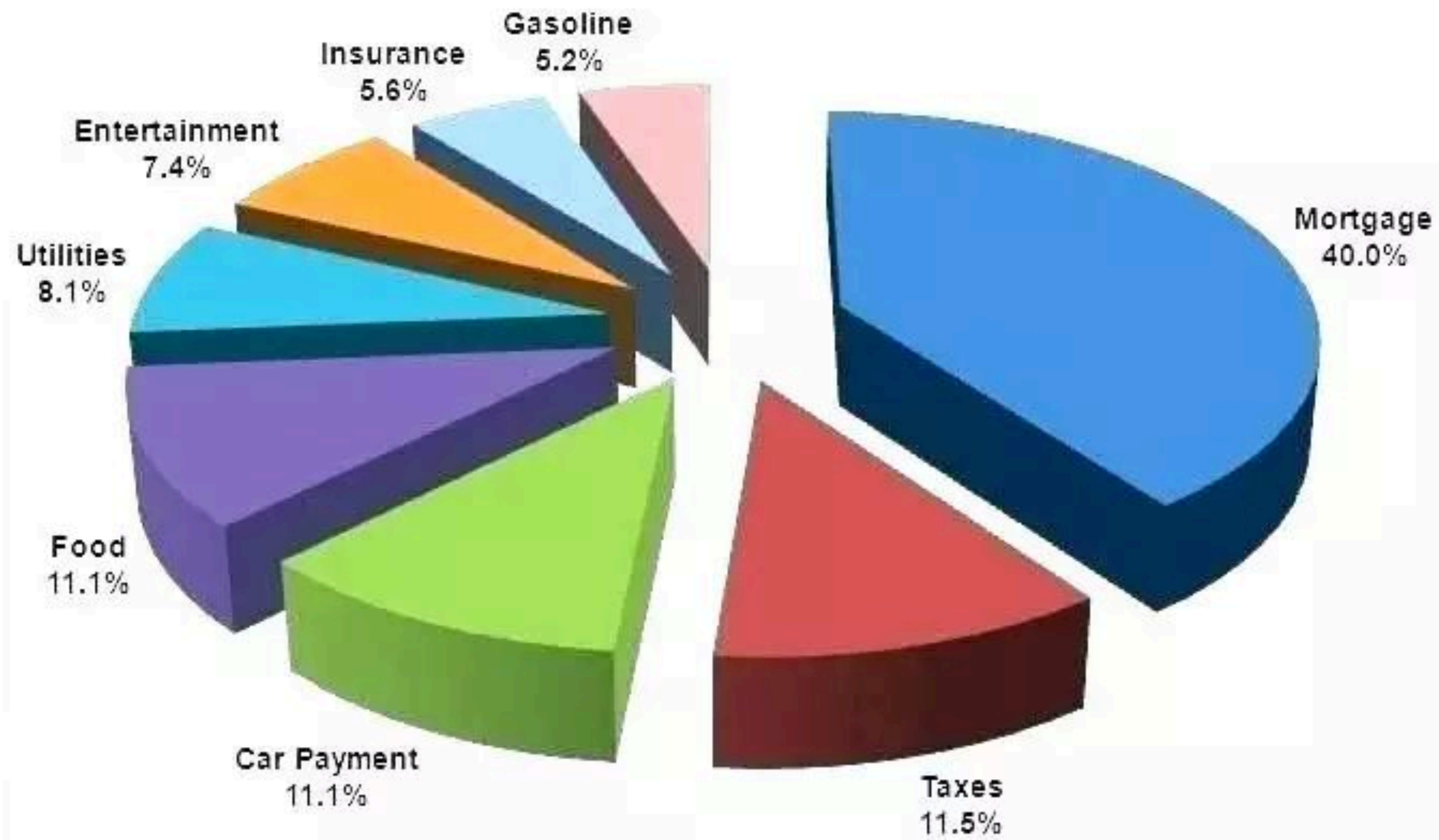


Monthly Sales Summary



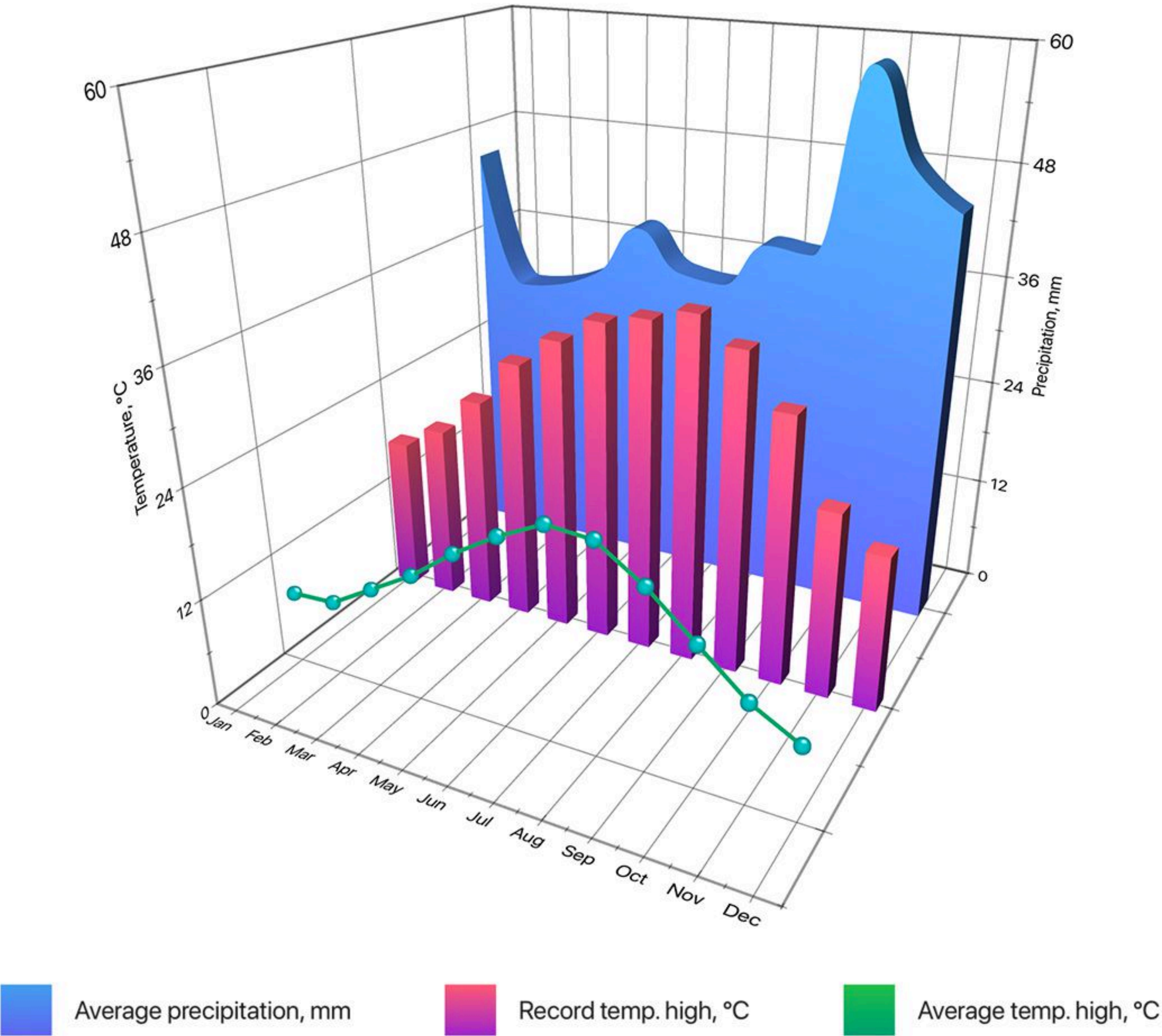


## Personal Expenses





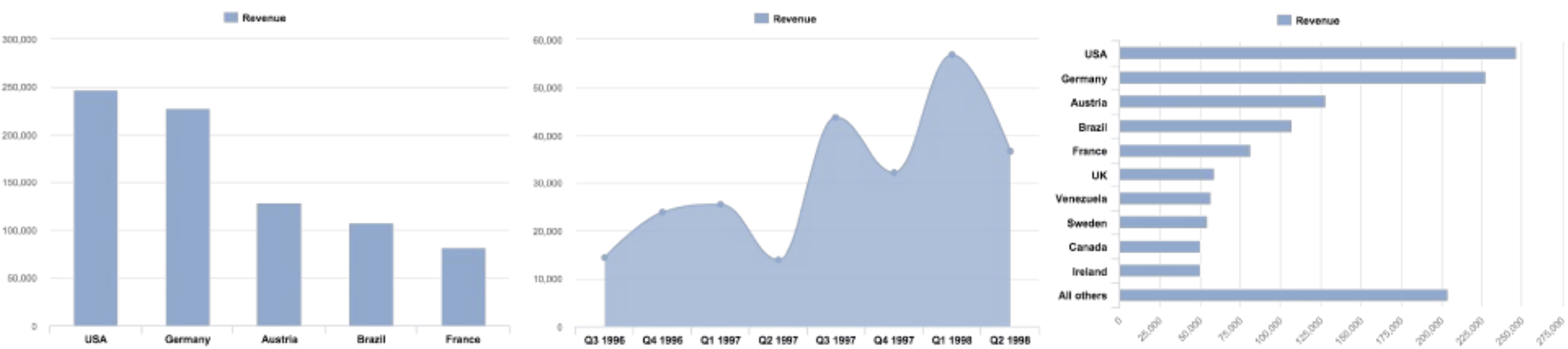
Climate data for London Heathrow (1981–present)



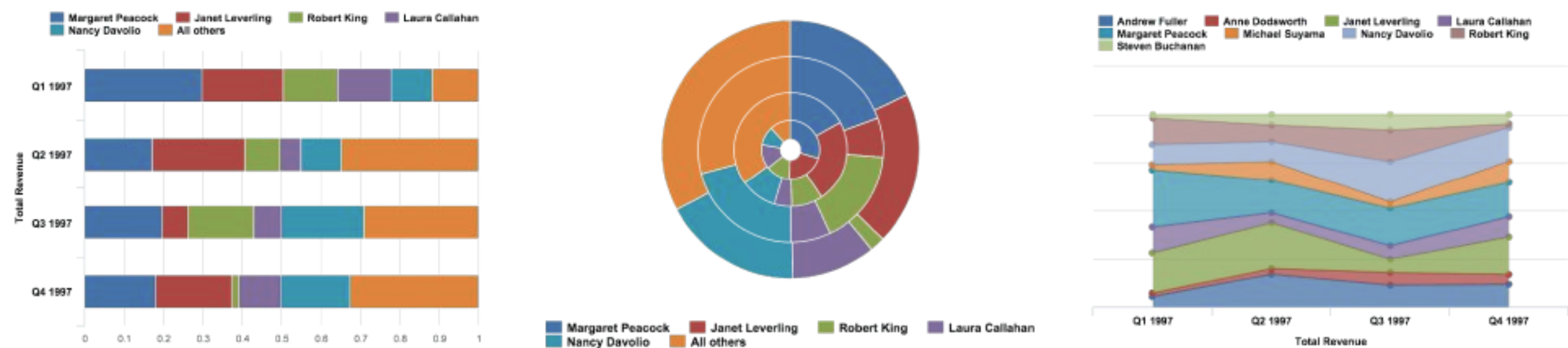


# 4 Basic Methods of Visual Data Analysis

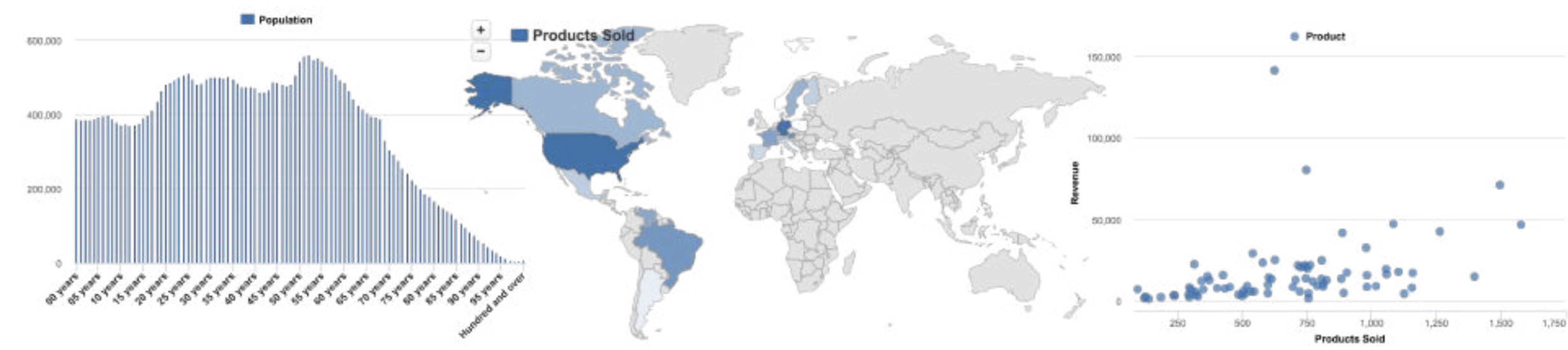
## Comparison



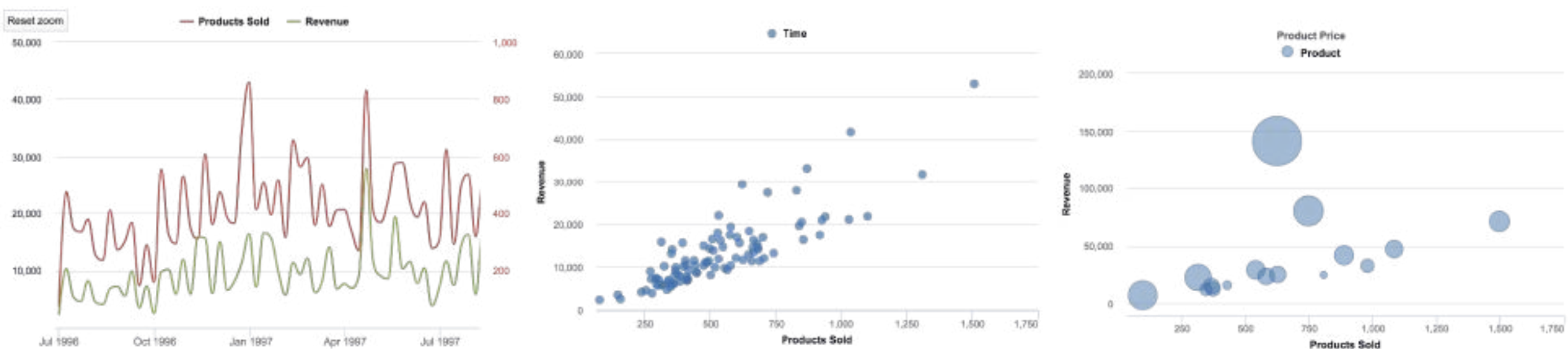
## Composition



## Distribution

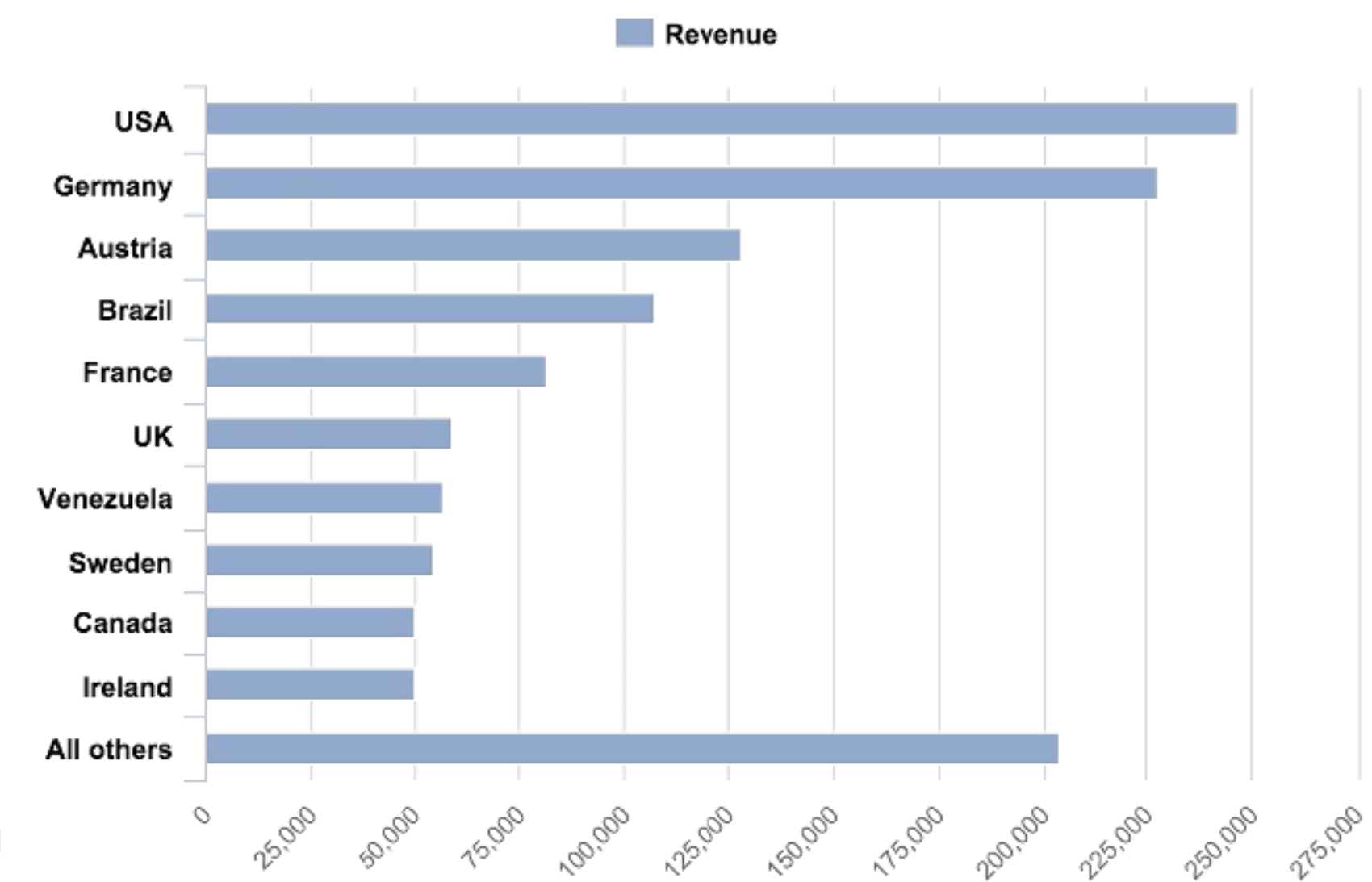
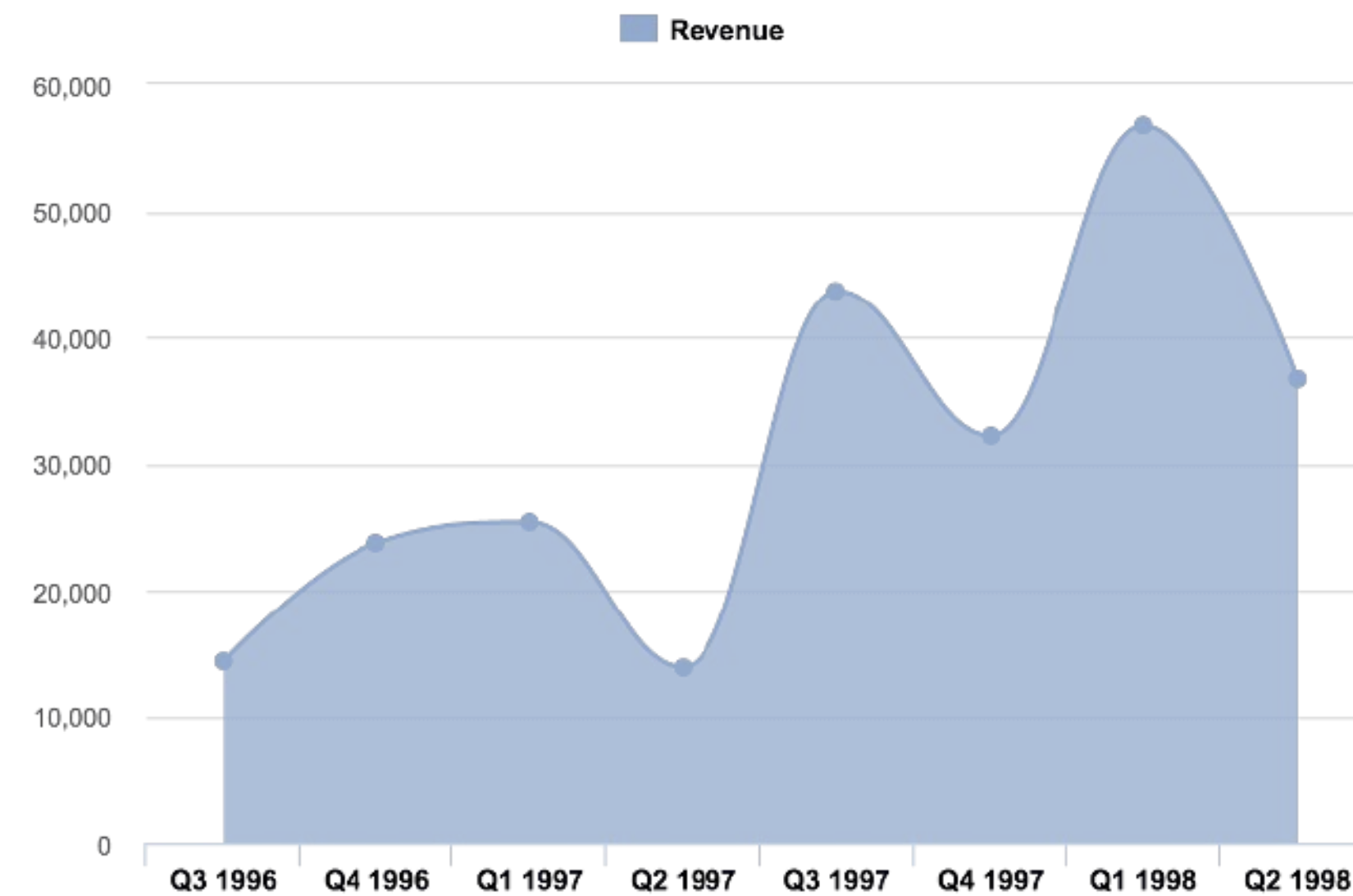
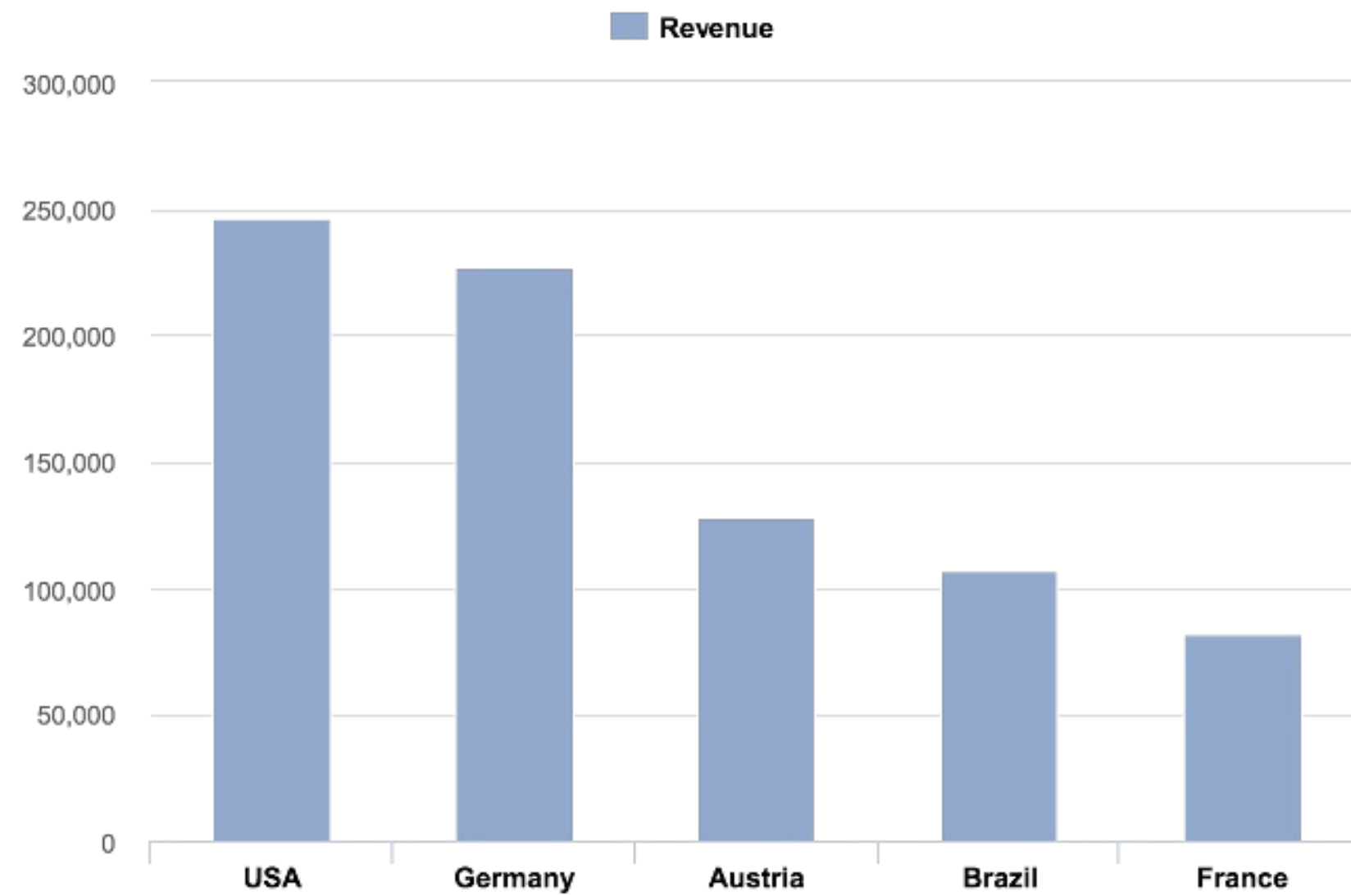


## Relationship





# Comparison

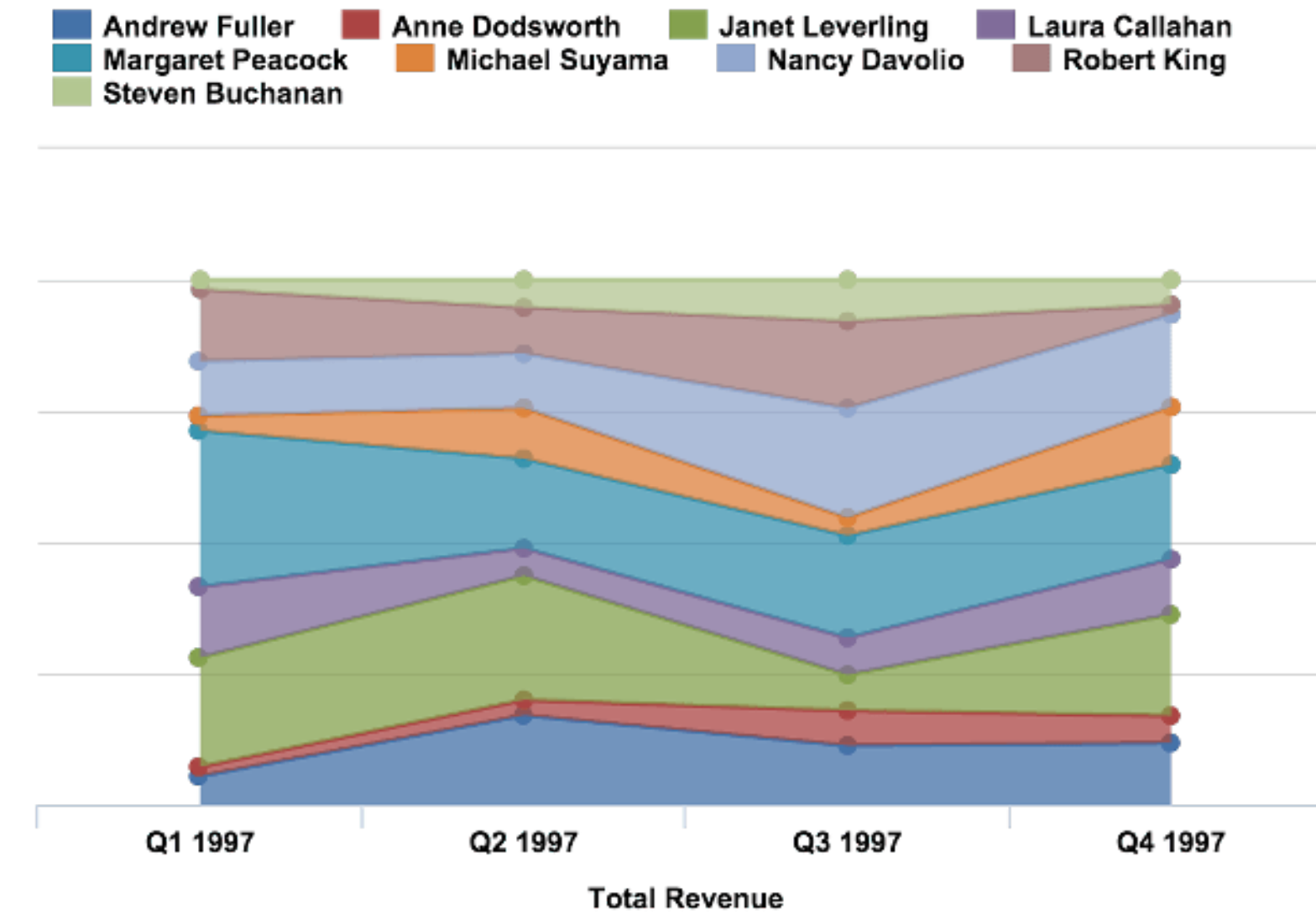
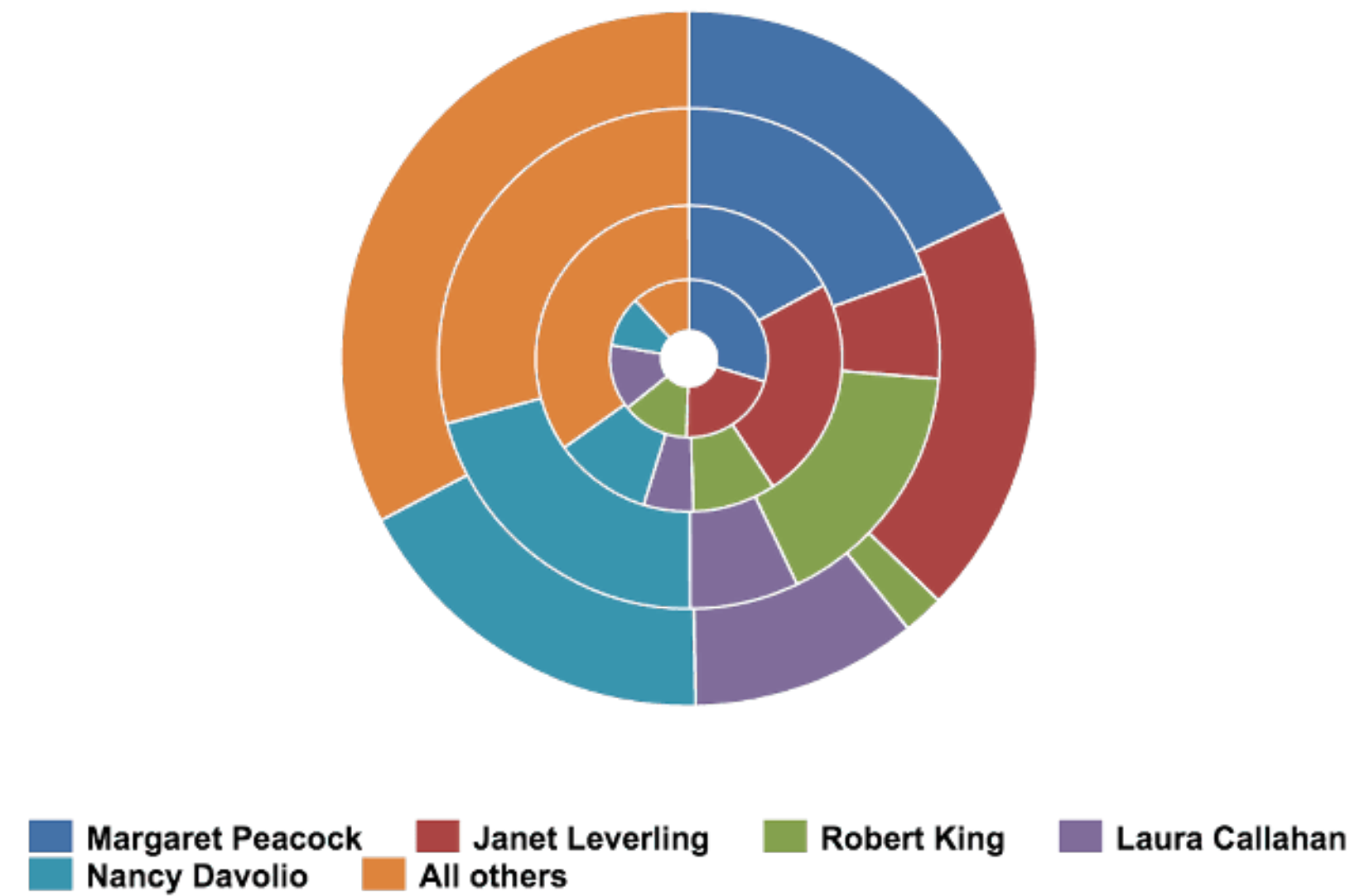
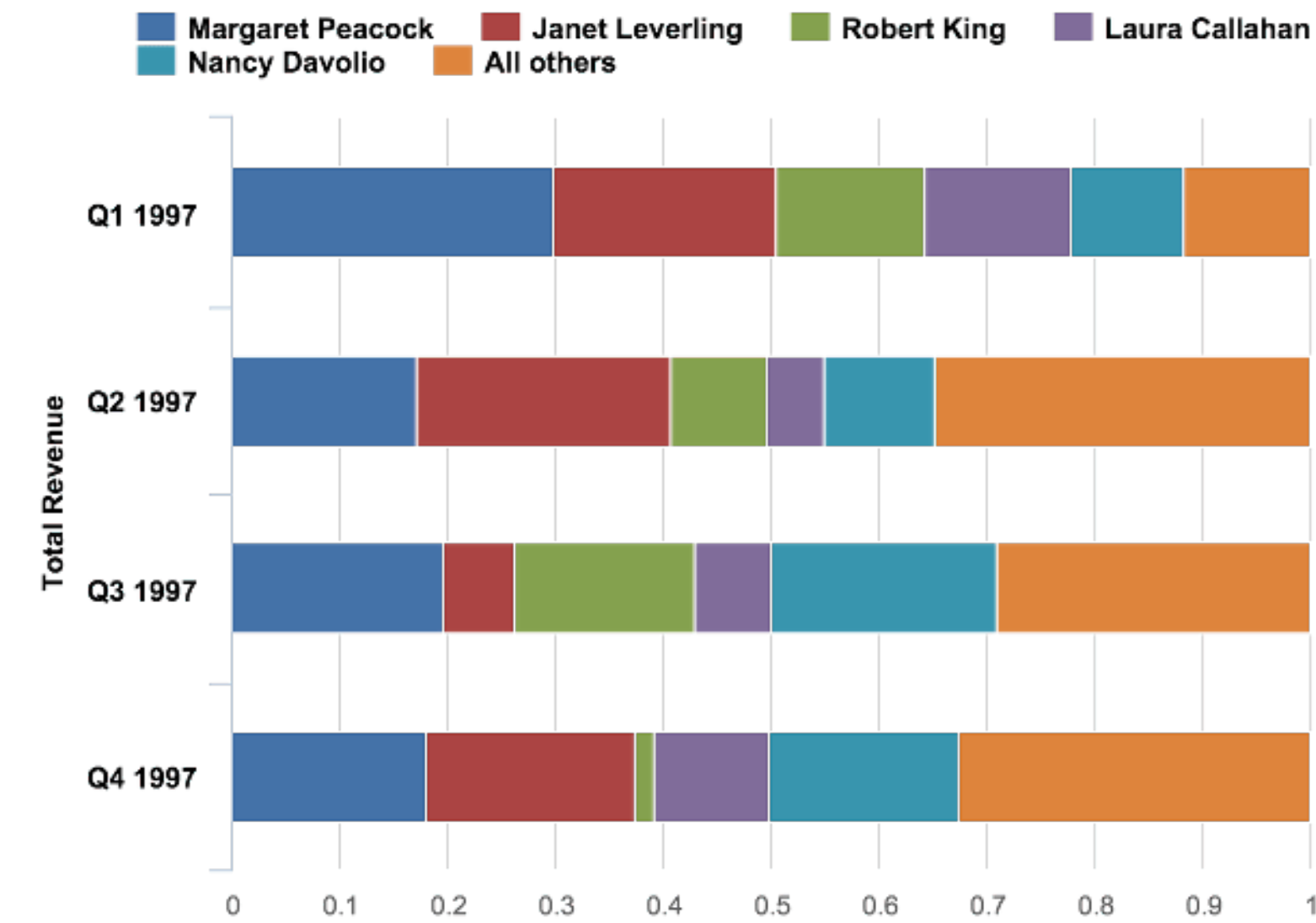


- Compare two or more values side by side
- List key values

- Rank values from best to worst or vice versa.
- Show patterns, gaps, spikes, outliers, or trends.



# Composition

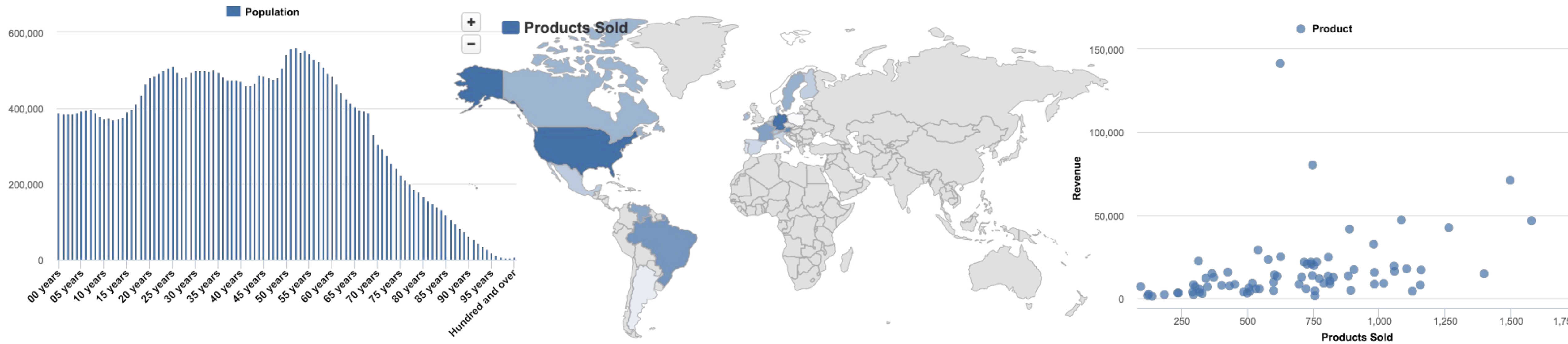


- Show part to whole relationship.

- Show how a total value can be divided into parts



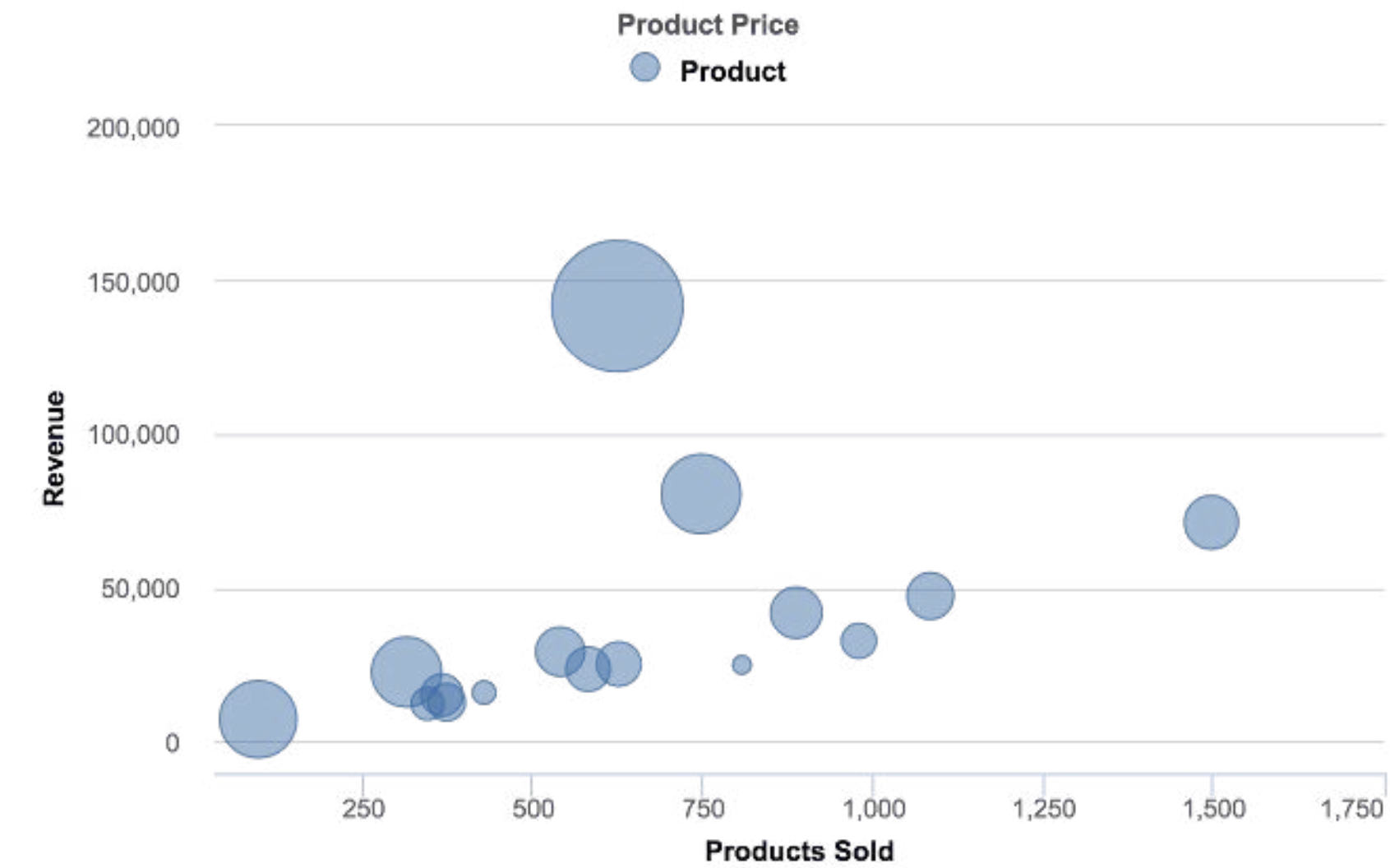
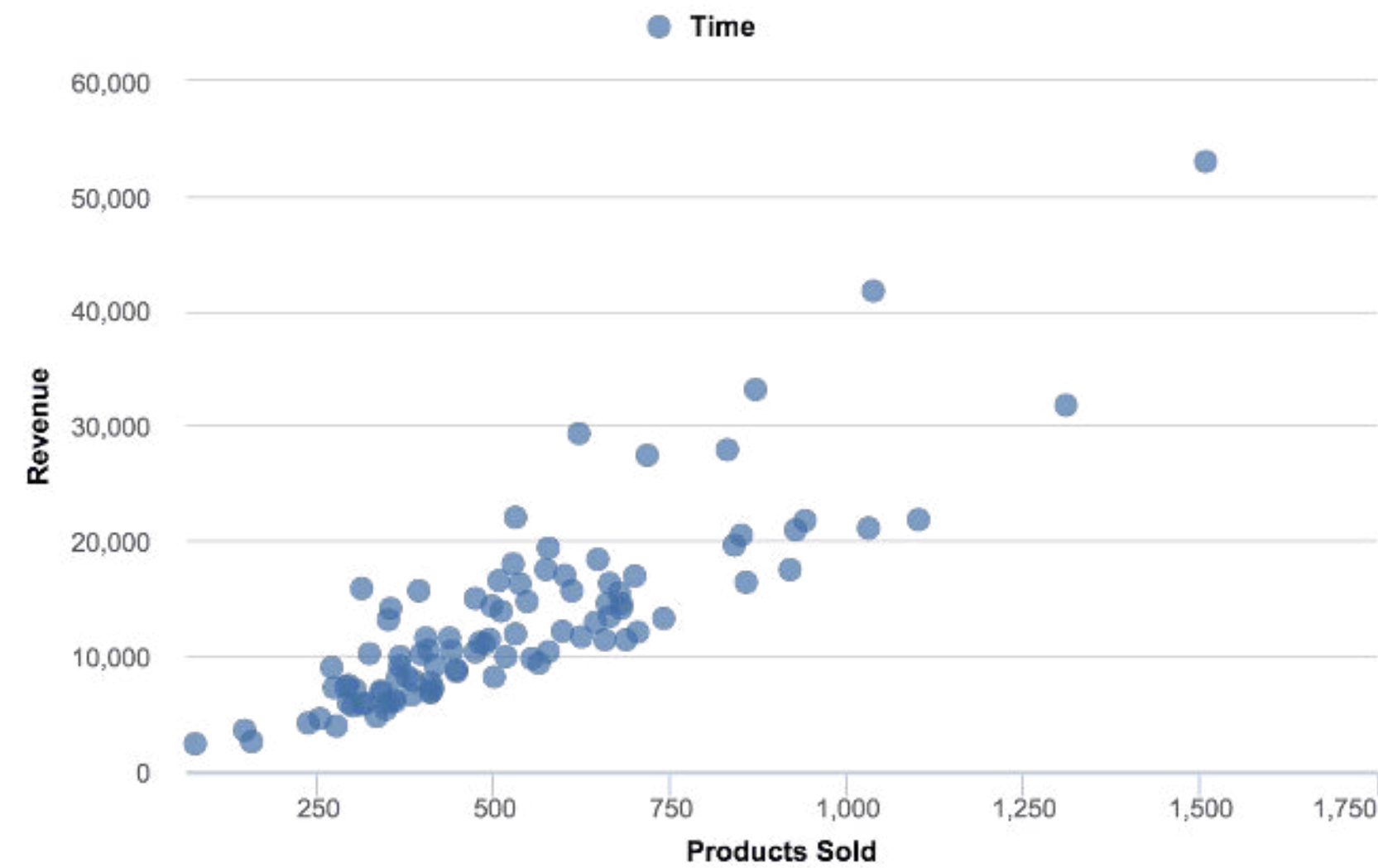
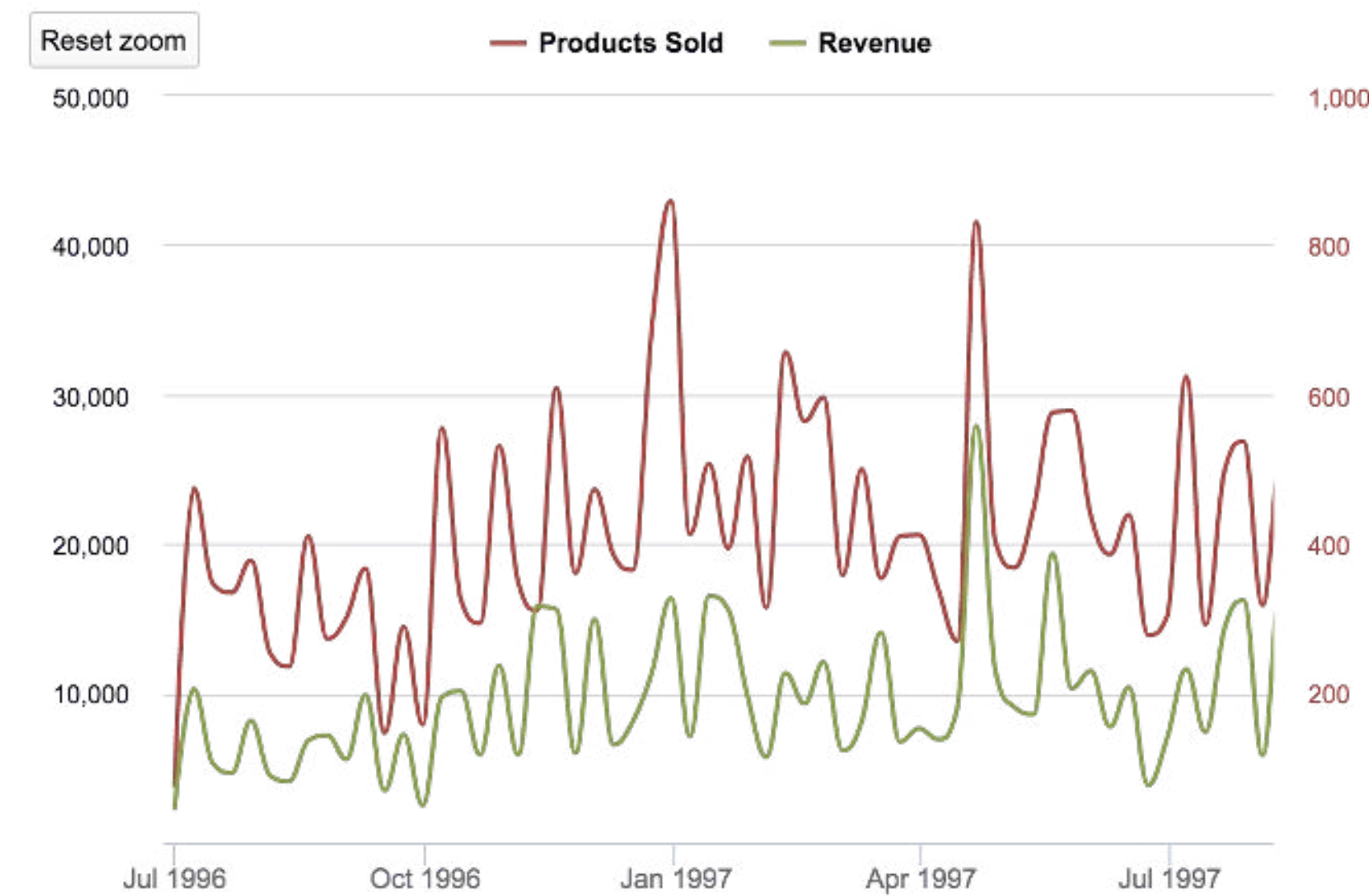
# Distribution



- Comparison and Composition.
- Correlations, trends, patterns, shapes, clusters, averages, or outliers.
- Deviation or Variance analysis.
- Visualize related or unrelated data points.



# Relationship

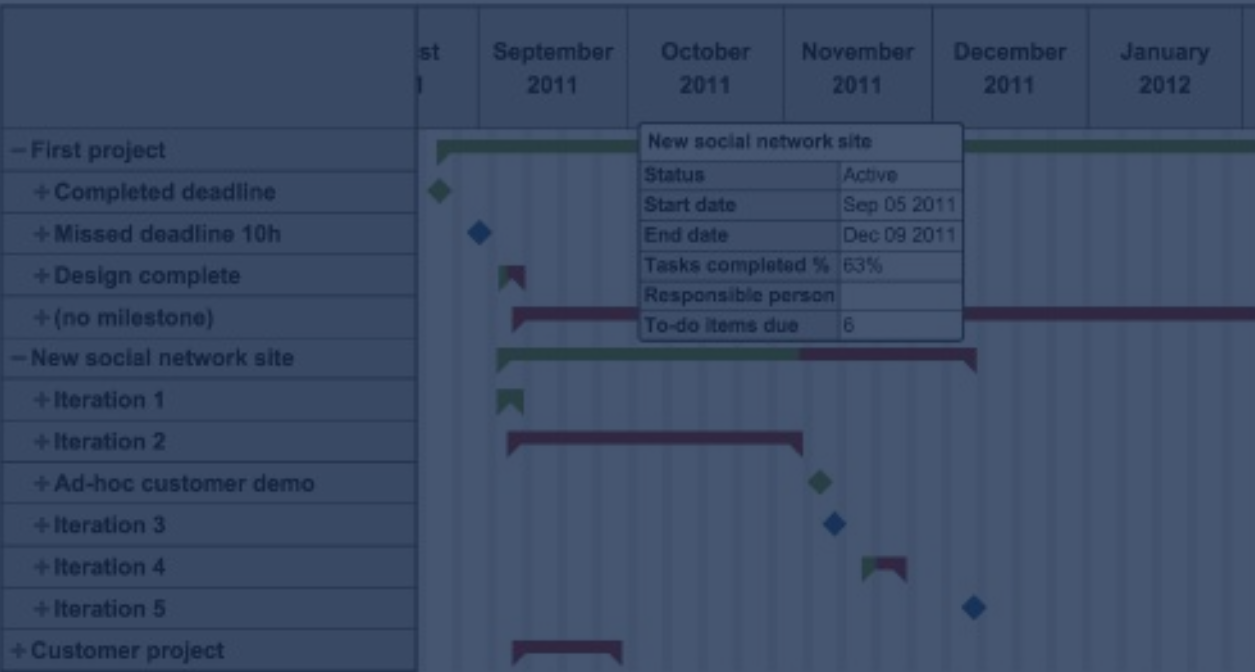
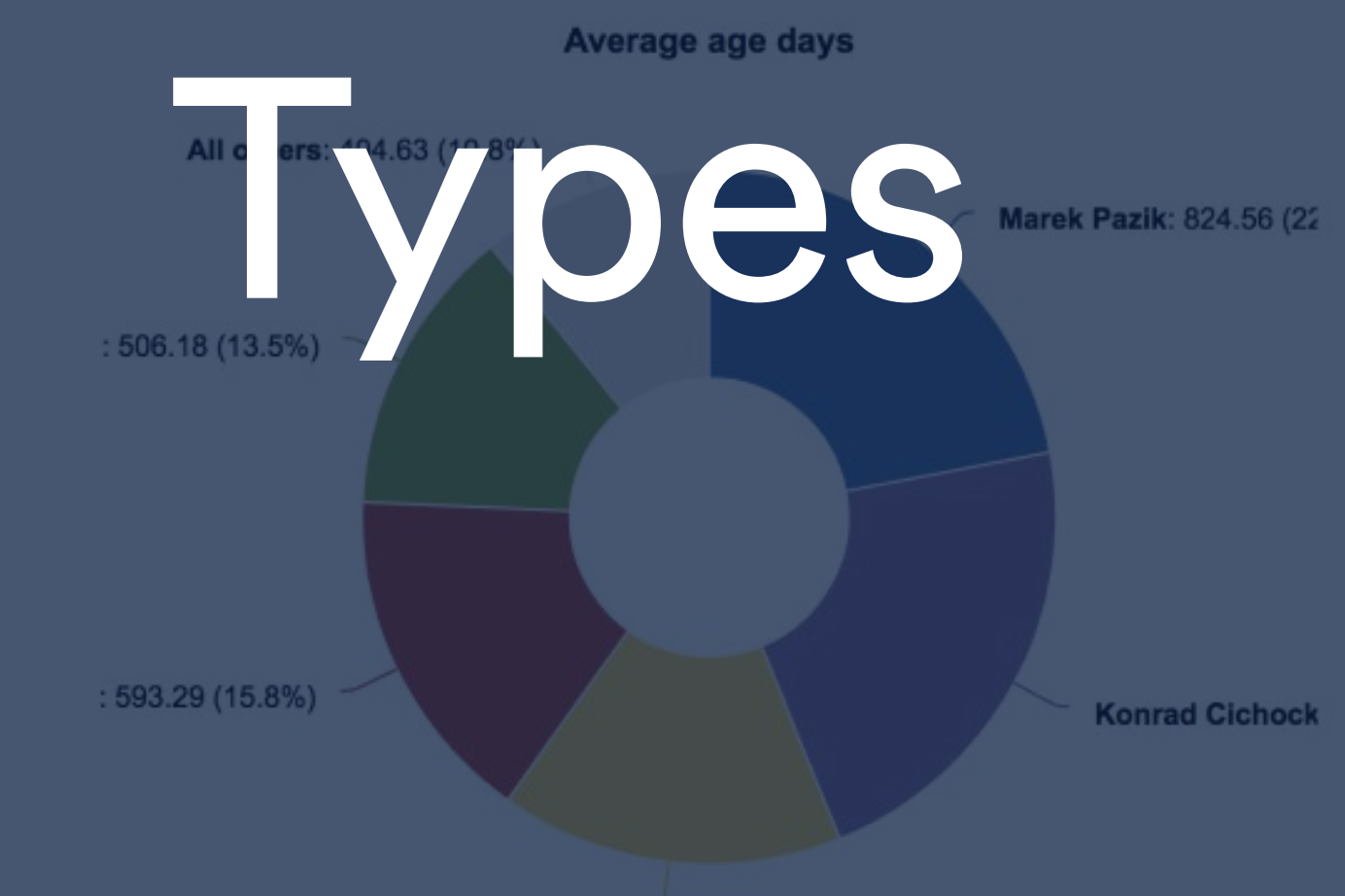
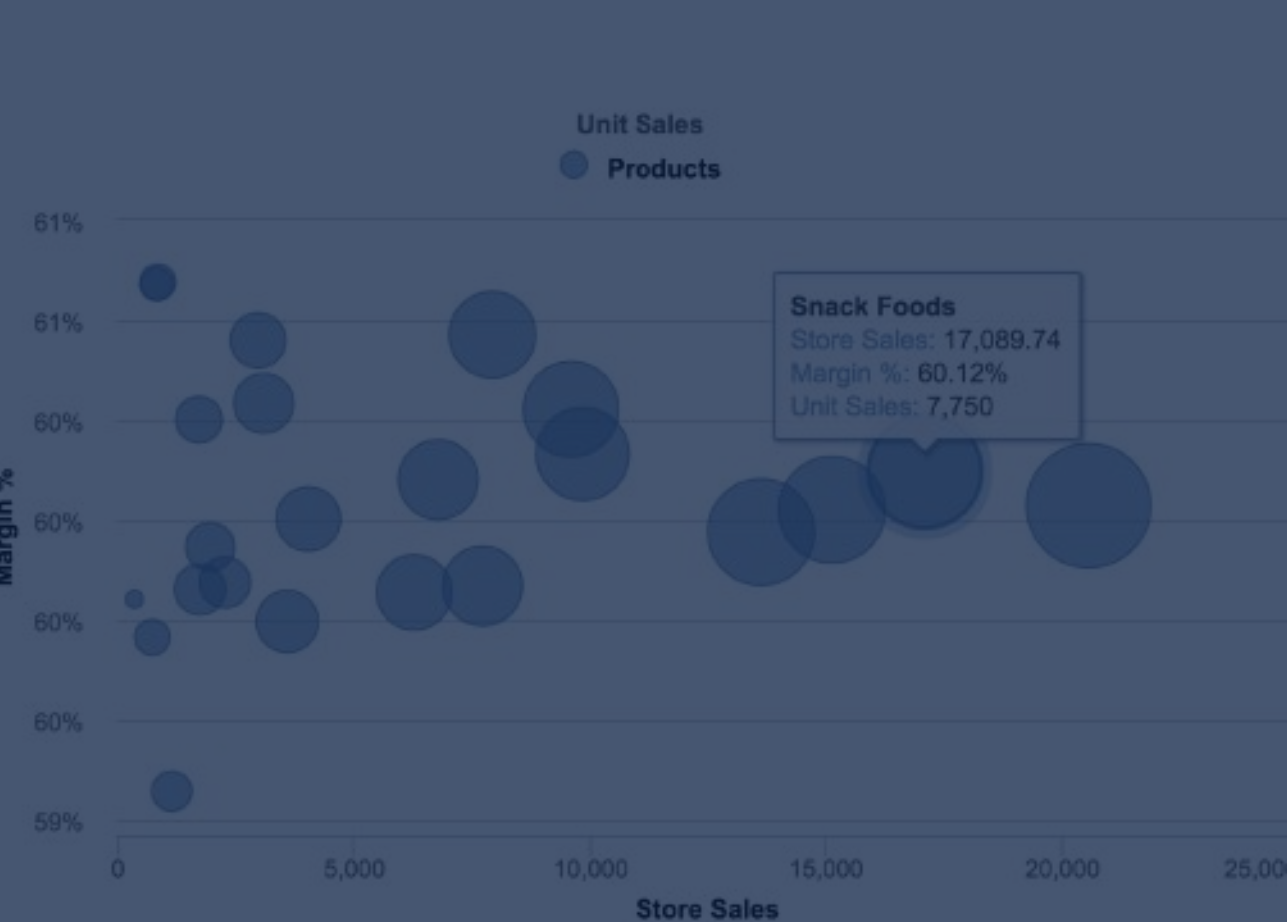
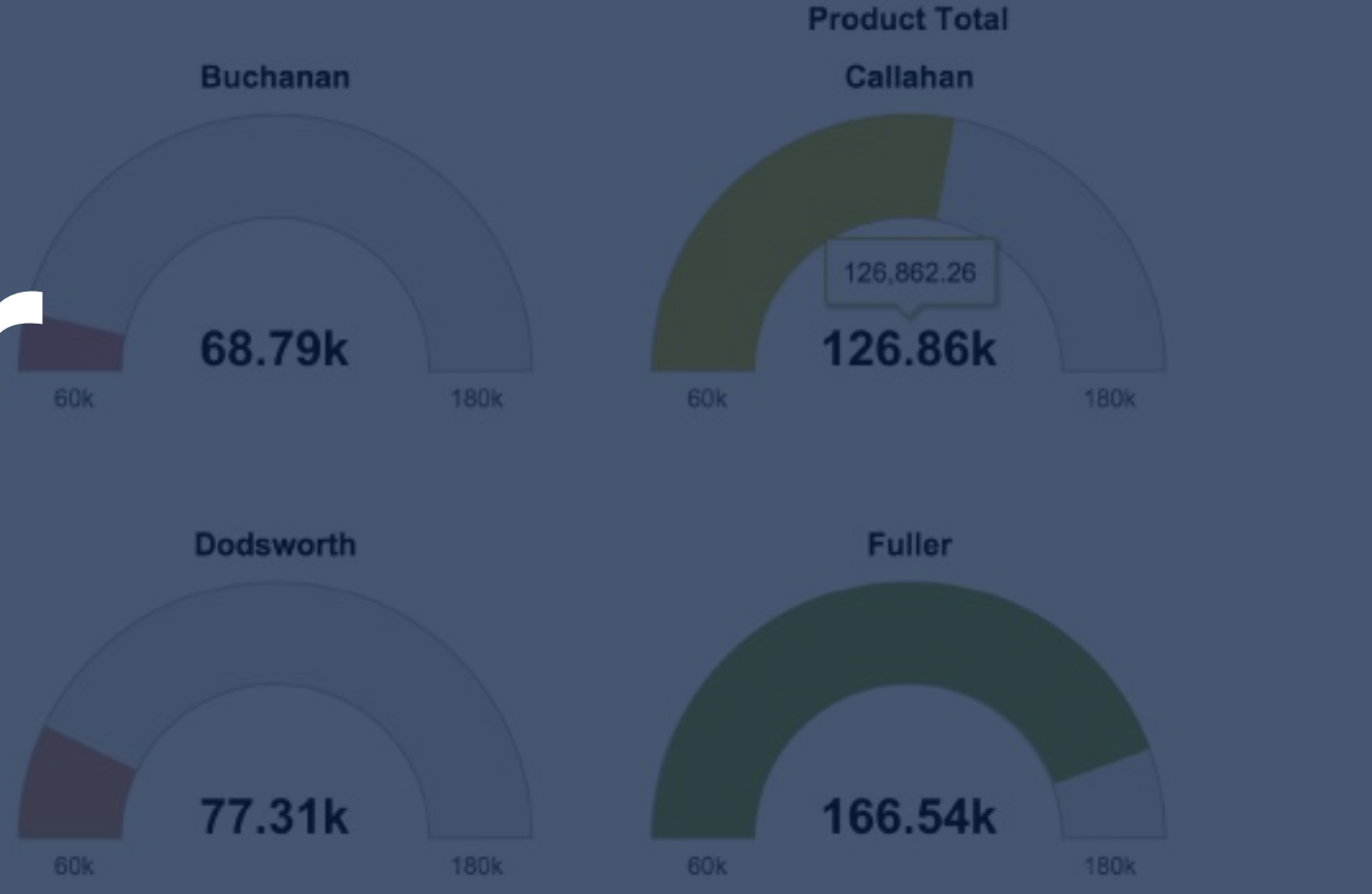
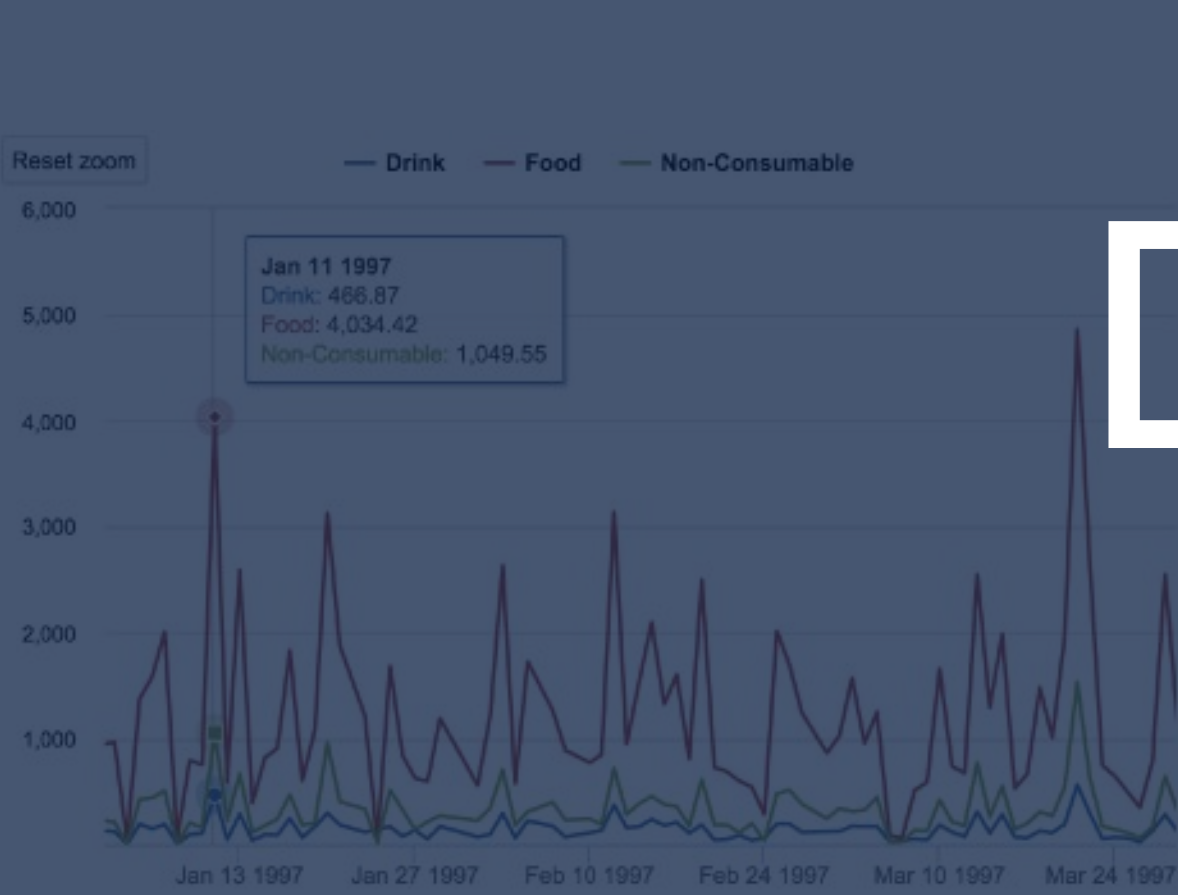


- Show the relationship, correlation, or connection.

- Find correlations, trends, patterns, clusters, averages, or outliers.



	Store Sales	Store Cost	Unit	Average
			Drill across	
			Select this	
			Remove	
			Order by	
			Top rows	
			Bottom rows	
			Filter rows	
			Cell formatting	
All Customers	139,628.35	55,752.240		
USA	139,628.35	55,752.240		
CA	36,175.20	14,431.085		
OR	40,170.29	16,081.073		
Albany	4,491.26	1,782.817		
Beaverton	2,407.97	950.359		
Corvallis	5,695.13	2,281.248		
Lake Oswego	2,262.56	907.6483	1,102	6.41
Lebanon	5,934.62	2,390.0872	2,826	6.49
Milwaukie	2,892.32	1,155.6925	1,345	6.92
Oregon City	2,324.62	929.6752	1,113	6.55
Portland	2,122.12	847.5187	1,001	6.65
Salem	4,251.81	1,697.9039	2,104	6.28
W. Linn	2,161.61	871.0418	1,041	6.59





# Table Charts

	Store Sales	Store Cost	Unit	Average
– All Customers	139,628.35	55,752.240		
– USA	139,628.35	55,752.240		
+ CA	36,175.20	14,431.085		
– OR	40,170.29	16,081.073		
+ Albany	4,491.26	1,782.817		
+ Beaverton	2,407.97	950.359		
+ Corvallis	5,695.13	2,281.248		
+ Lake Oswego	2,262.56	907.6483	1,102	6.41
+ Lebanon	5,934.62	2,390.0872	2,826	6.49
+ Milwaukie	2,892.32	1,155.6925	1,345	6.92
+ Oregon City	2,324.62	929.6752	1,113	6.55
+ Portland	2,122.12	847.5187	1,001	6.65
+ Salem	4,251.81	1,697.9039	2,104	6.28
+ W. Linn	2,161.61	871.0418	1,041	6.59

↶ Drill across ▶  
➔ Select this  
🗑 Remove  
↕ Order by ▶  
▼ Top rows ▶  
▲ Bottom rows ▶  
🔹 Filter rows ▶  
🔲 Cell formatting

Gender ▶  
Products ▶  
**Time** ▶  
Year  
Quarter  
Month  
Day  
**Weekly**  
Year  
Week  
Day  
**Fiscal**  
Year  
Quarter  
Month  
Day



## USE TABLES

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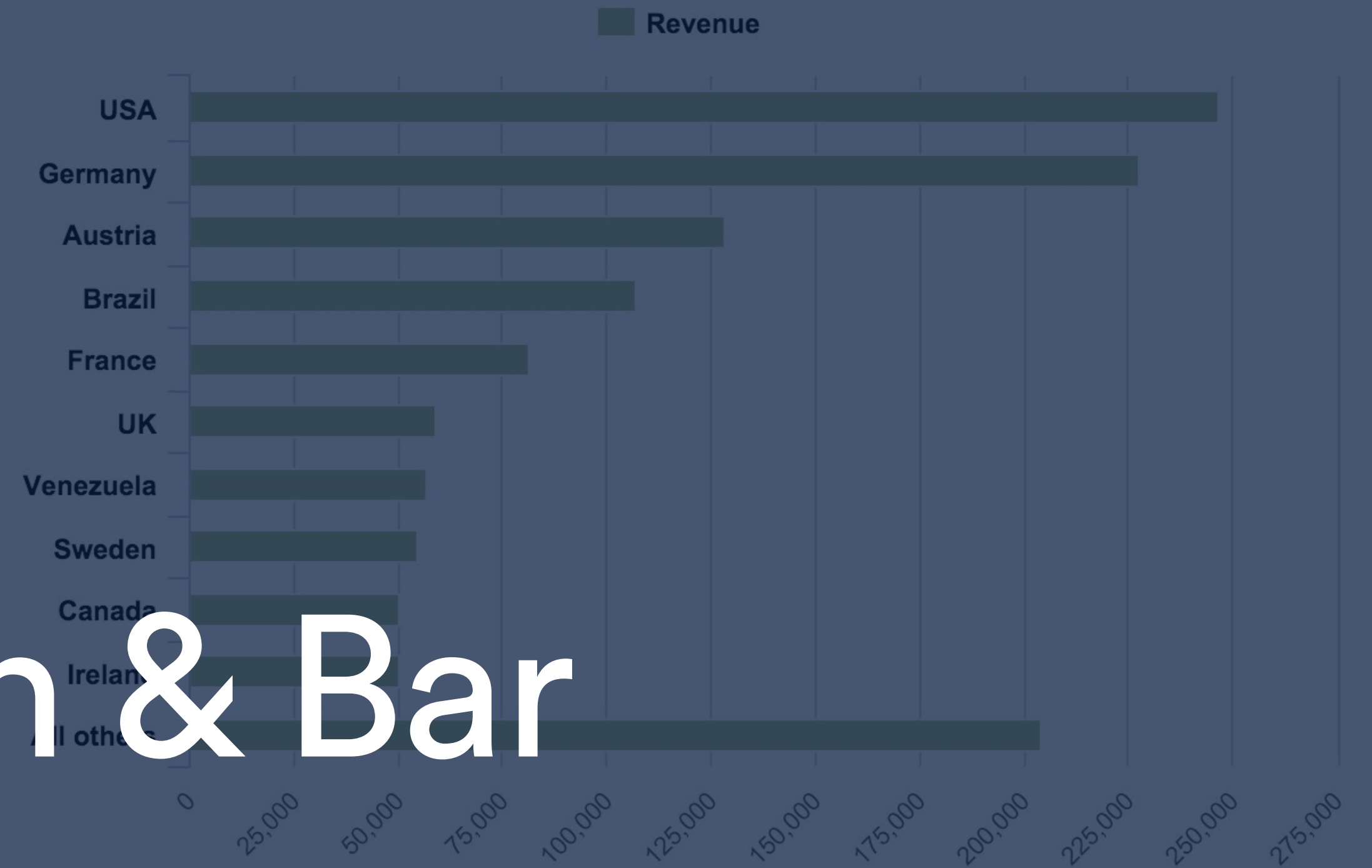
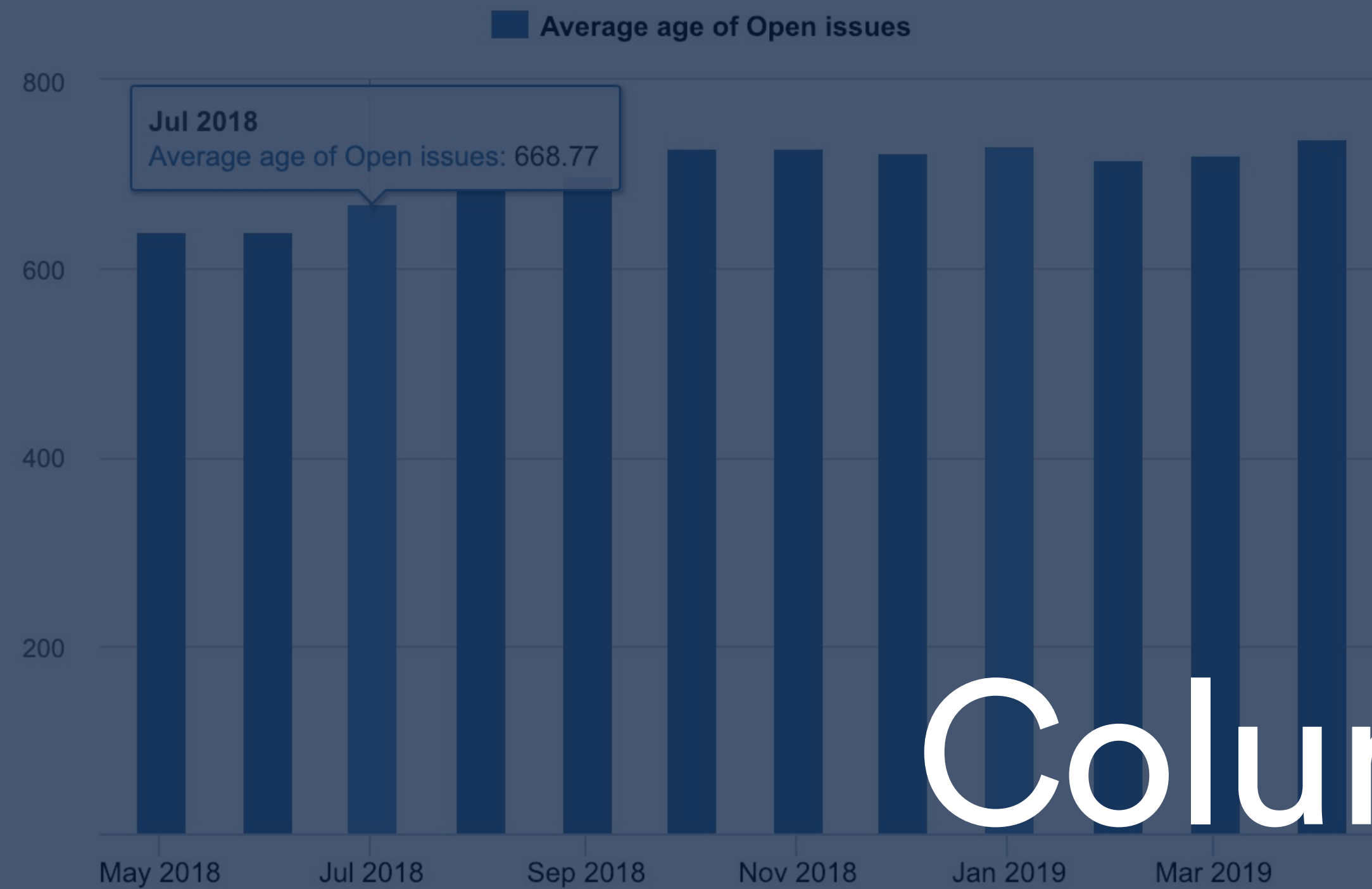
- You need to compare or look up individual values.
- You require precise values.
- Values involve multiple units of measure.
- The data has to communicate quantitative information, but not trends.

## USE CHARTS

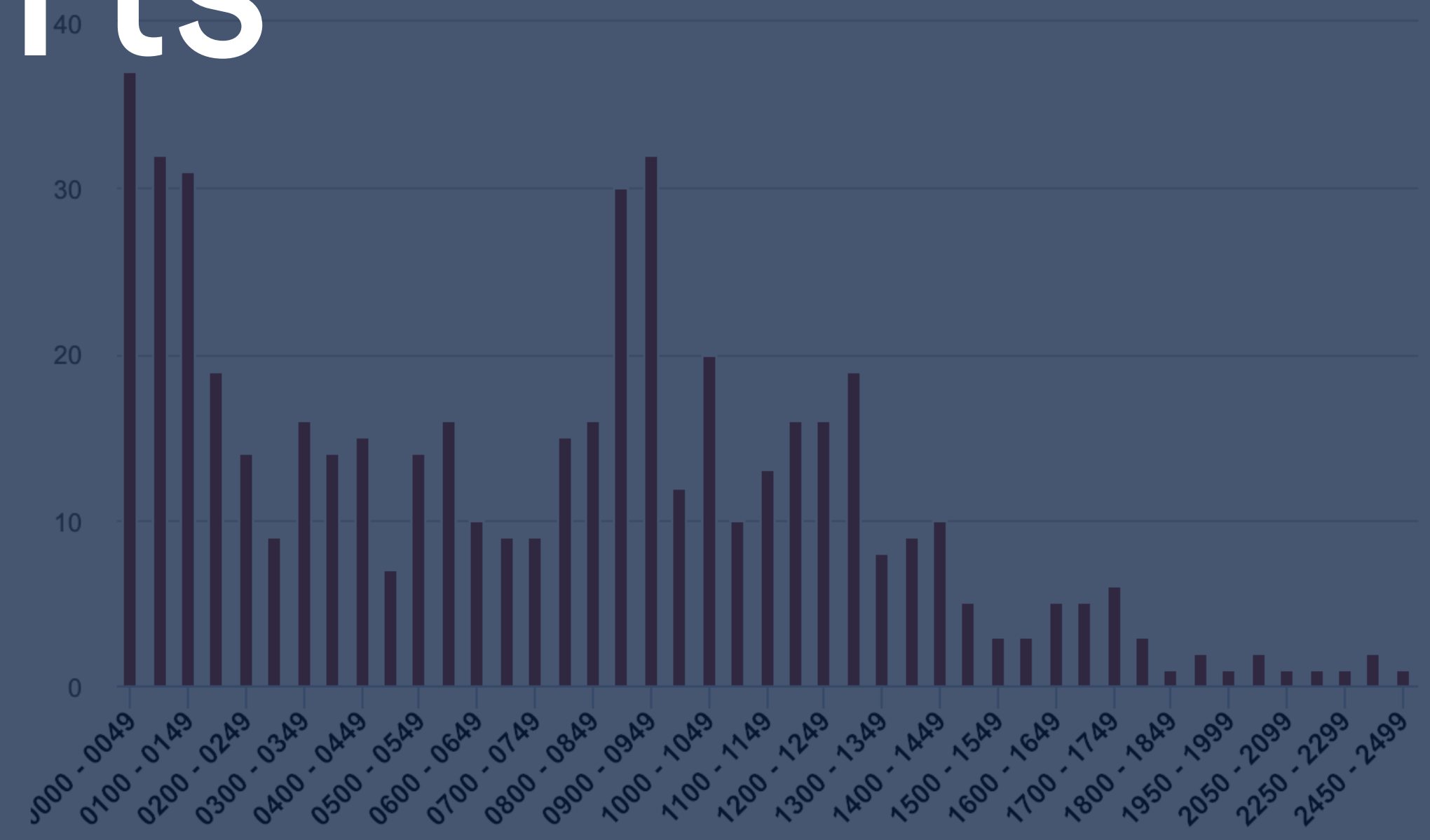
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- You want to convey a message that is contained in the shape of the data.
- The chart is used to show a relationship between many values.



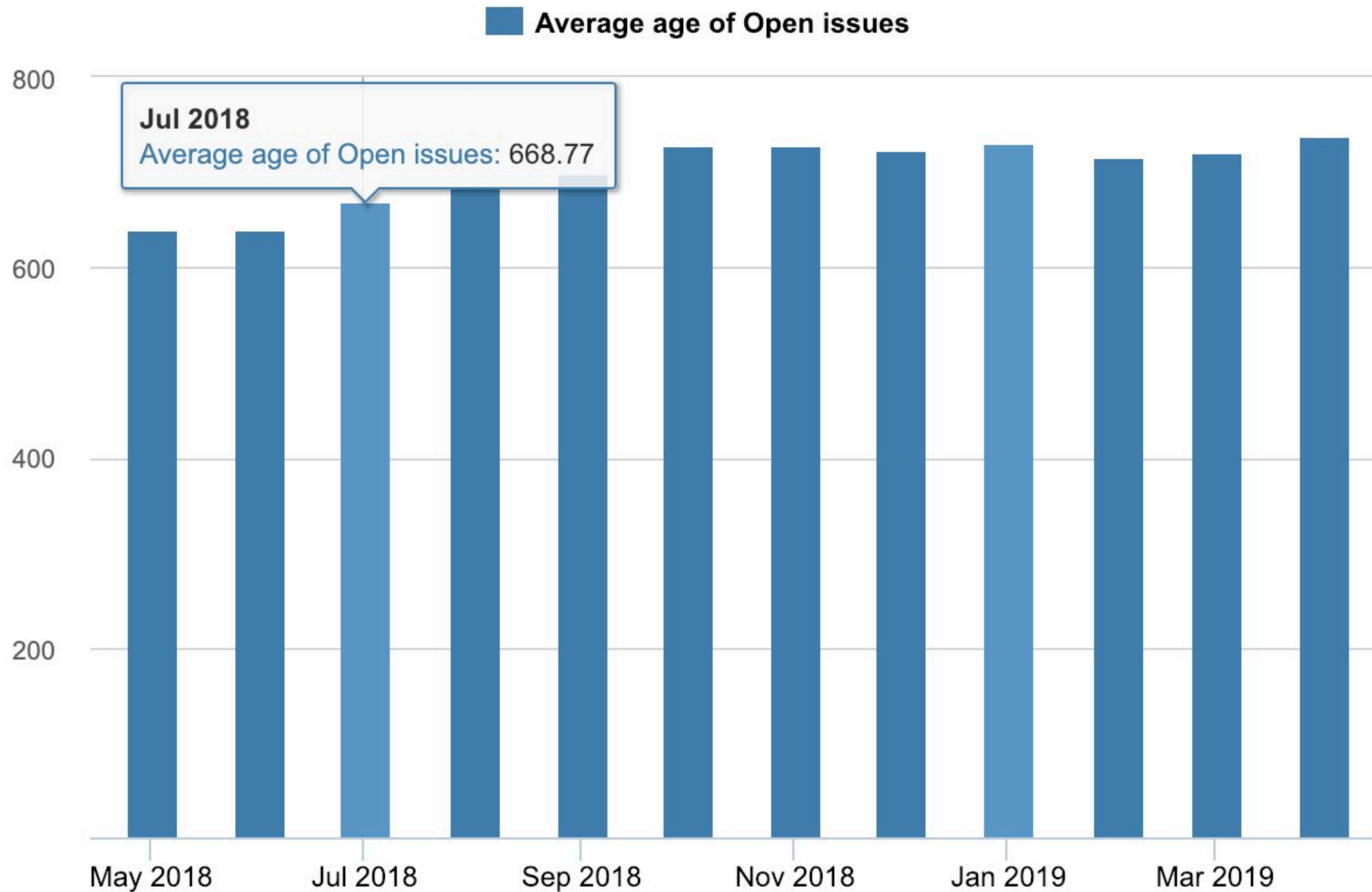


# Column & Bar Charts



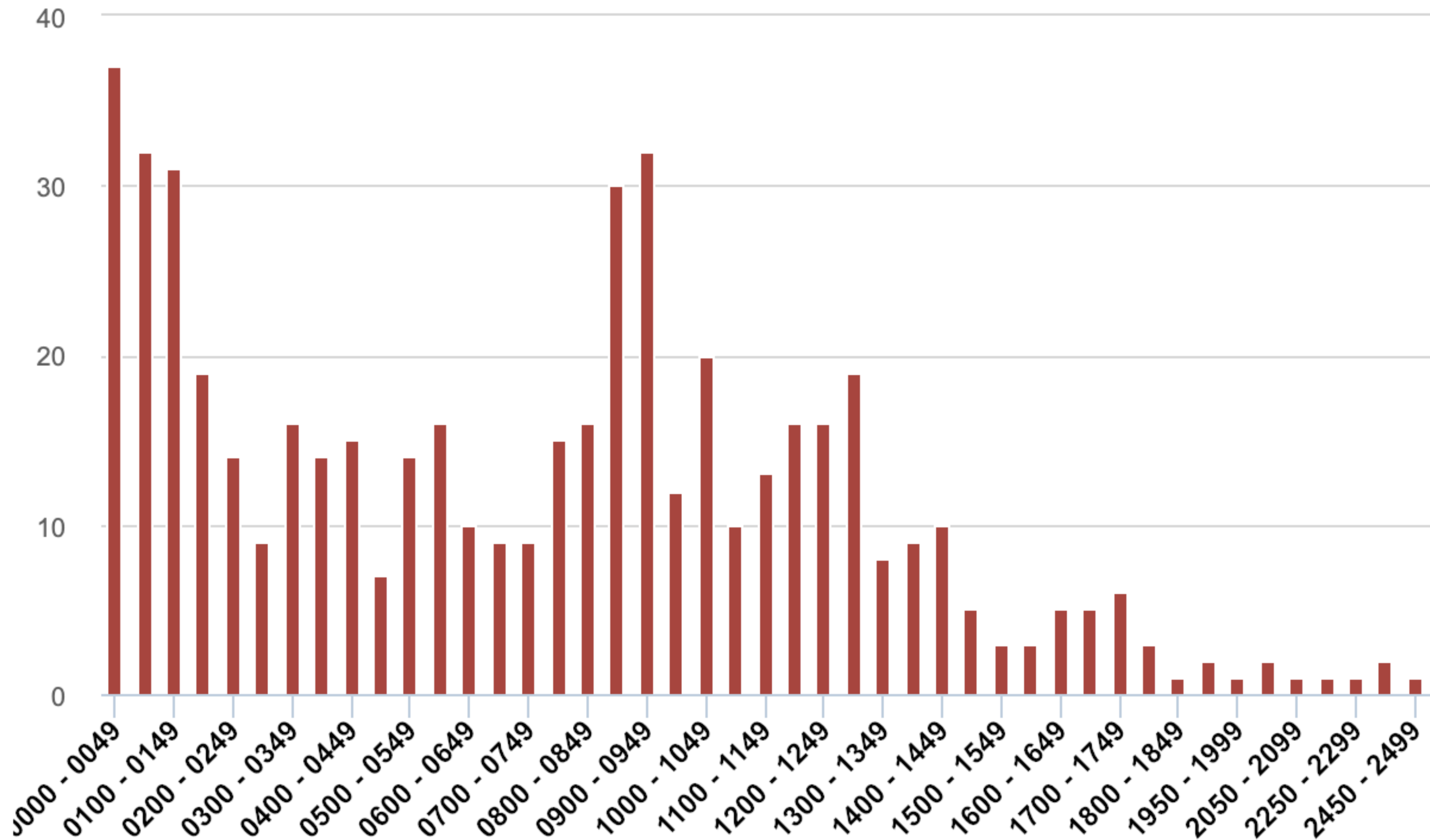


# Column Charts



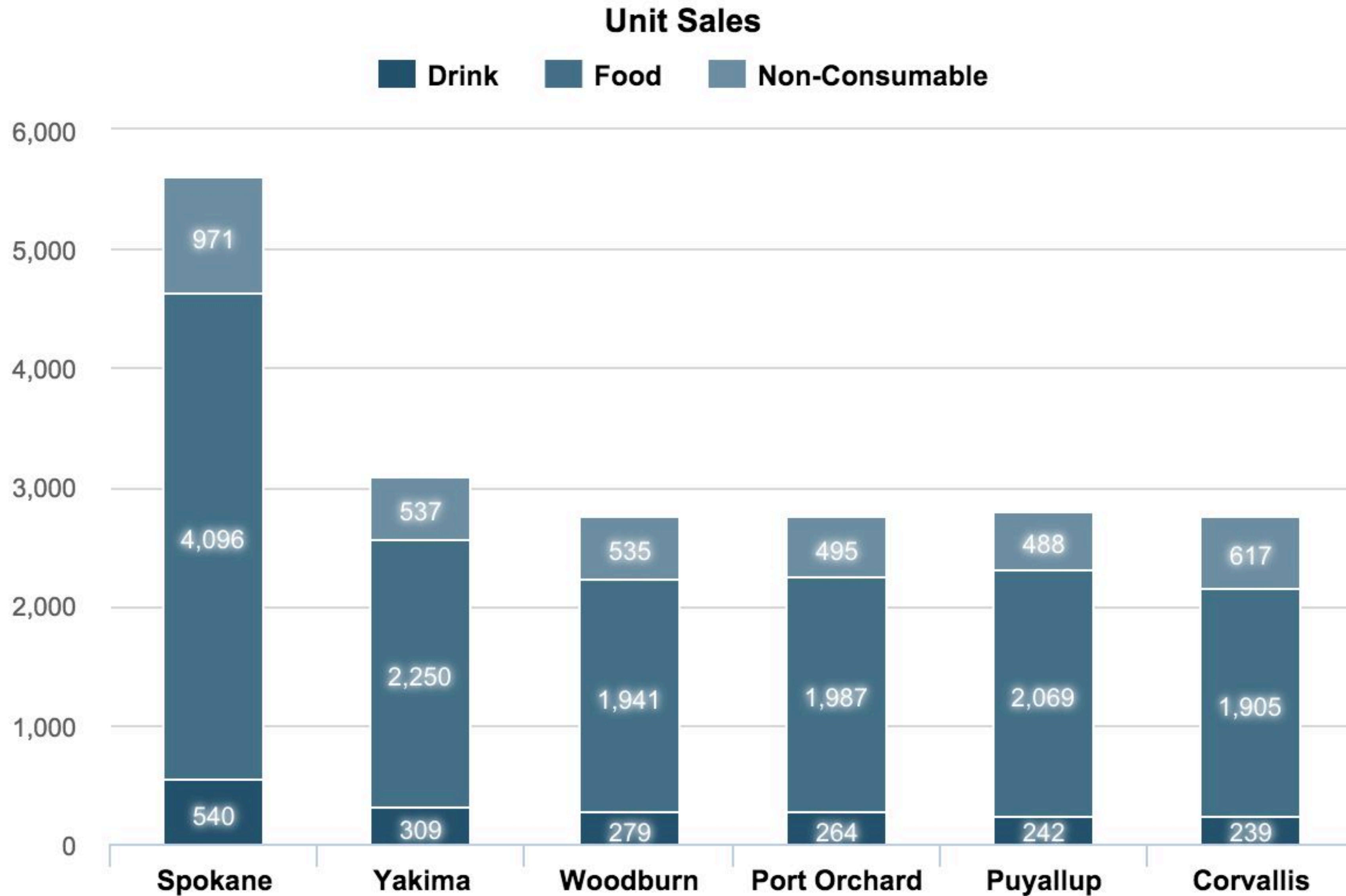


# Column Histogram Charts



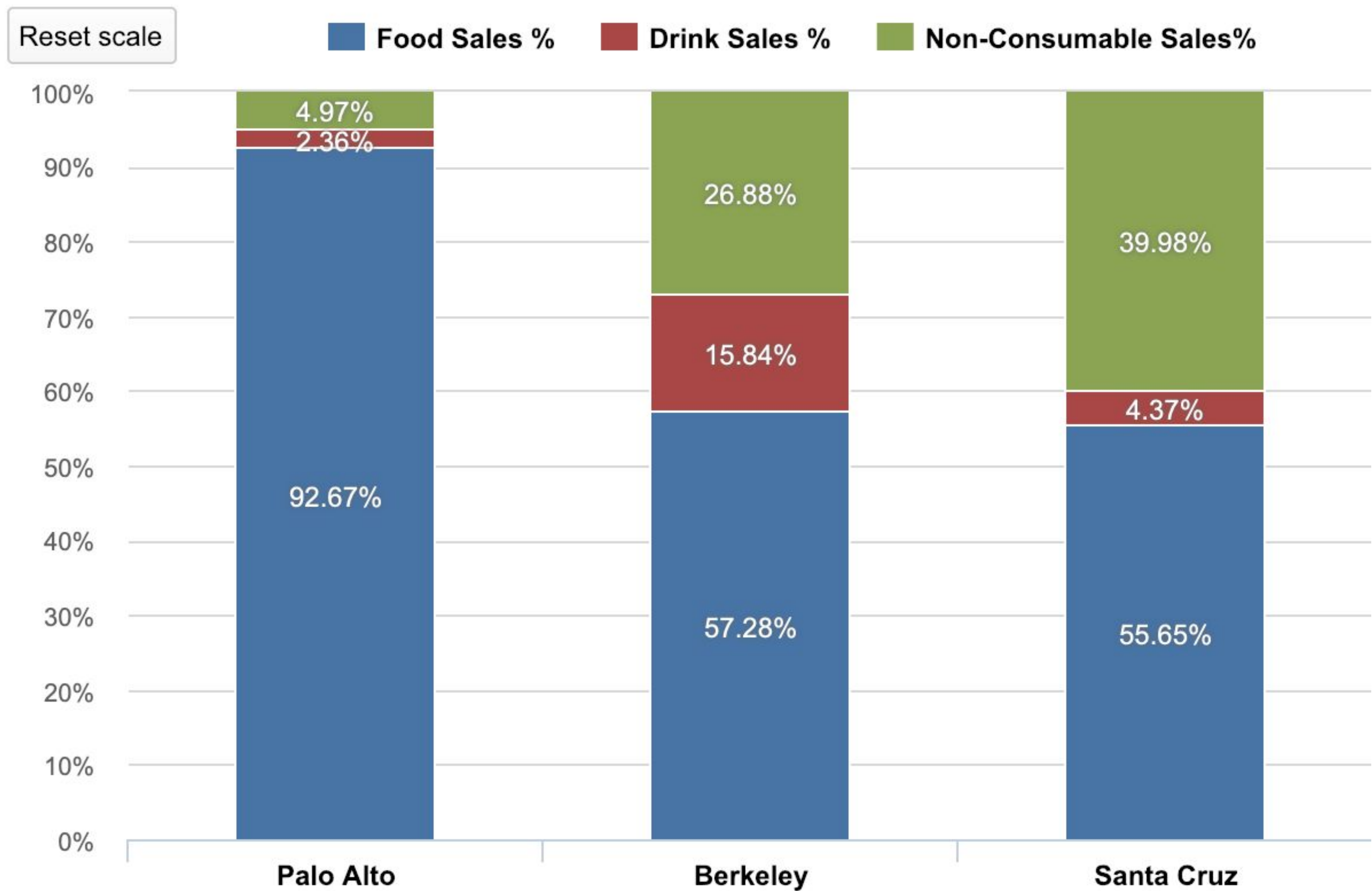


# Stacked Column Charts





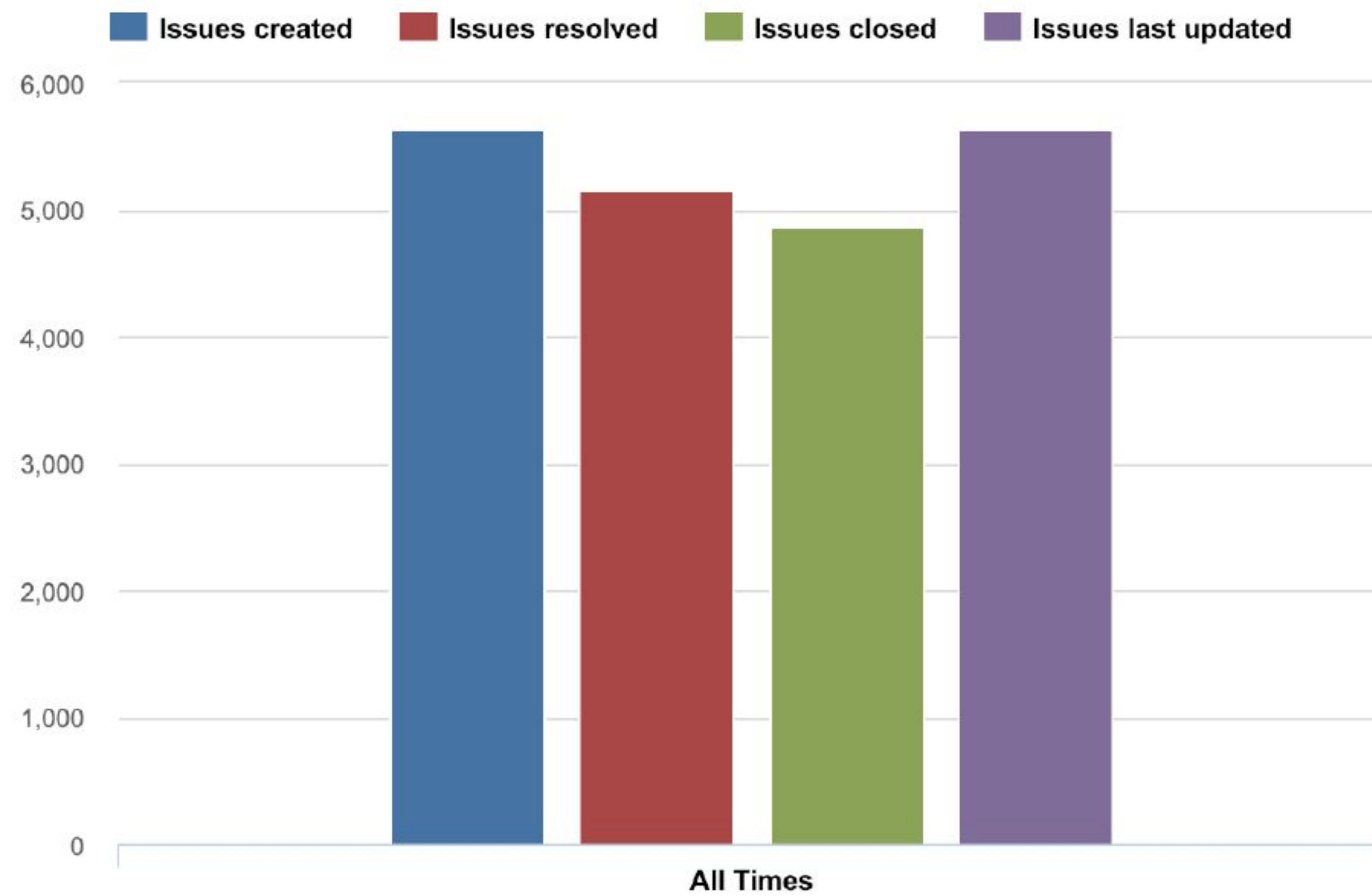
# Relative Stacked Column Charts





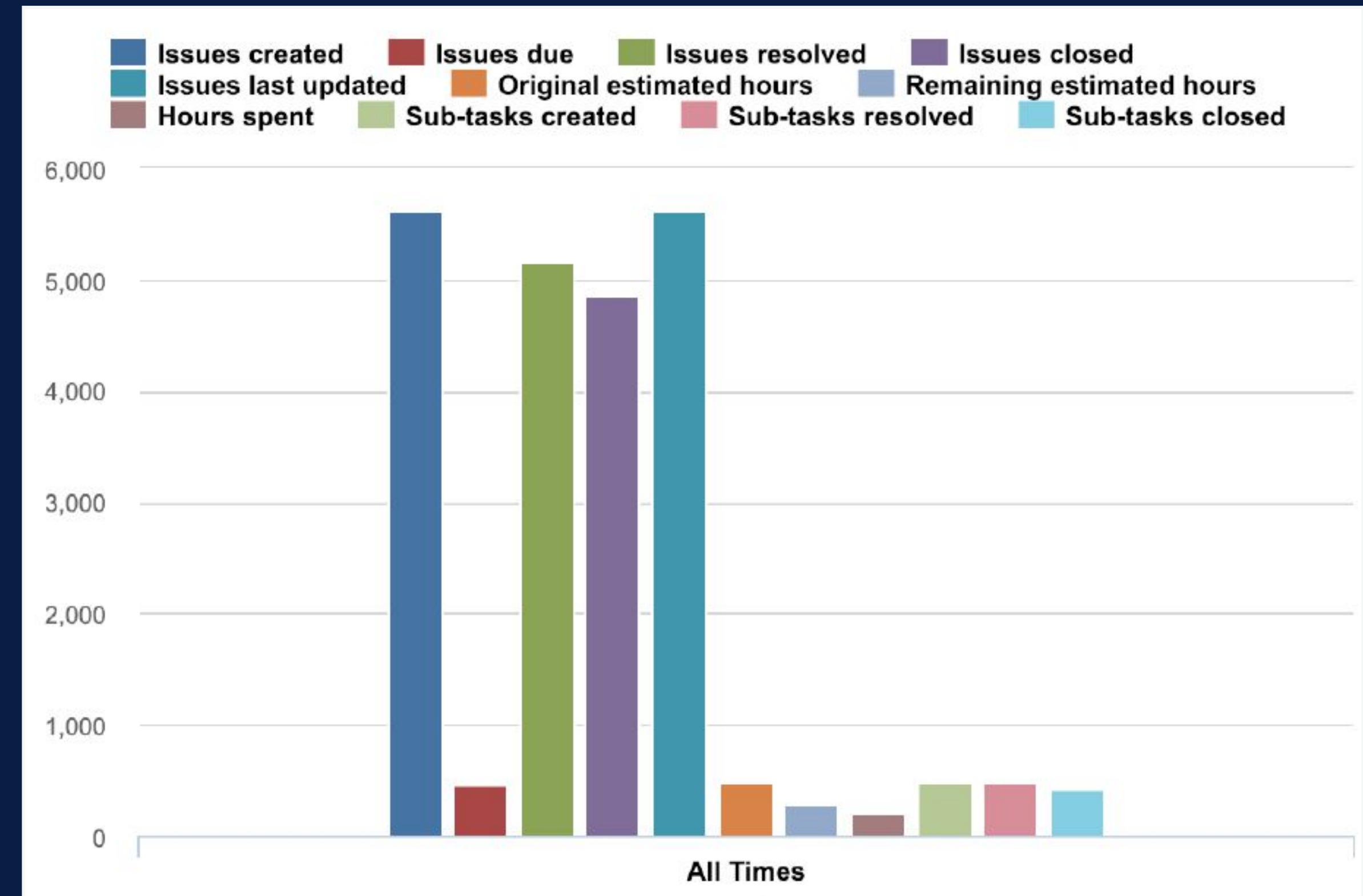
# DO'S

- Compare max 5-7 categories.



# DON'TS

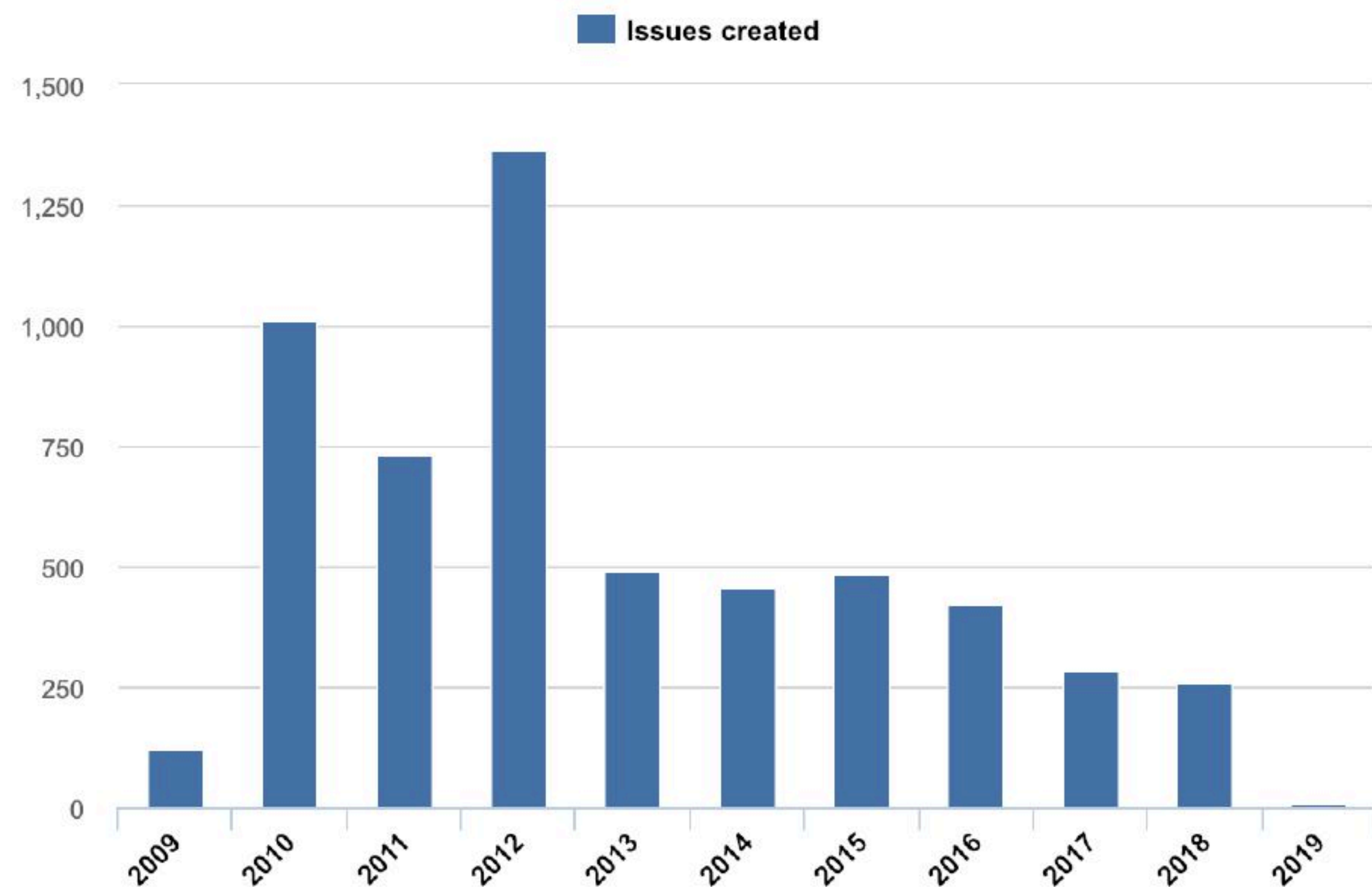
- More than 7 categories





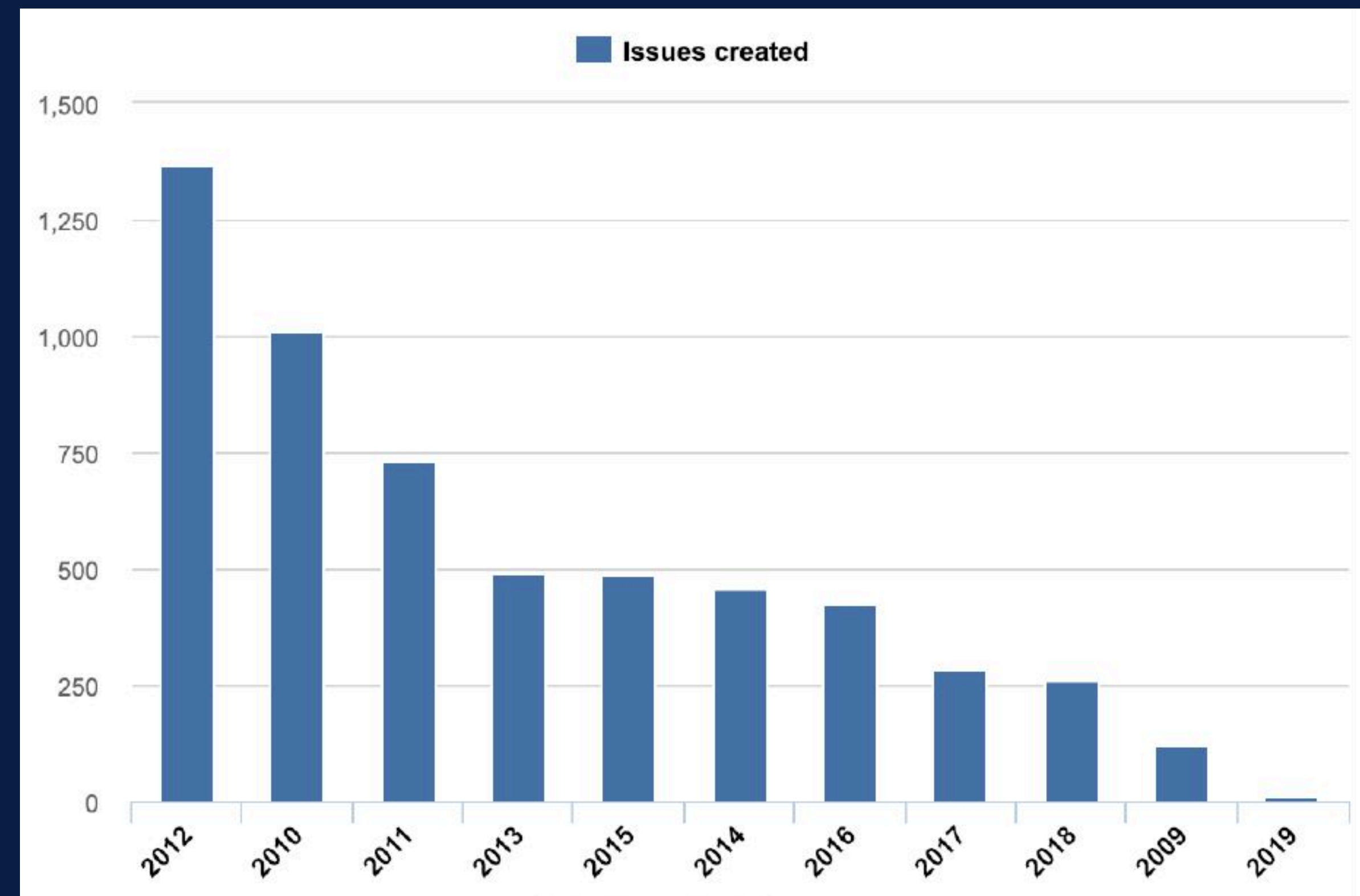
## DO'S

- Time dimensions on the horizontal axis.
- Time from left to right.



## DON'TS

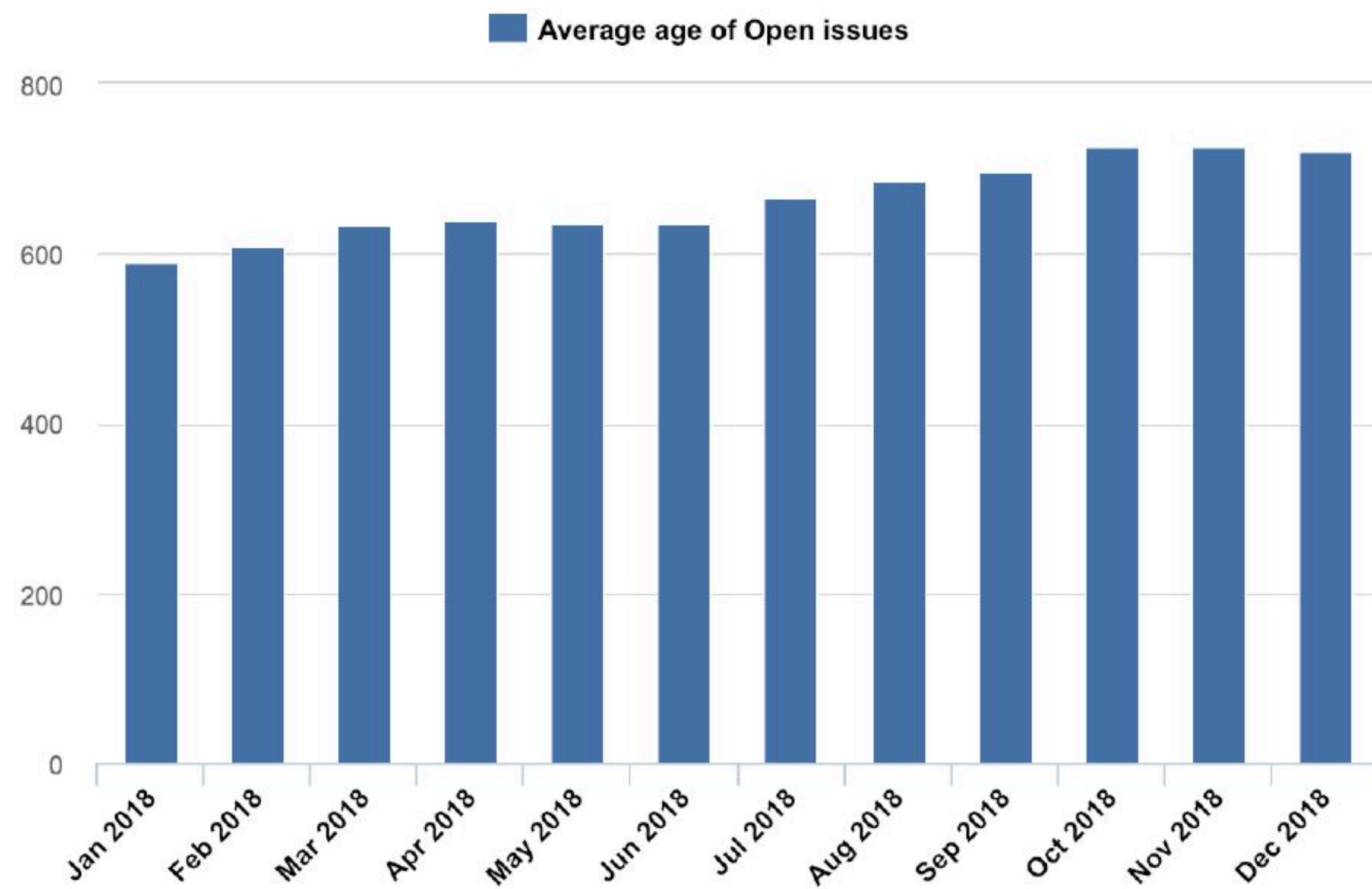
- Time dimension on Vertical axis
- Reorder chronological data charts.





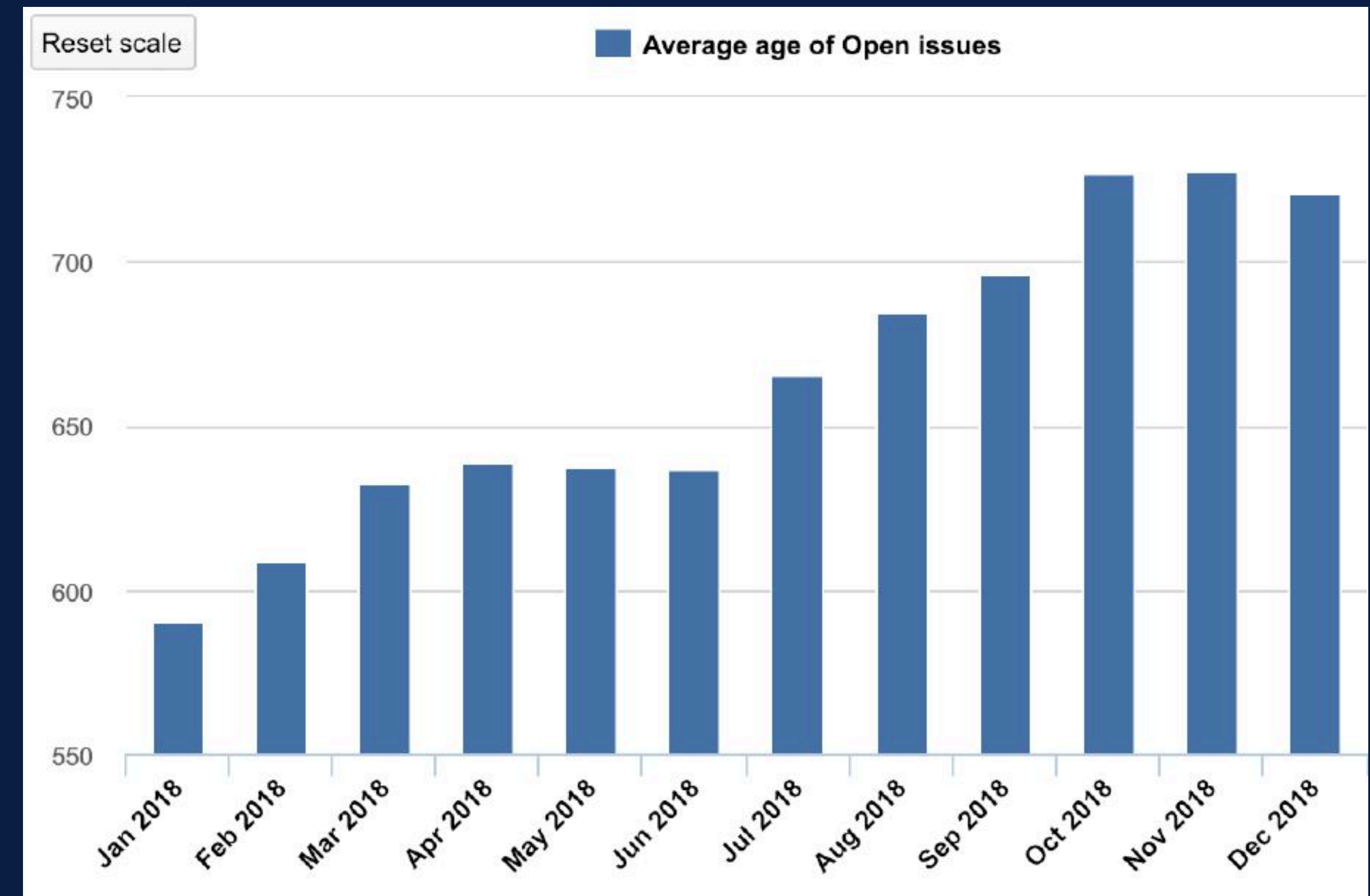
## DO'S

- Value axis must start at zero.



## DON'TS

- Numerical starts at a non-zero base.

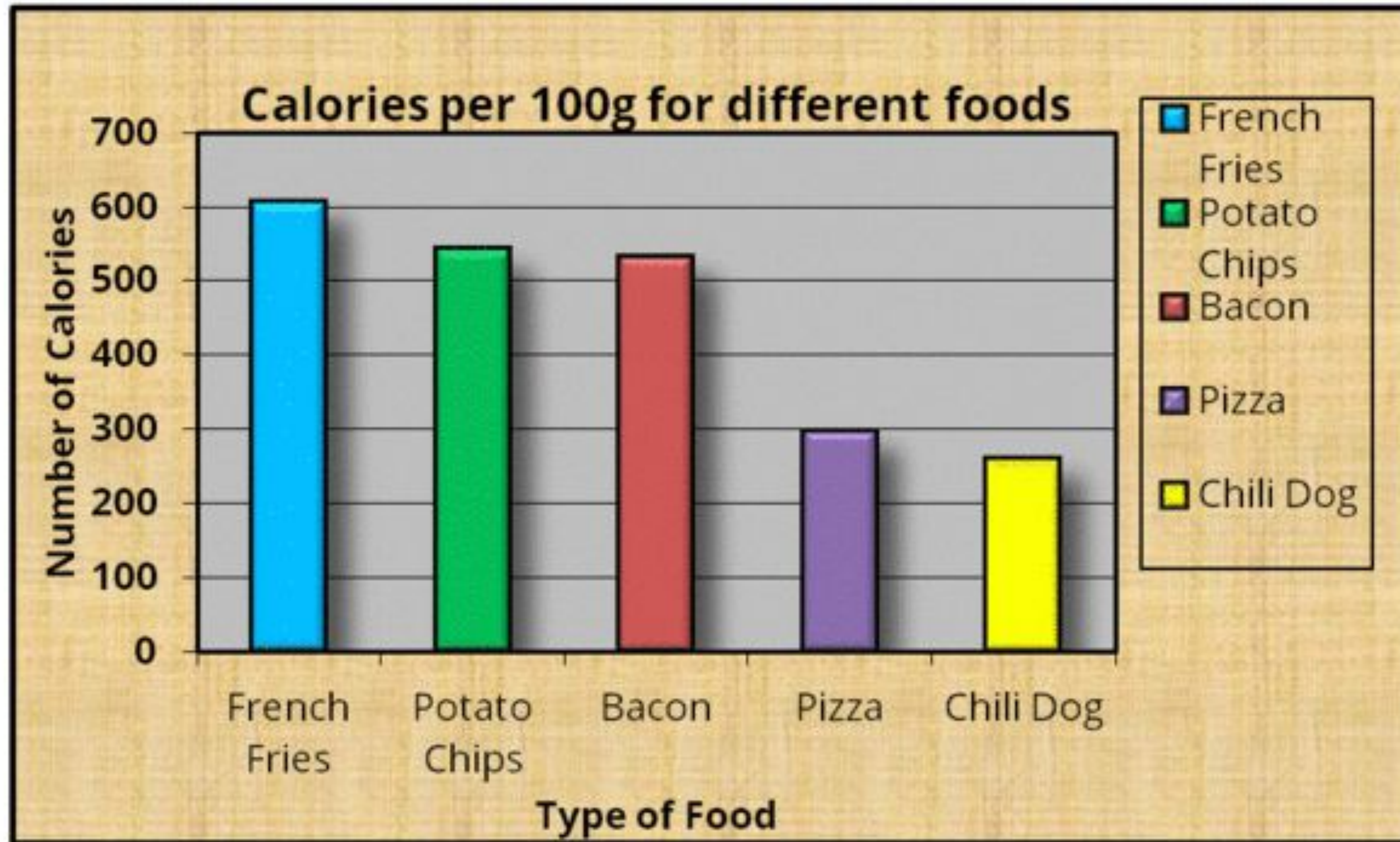




**Remove**  
to improve  
(the **data-ink** ratio)

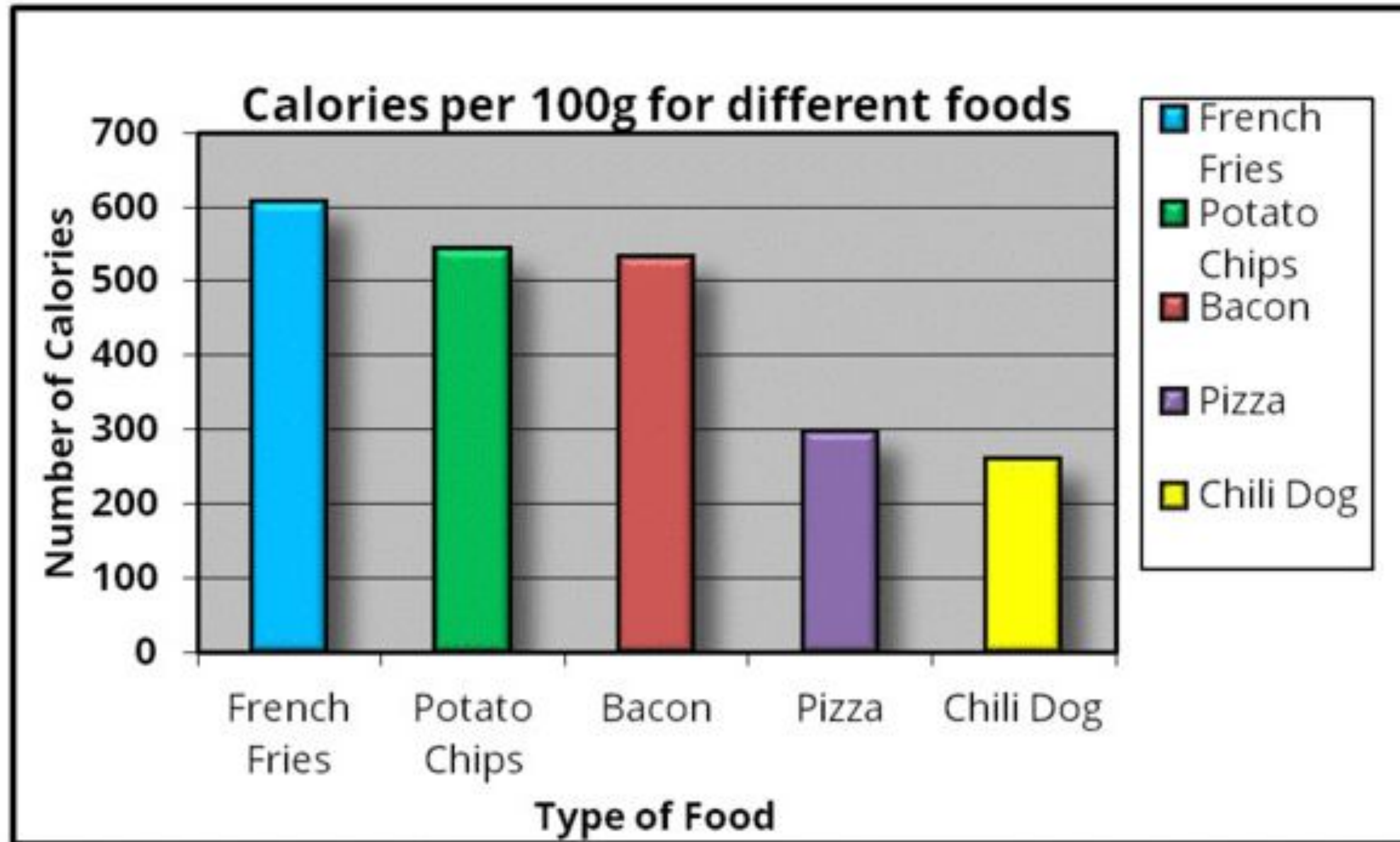


# Remove backgrounds



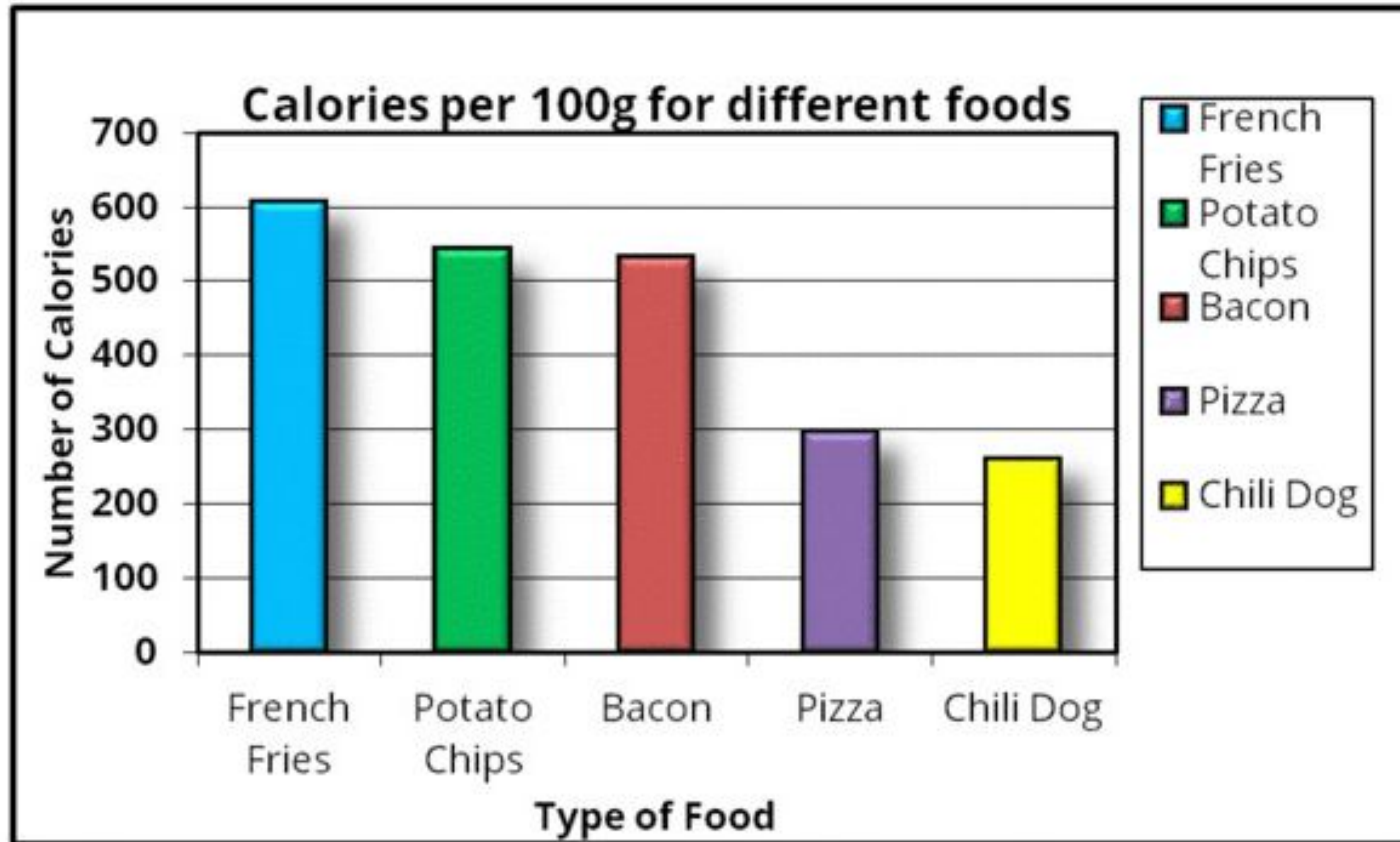


# Remove backgrounds



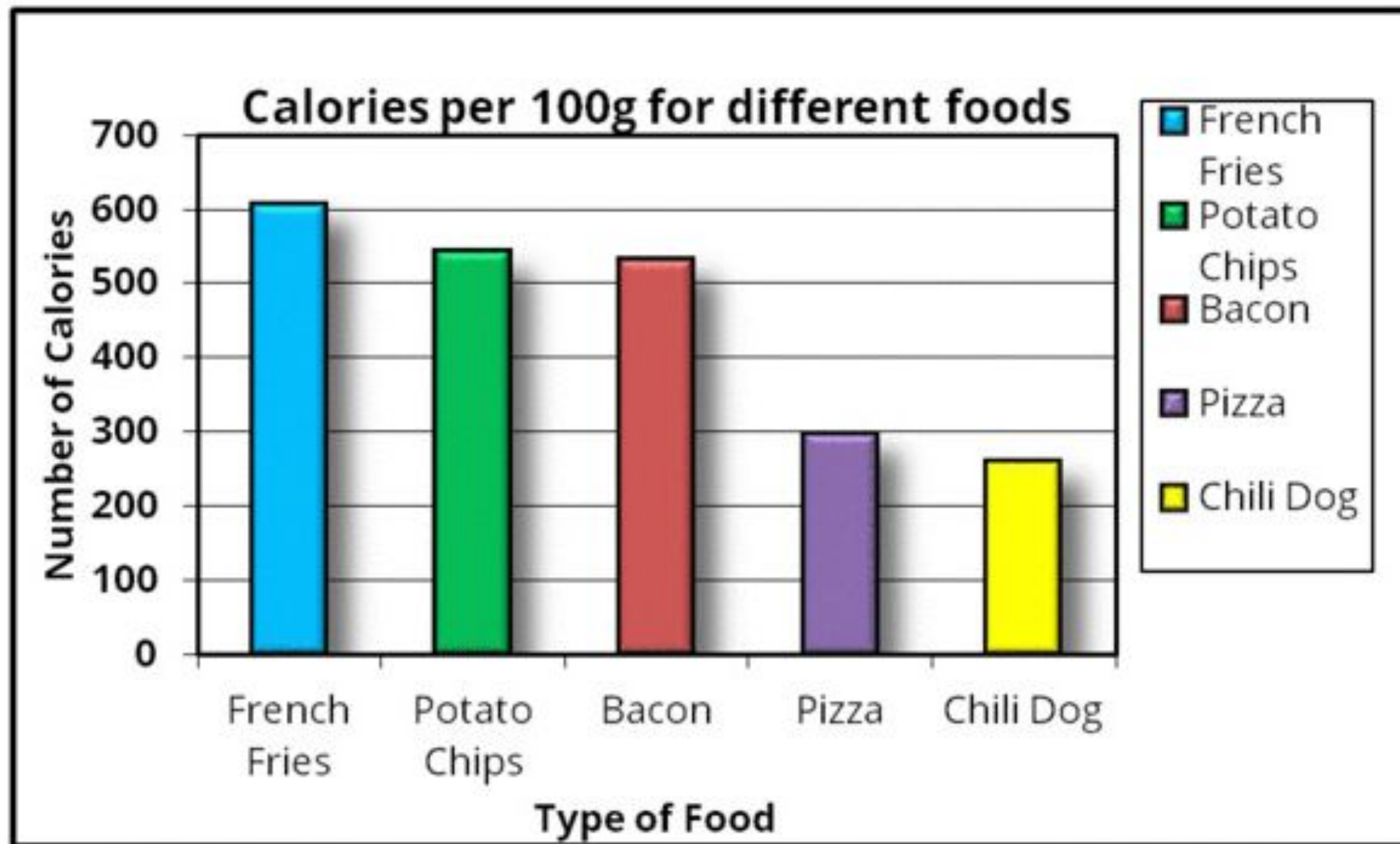


# Remove backgrounds



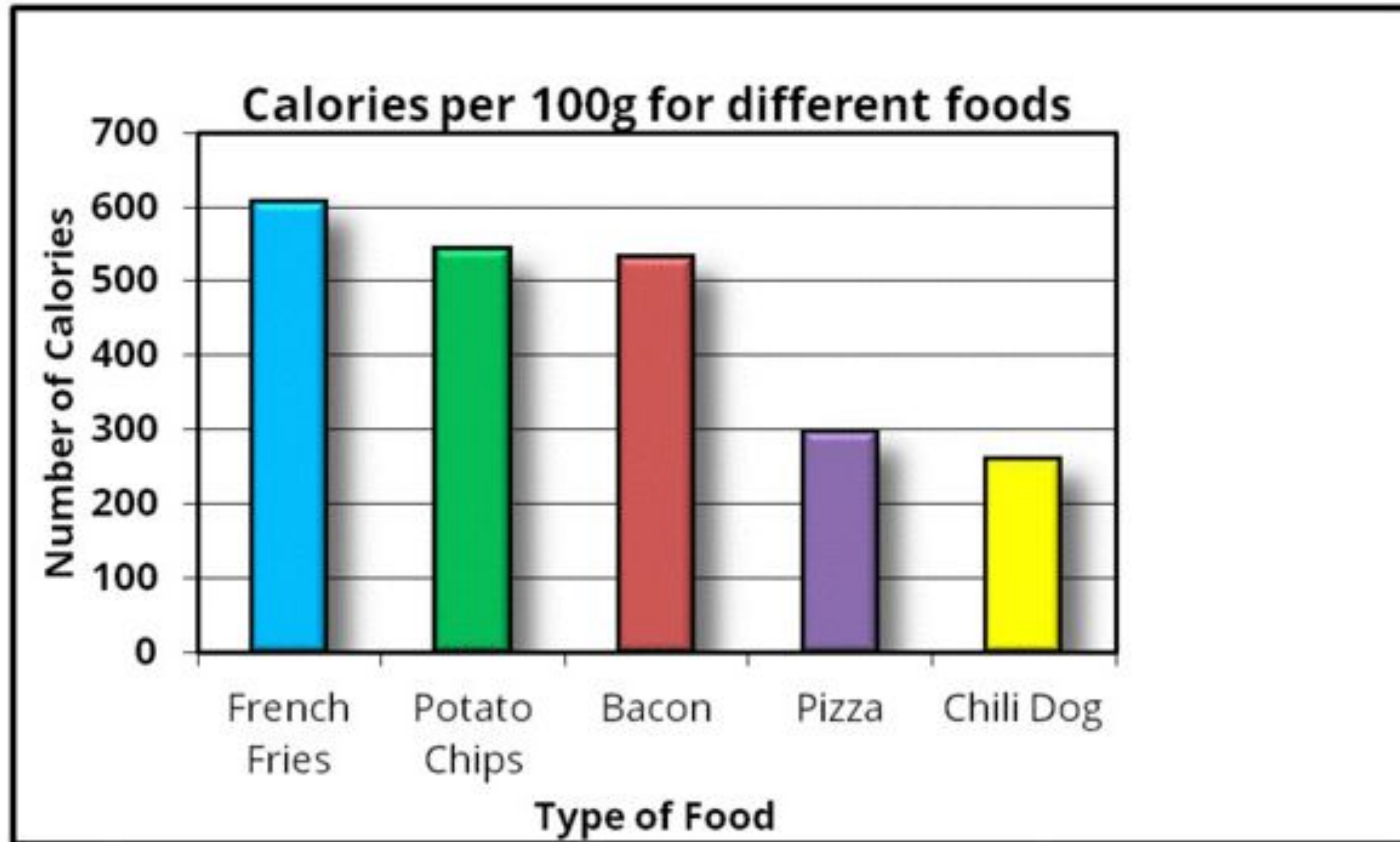


# Remove redundant labels



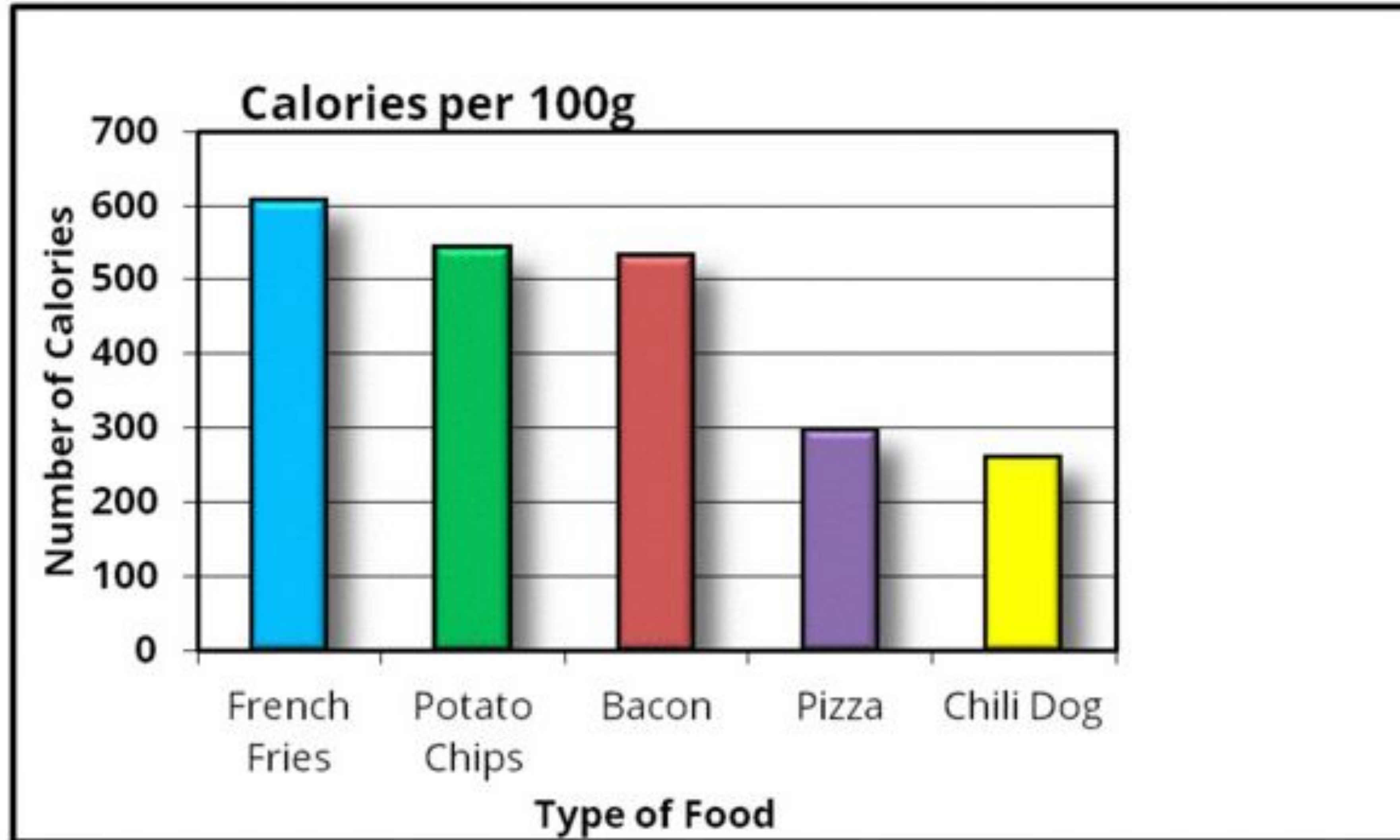


# Remove redundant labels



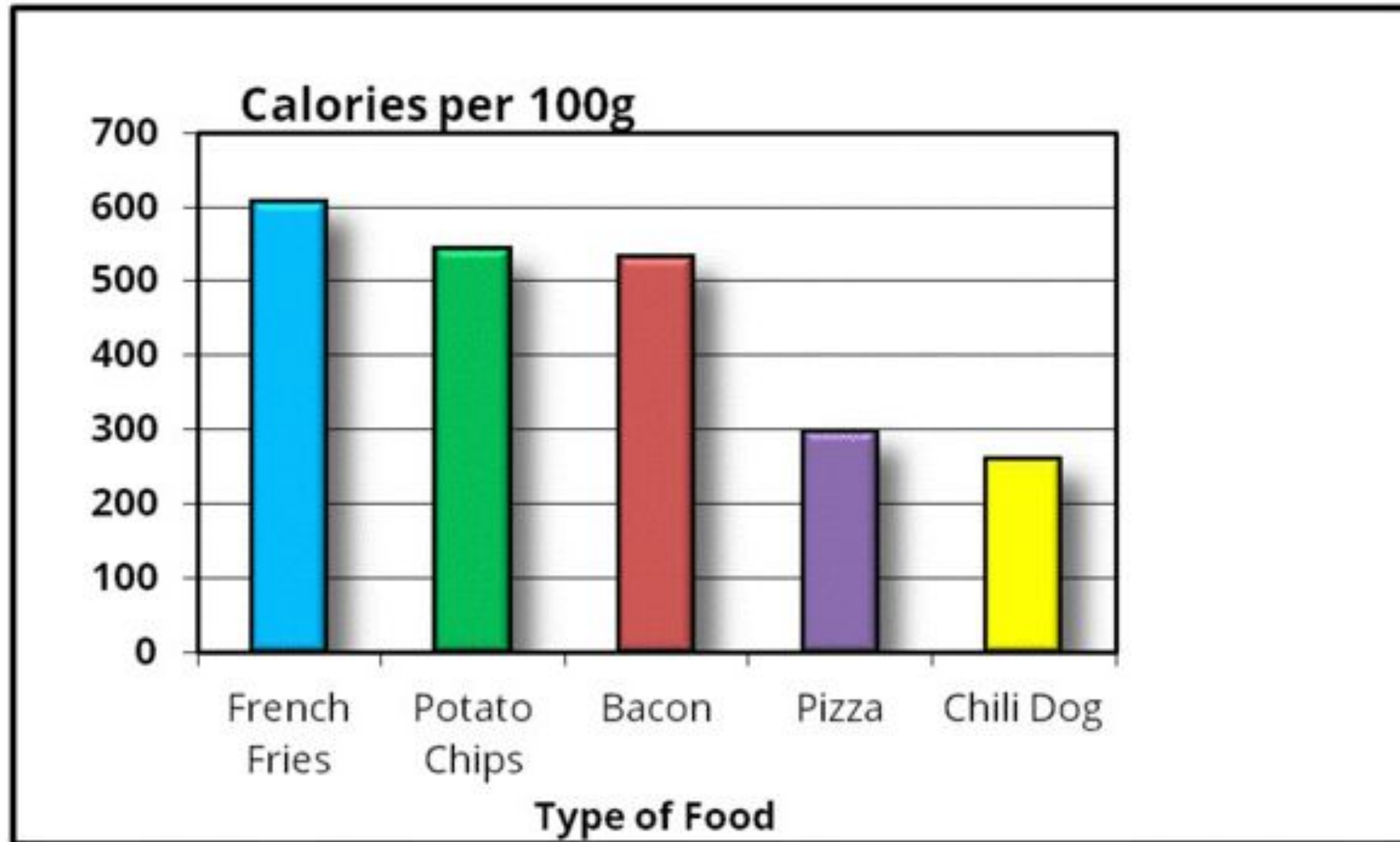


# Remove redundant labels



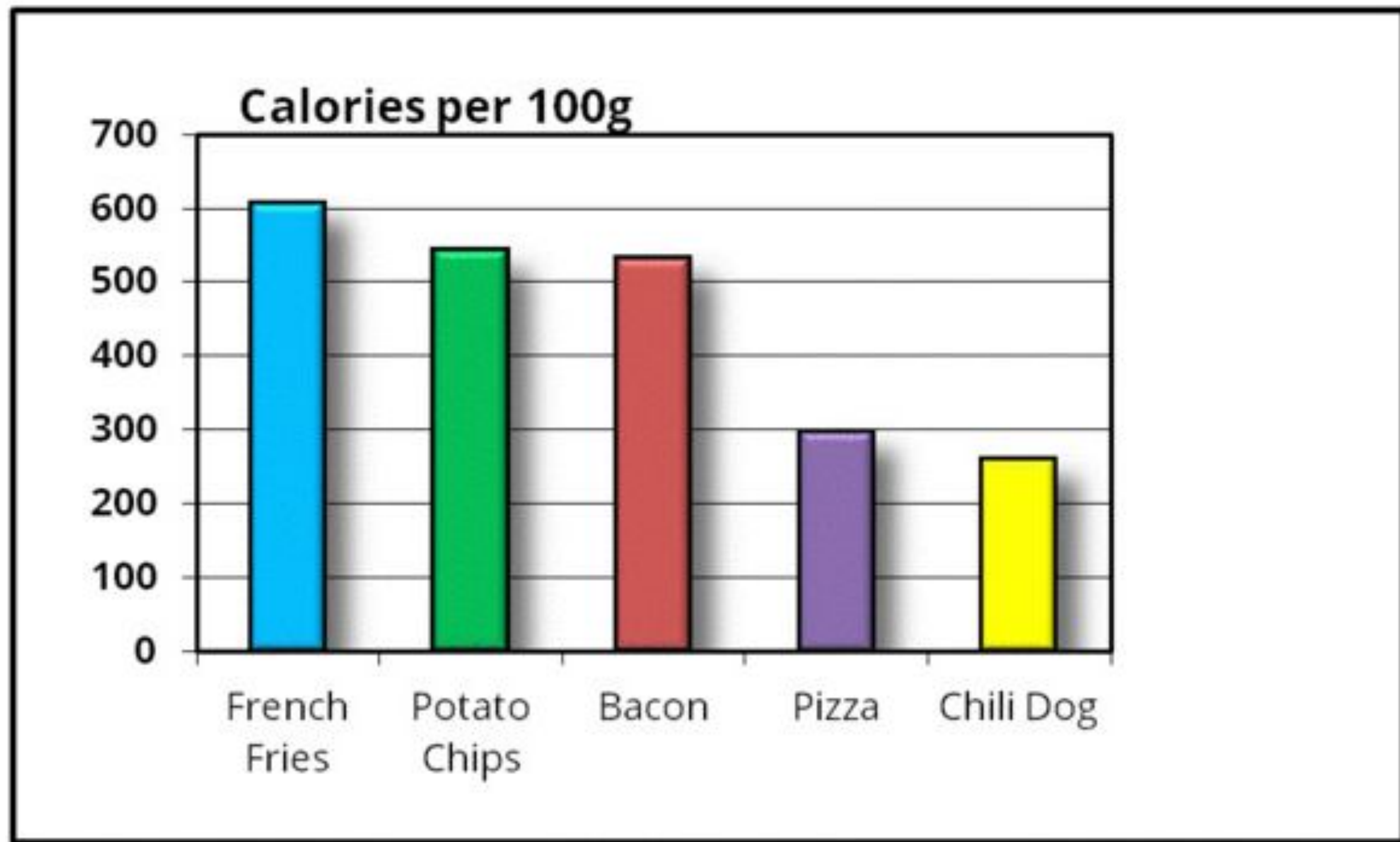


# Remove redundant labels

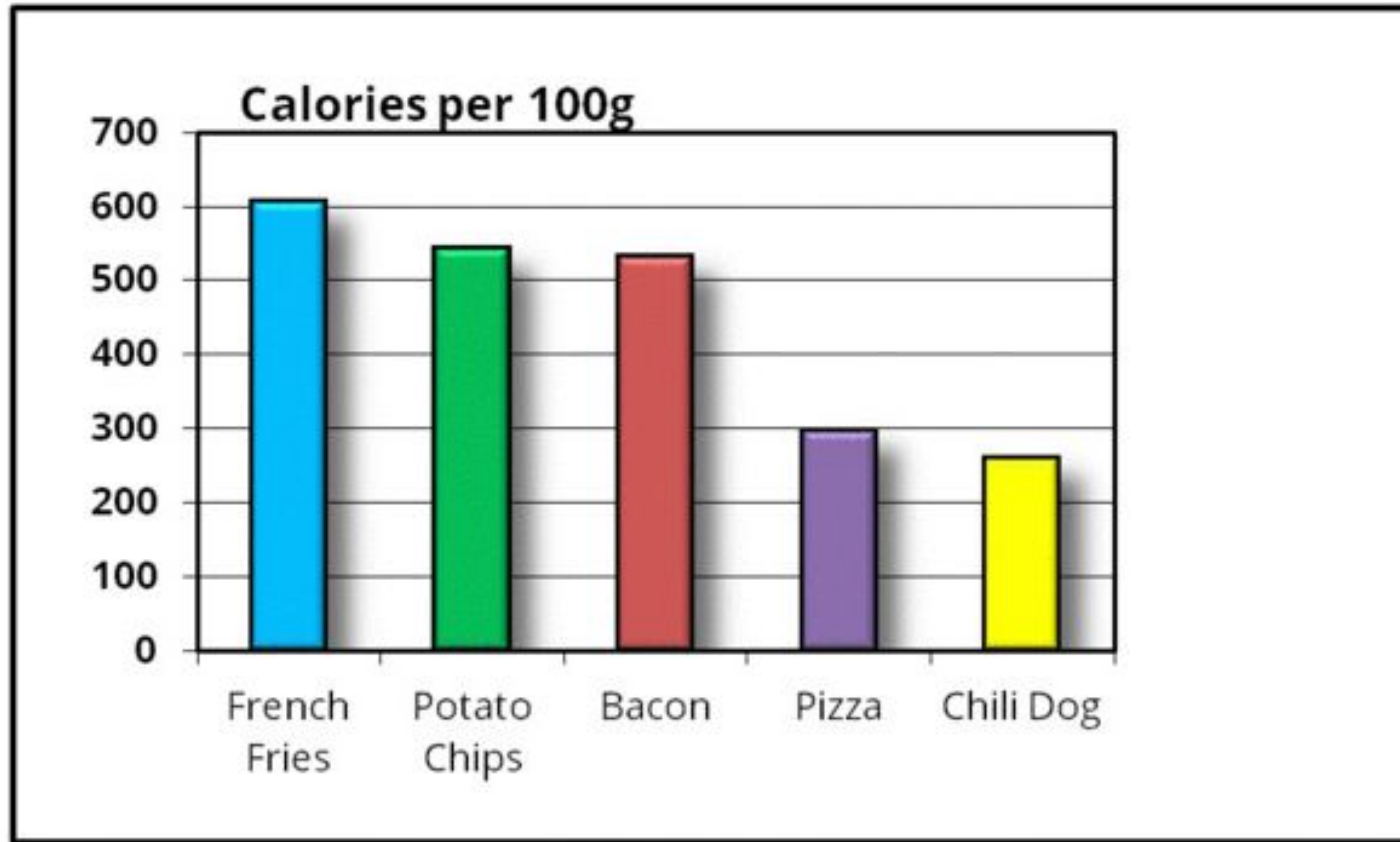




# Remove redundant labels

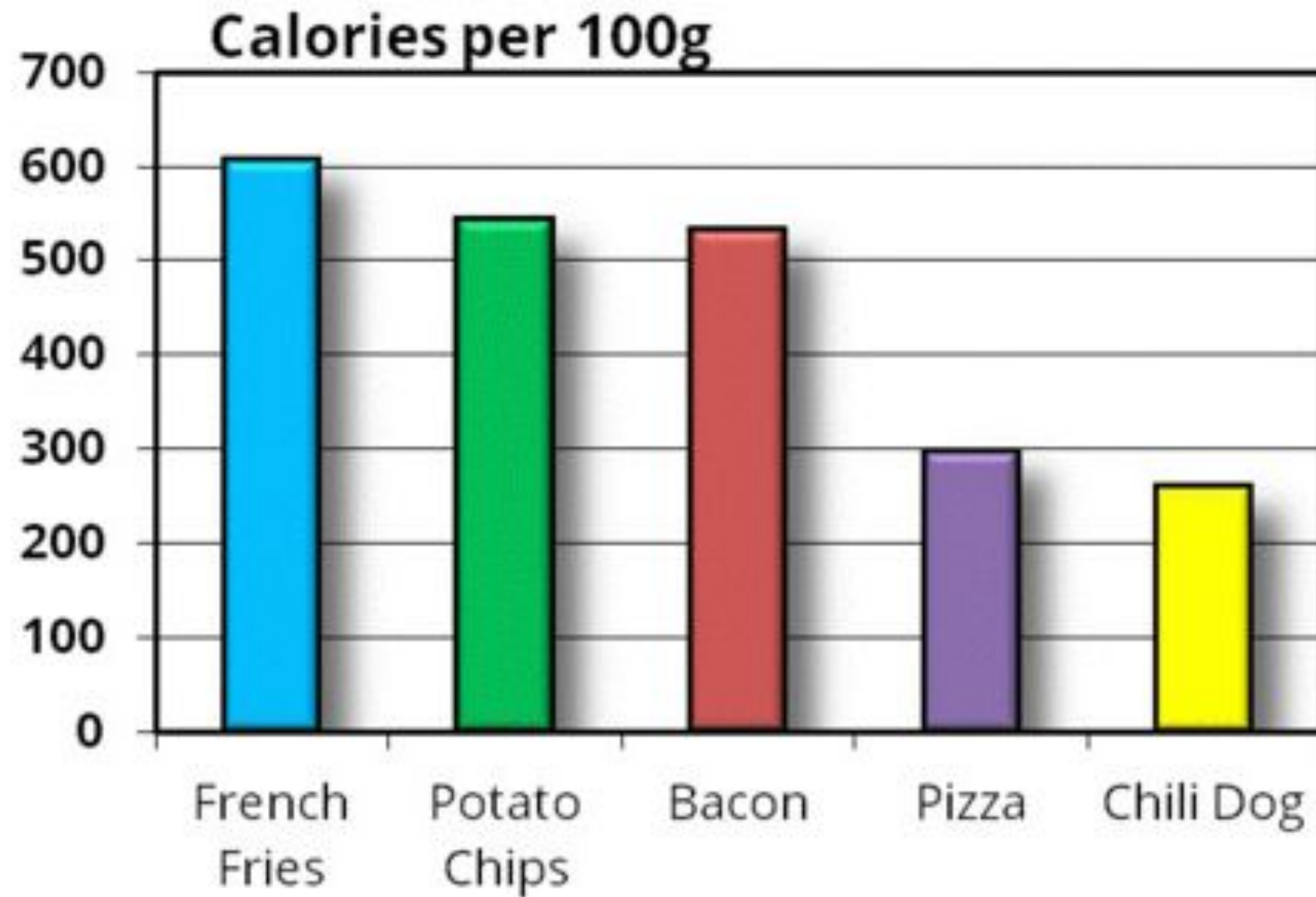


# Remove borders

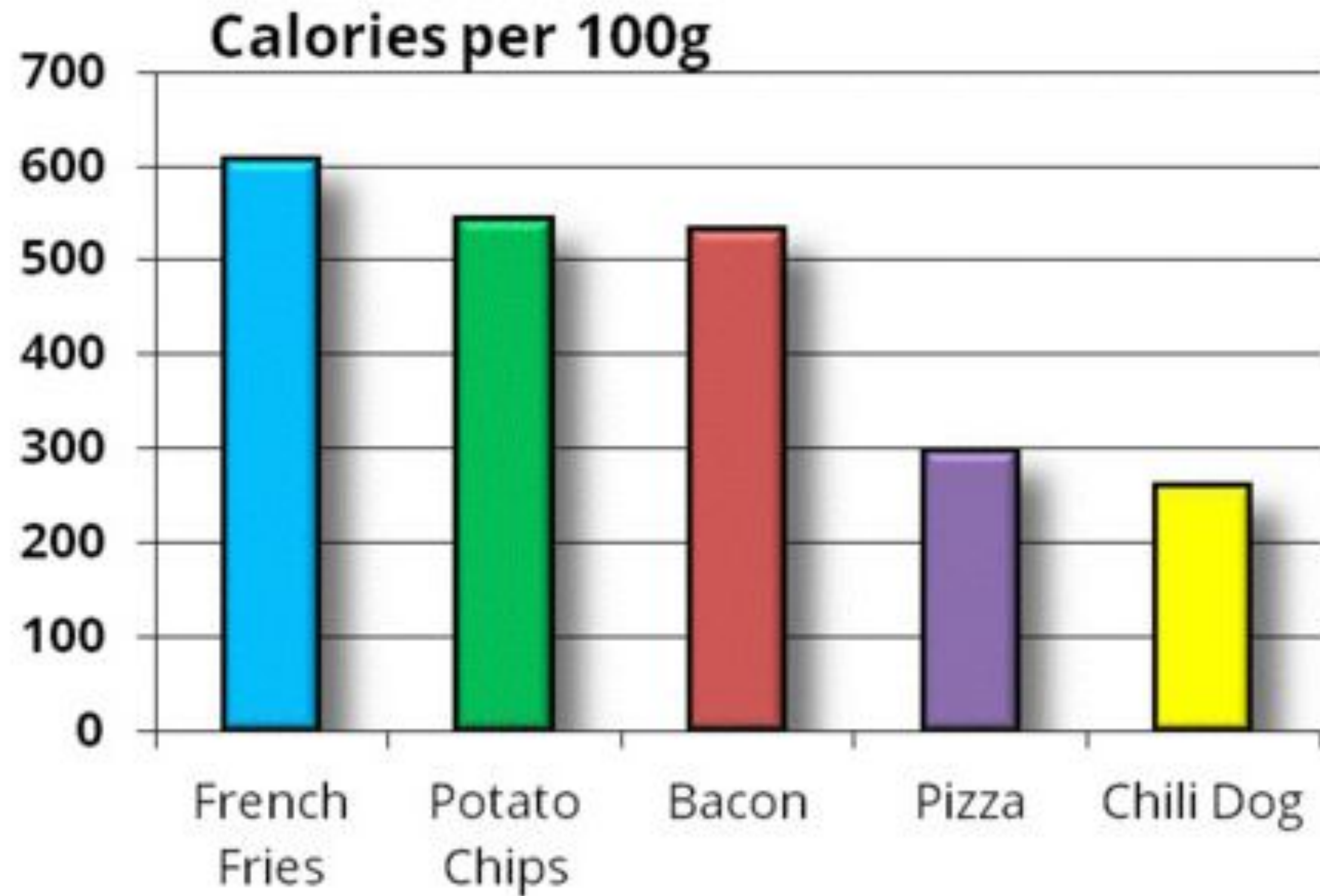




# Remove borders

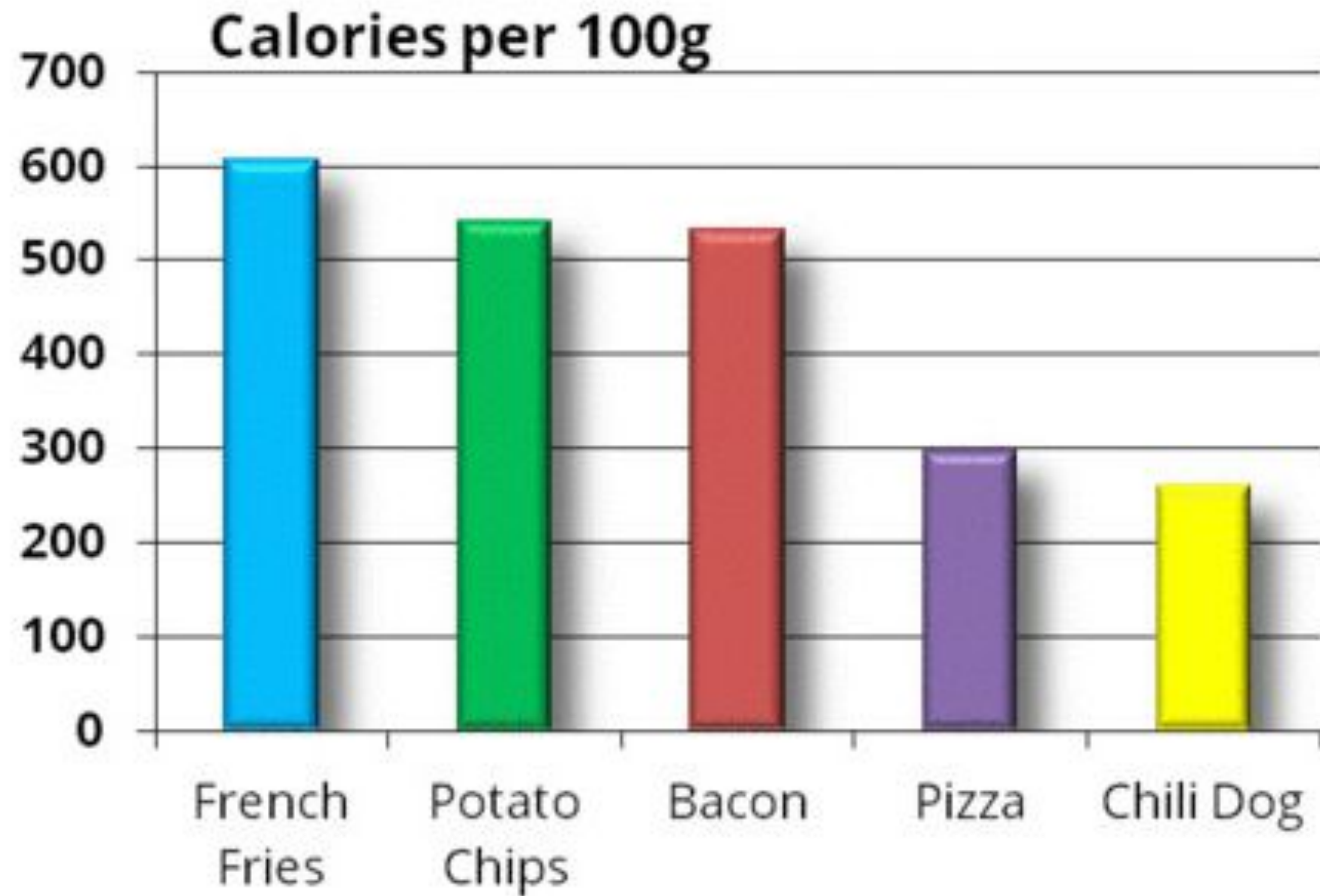


# Remove borders

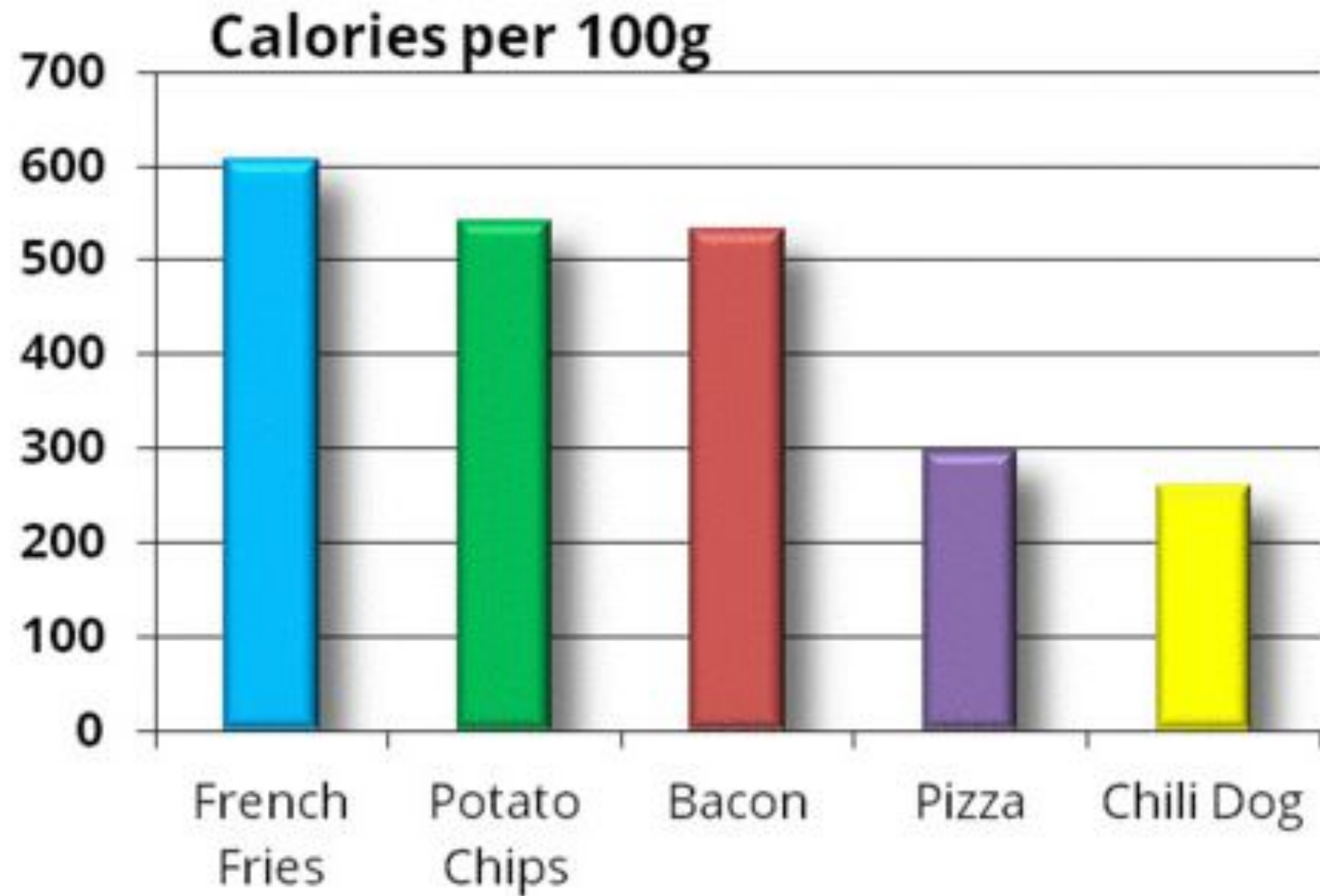




# Remove borders

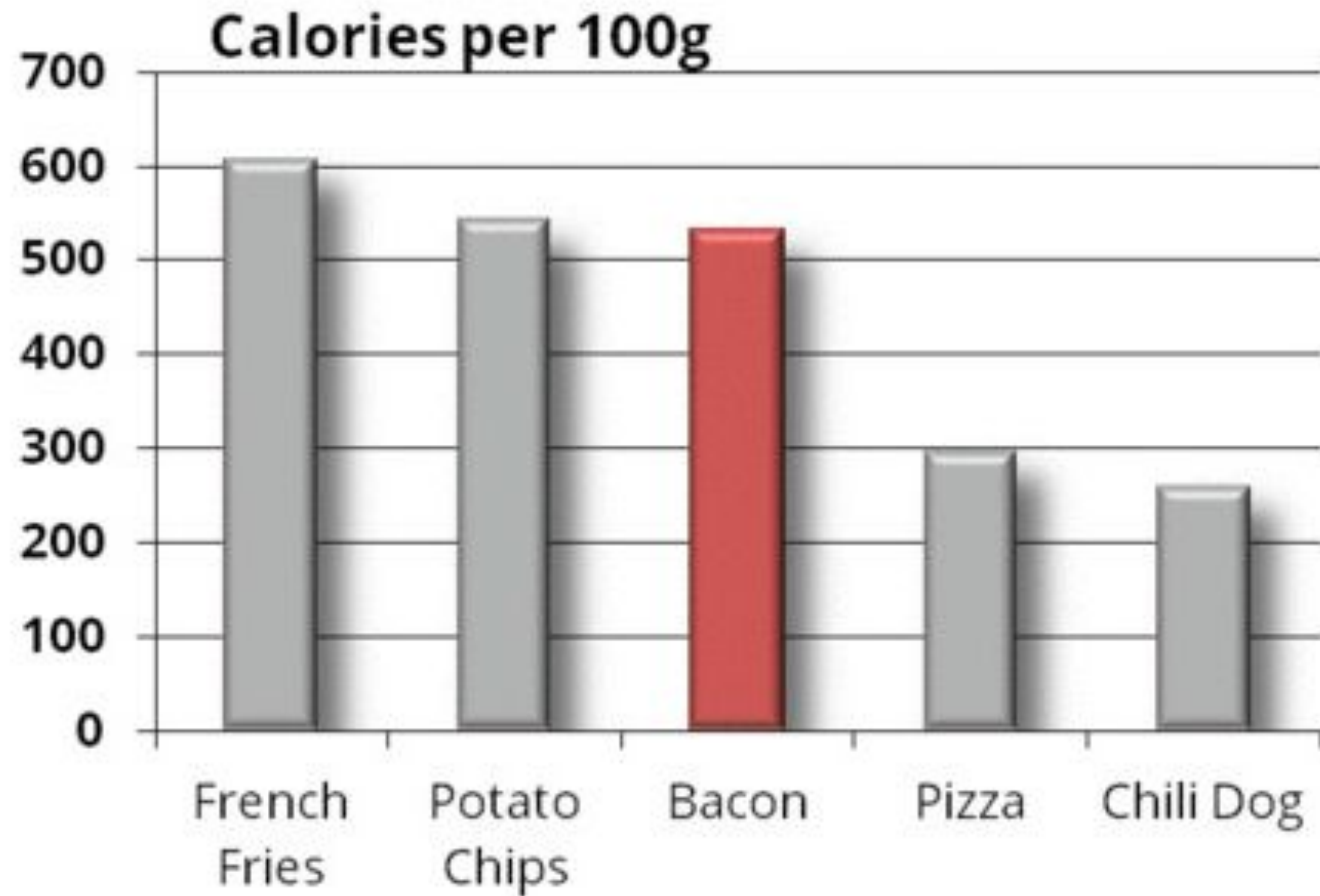


# Reduce colors

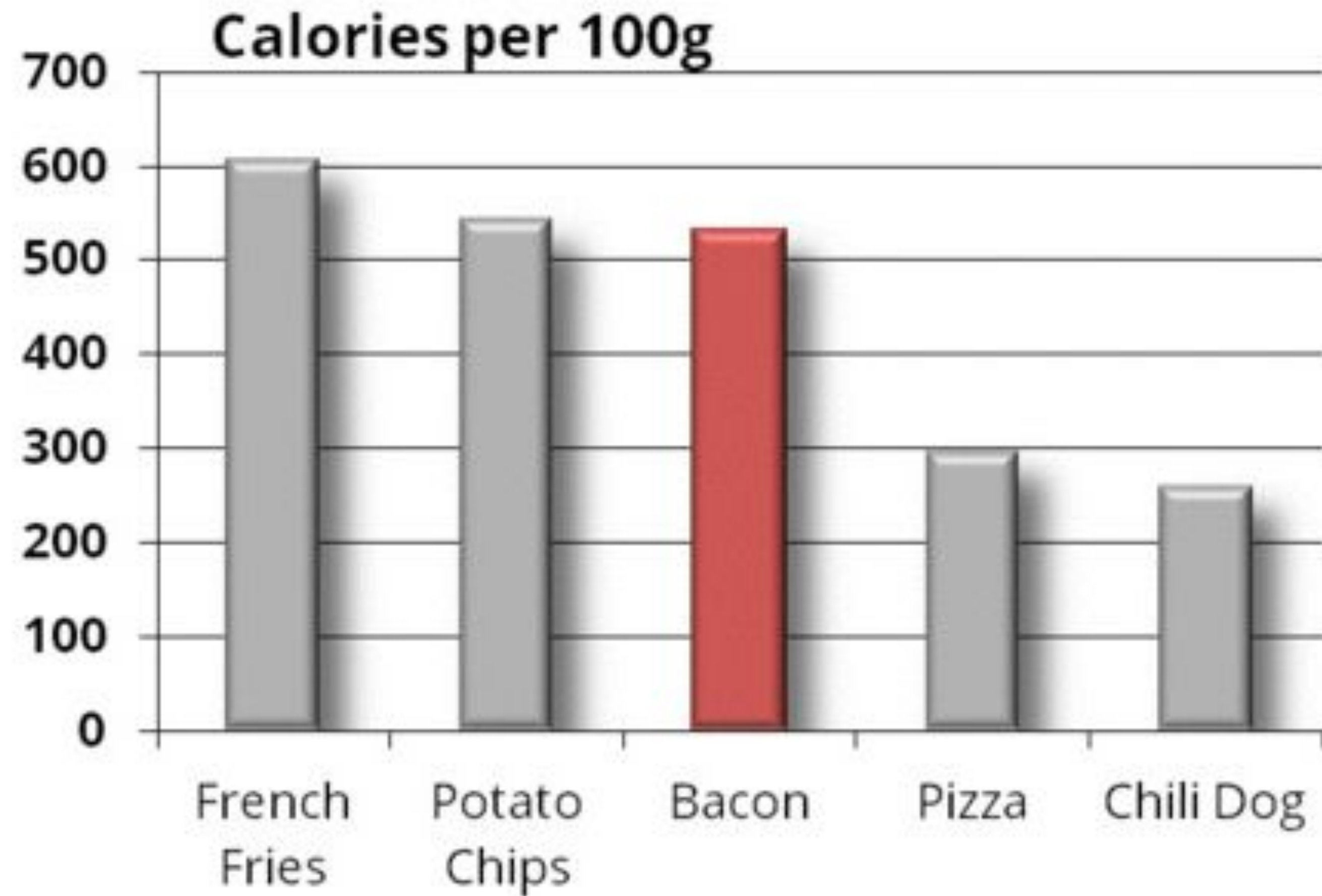




# Reduce colors

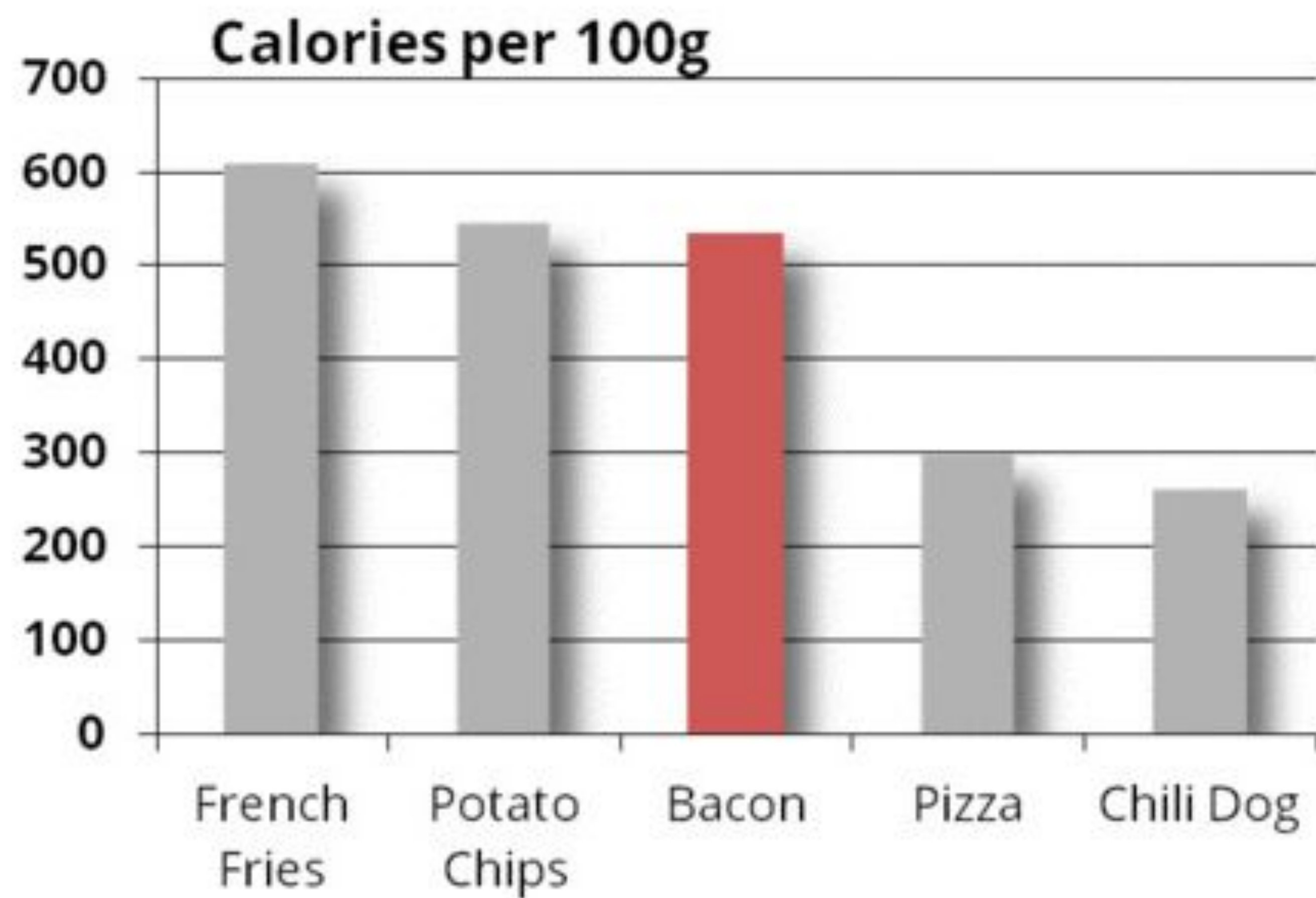


# Remove special effects

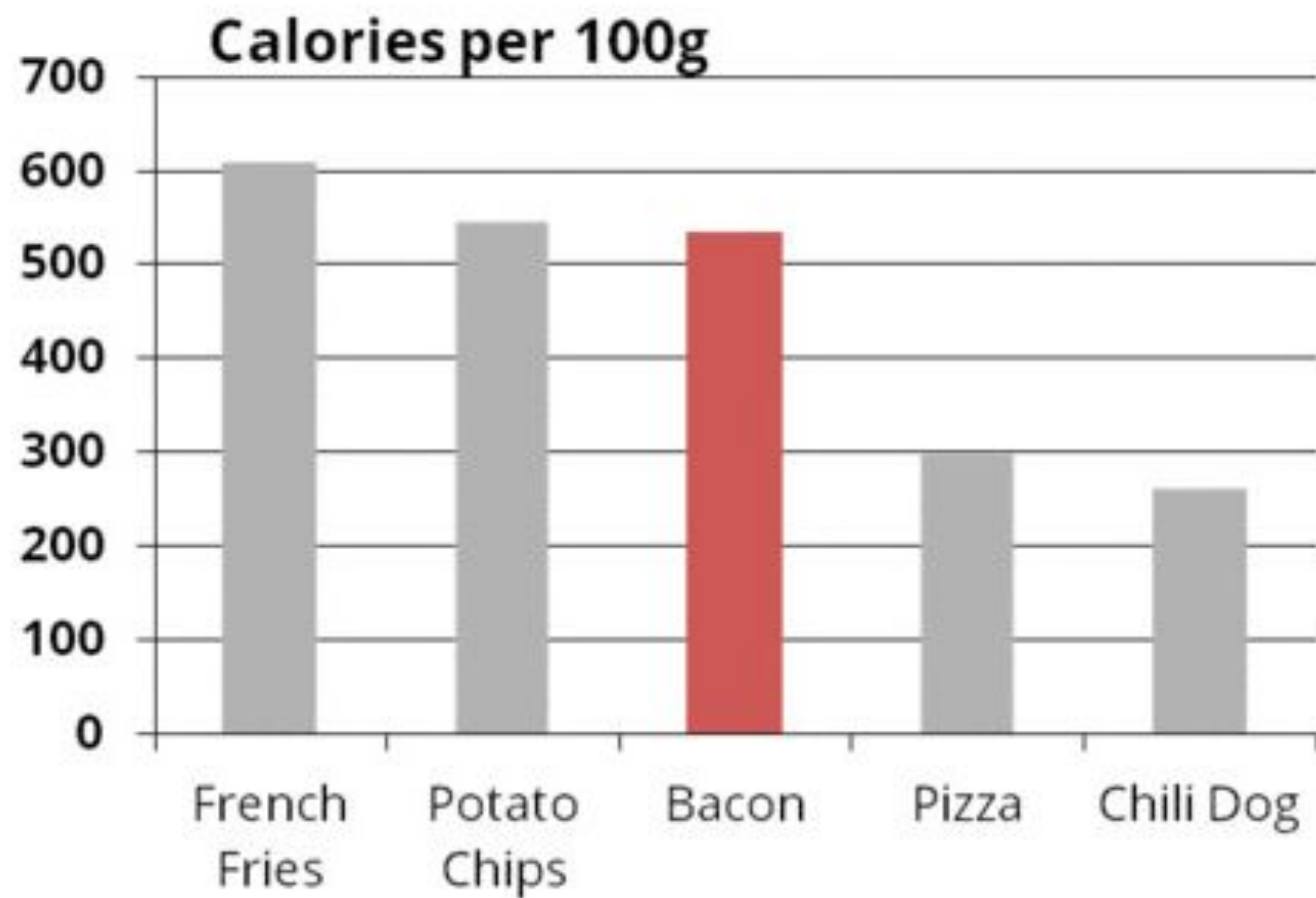




# Remove special effects

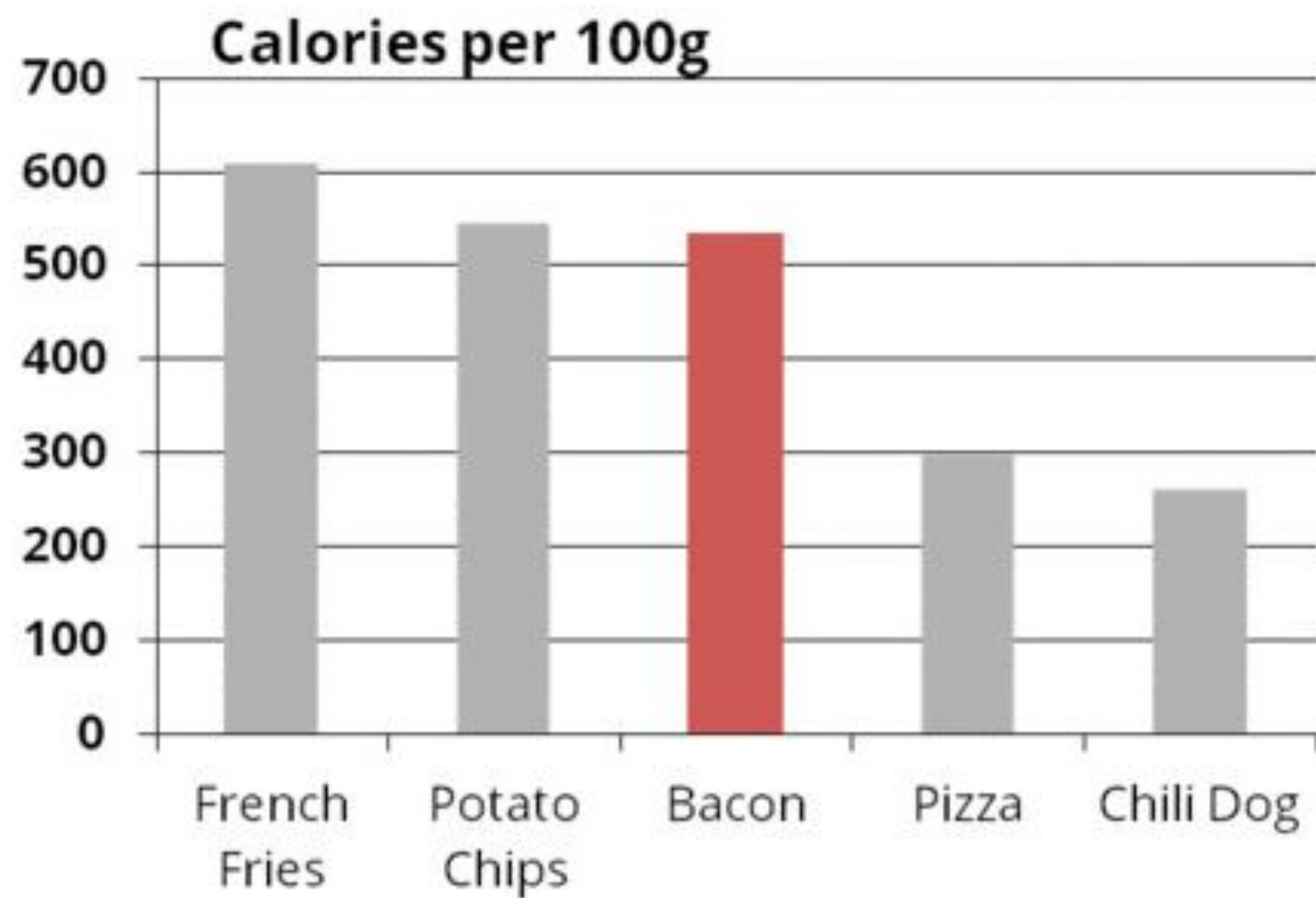


# Remove special effects

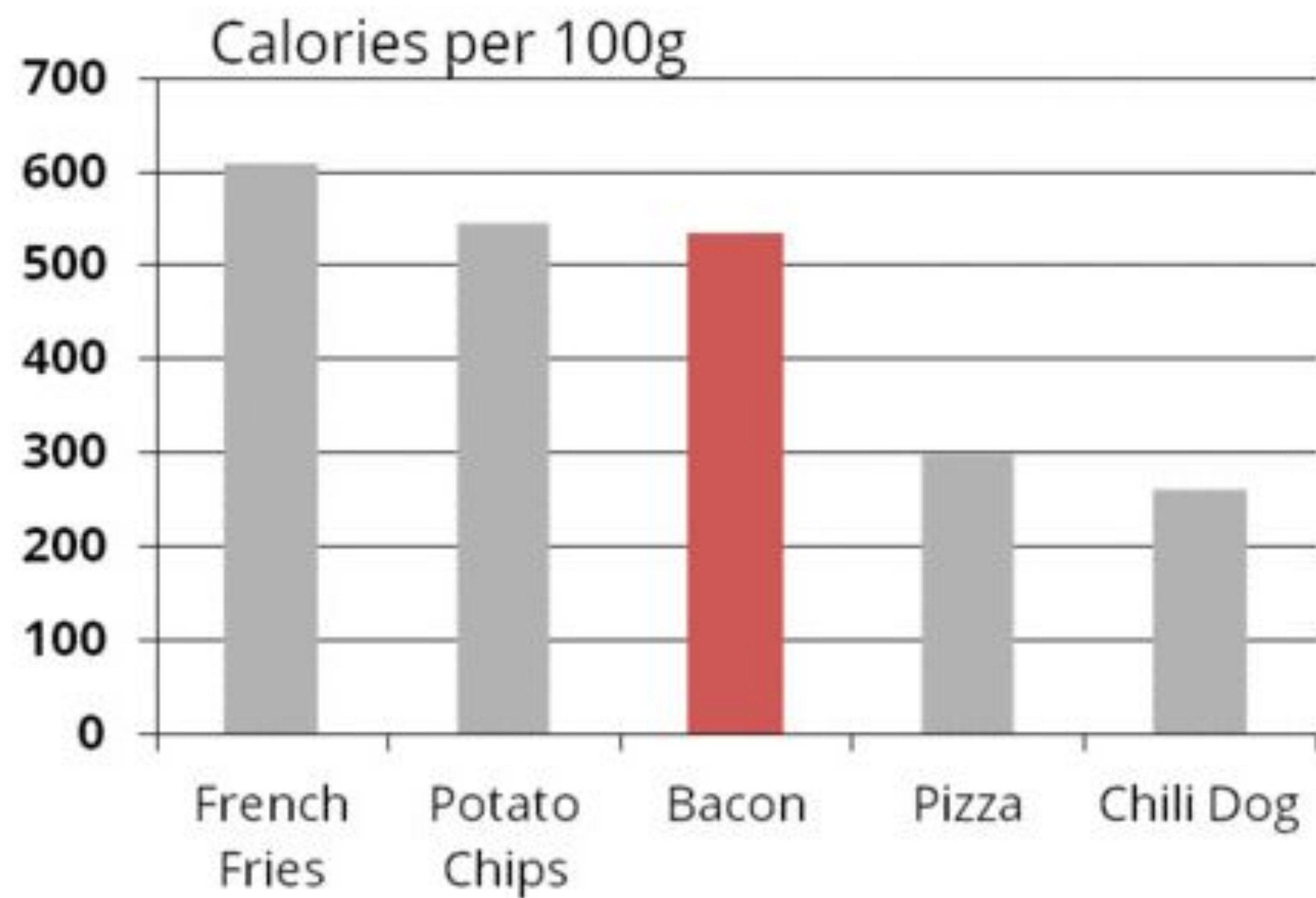




# Remove bolding

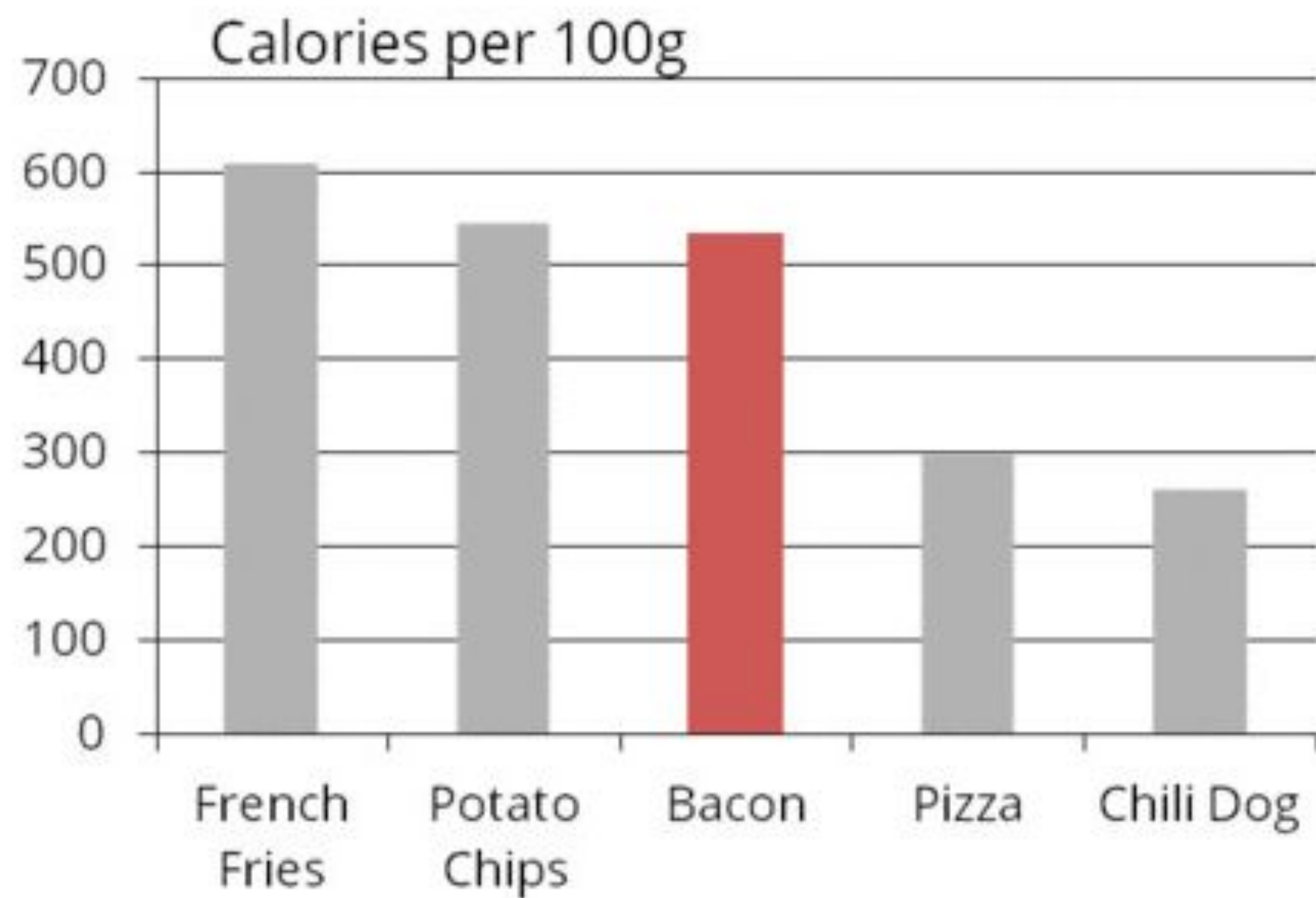


# Remove bolding

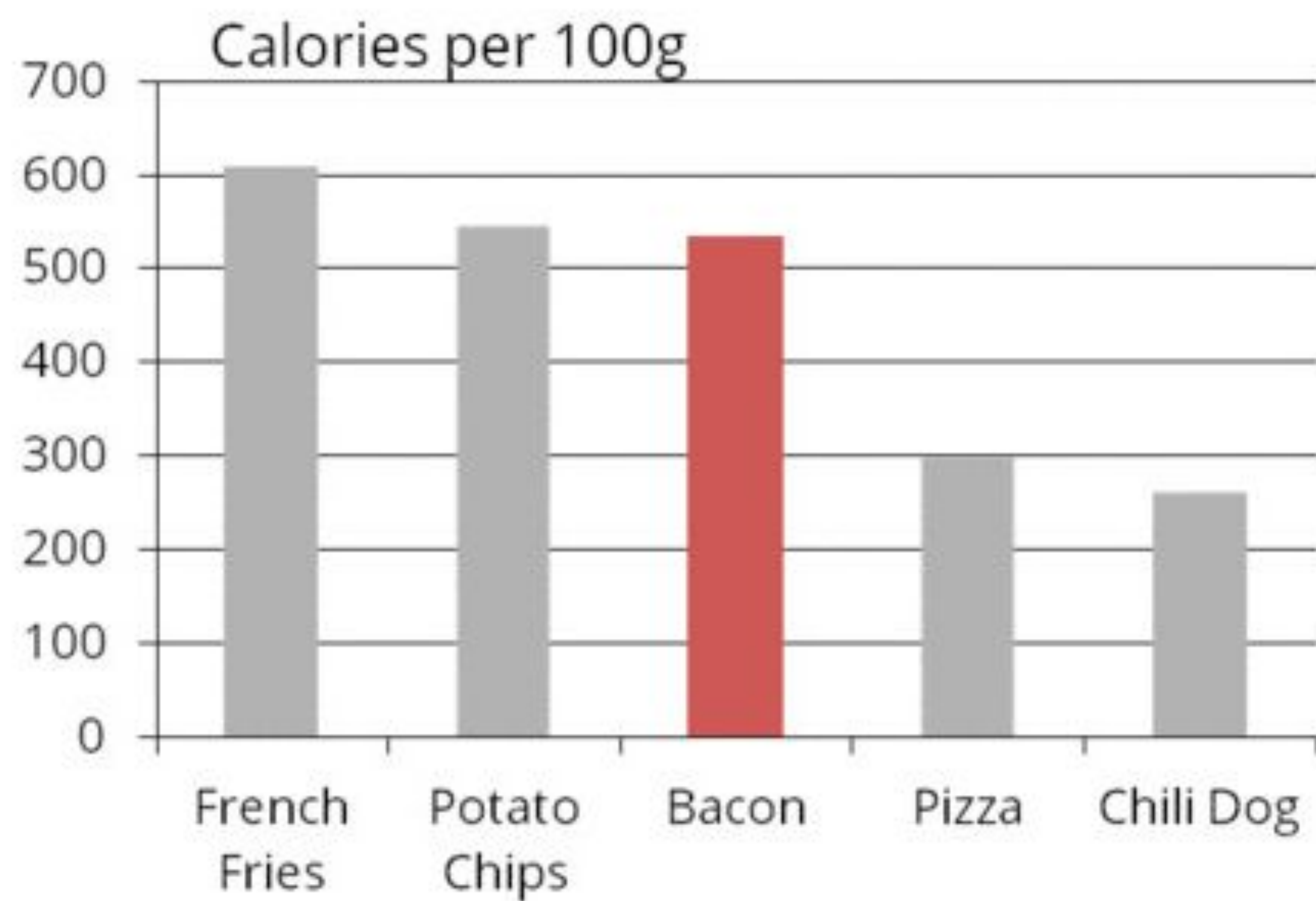




# Remove bolding

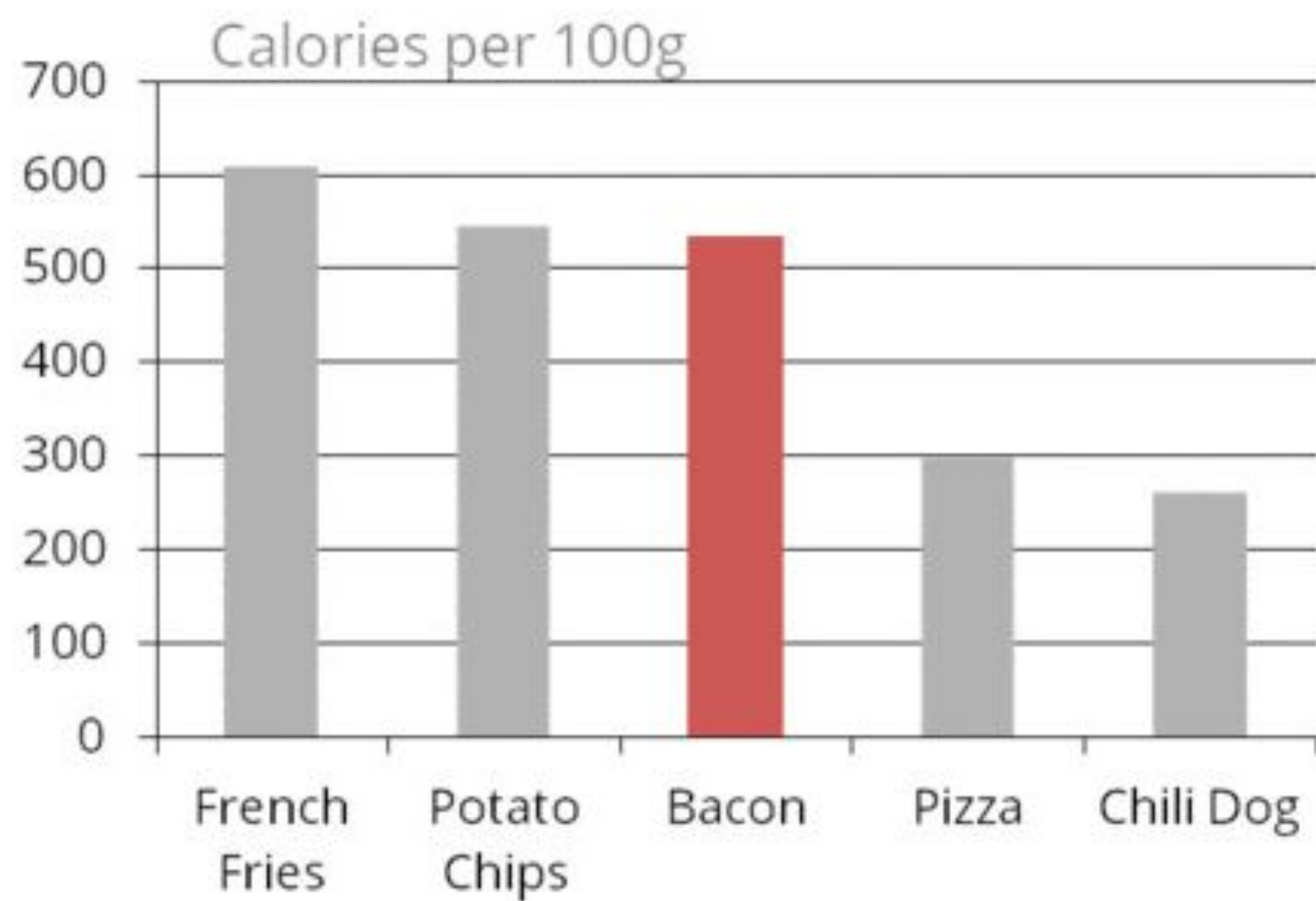


# Lighten labels

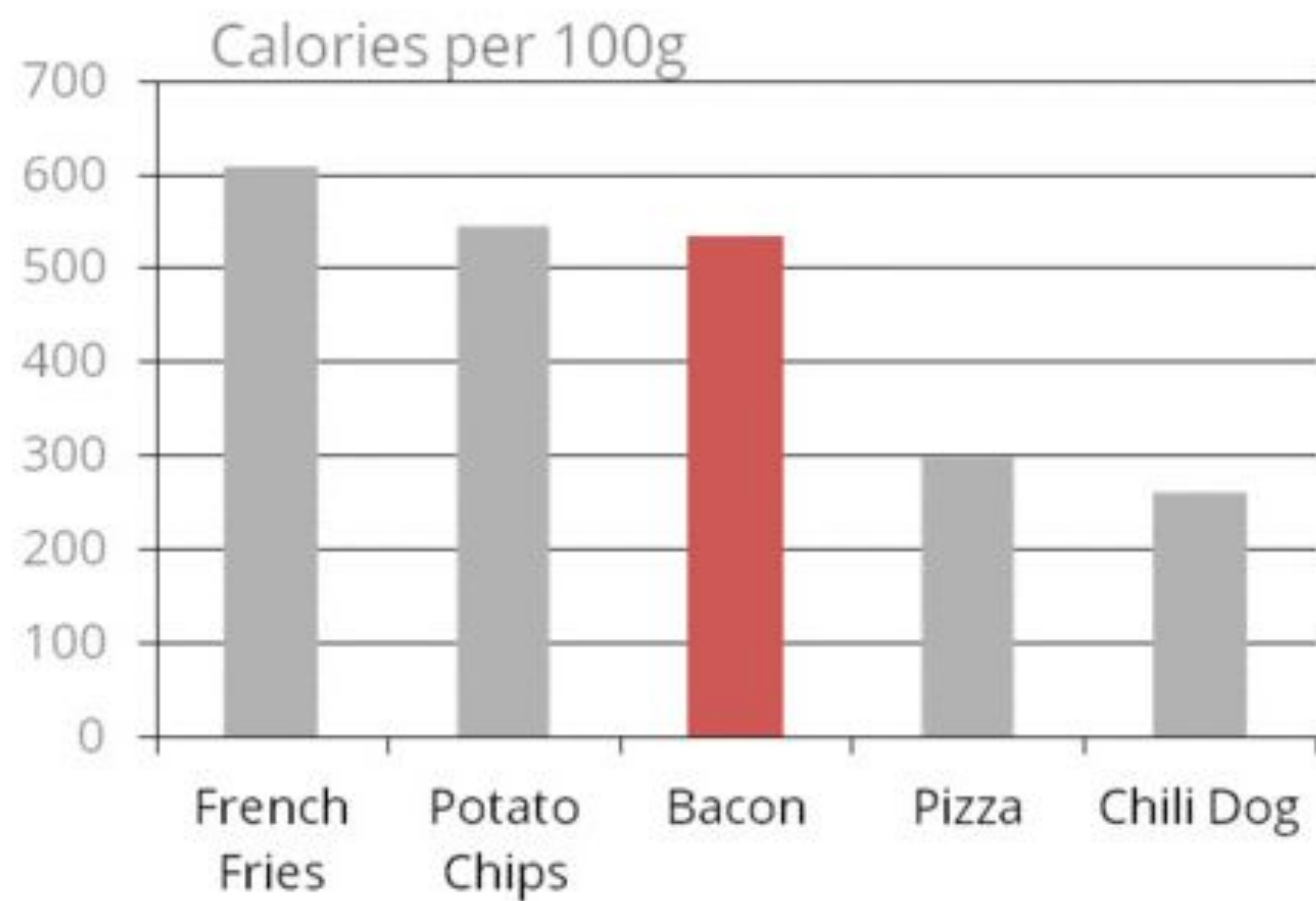




# Lighten labels

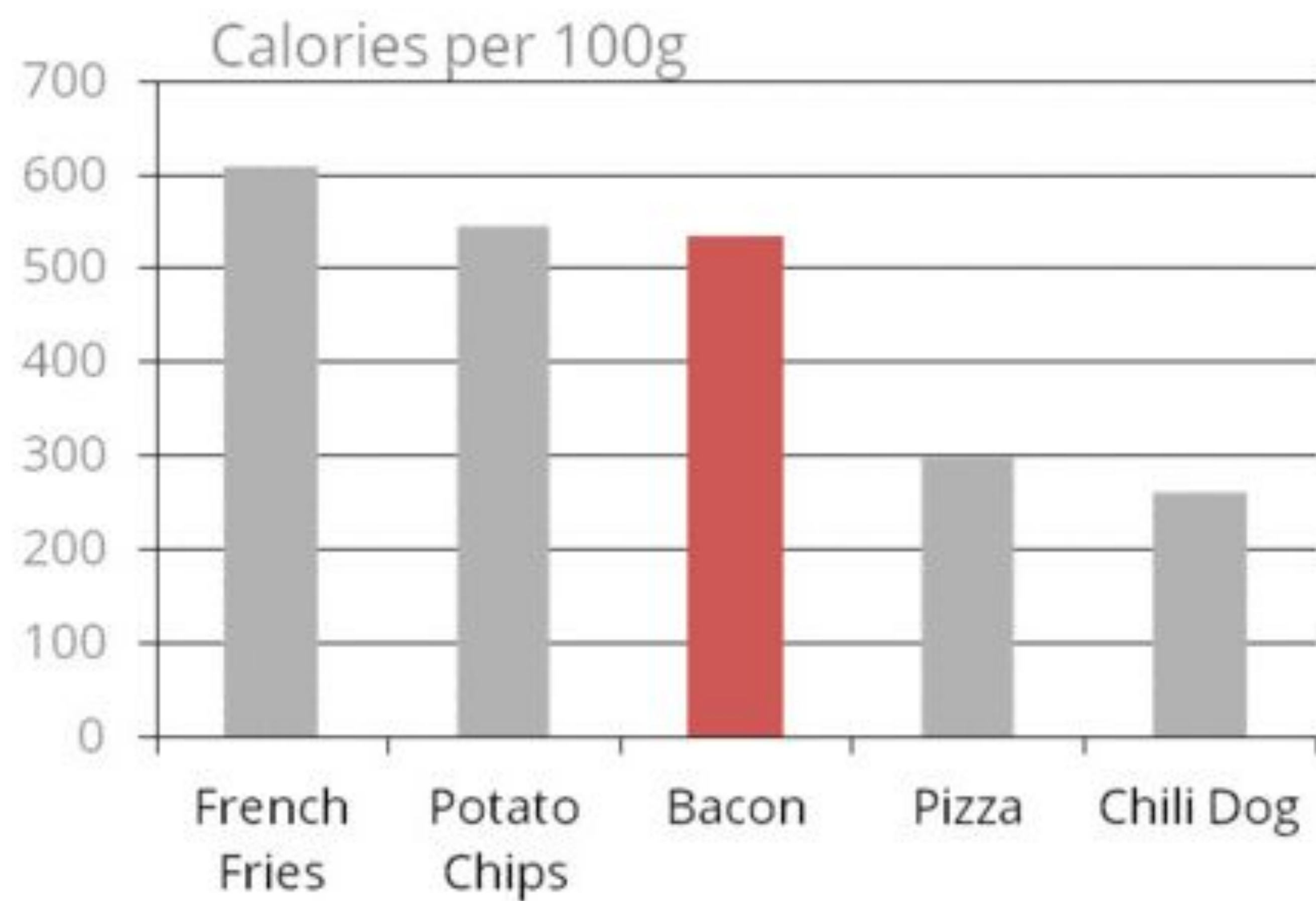


# Lighten labels

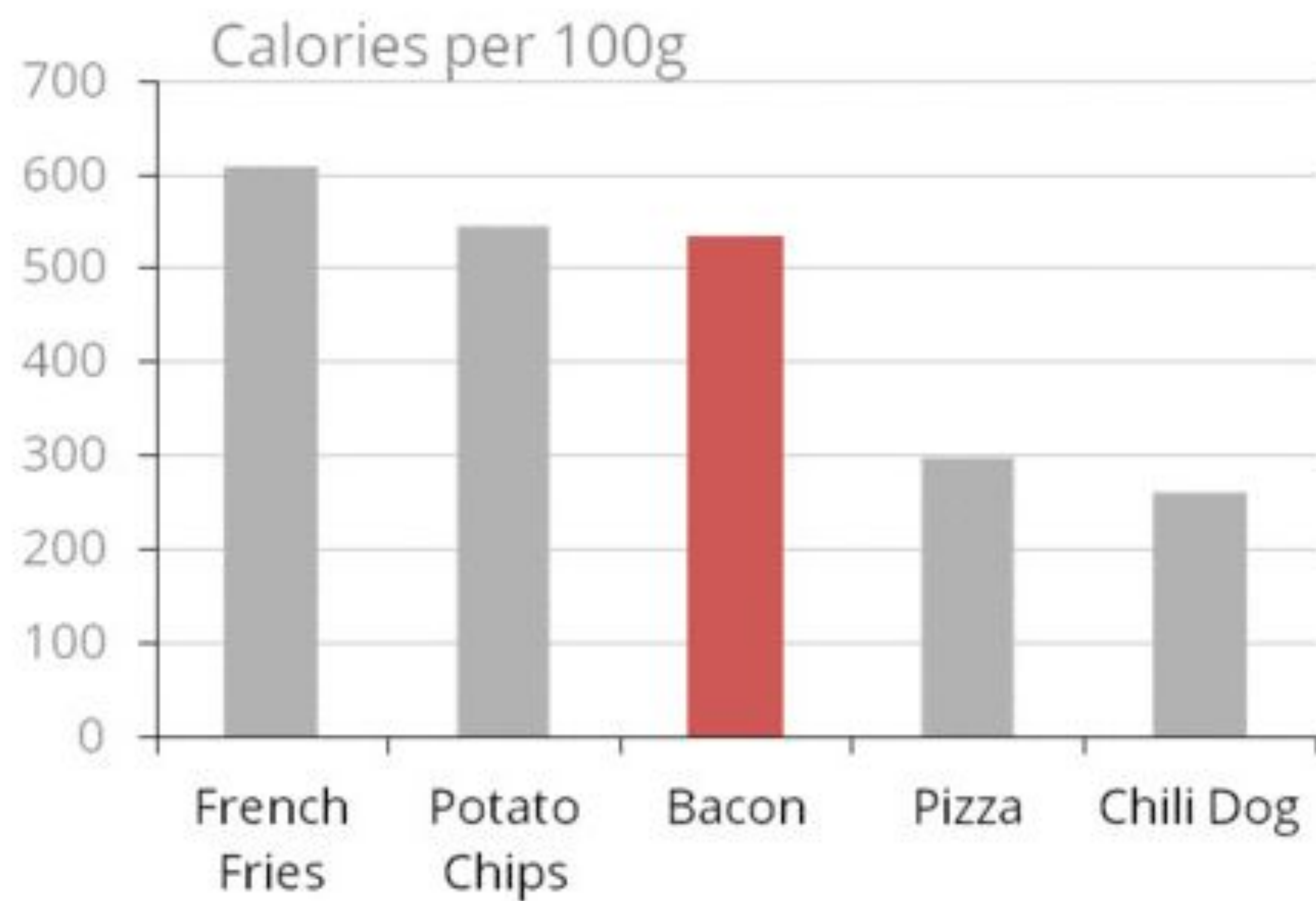




# Lighten lines

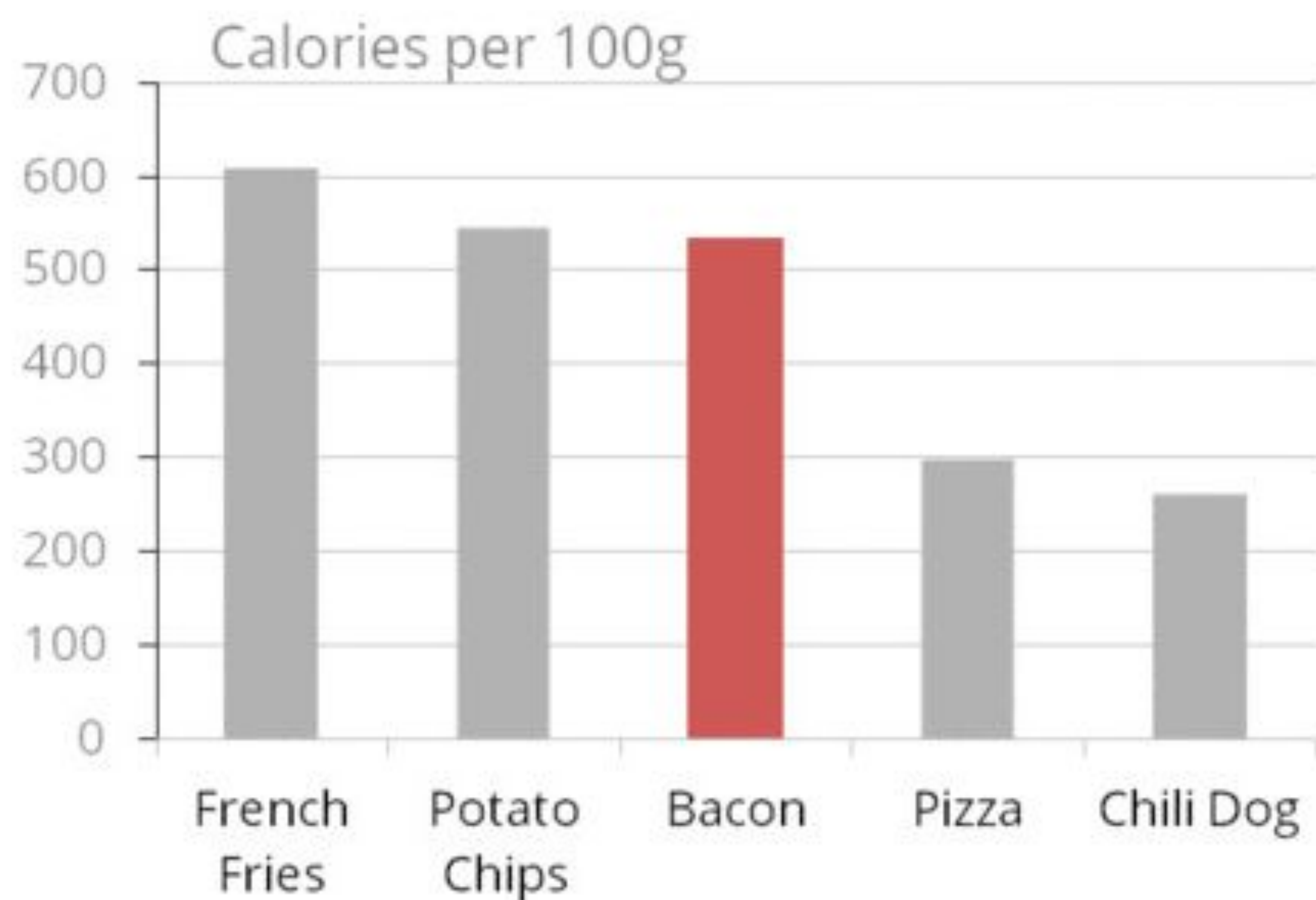


# Lighten lines

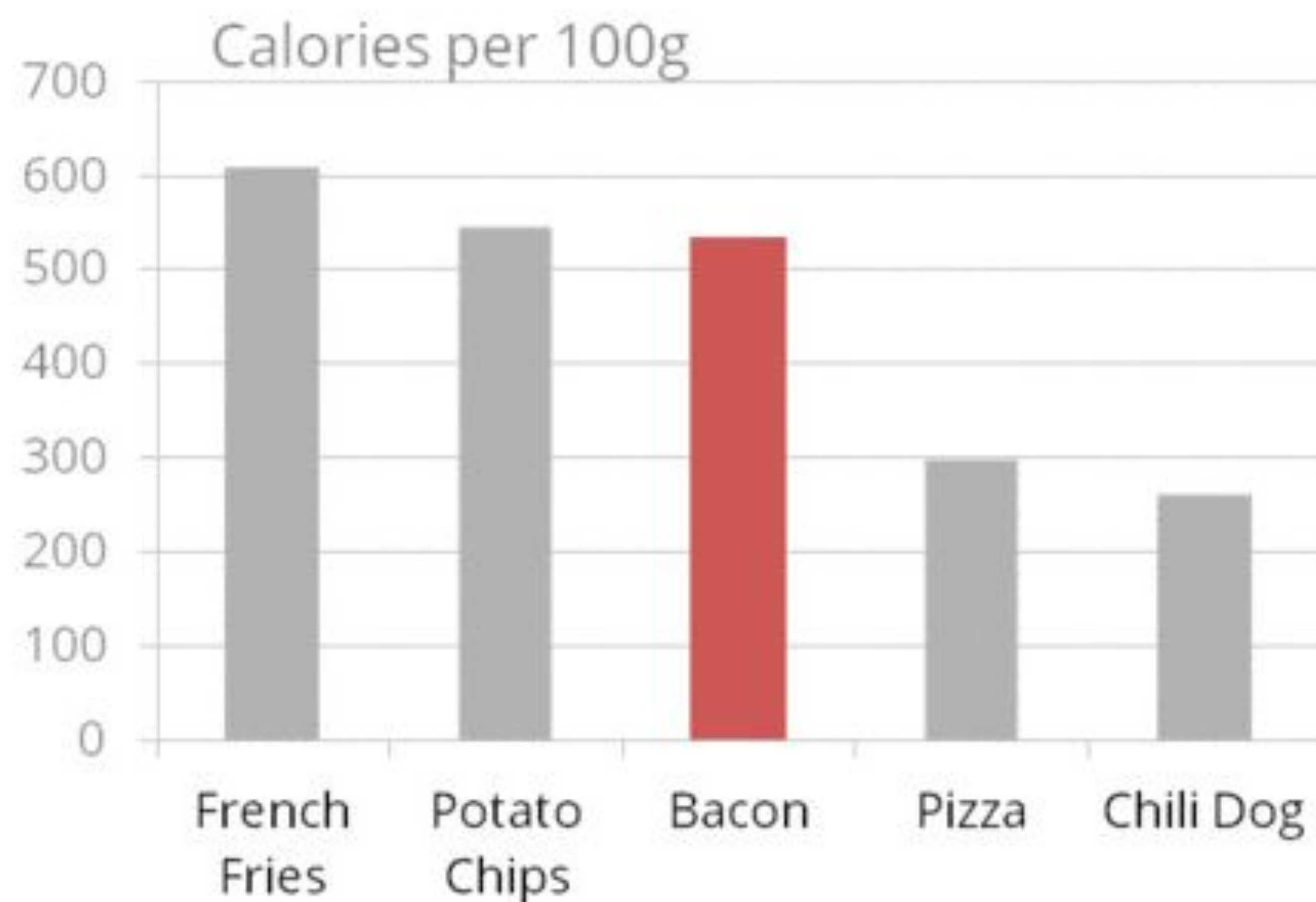




# Lighten lines

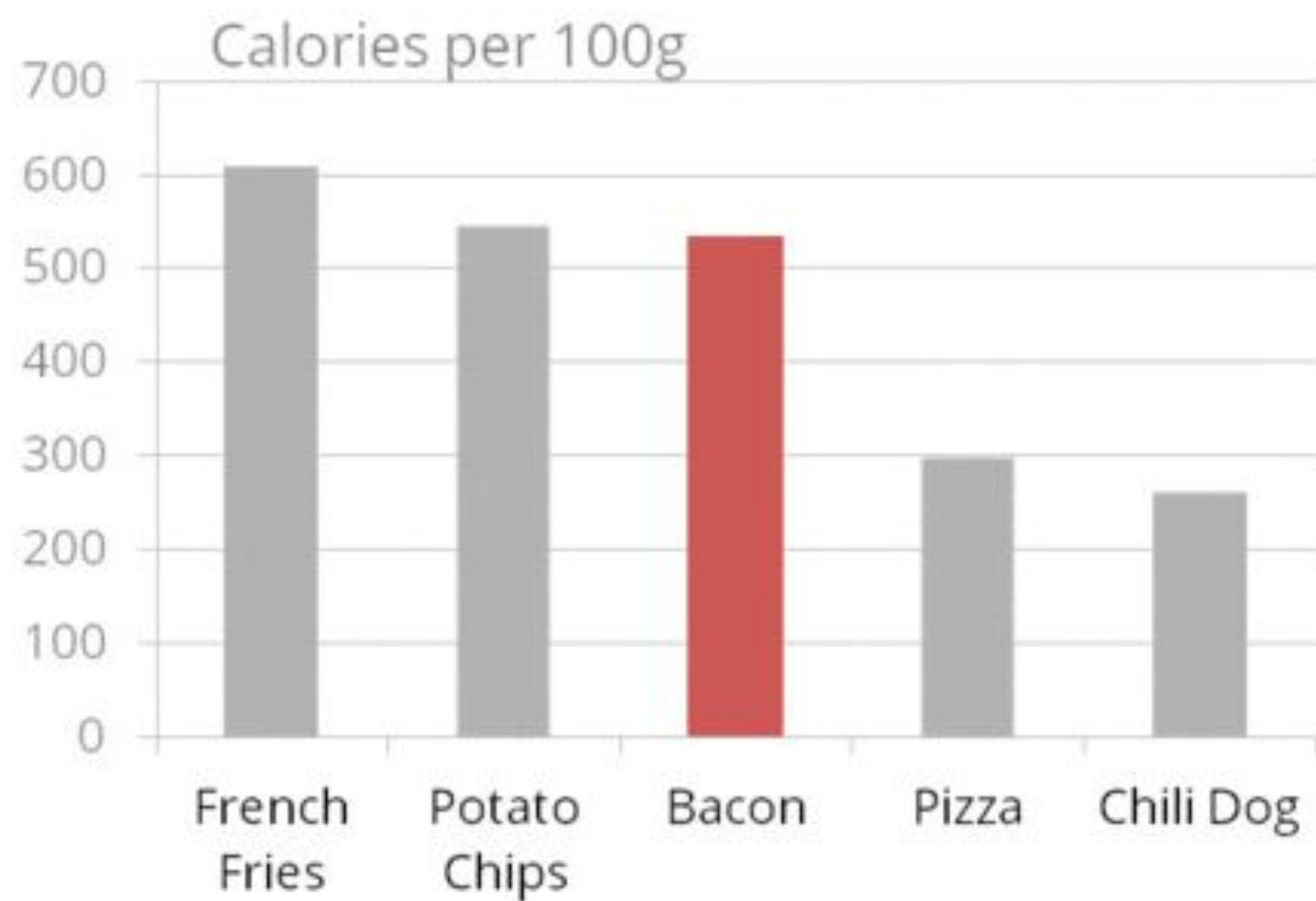


# Lighten lines

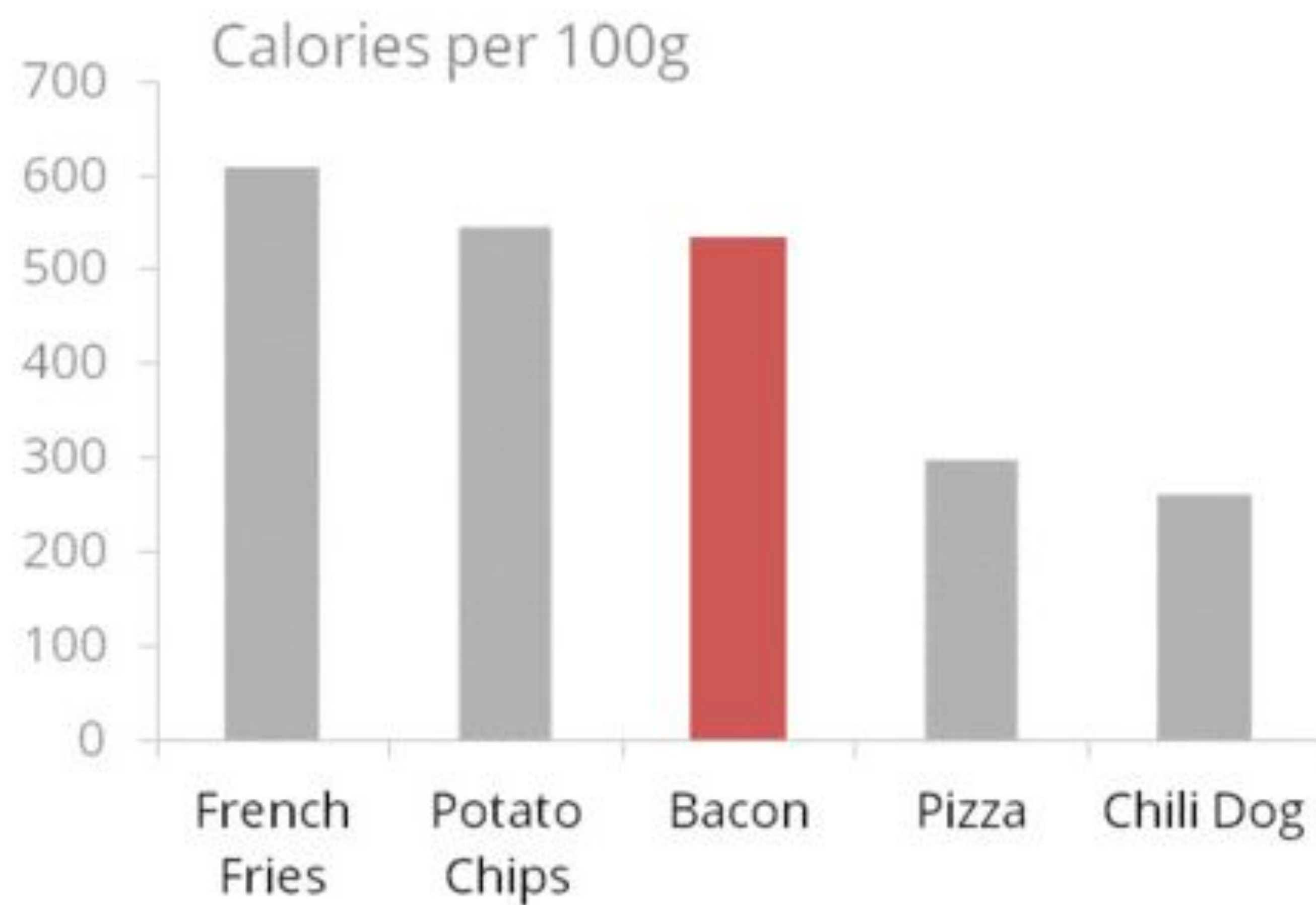




# Or remove lines

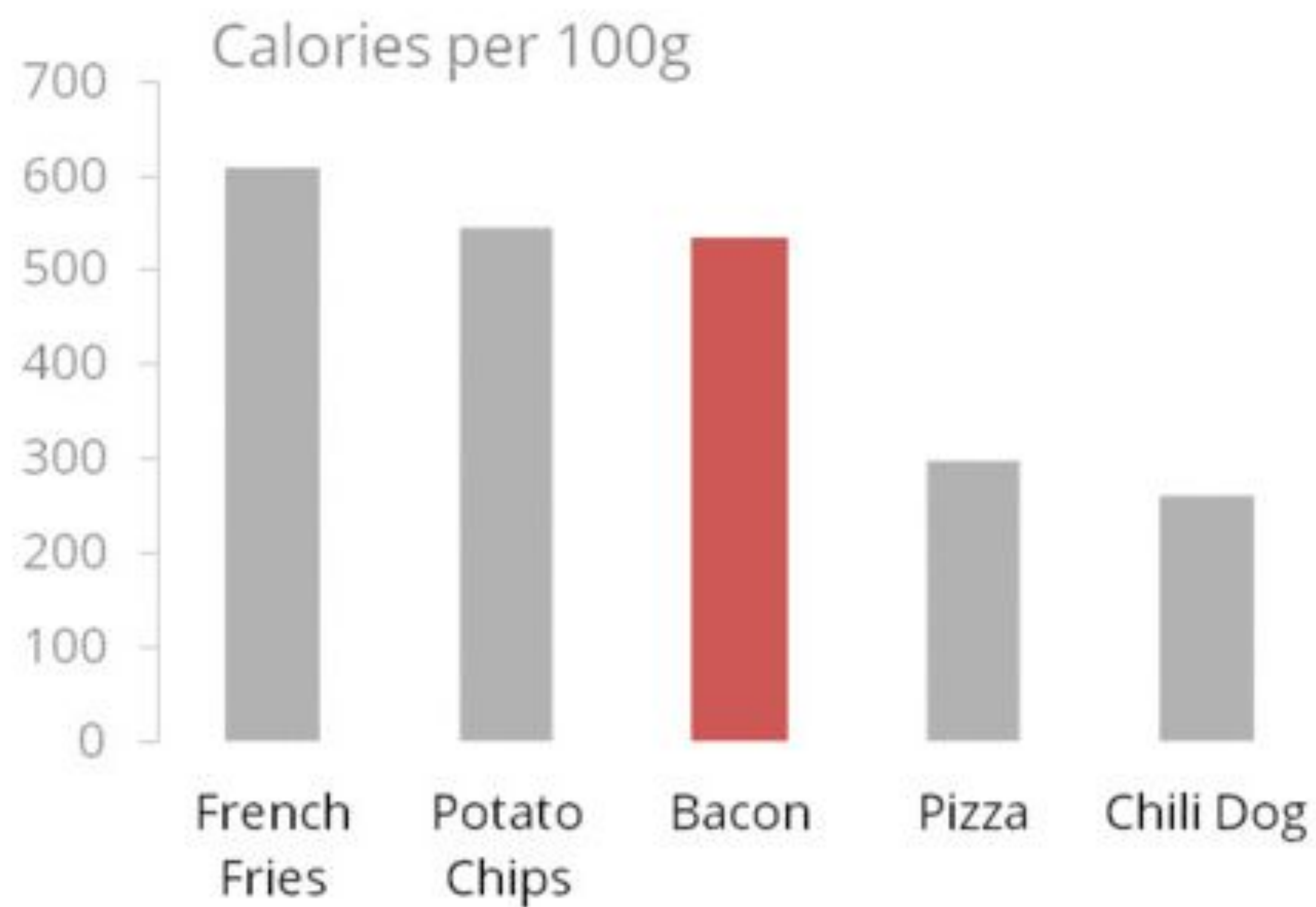


# Or remove lines

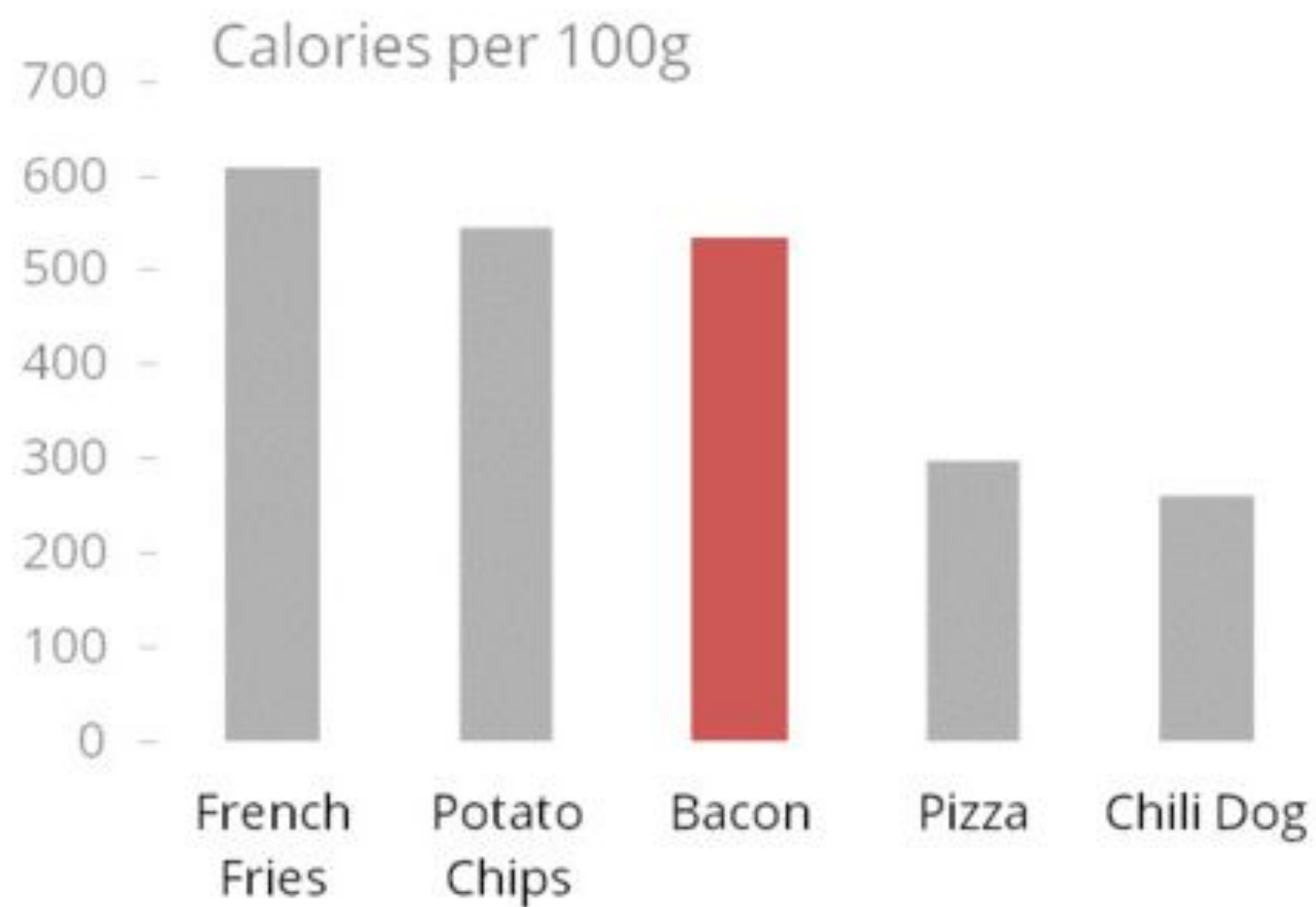




# Or remove lines

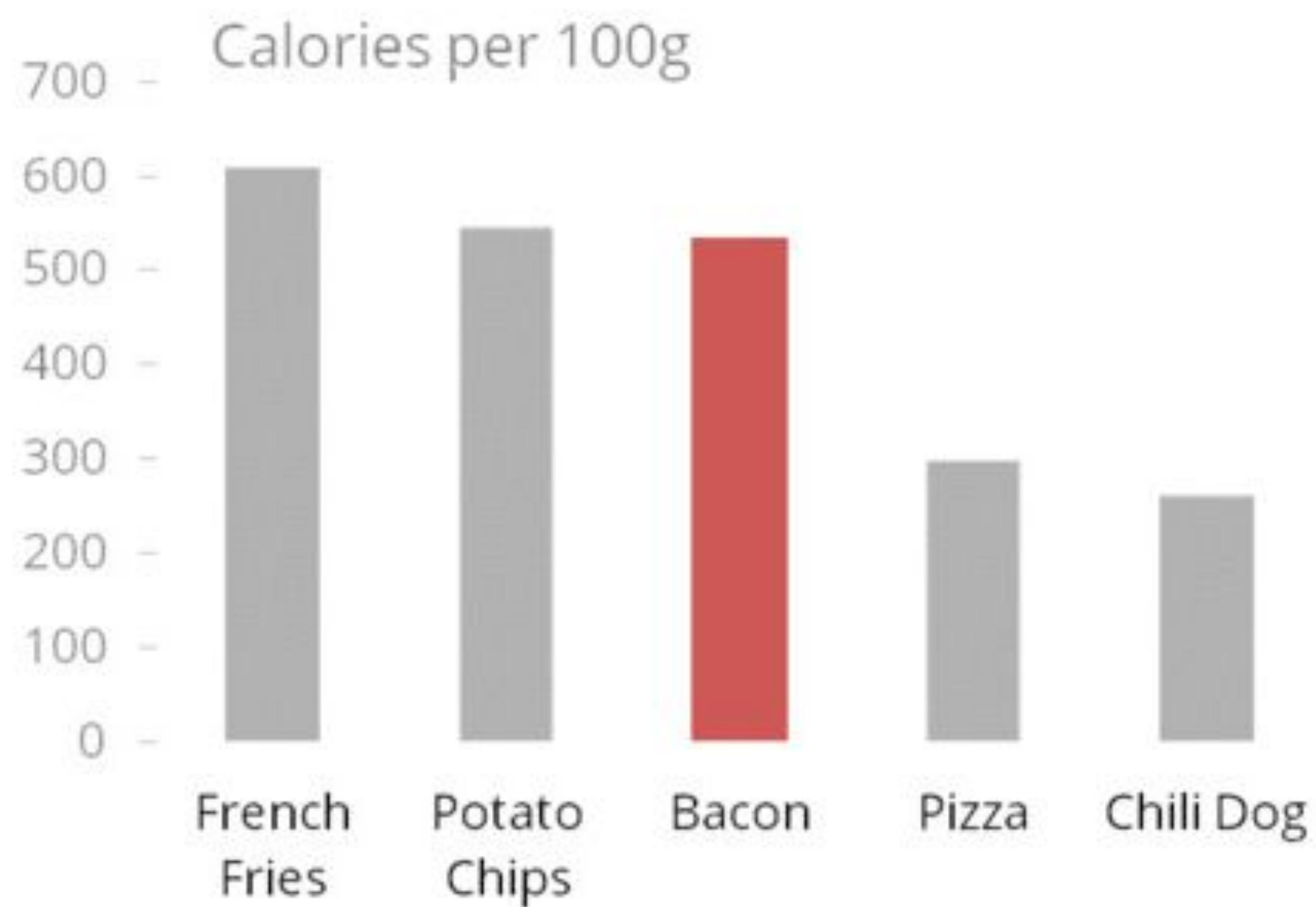


# Or remove lines



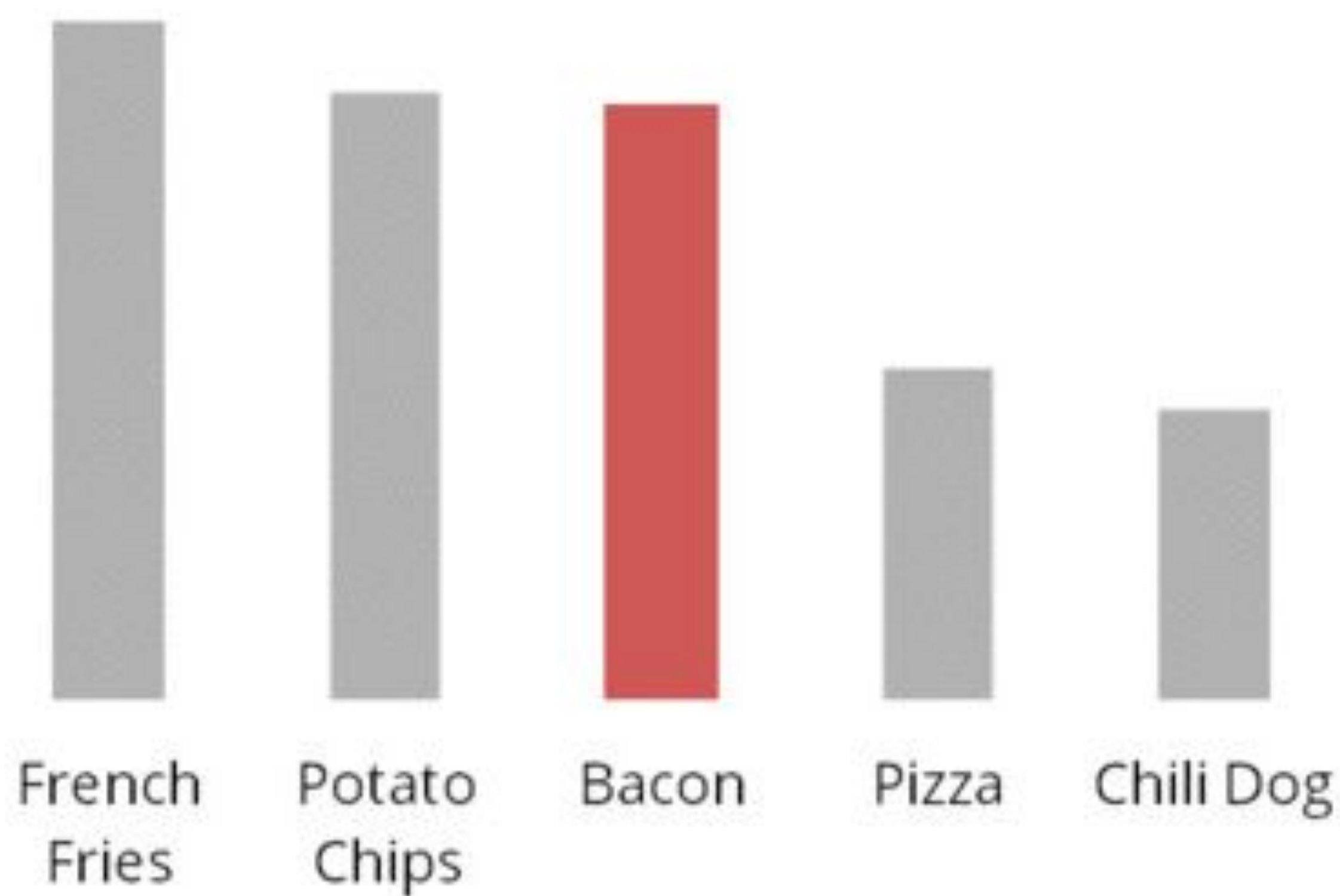


# Direct label



# Direct label

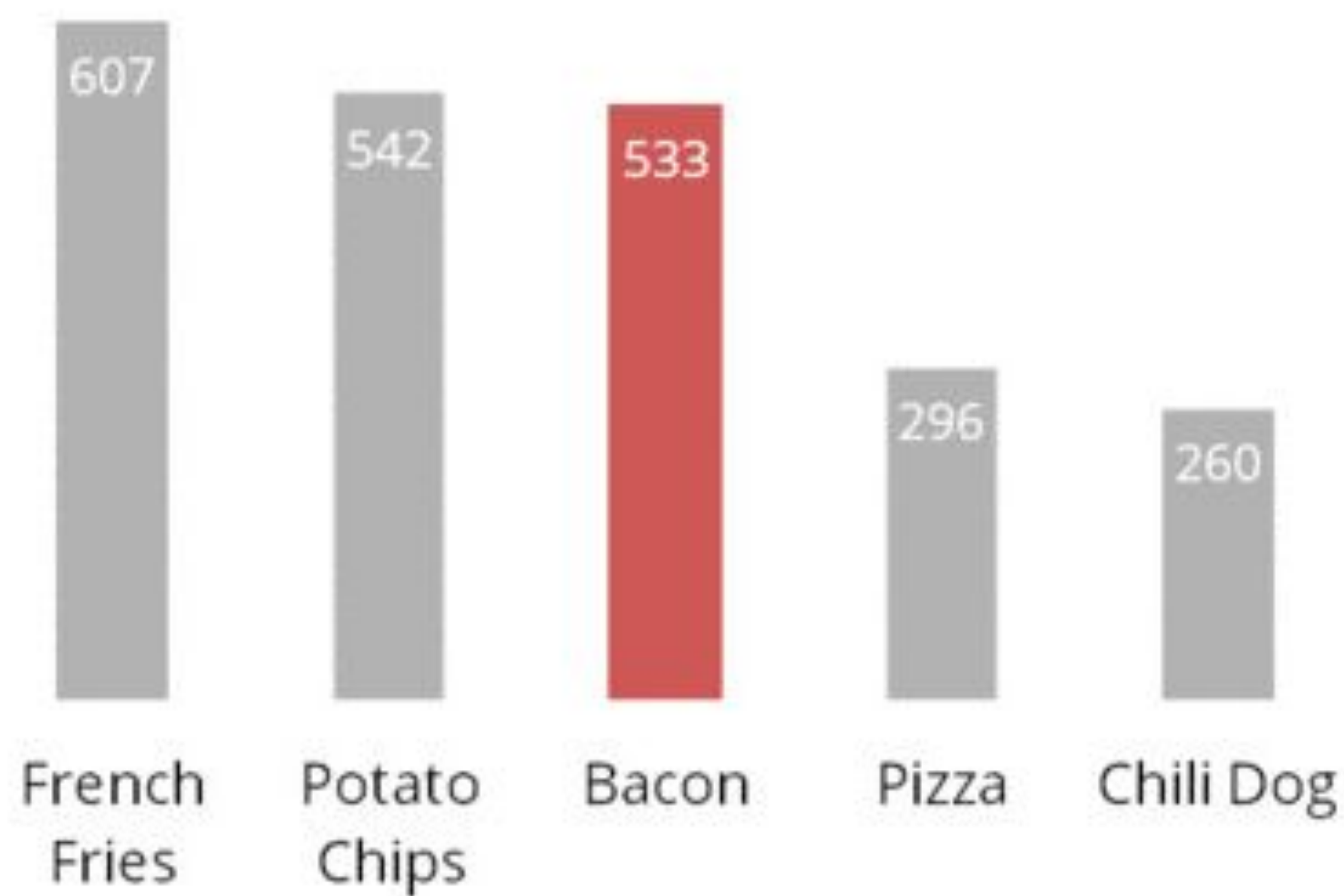
Calories per 100g



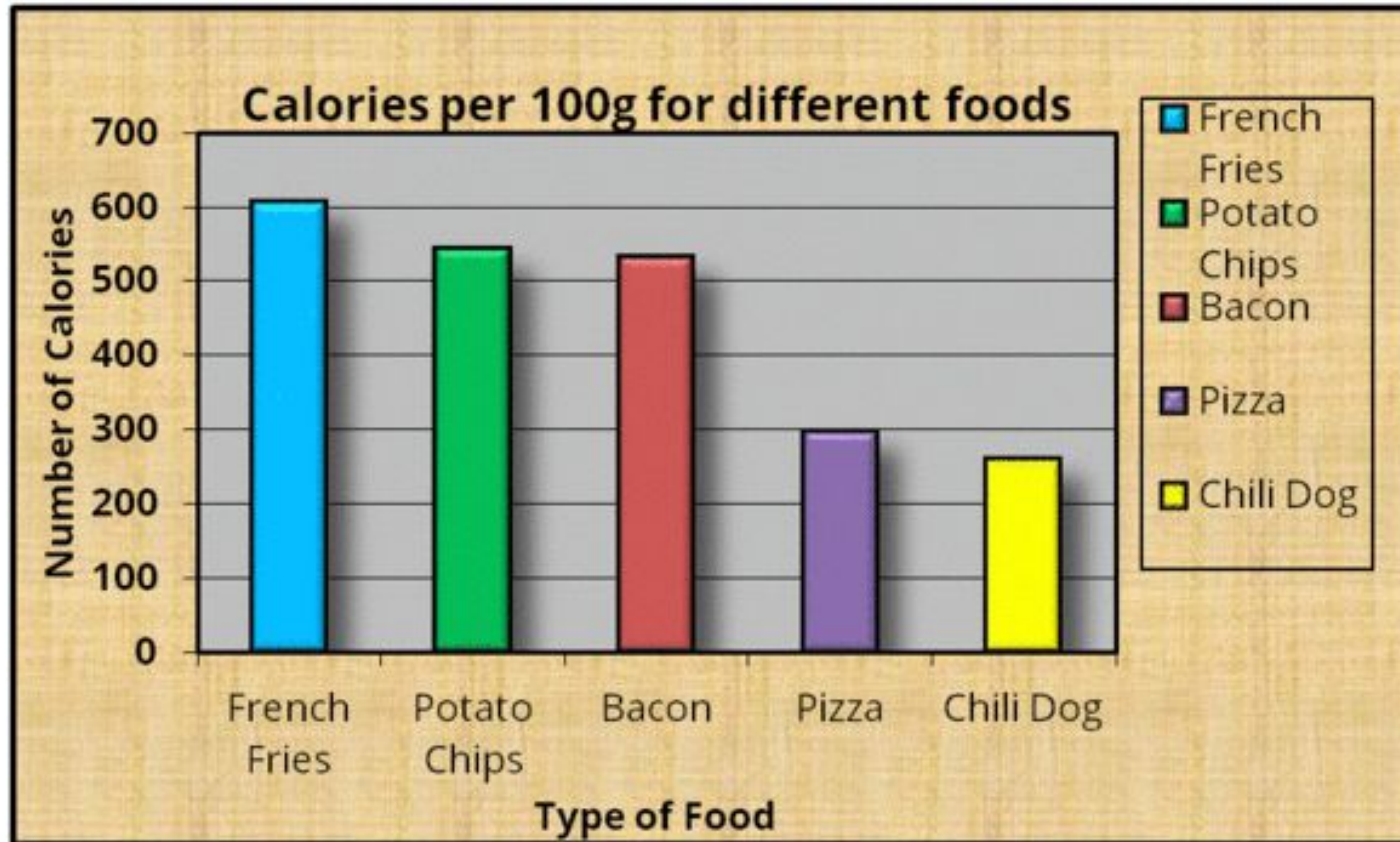


# Direct label

Calories per 100g



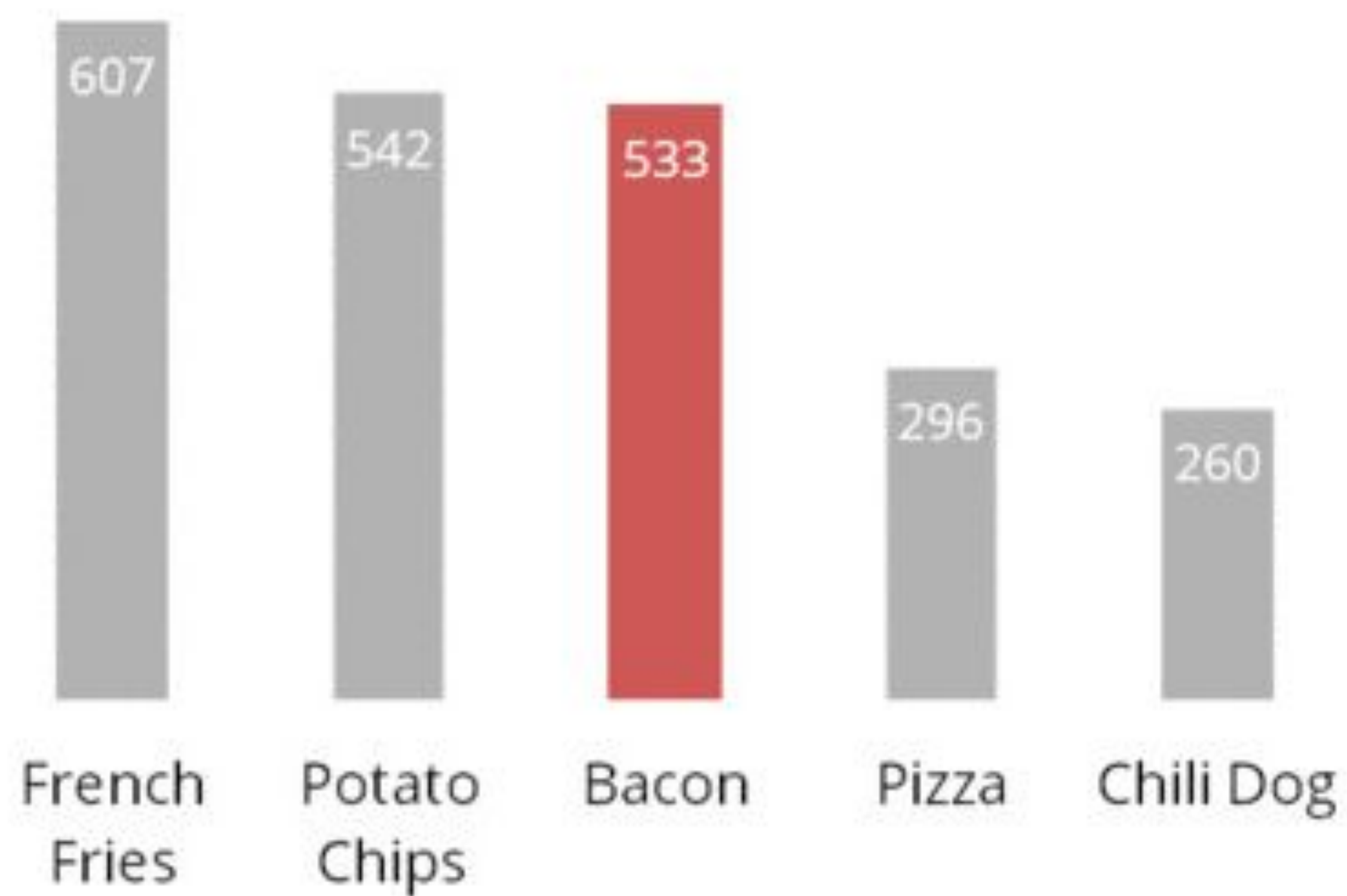
# Before



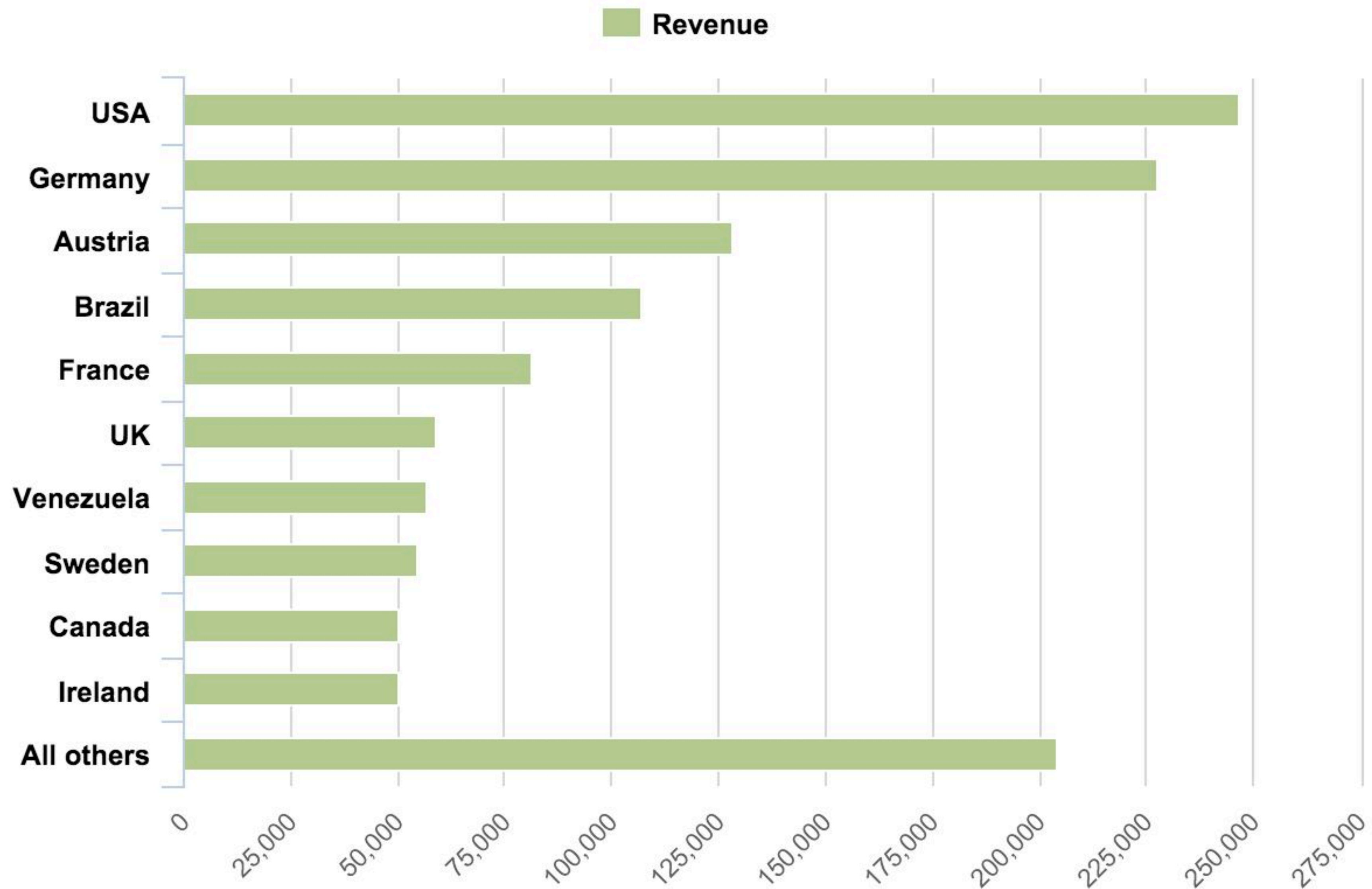


# After

Calories per 100g

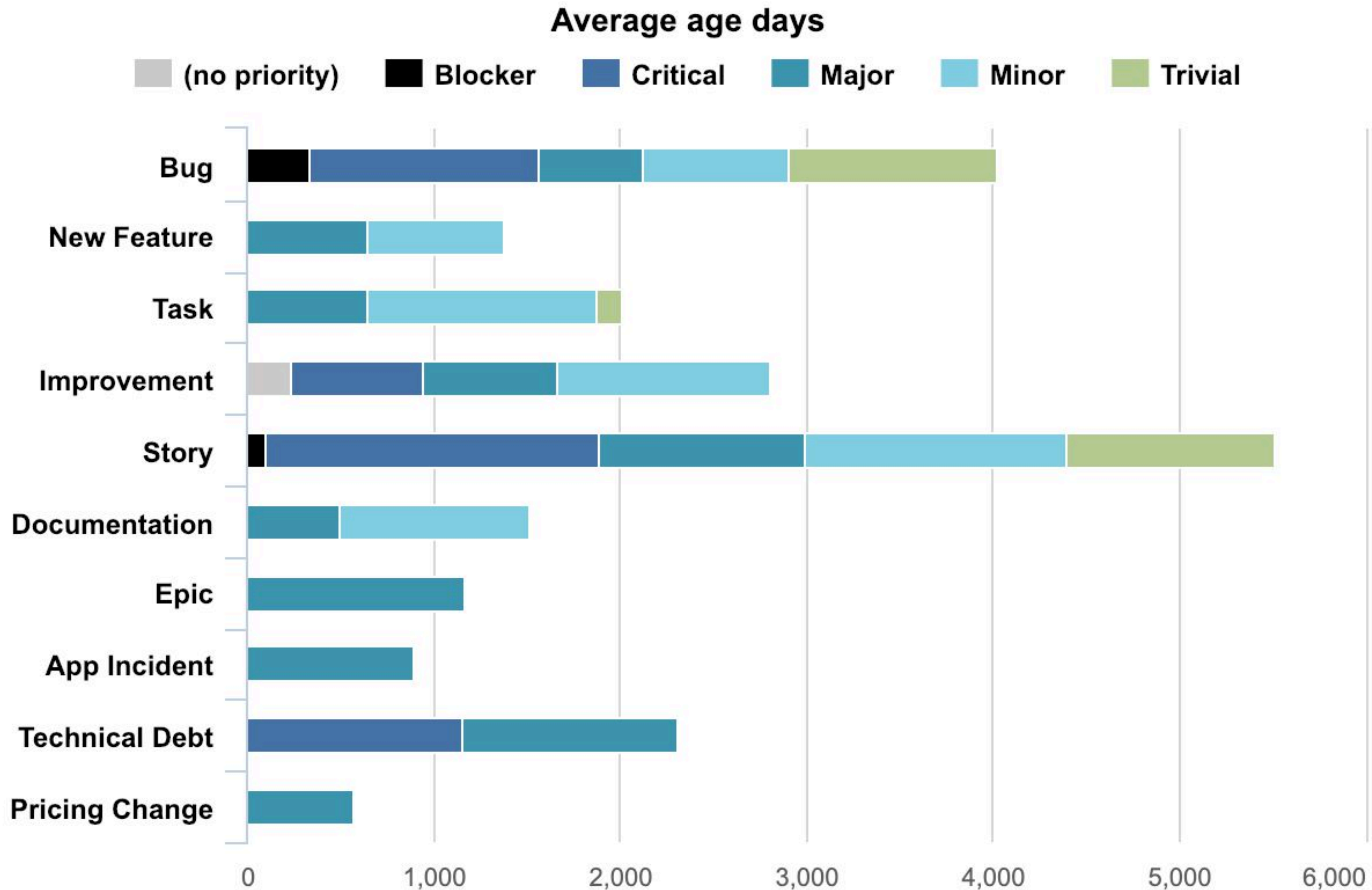


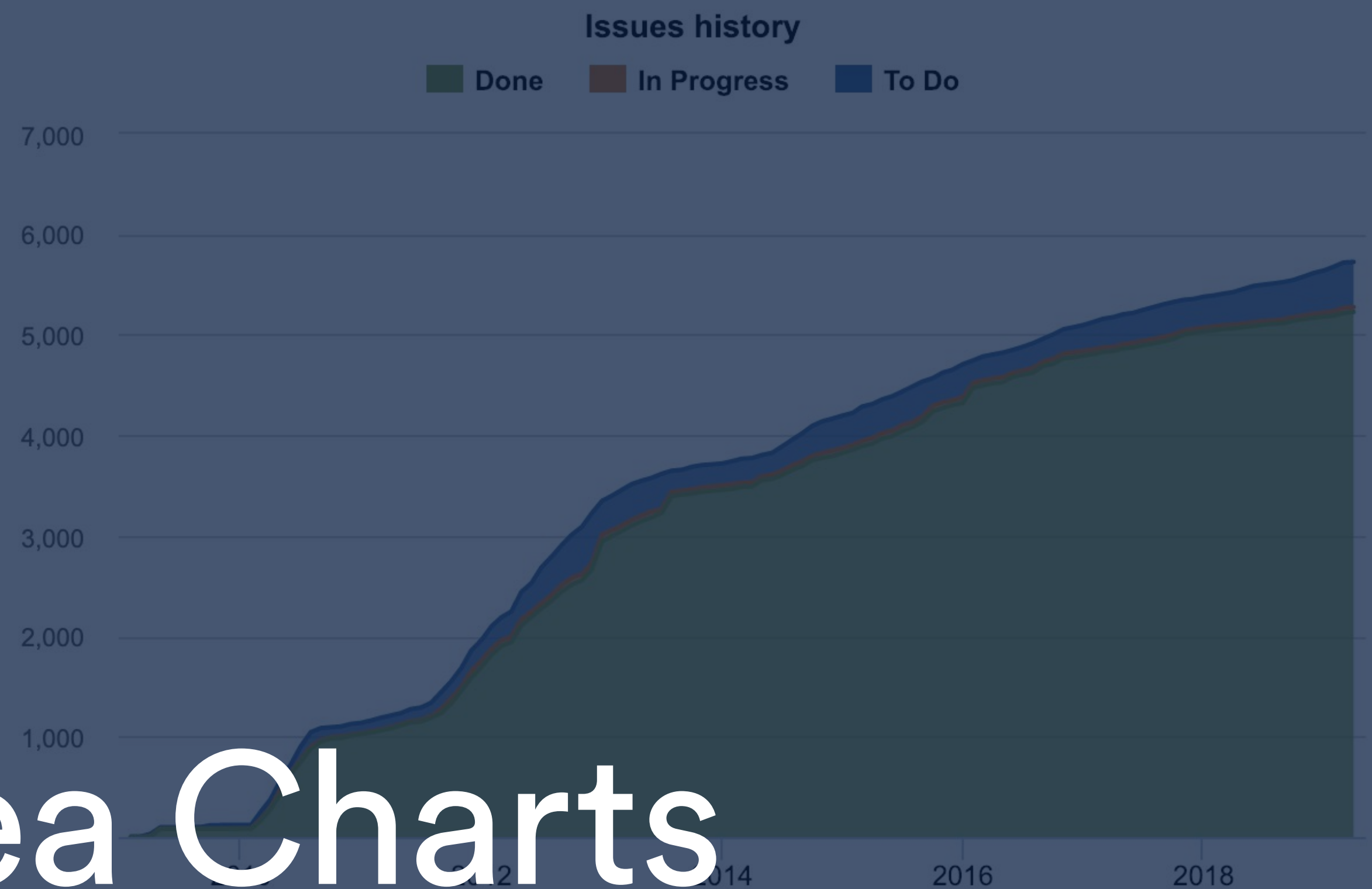
# Bar Charts



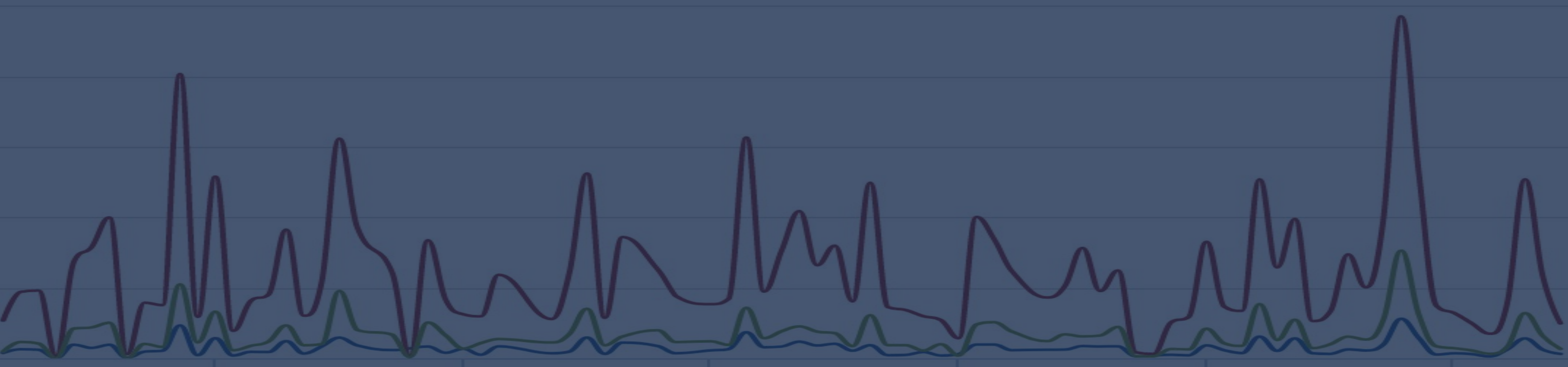


# Stacked Bar Charts



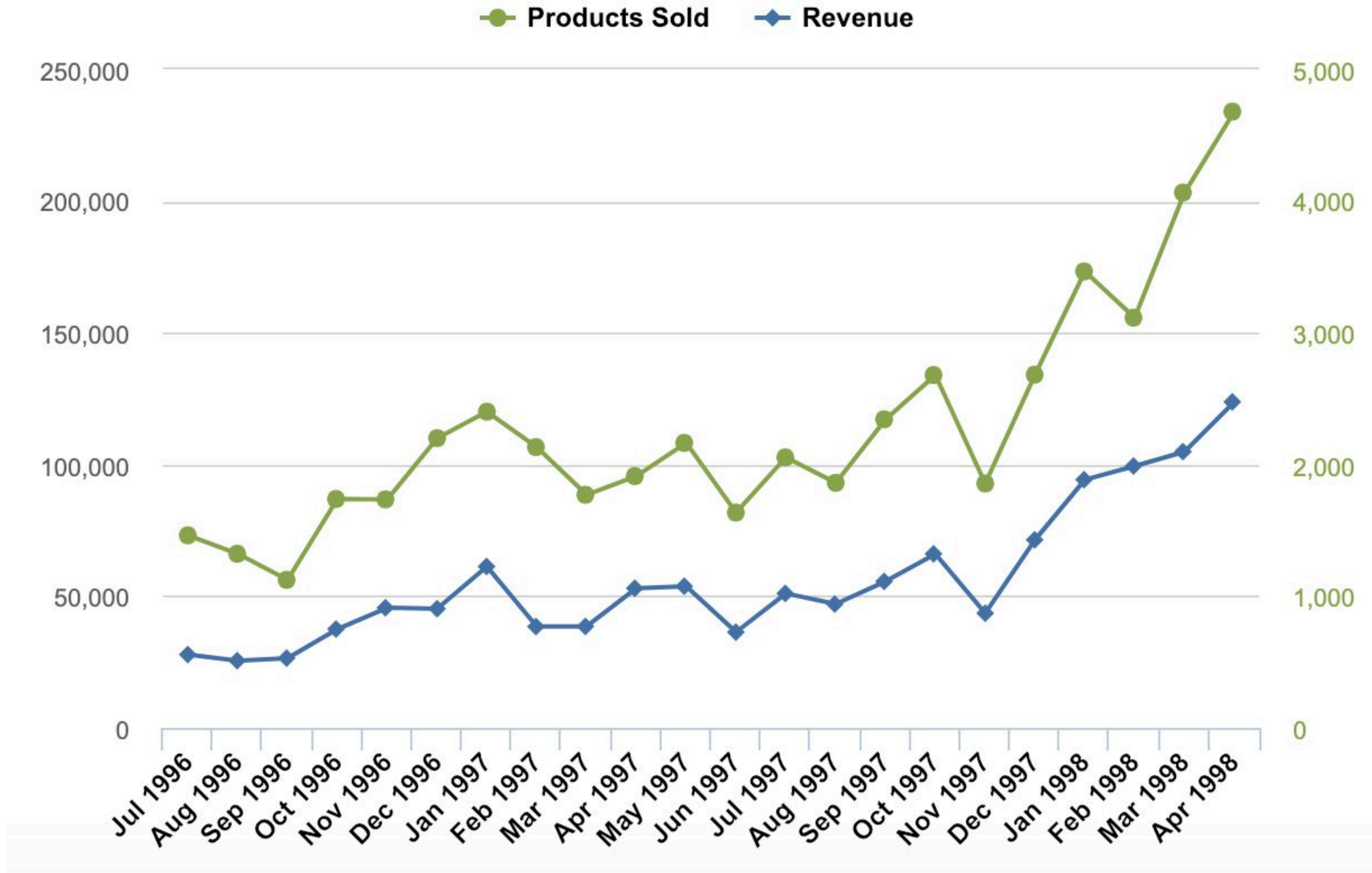


# Line & Area Charts

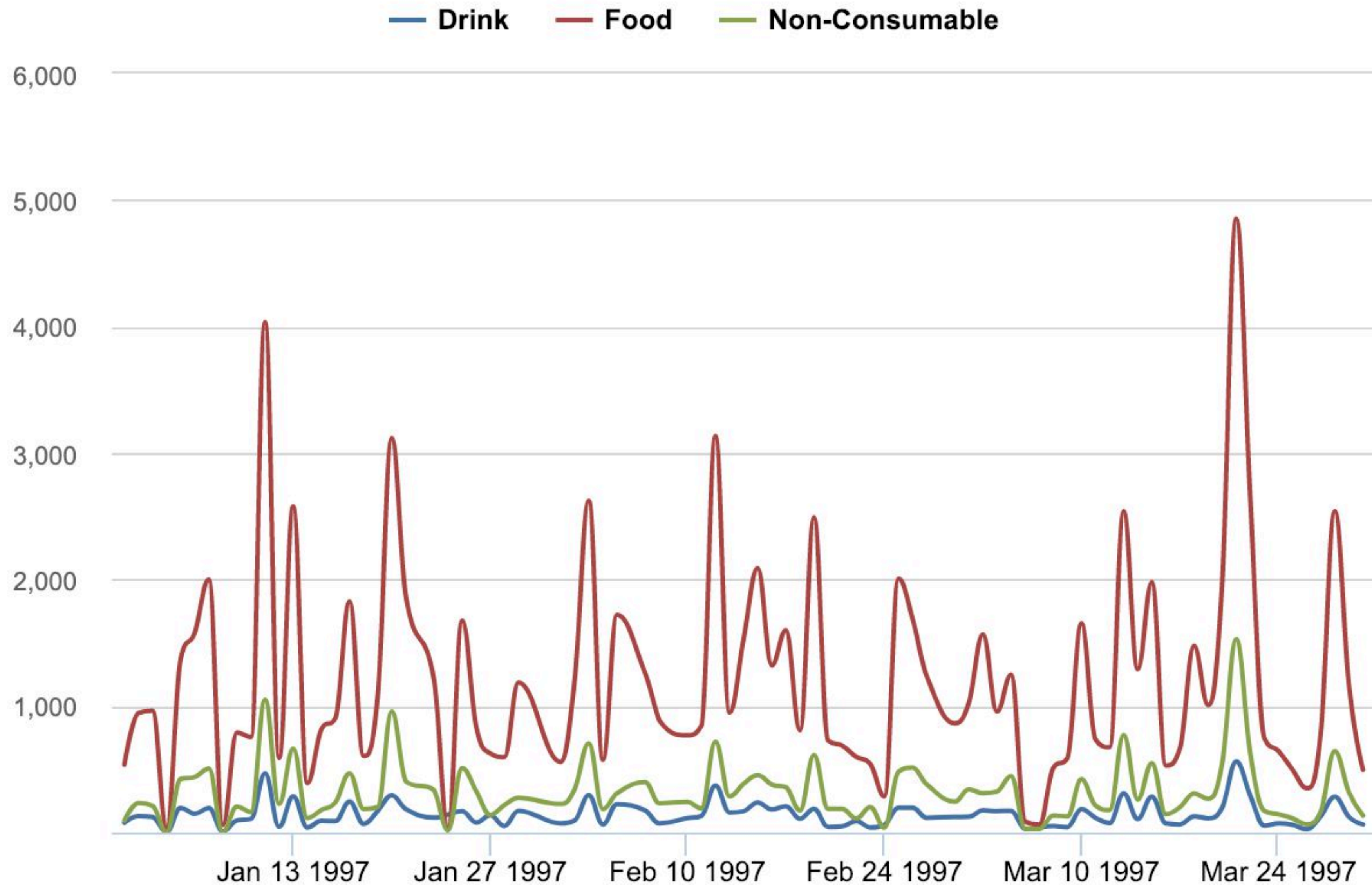




# Line Charts

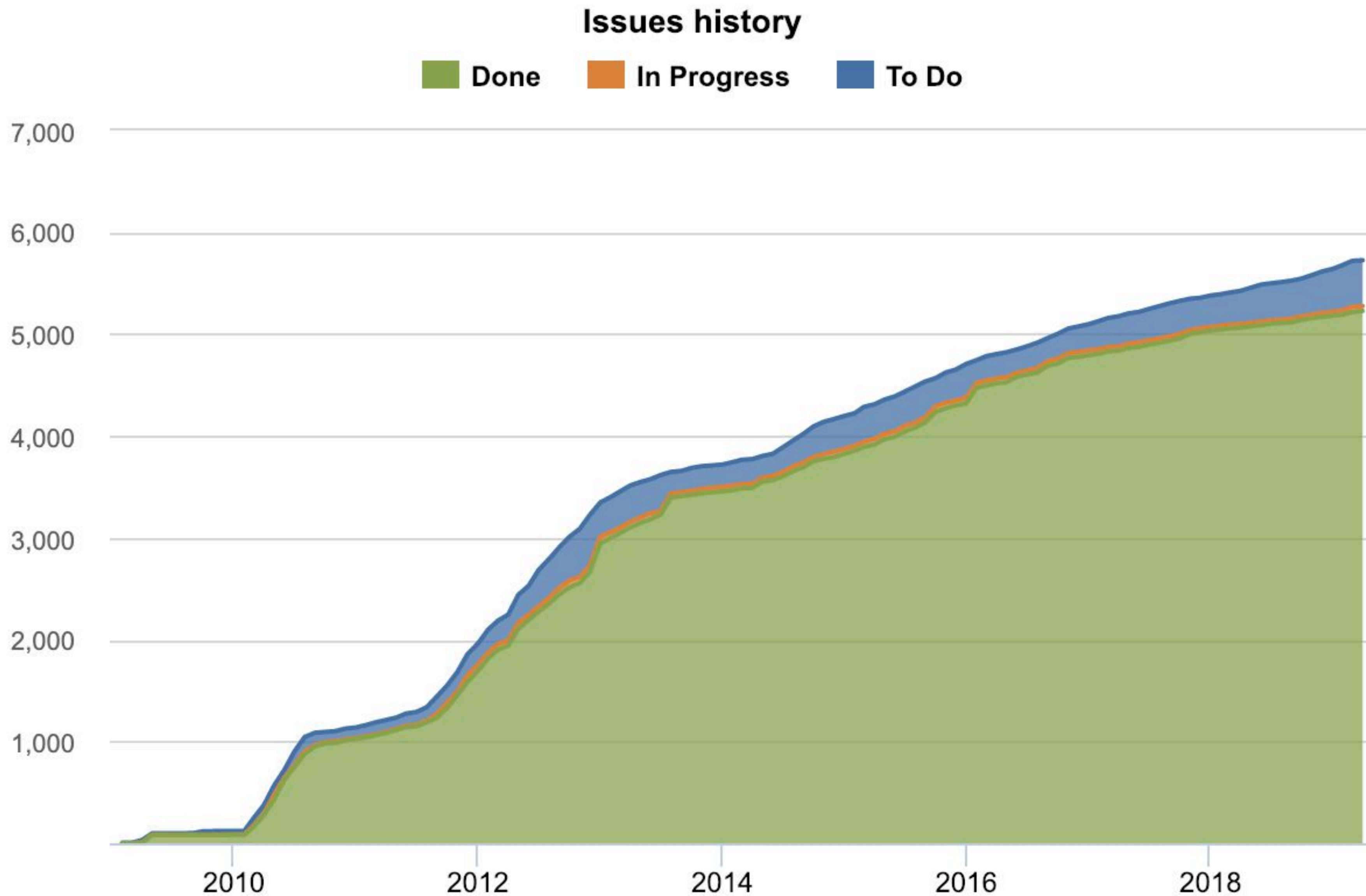


# TimeLine Charts

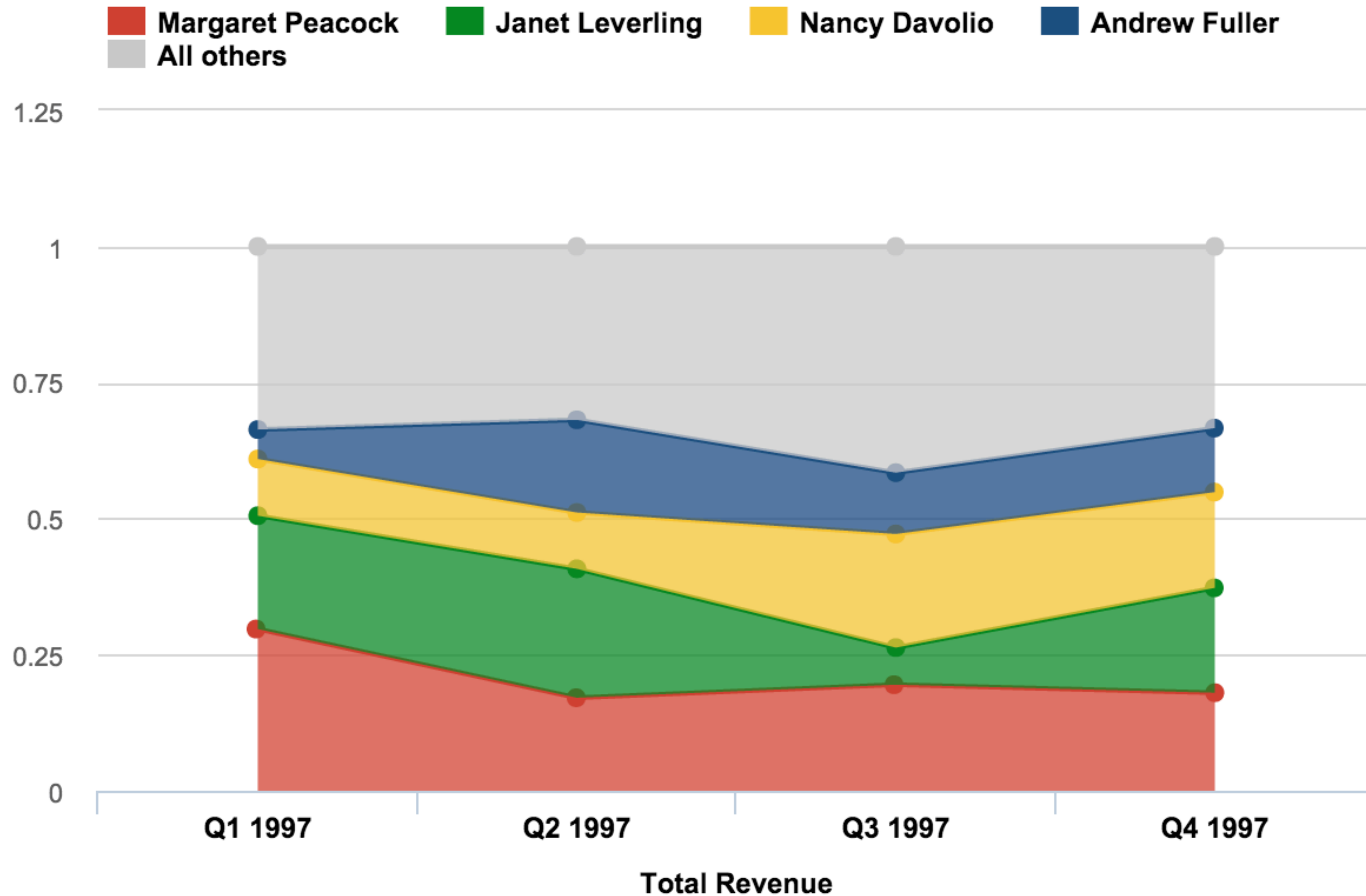




# Area Charts



# Stacked Area Charts





## DO'S

---

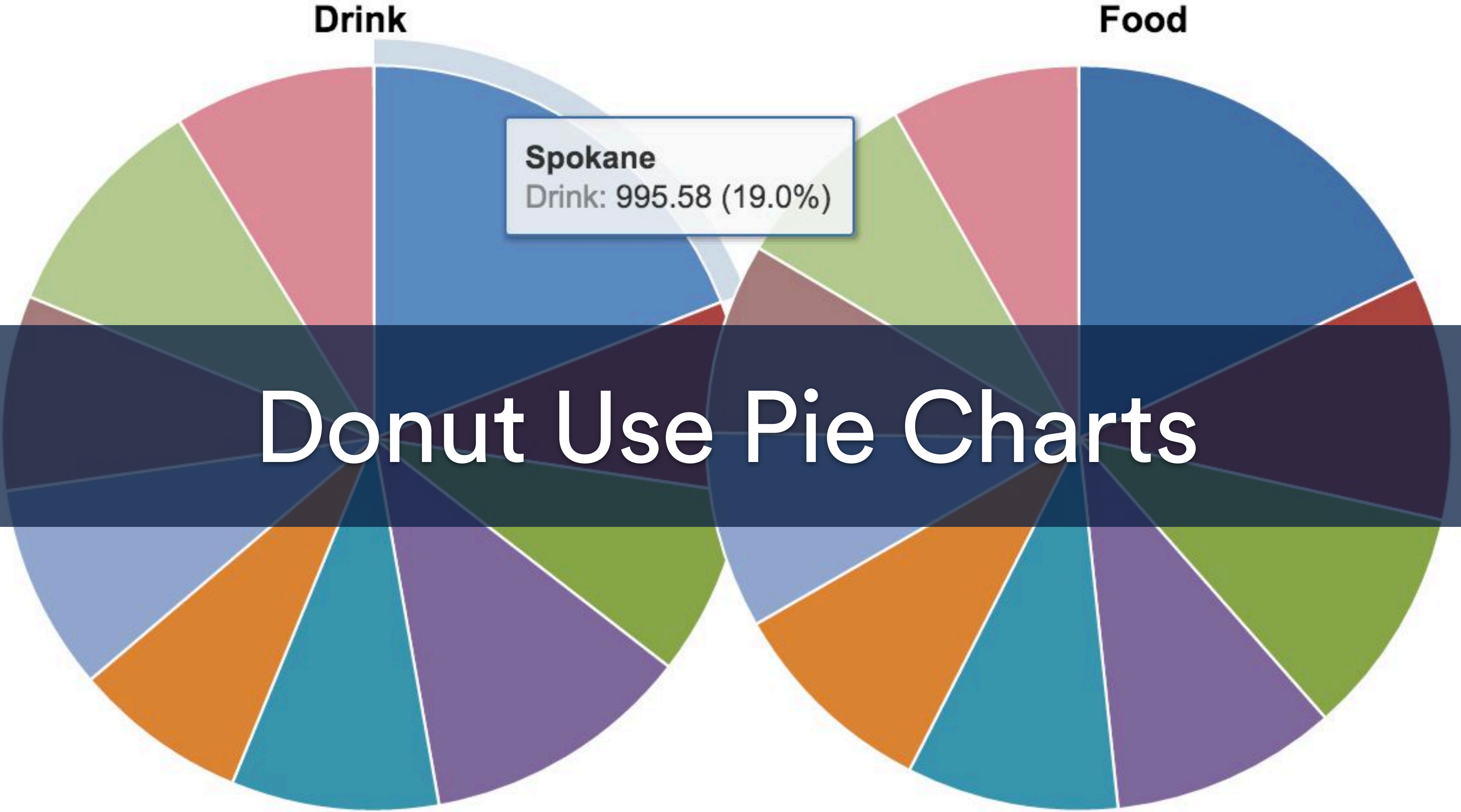
- Present continuous data in an interval scale, where intervals are equal in size.
- Emphasize rate of change or an overall trend
- Time from left to right – always.
- Remove guidelines to emphasize the trend, rate of change, and to reduce distraction.

## DON'TS

---

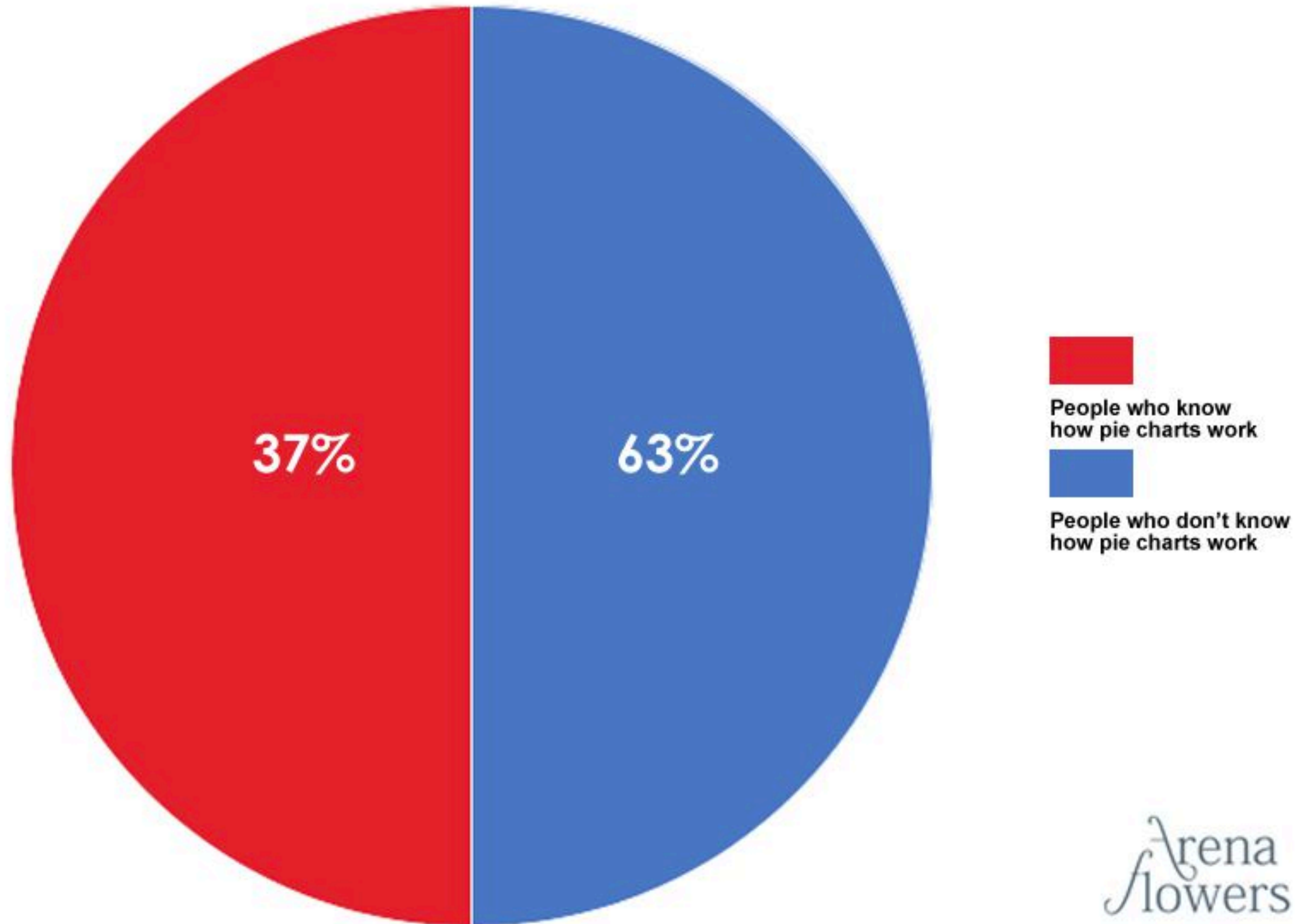
- Do not skip values
- Don't squeeze or expand line charts
- Aim for less than a 45-degree slope.

# Pie Charts and Donut Charts

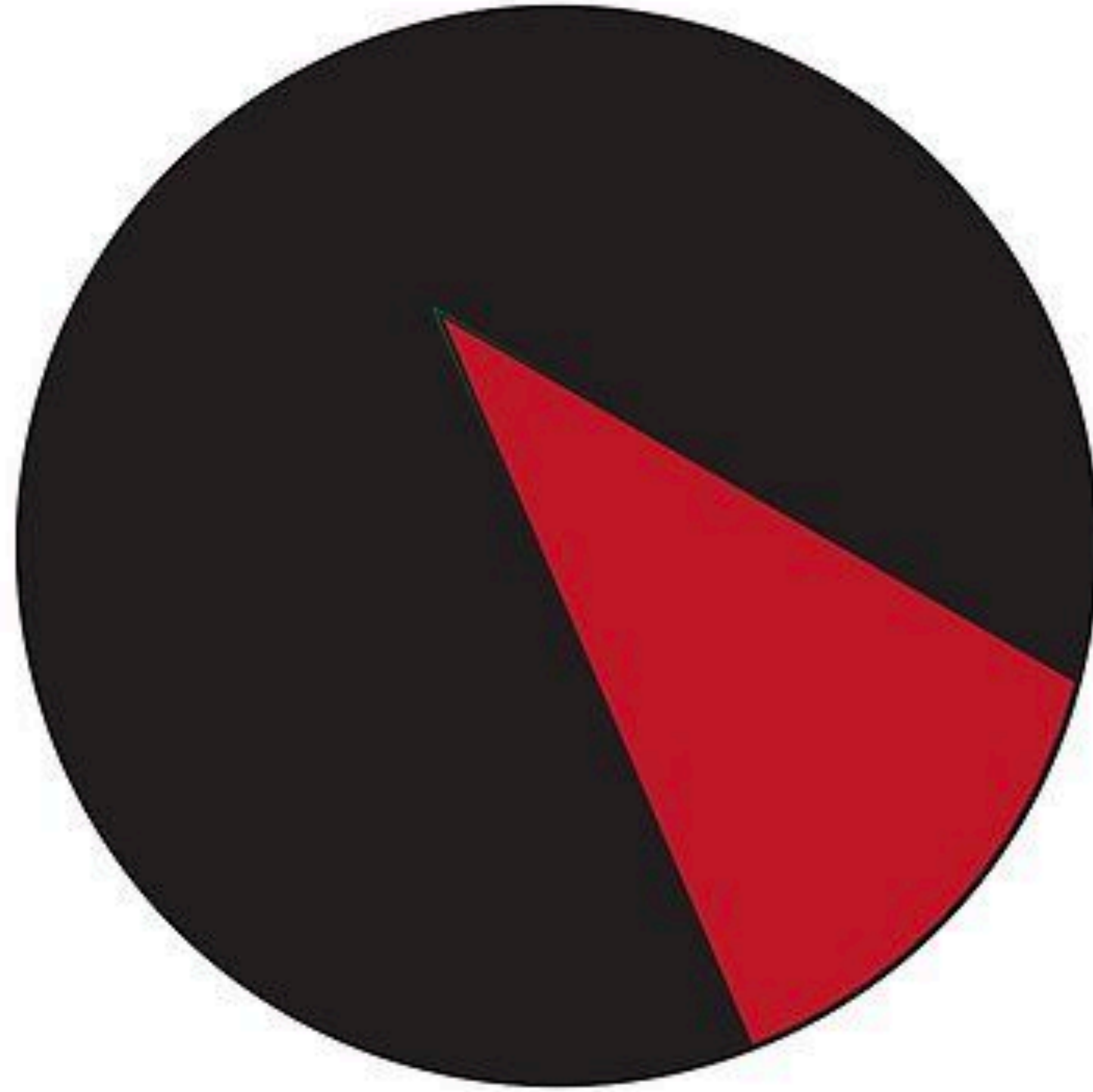




# How Pie Charts Work



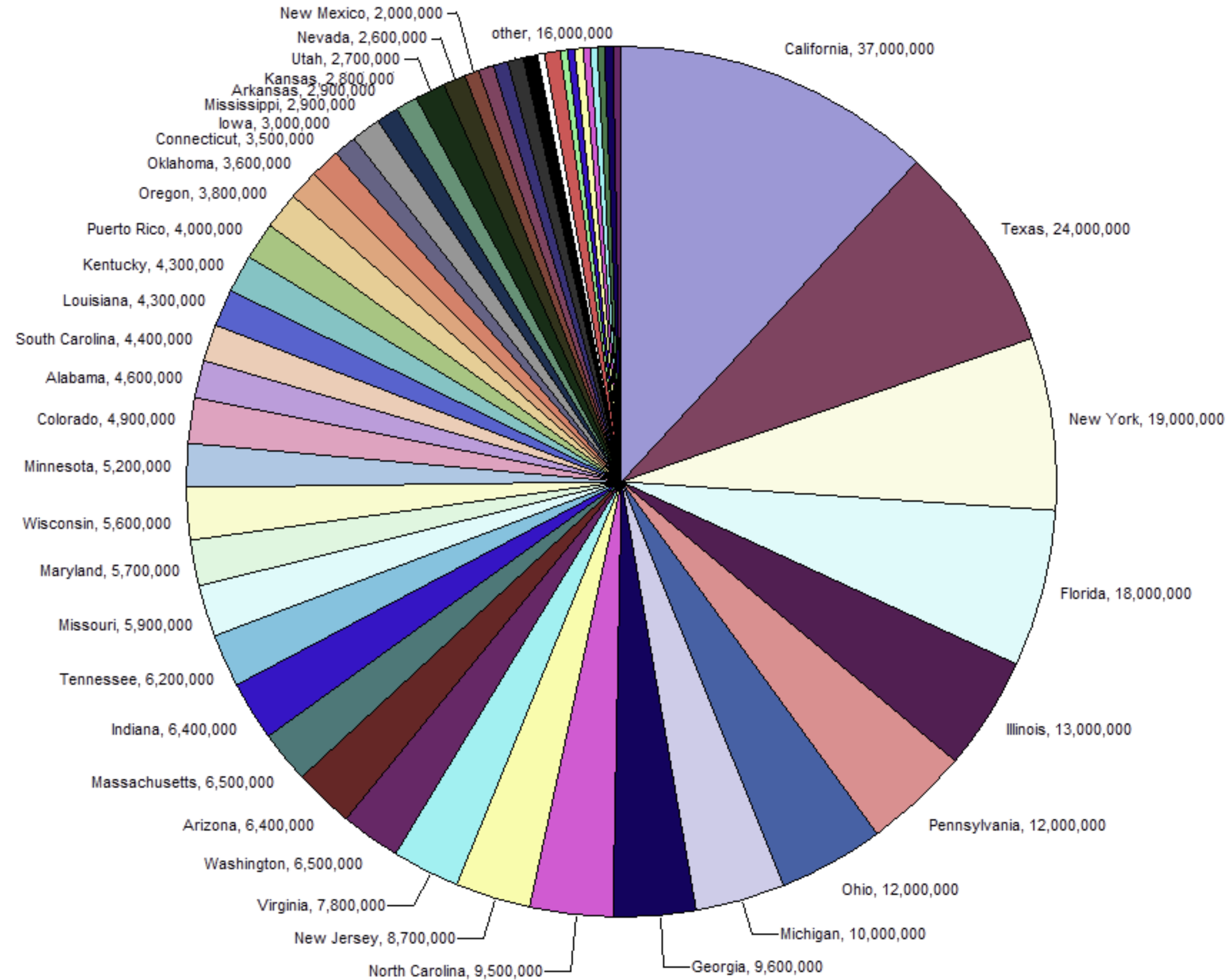
# THINGS I DON'T UNDERSTAND



 **PIE CHARTS**



# Bad Pie Chart





# AMERICANS WHO HAVE TRIED MARIJUANA

CBS NEWS POLL

51%  
TODAY

43%  
LAST YEAR

34%  
1997



Source: MOE +/- 4%

HIGH SUPPORT FOR LEGALIZING MARIJUANA

MORE THAN HALF OF AMERICANS SAY THEY'VE TRIED POT

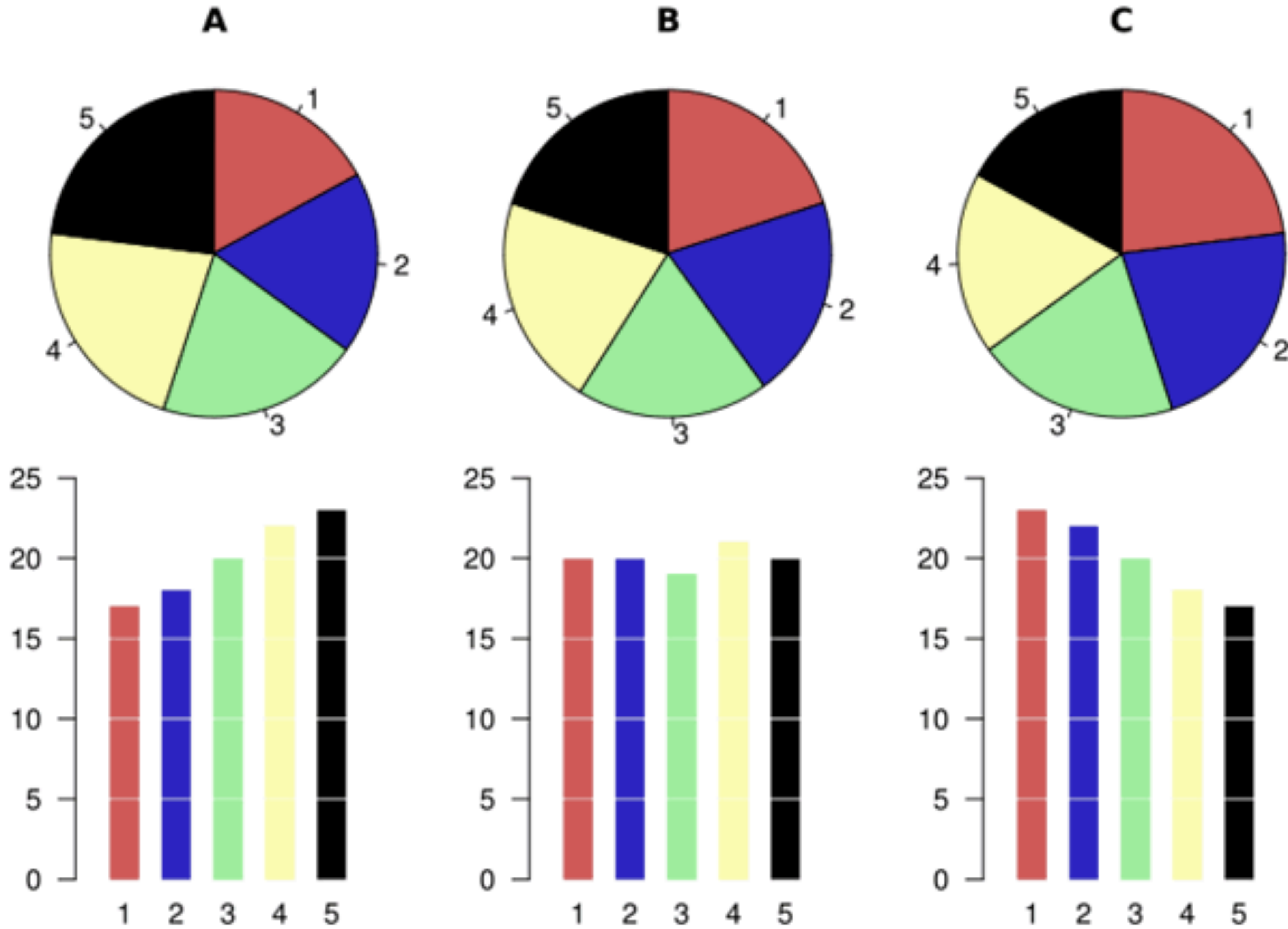


LIVE

CBSN

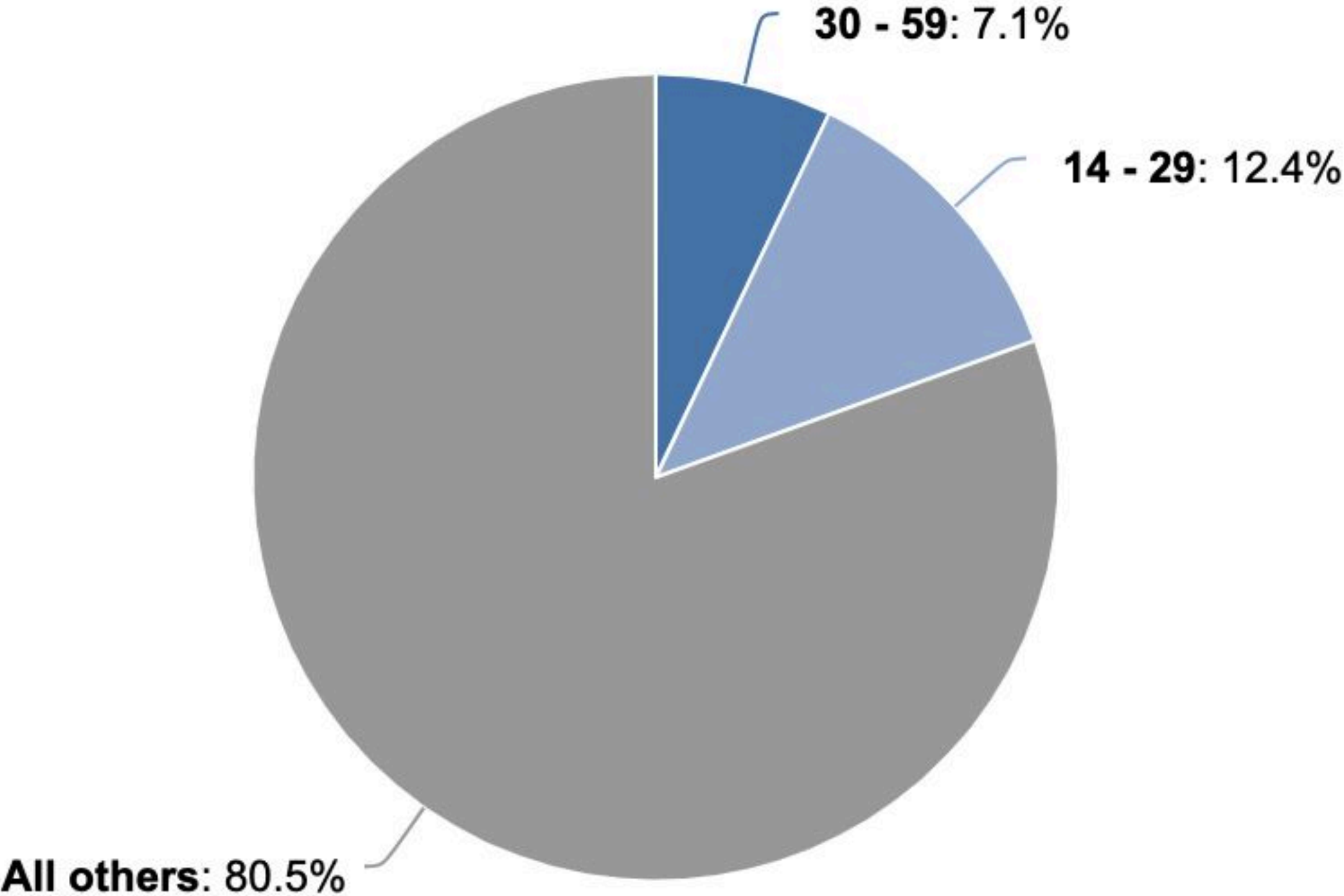


# Pie Charts



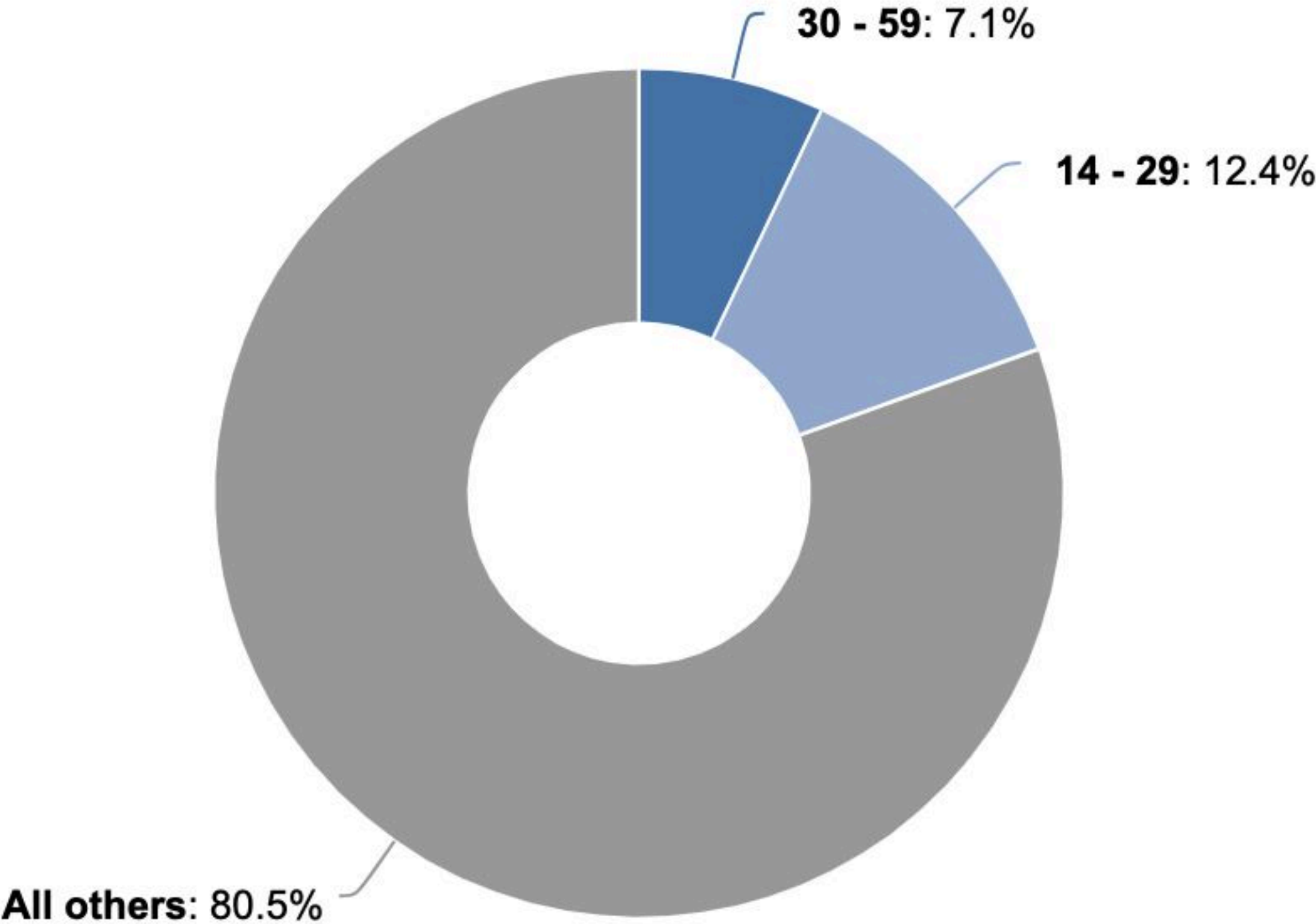
# Better Use of Donut Charts

Issues resolved: 5,155



30 - 59 14 - 29 All others

Issues resolved



30 - 59 14 - 29 All others



## DO'S

---

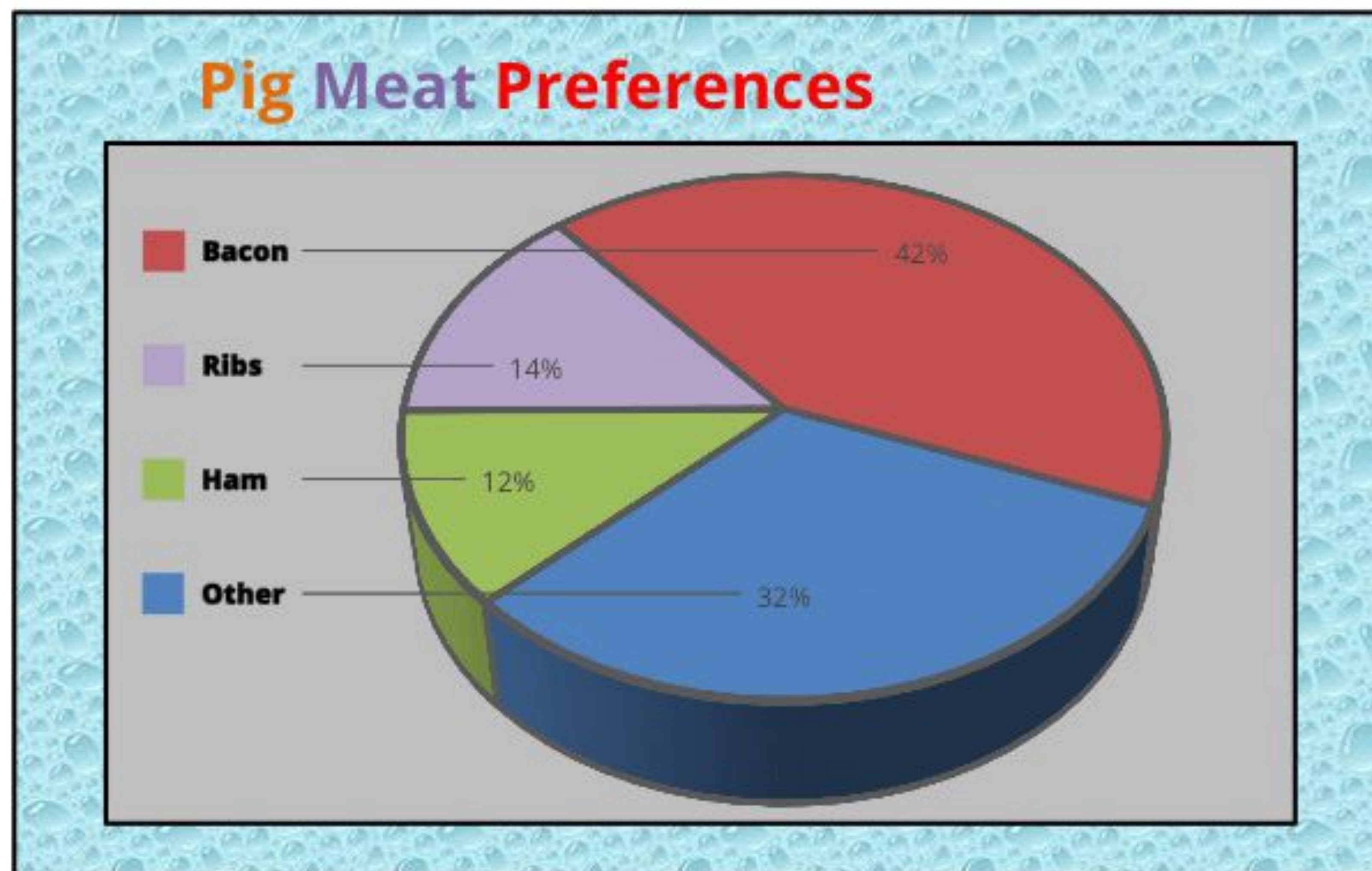
- Total sum of all segments equals 100%
- Less than 6 categories.
- Ideally only 2 categories (us vs others)

## DON'TS

---

- Don't use for identical or very different values.
- Don't use 3D or blow apart effects.
- Don't use a pie charts to COMPARE

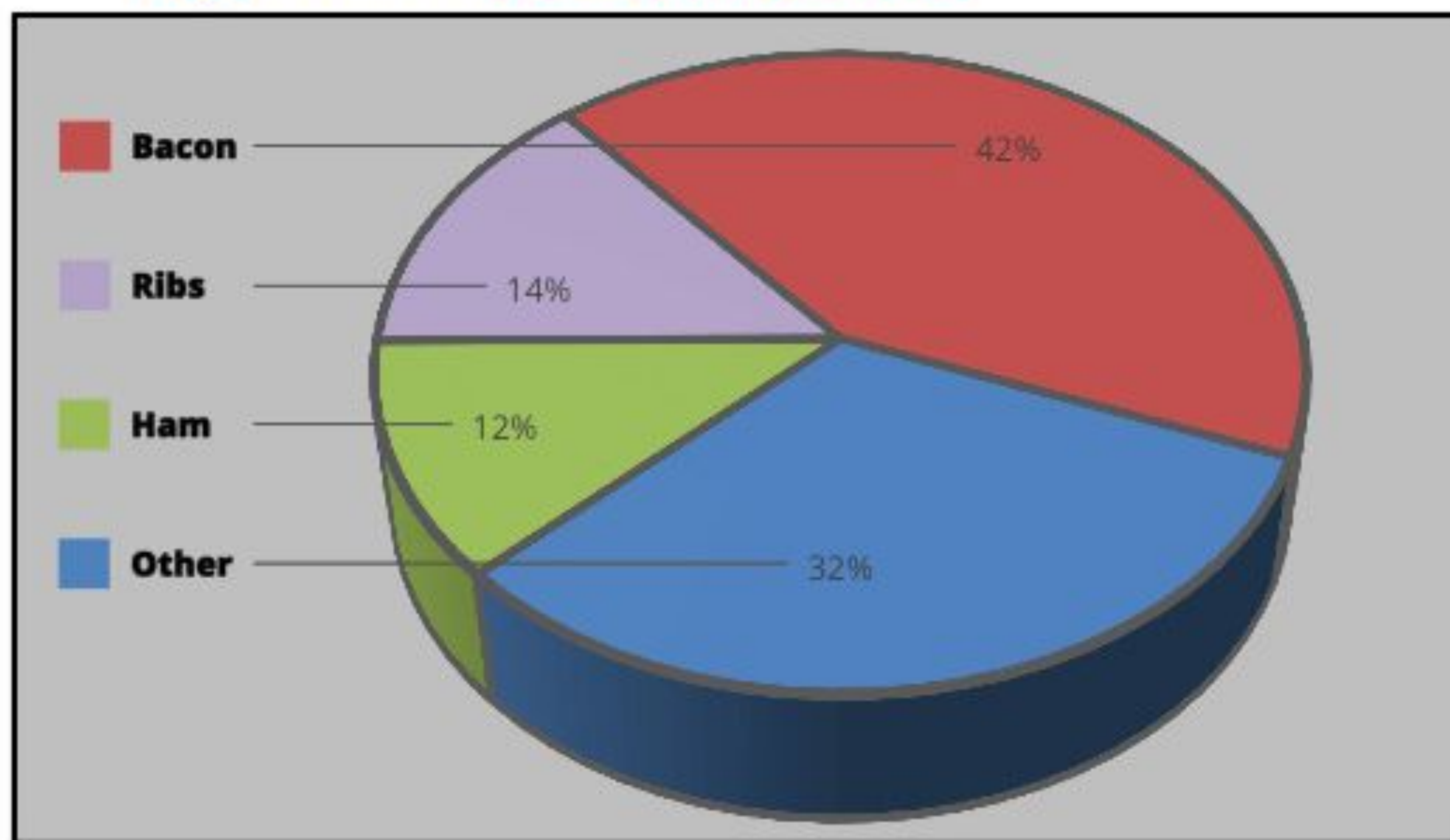
# Remove backgrounds





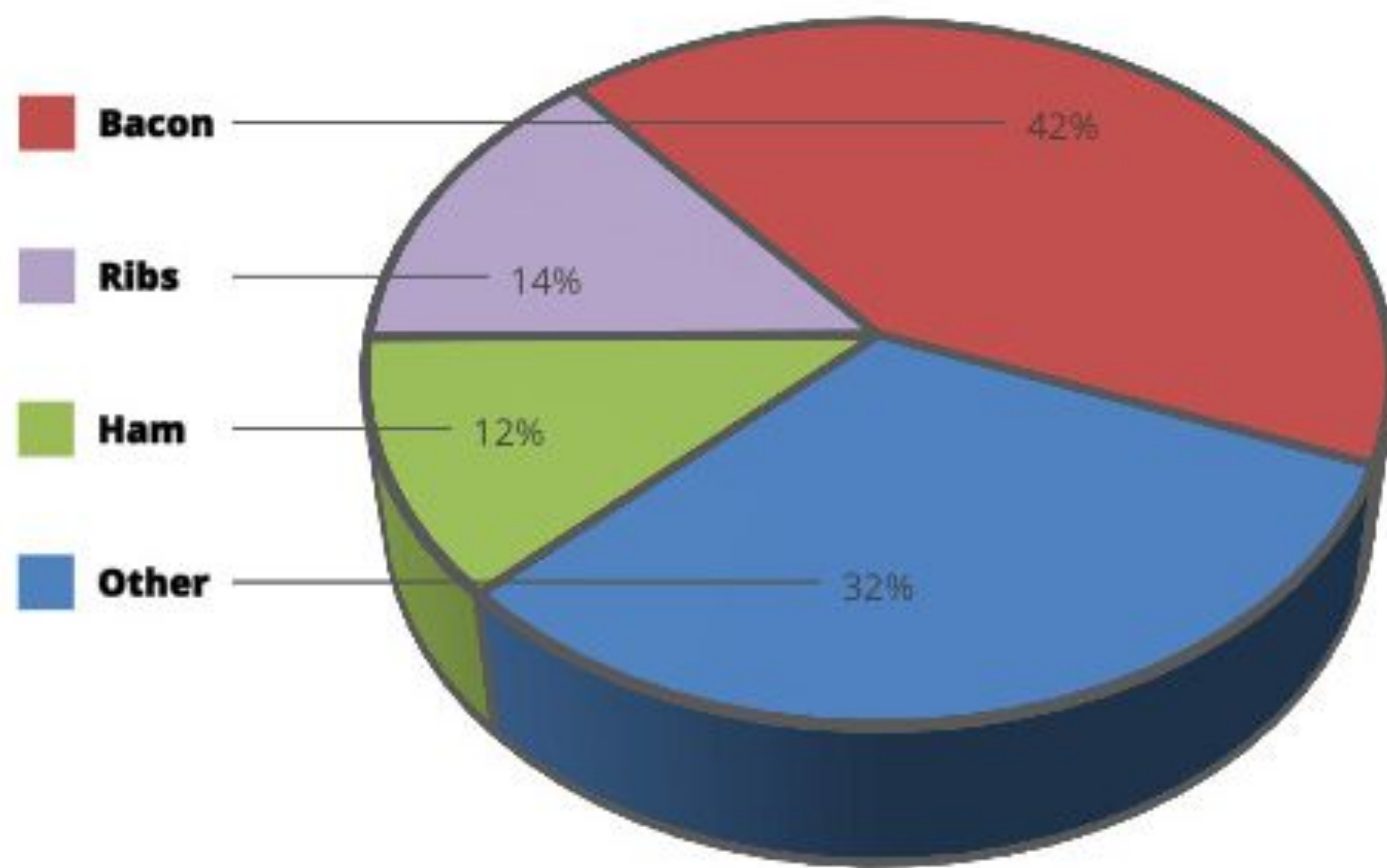
# Remove backgrounds

## Pig Meat Preferences



# Remove backgrounds

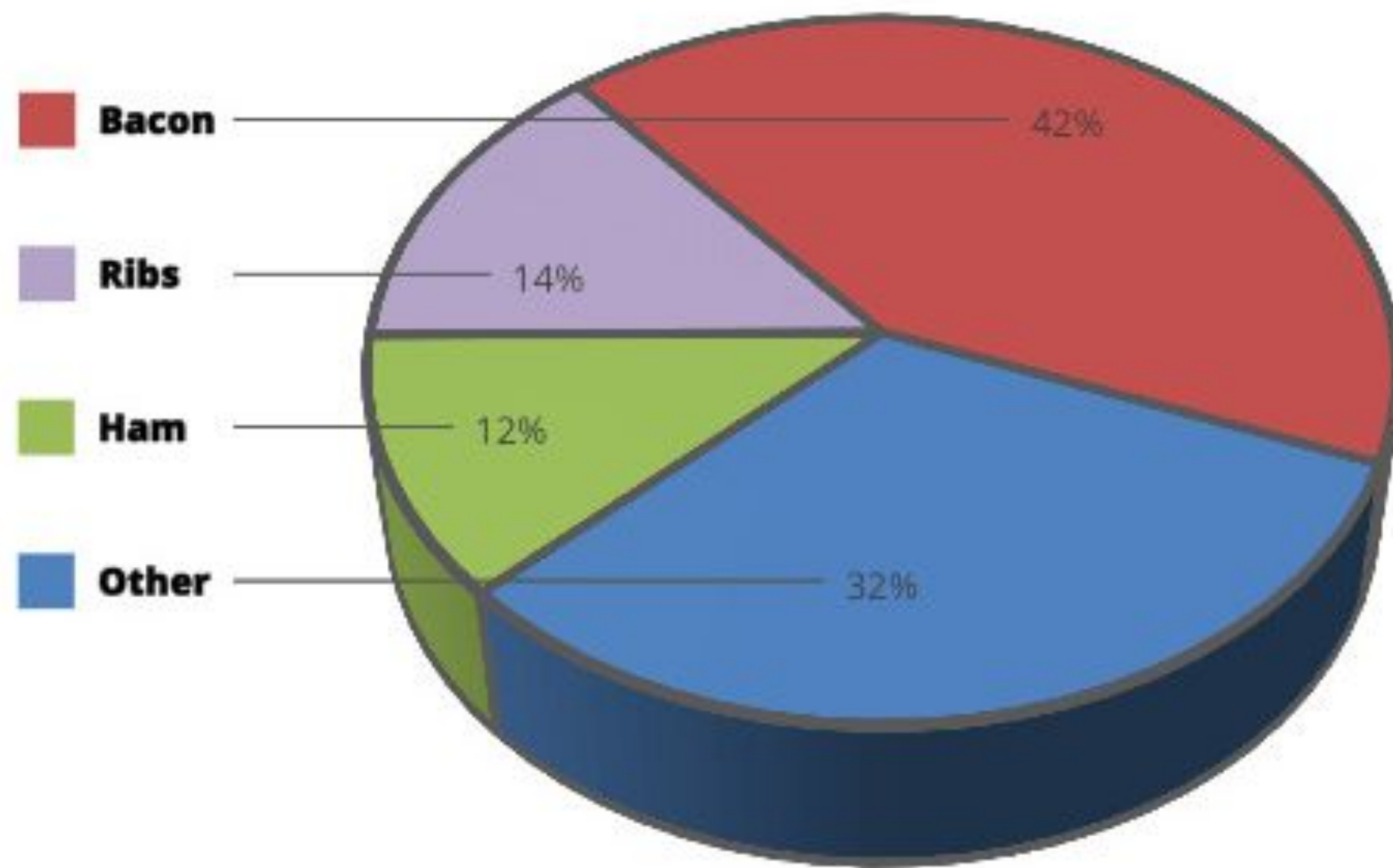
## Pig Meat Preferences





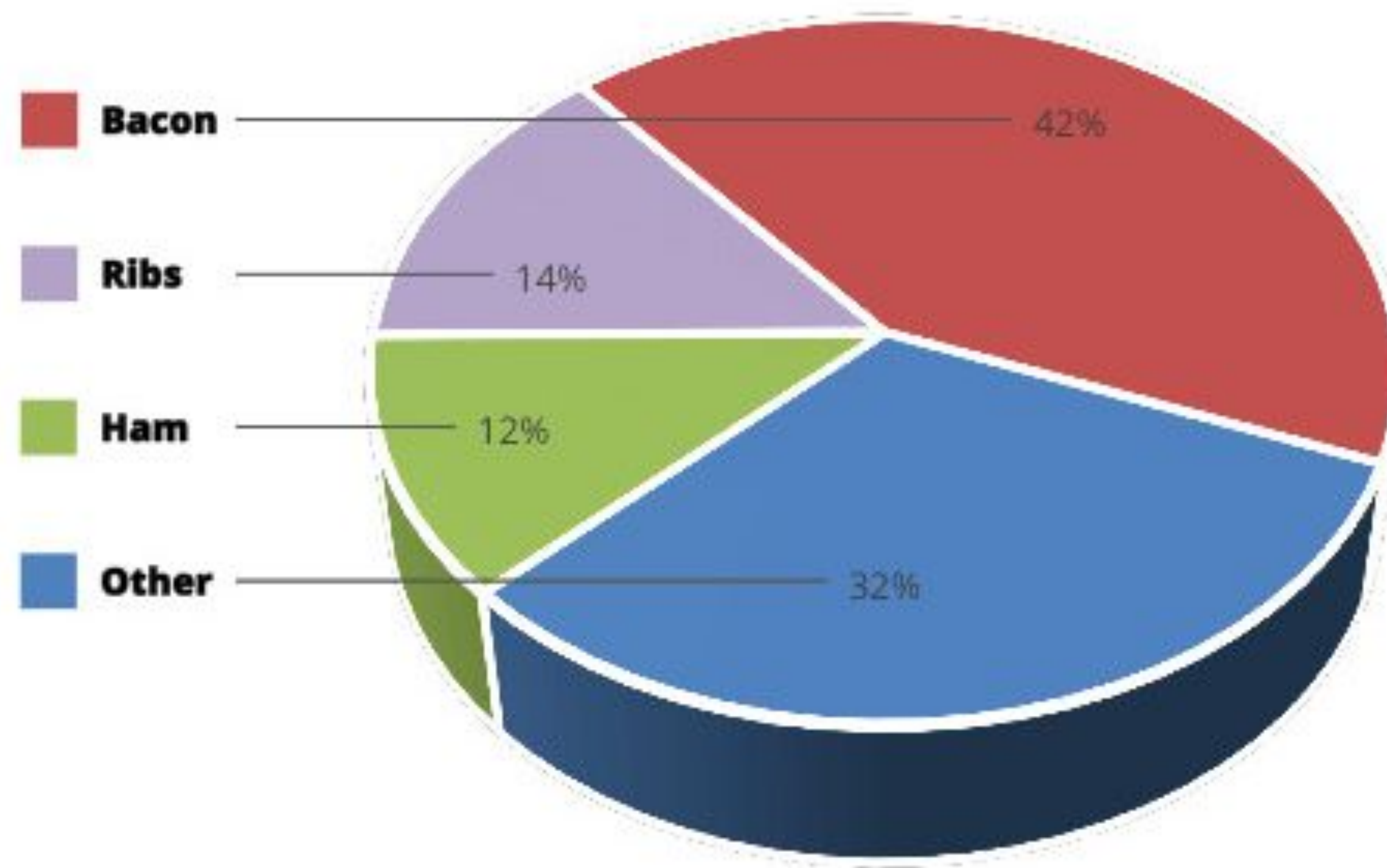
# Remove borders

## Pig Meat Preferences



# Remove borders

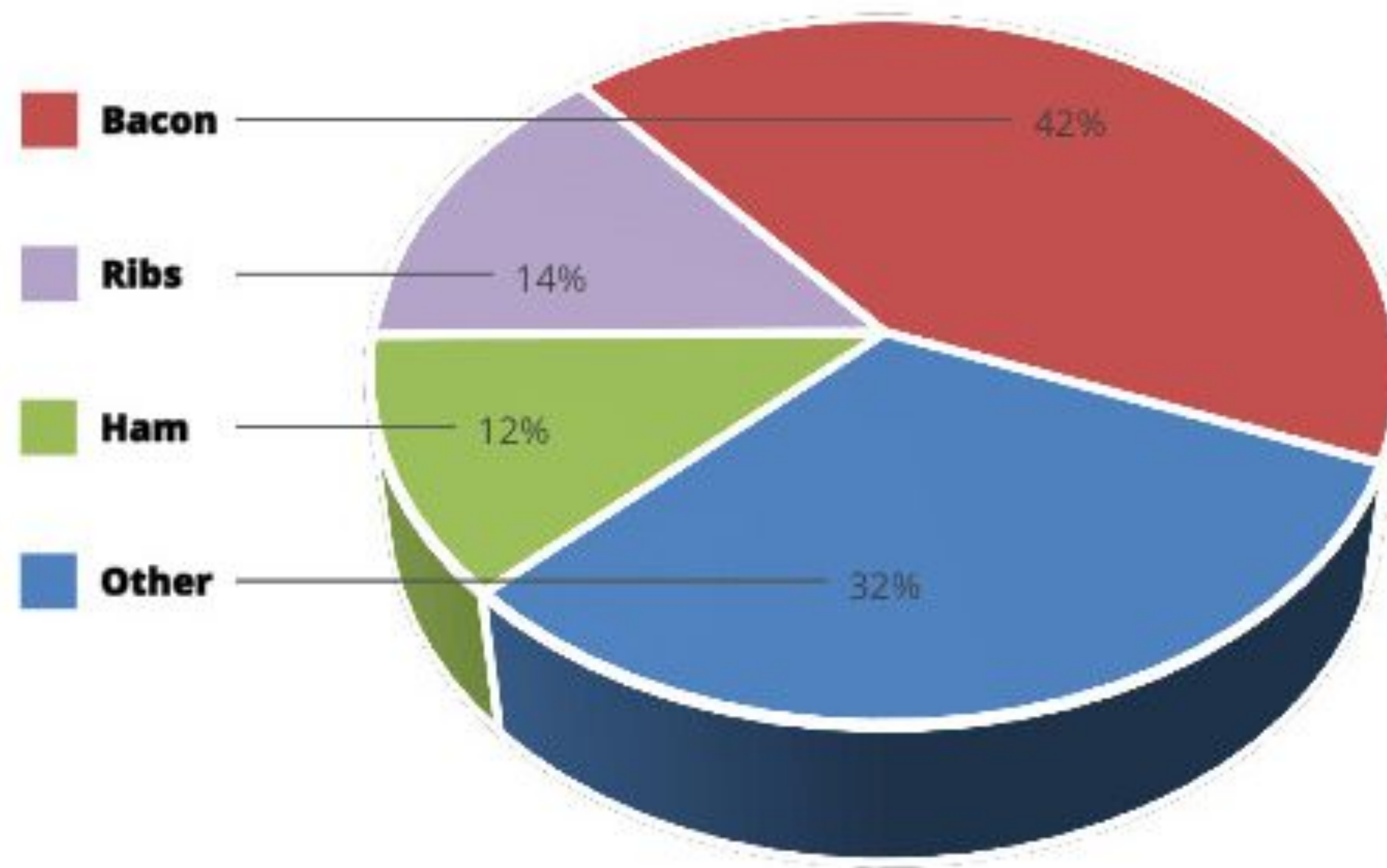
## Pig Meat Preferences





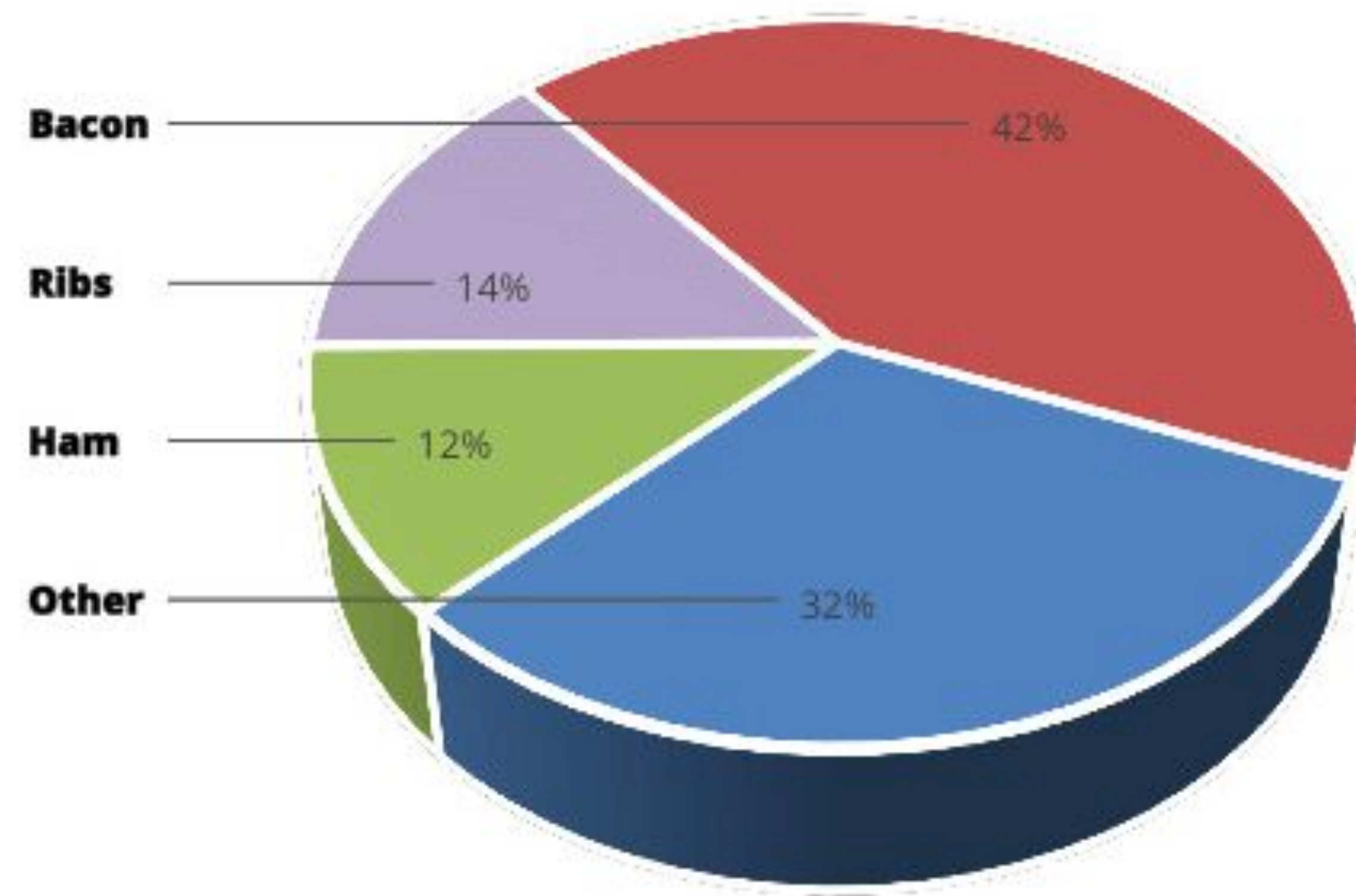
# Remove redundant legend

## Pig Meat Preferences



# Remove redundant legend

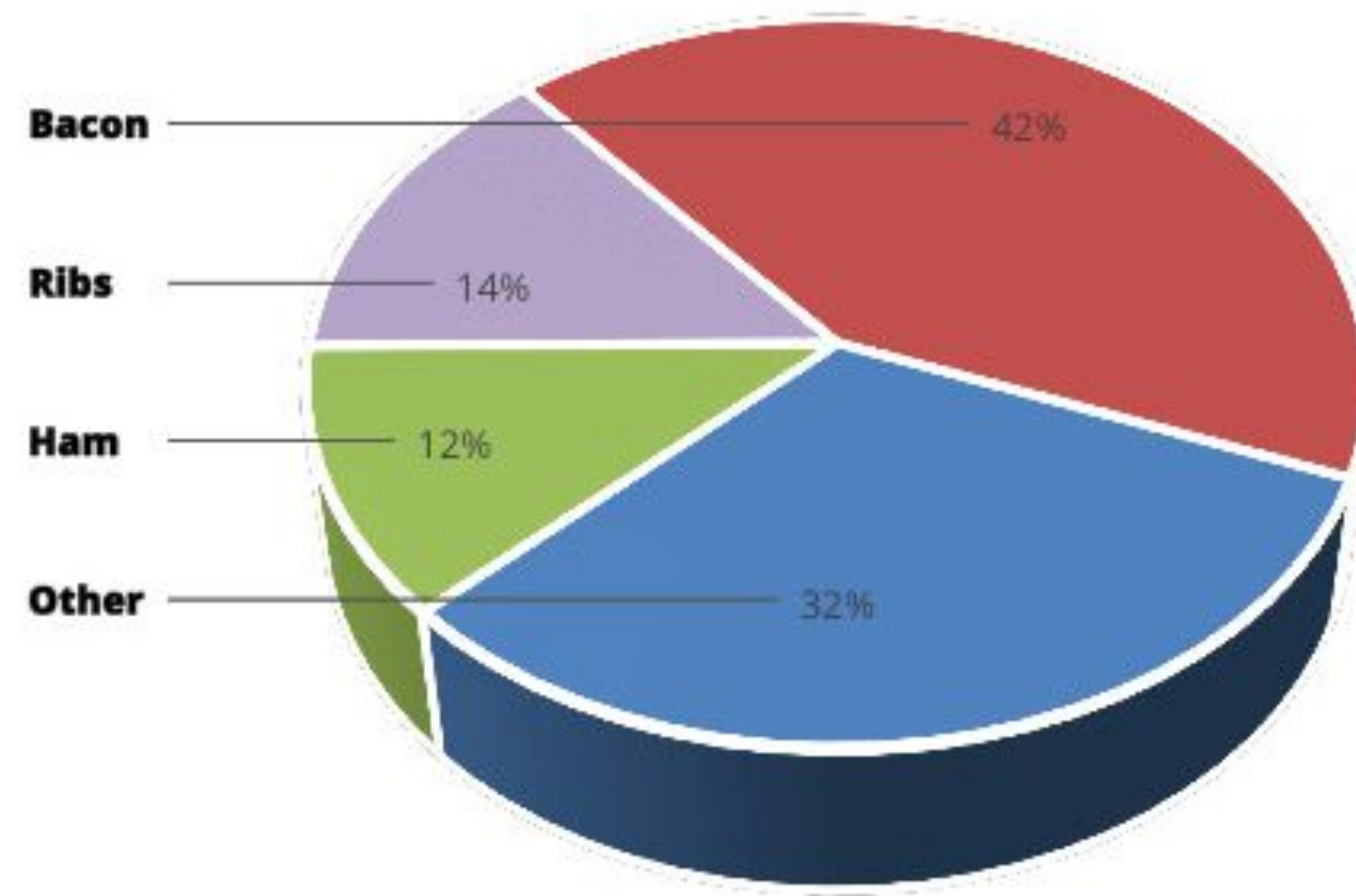
## Pig Meat Preferences





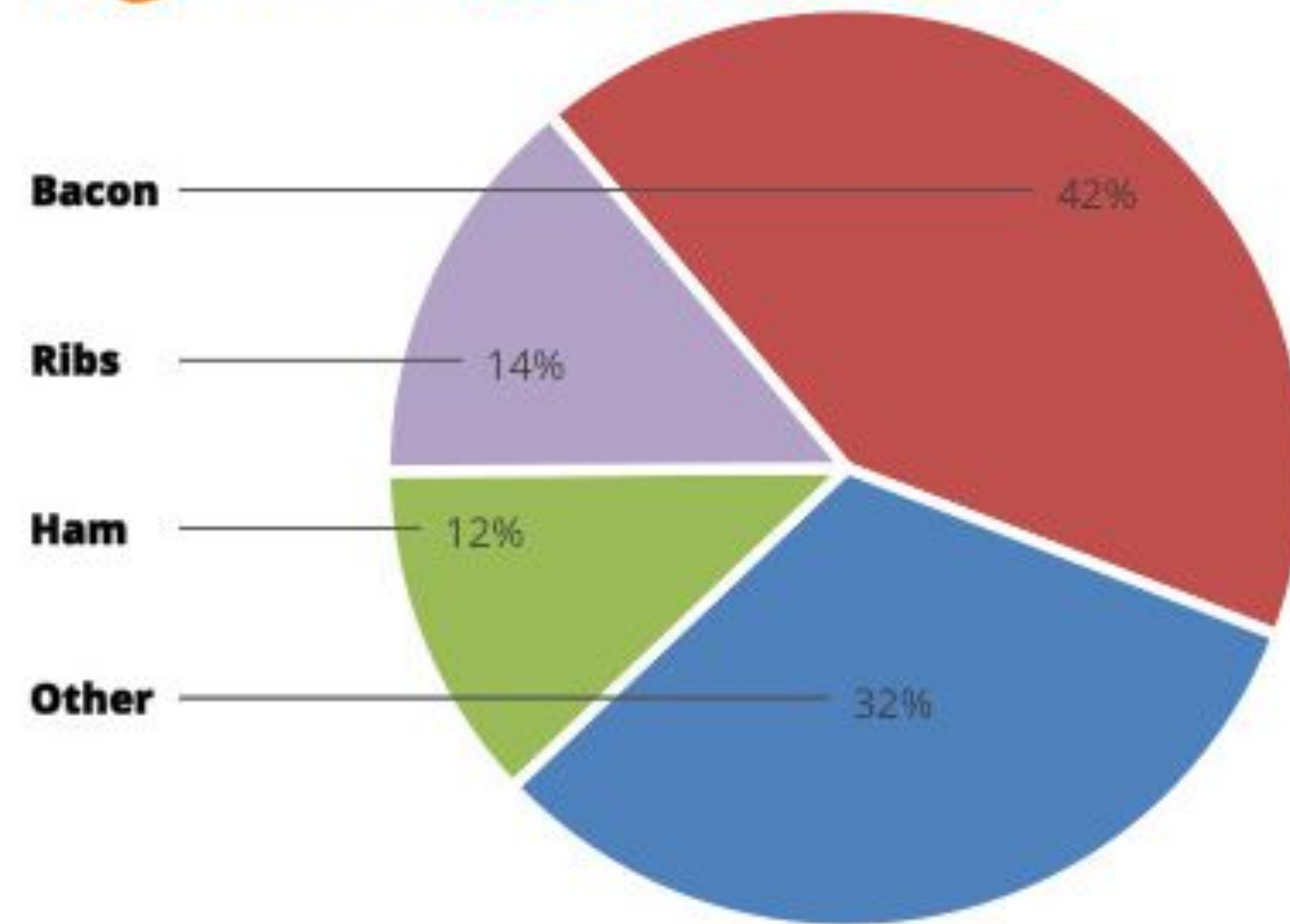
# Remove 3D

## Pig Meat Preferences



# Remove 3D

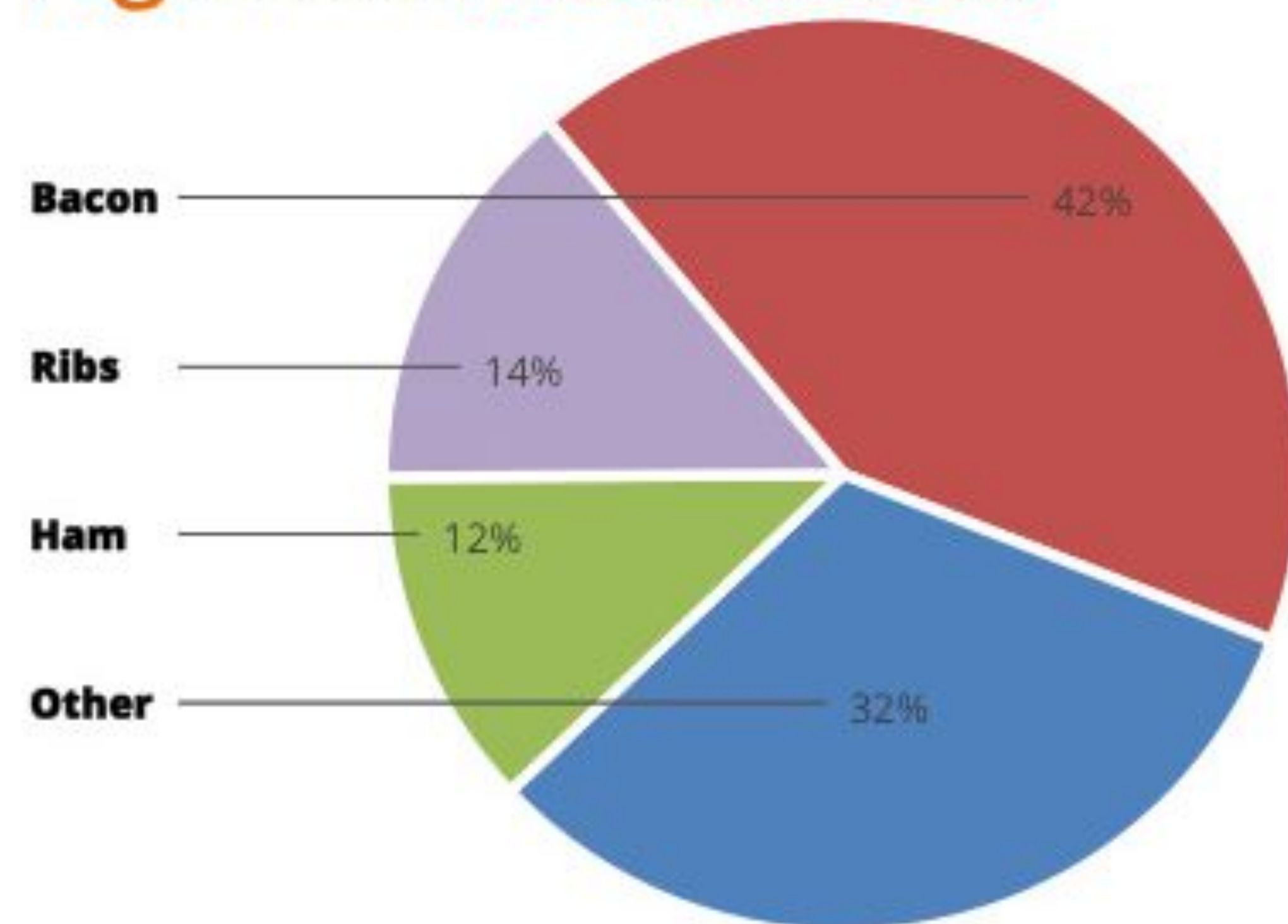
## Pig Meat Preferences





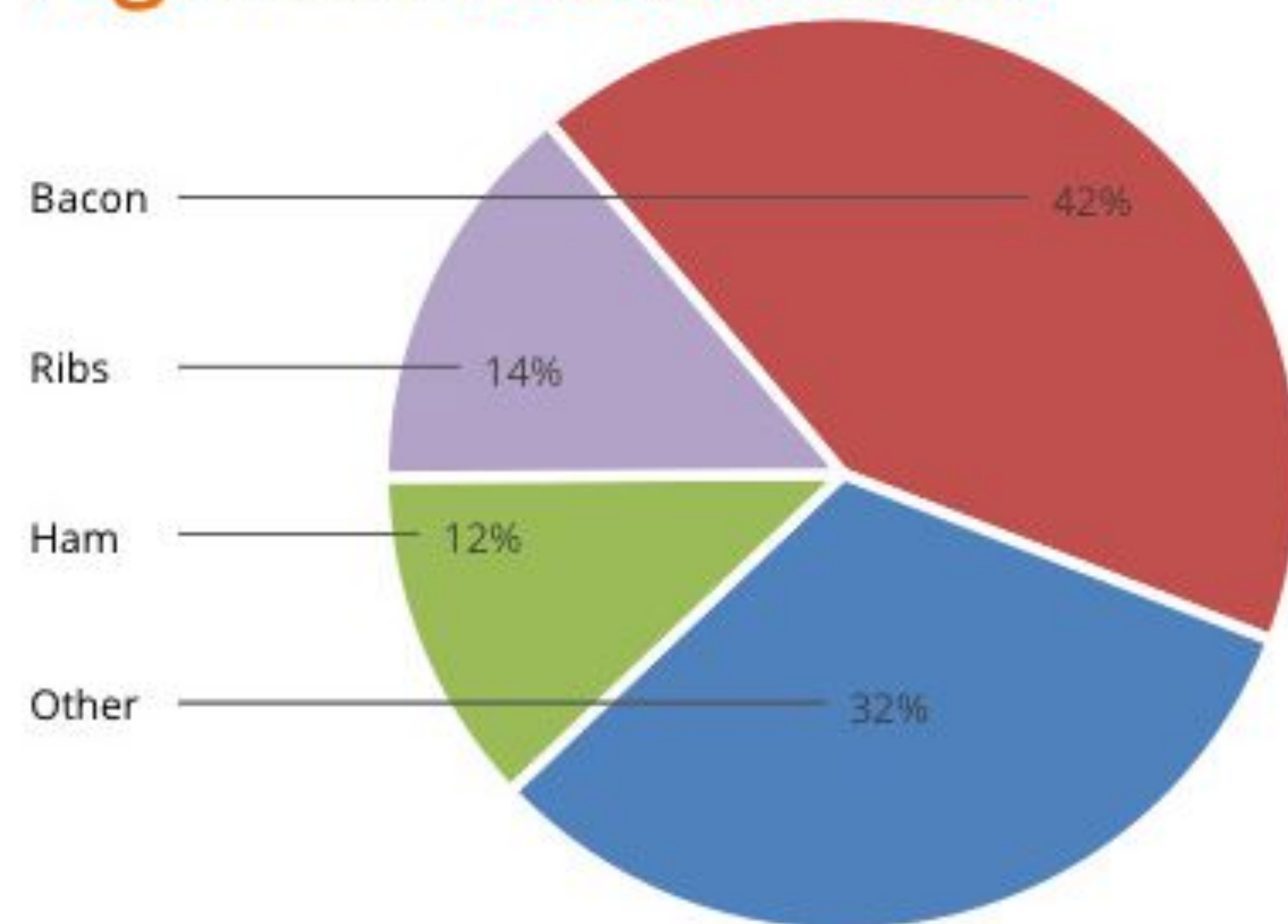
# Remove Bolding

## Pig Meat Preferences



# Remove Bolding

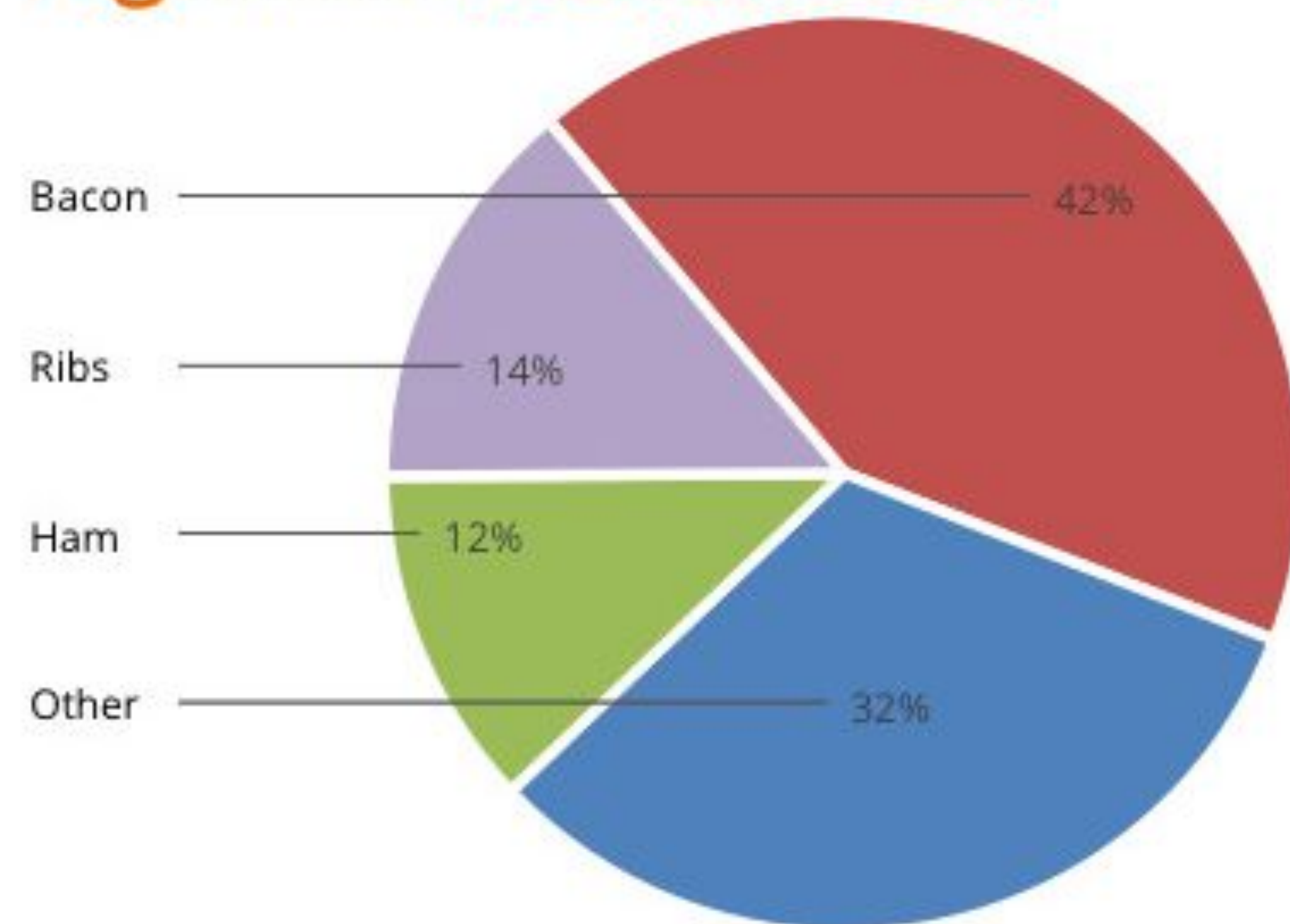
## Pig Meat Preferences





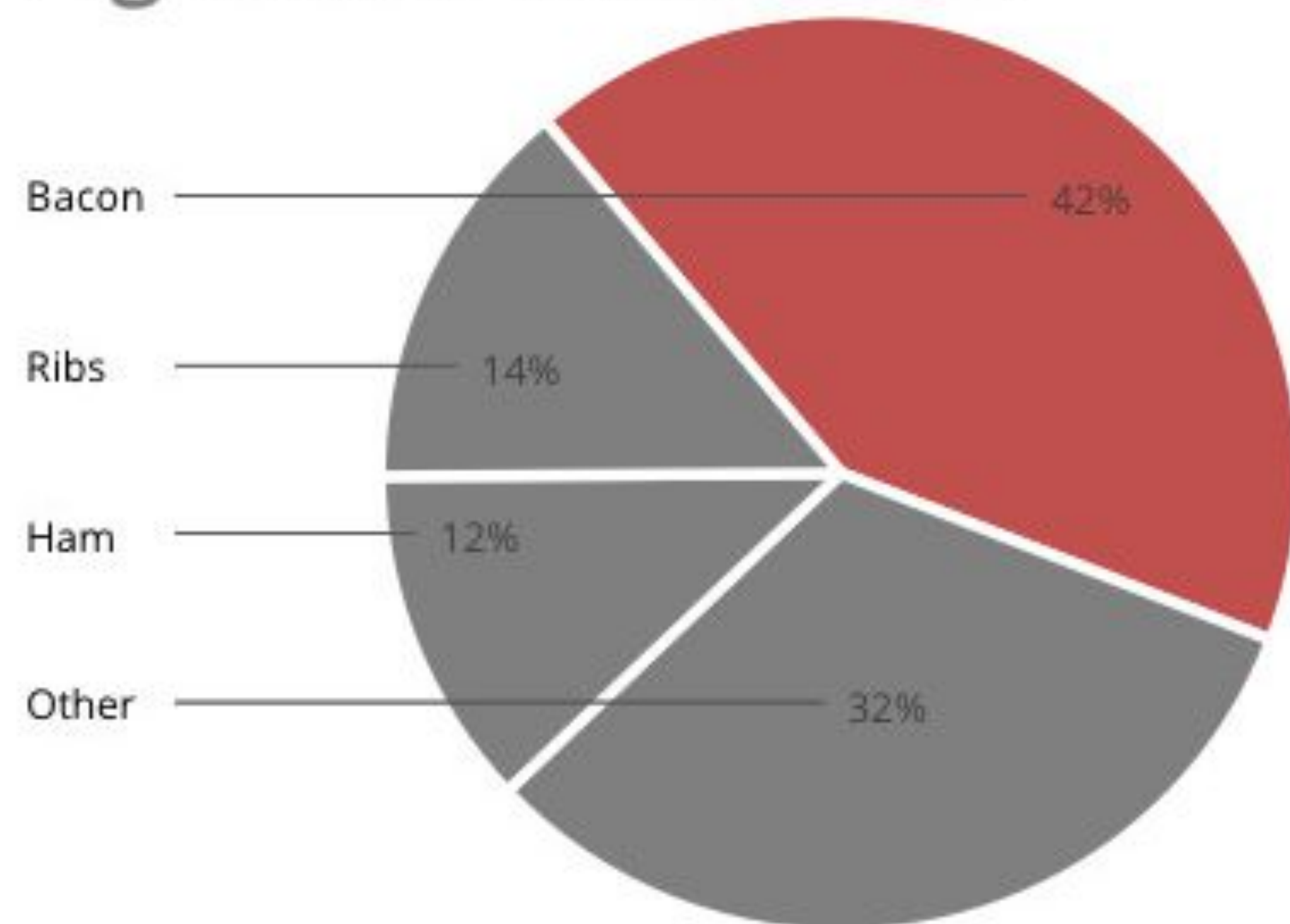
# Reduce Colors

## Pig Meat Preferences



# Reduce Colors

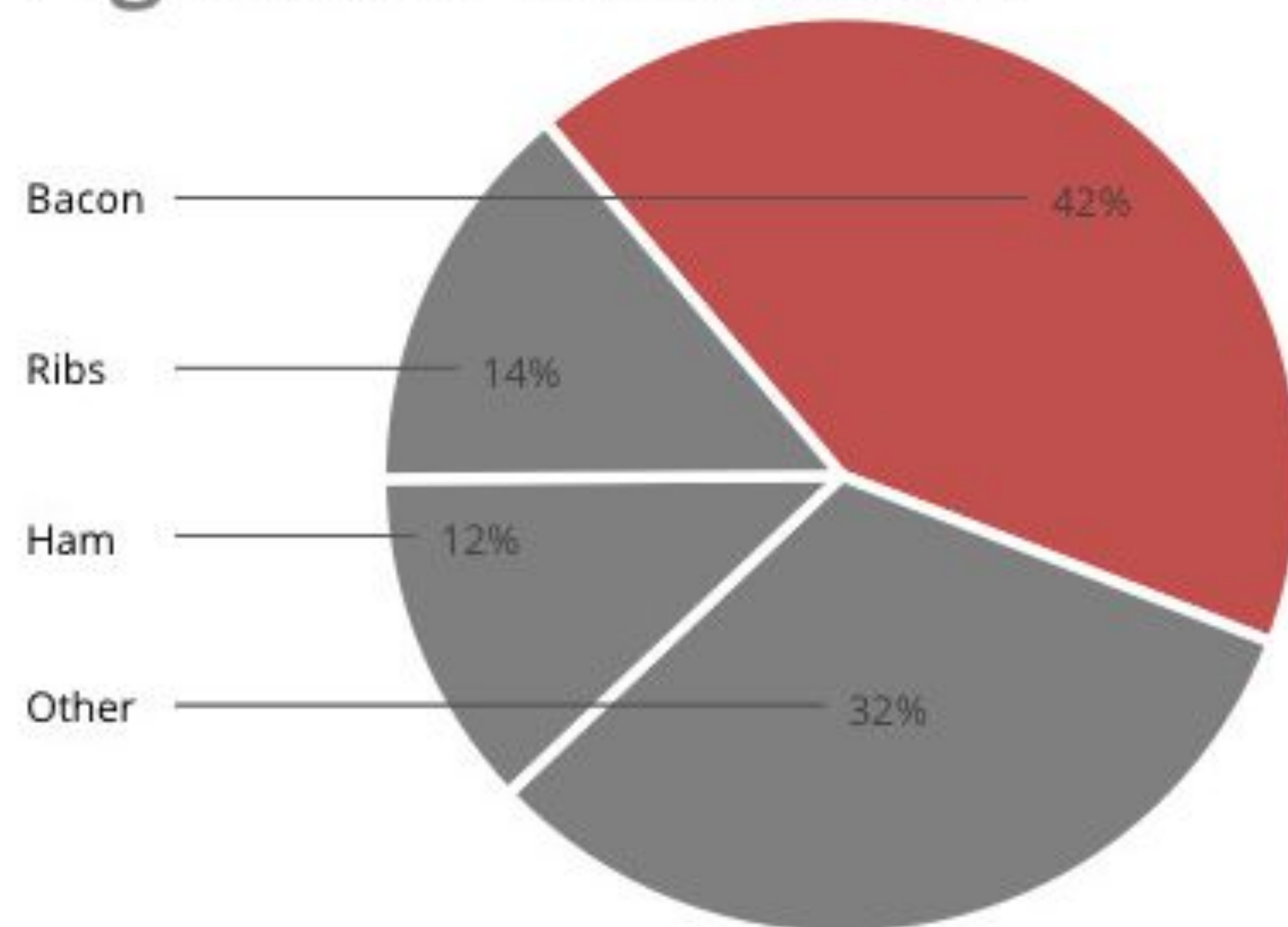
## Pig Meat Preferences





# Remove the wedges

## Pig Meat Preferences



# Remove the wedges

## Pig Meat Preferences





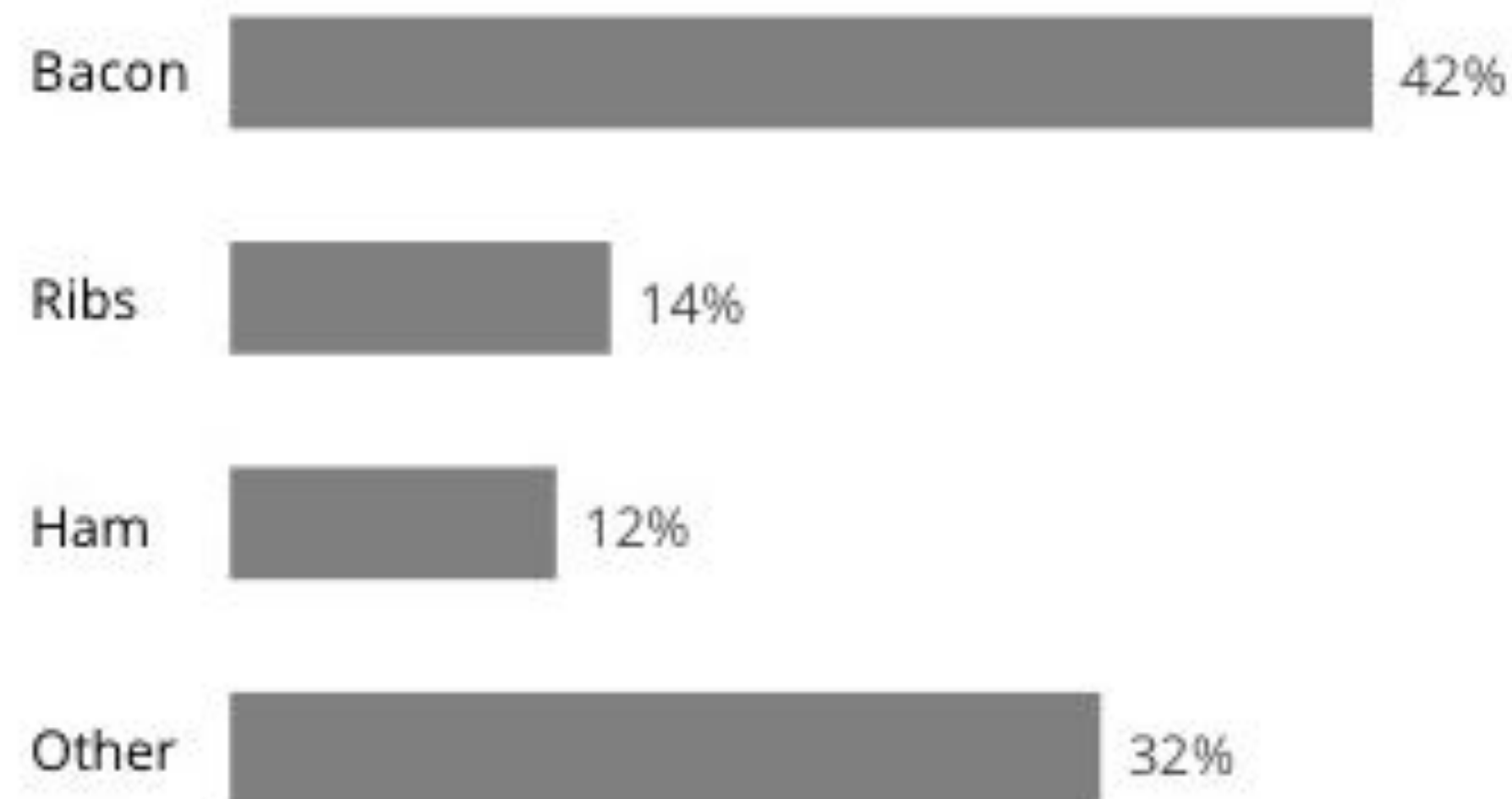
# Thicken the lines

## Pig Meat Preferences



# Thicken the lines

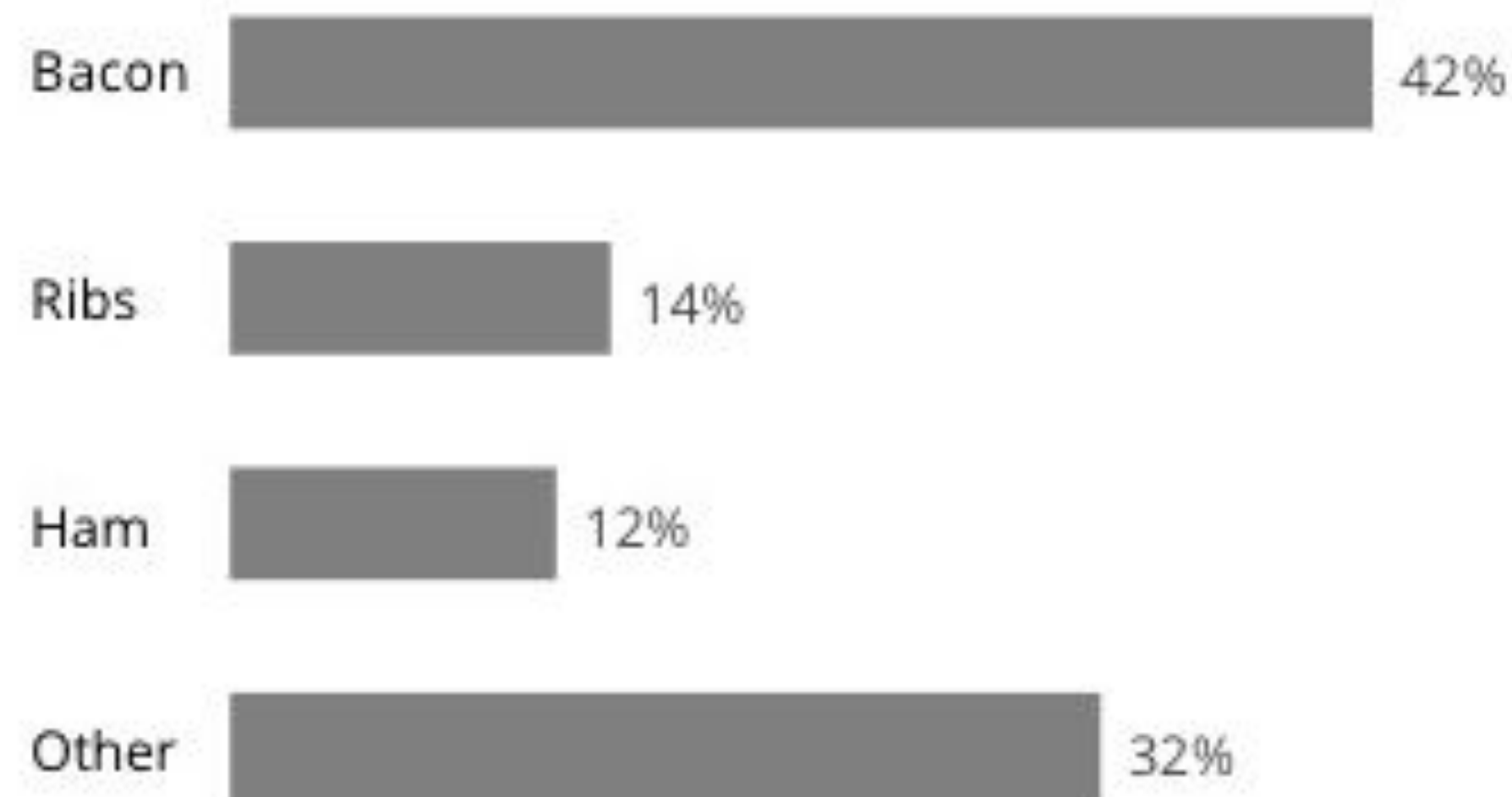
## Pig Meat Preferences





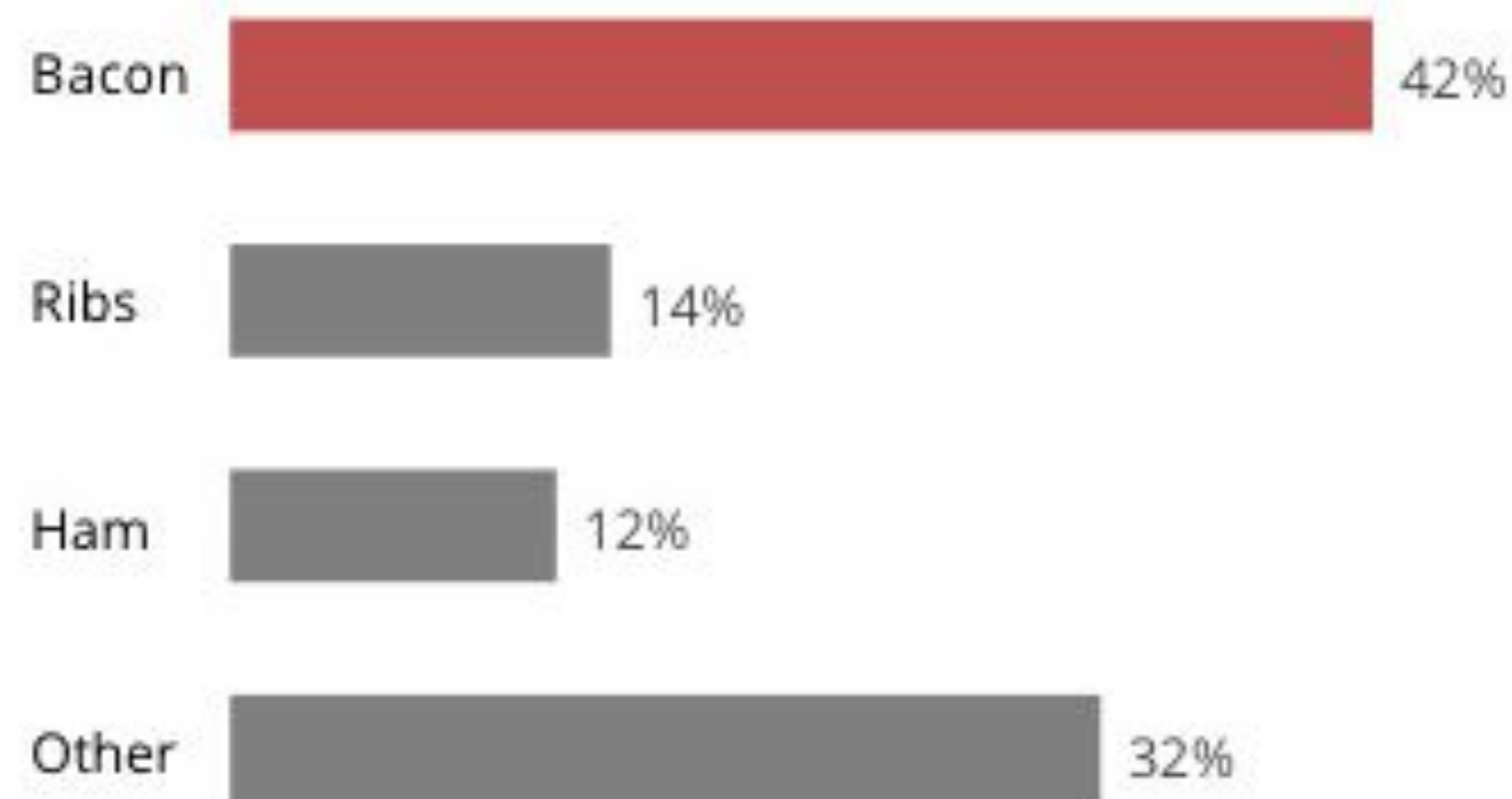
# Emphasize the bacon

## Pig Meat Preferences



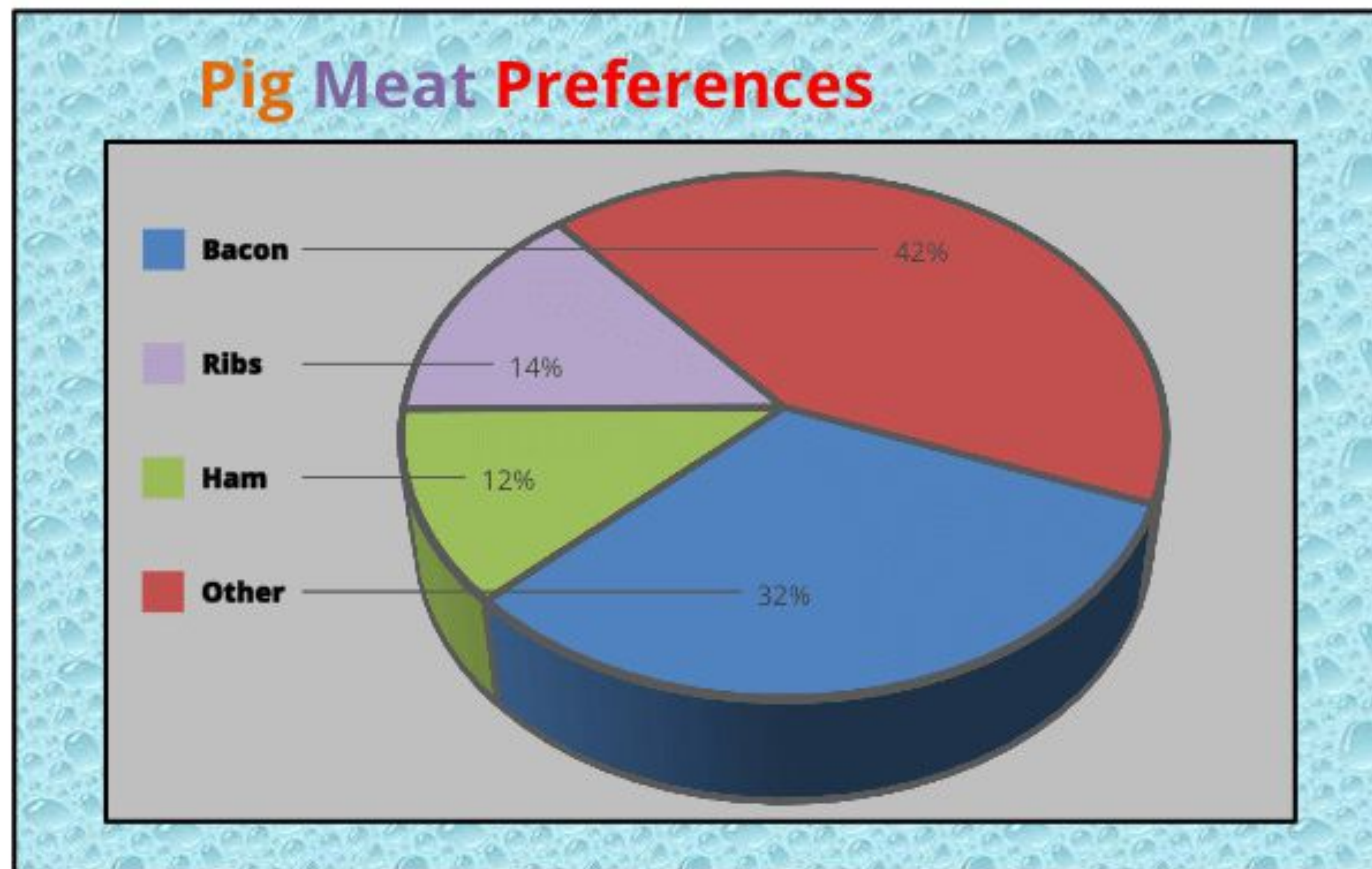
# Emphasize the bacon

## Pig Meat Preferences



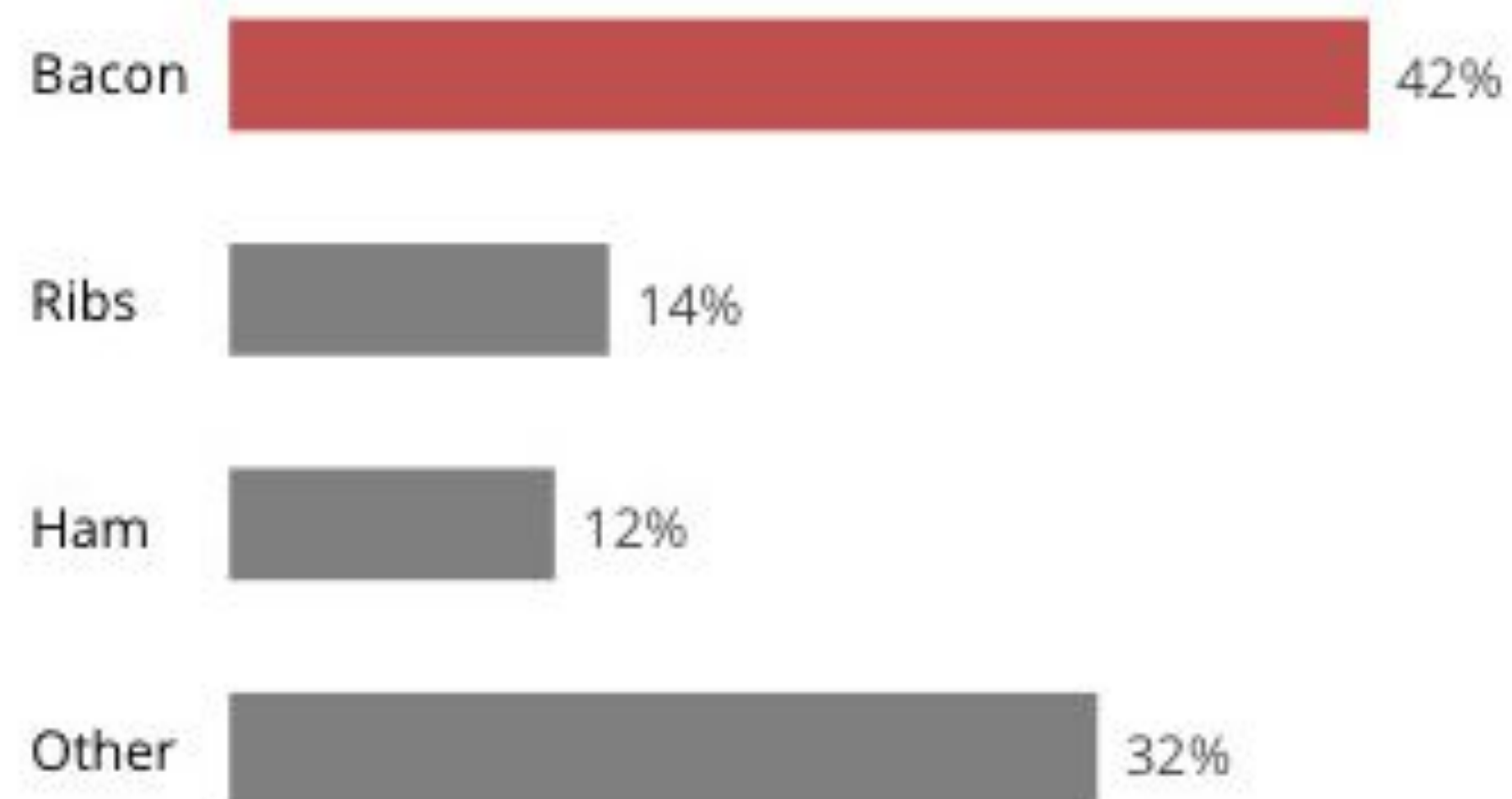


# Before



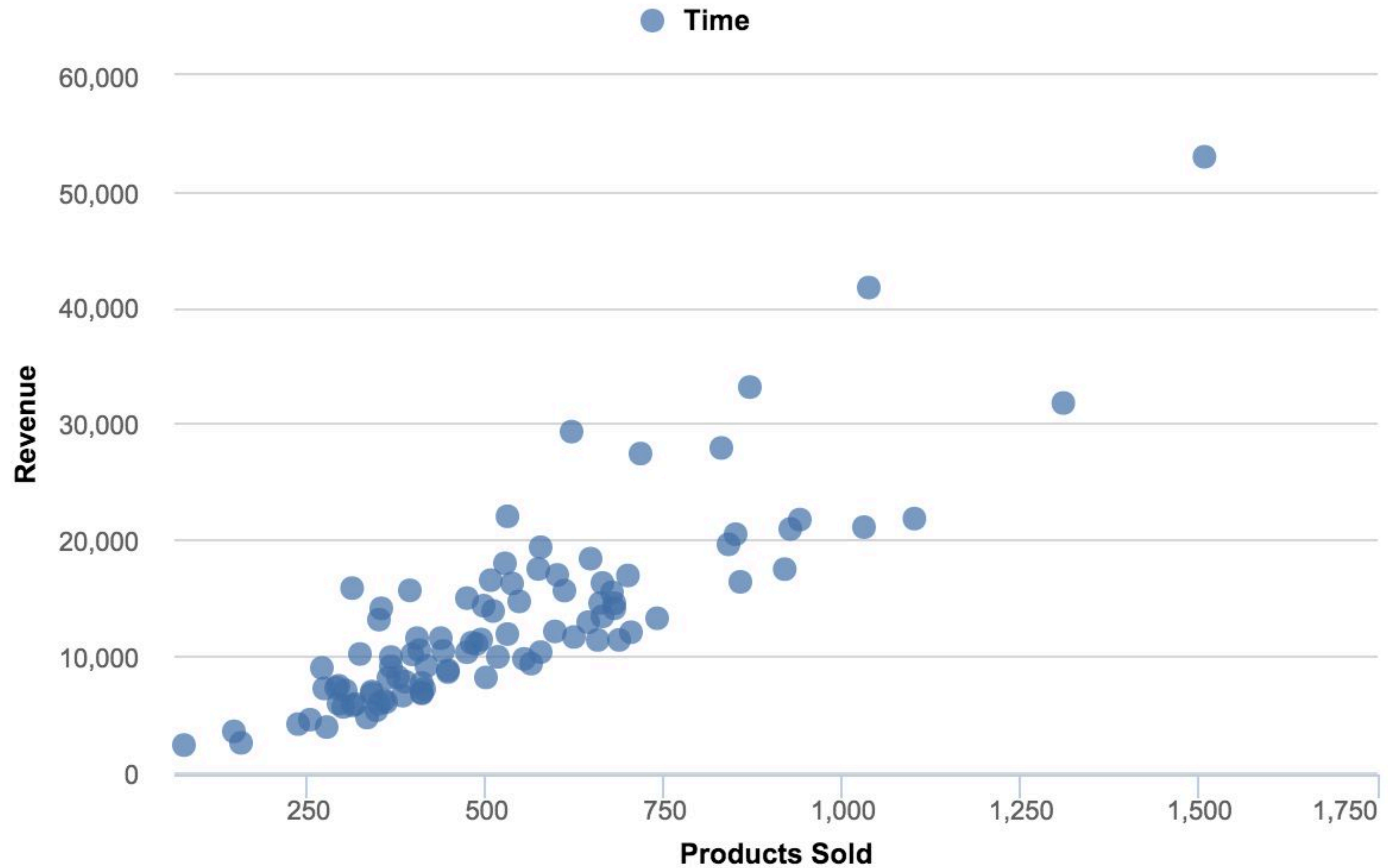
# After

## Pig Meat Preferences

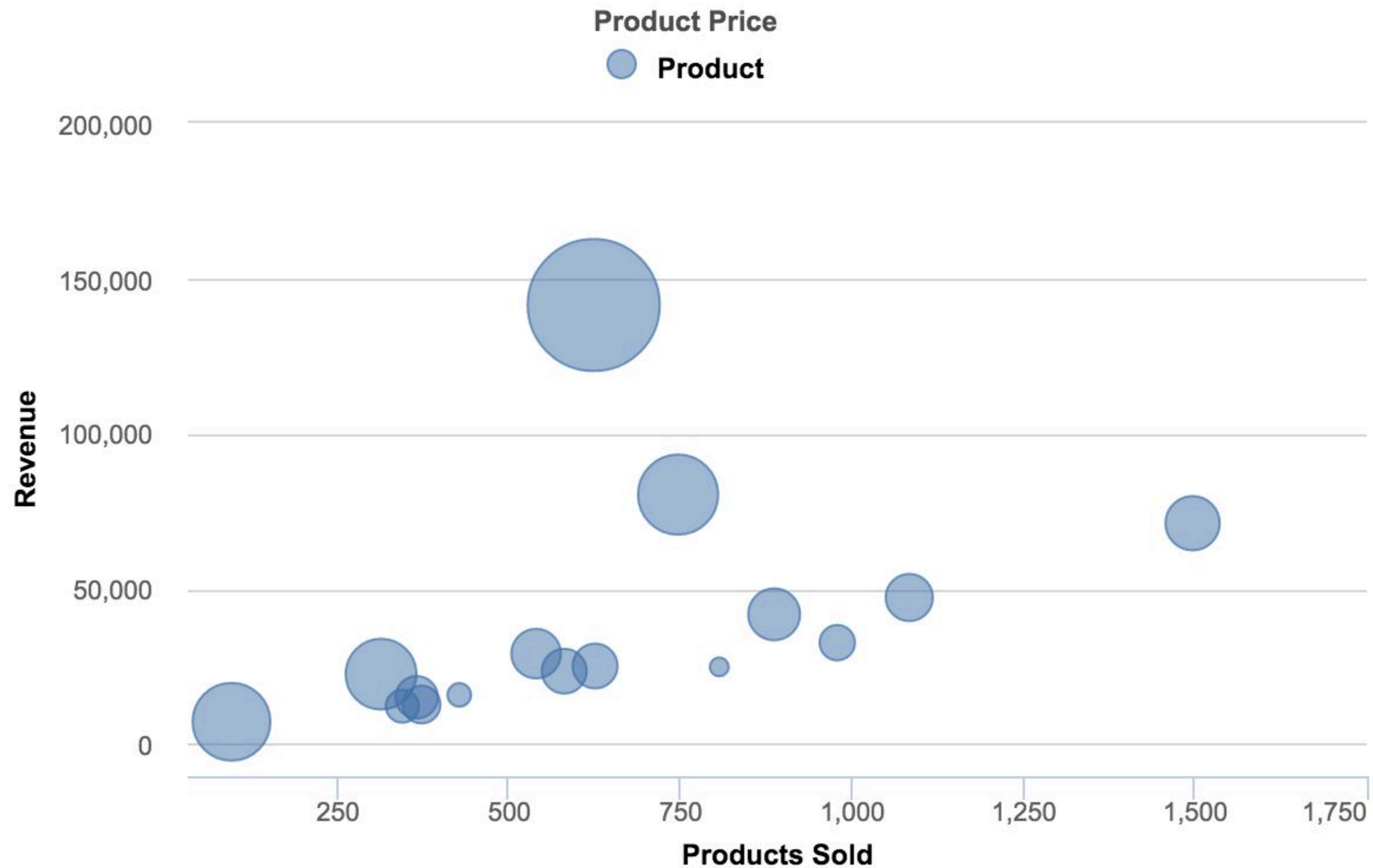




# Scatter Charts

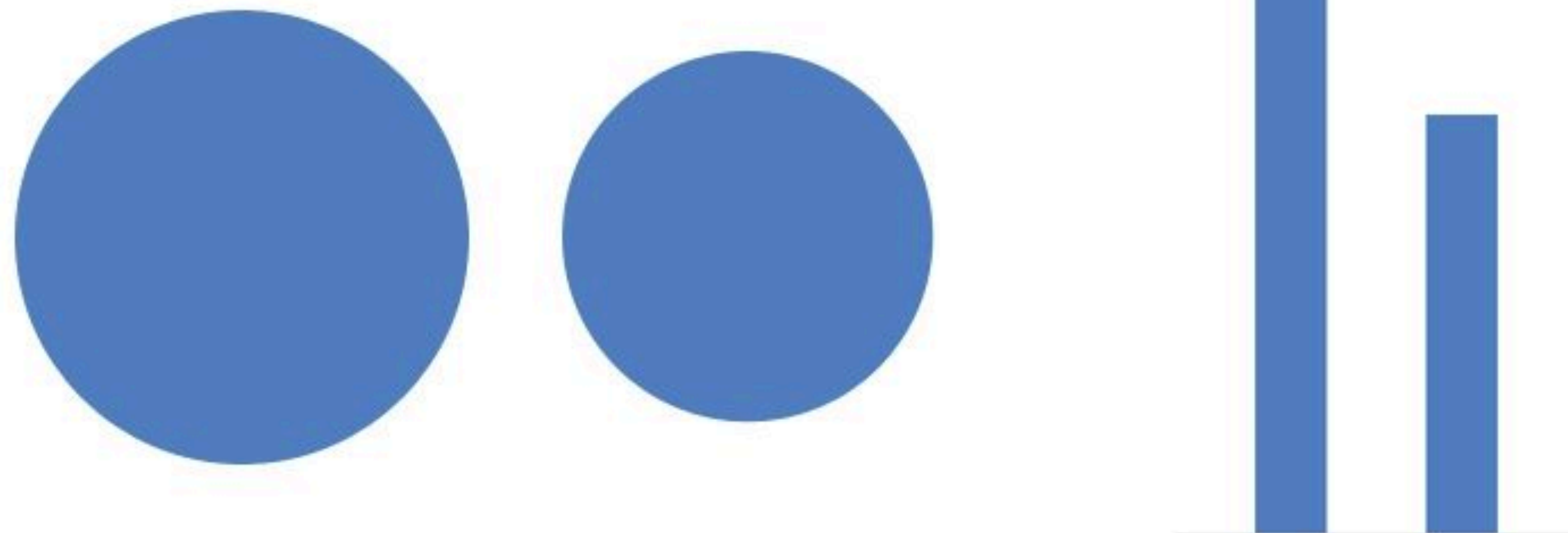
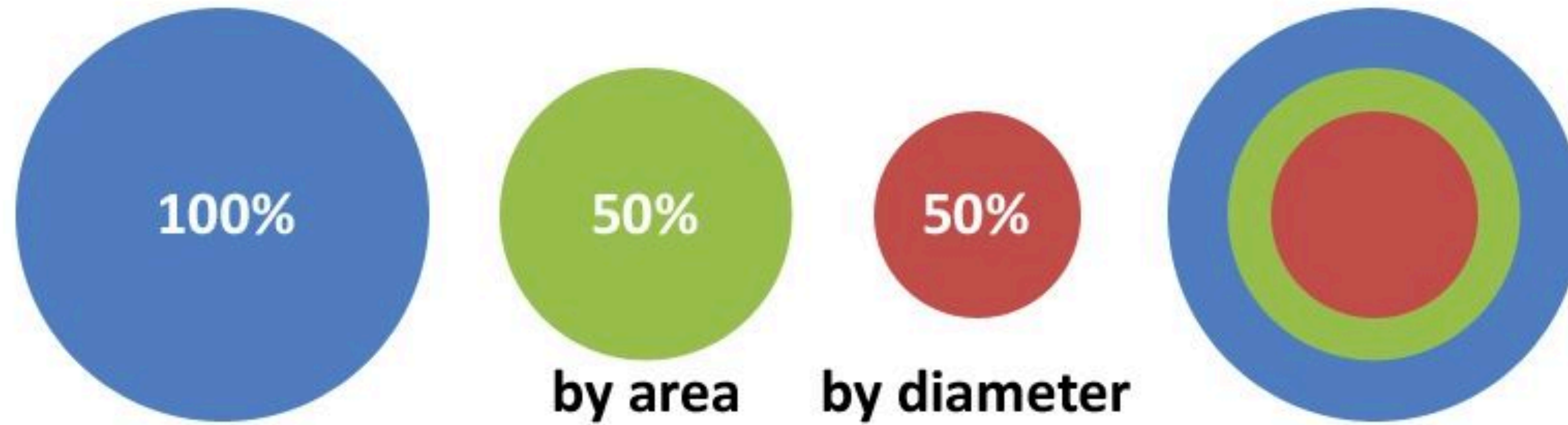


# Scatter Bubble Charts

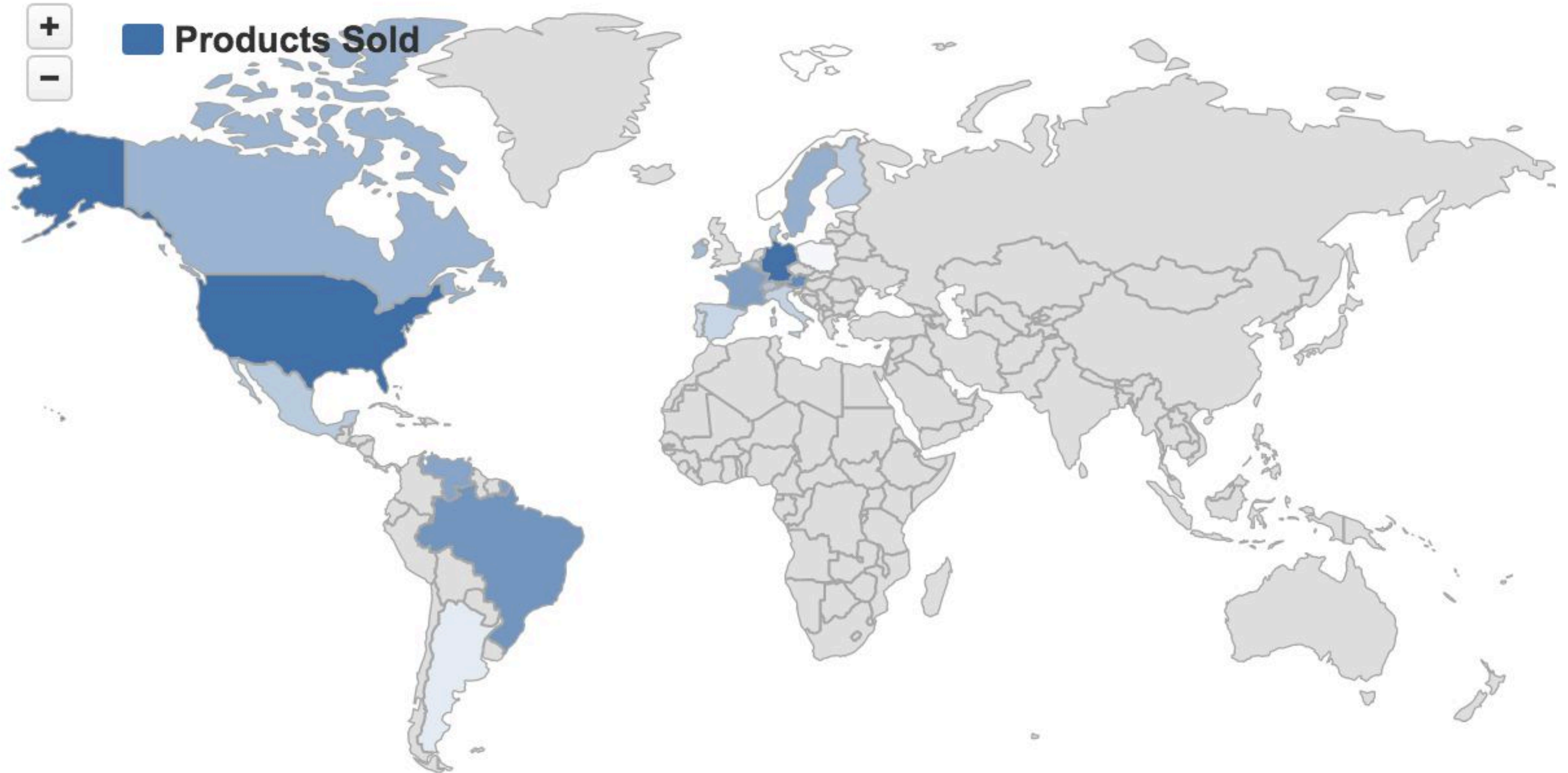




# Problems with Bubbles



# Map Charts



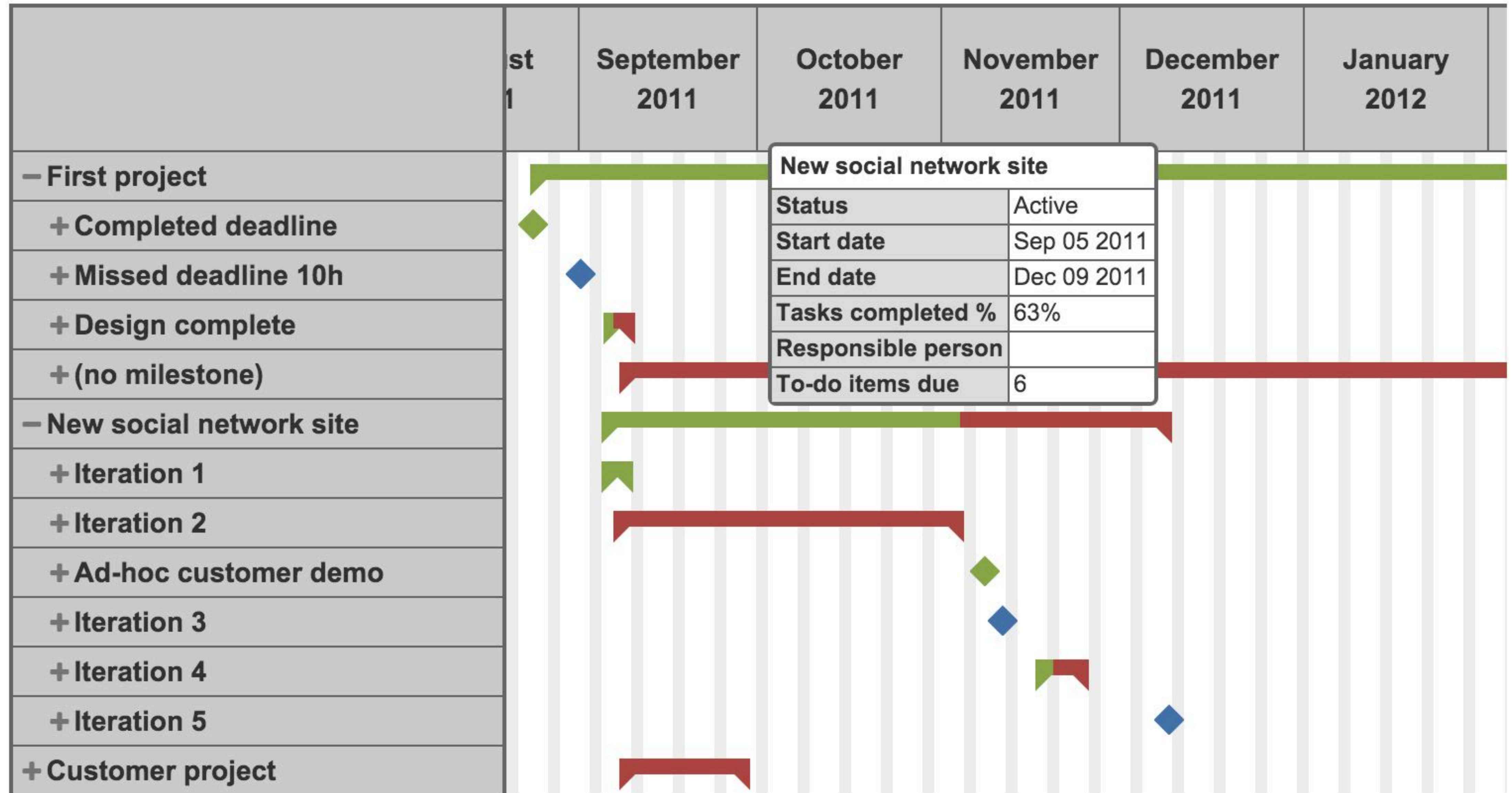


# Map Charts



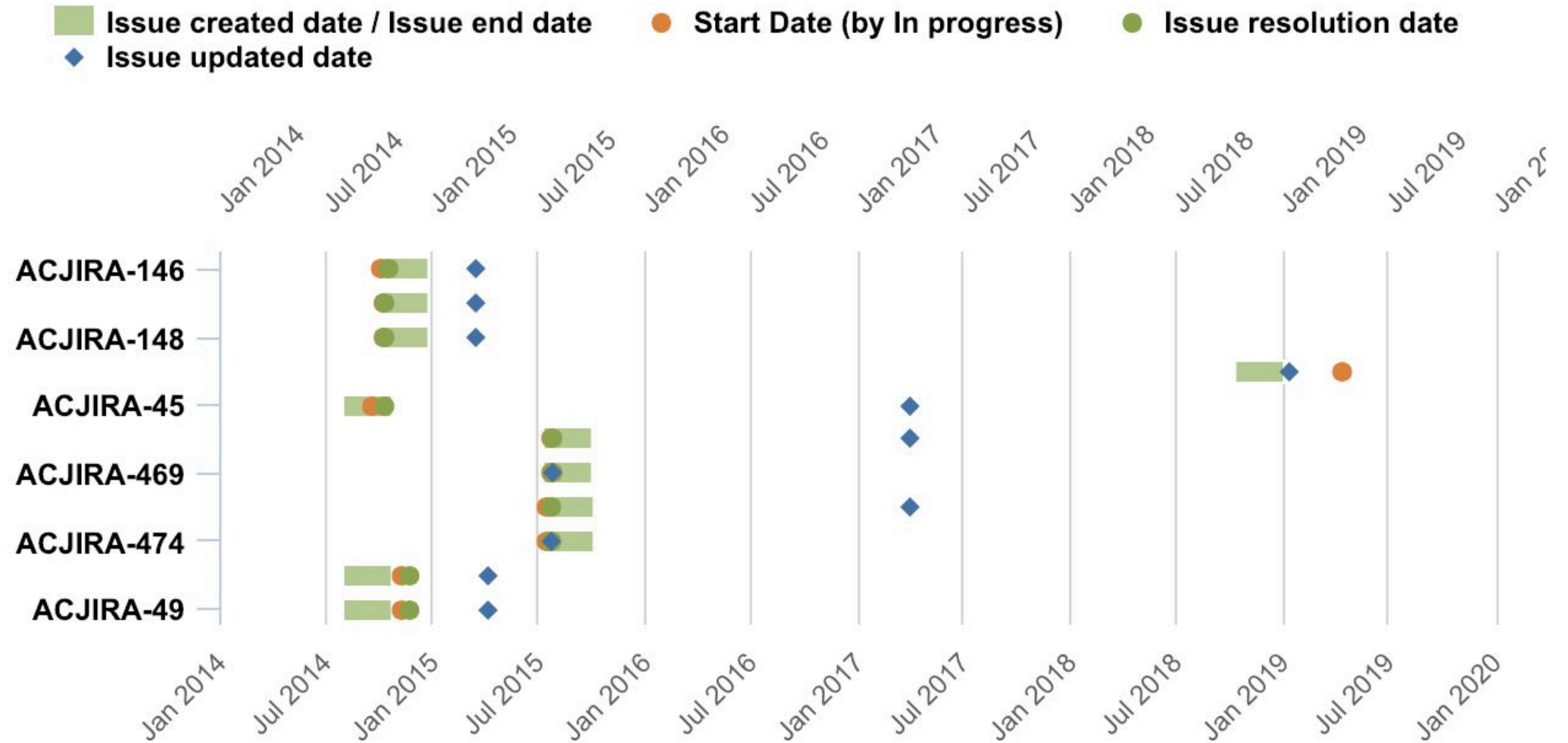


# Gantt Charts

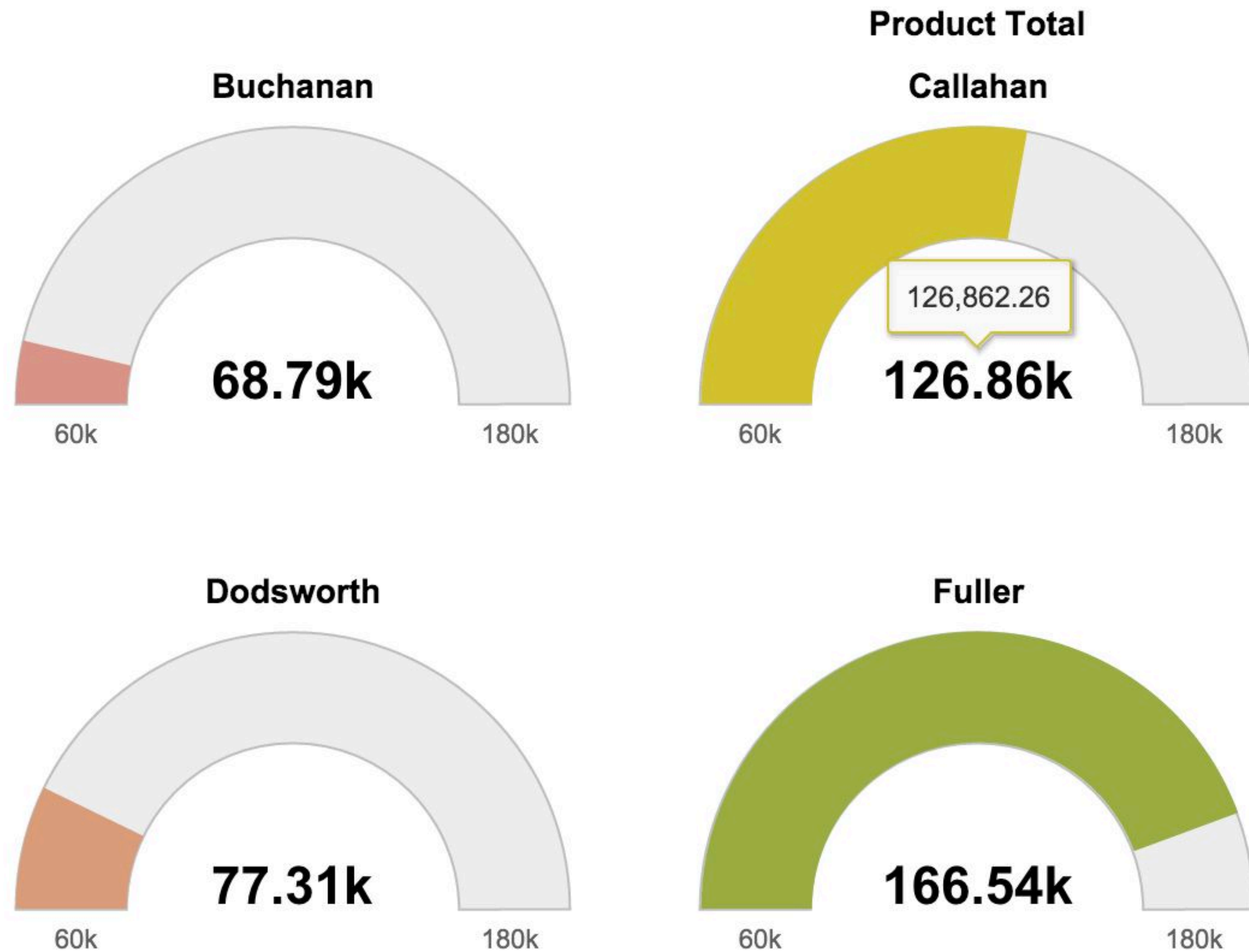




# Gantt Charts

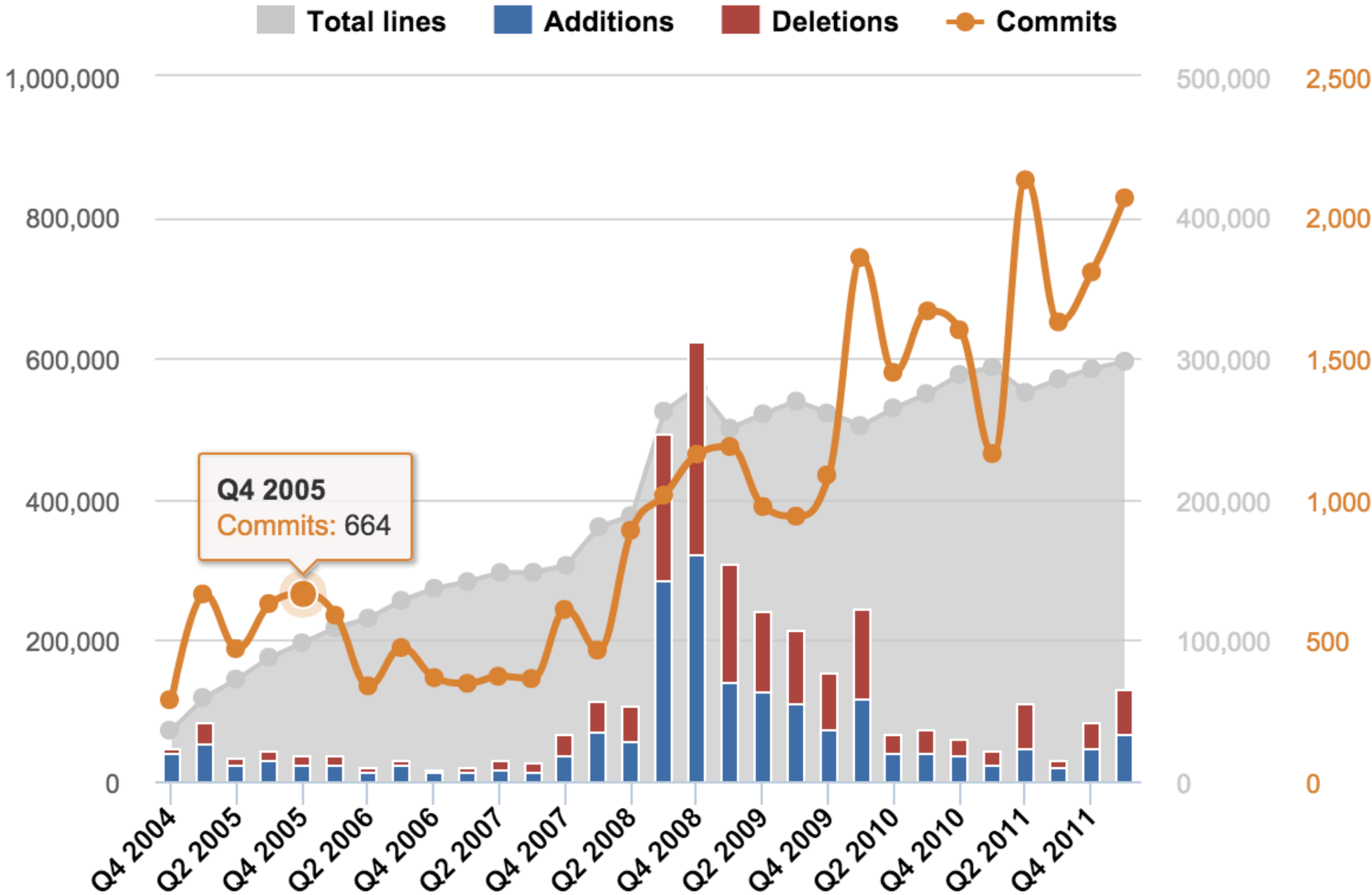


# Gauge Charts

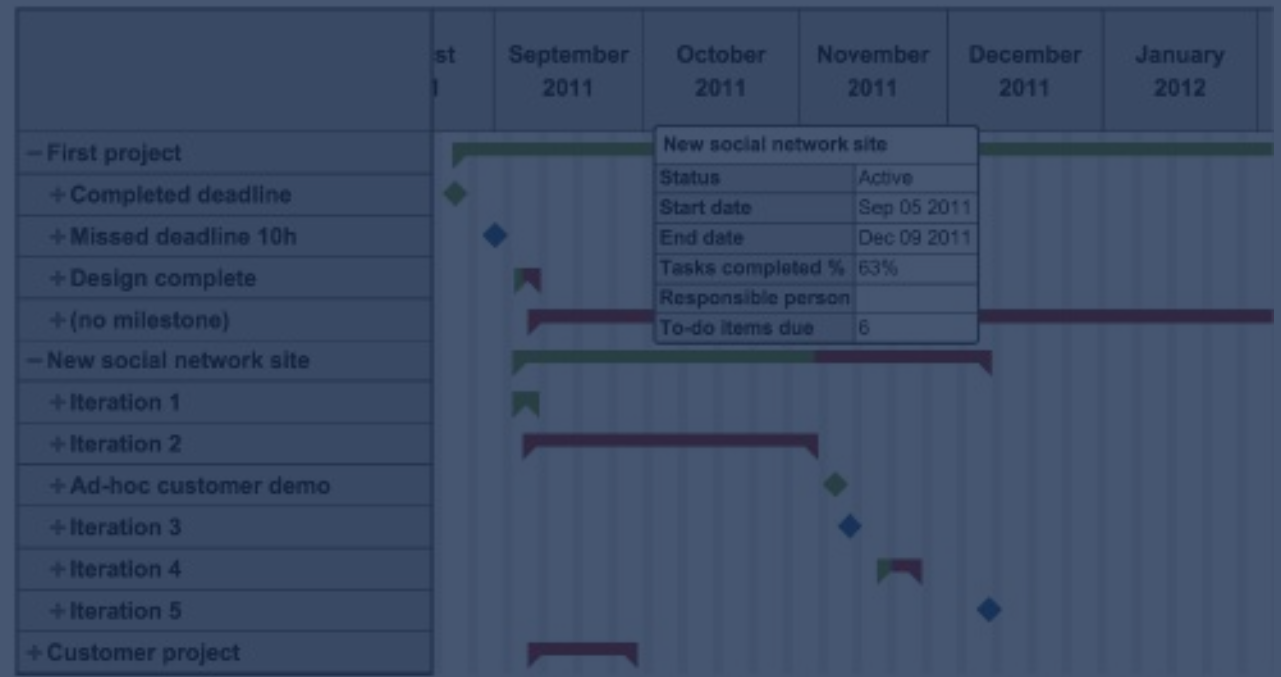
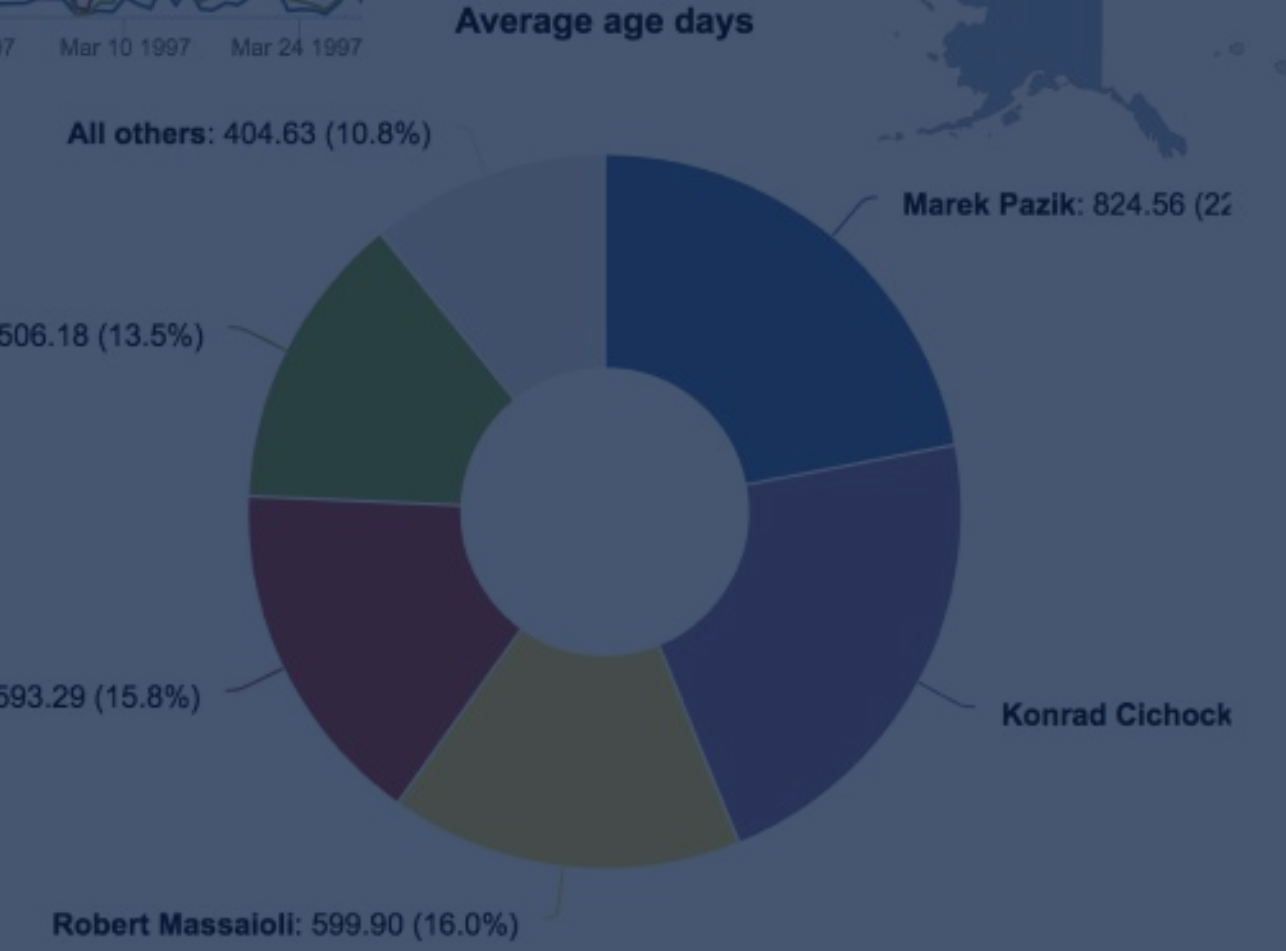
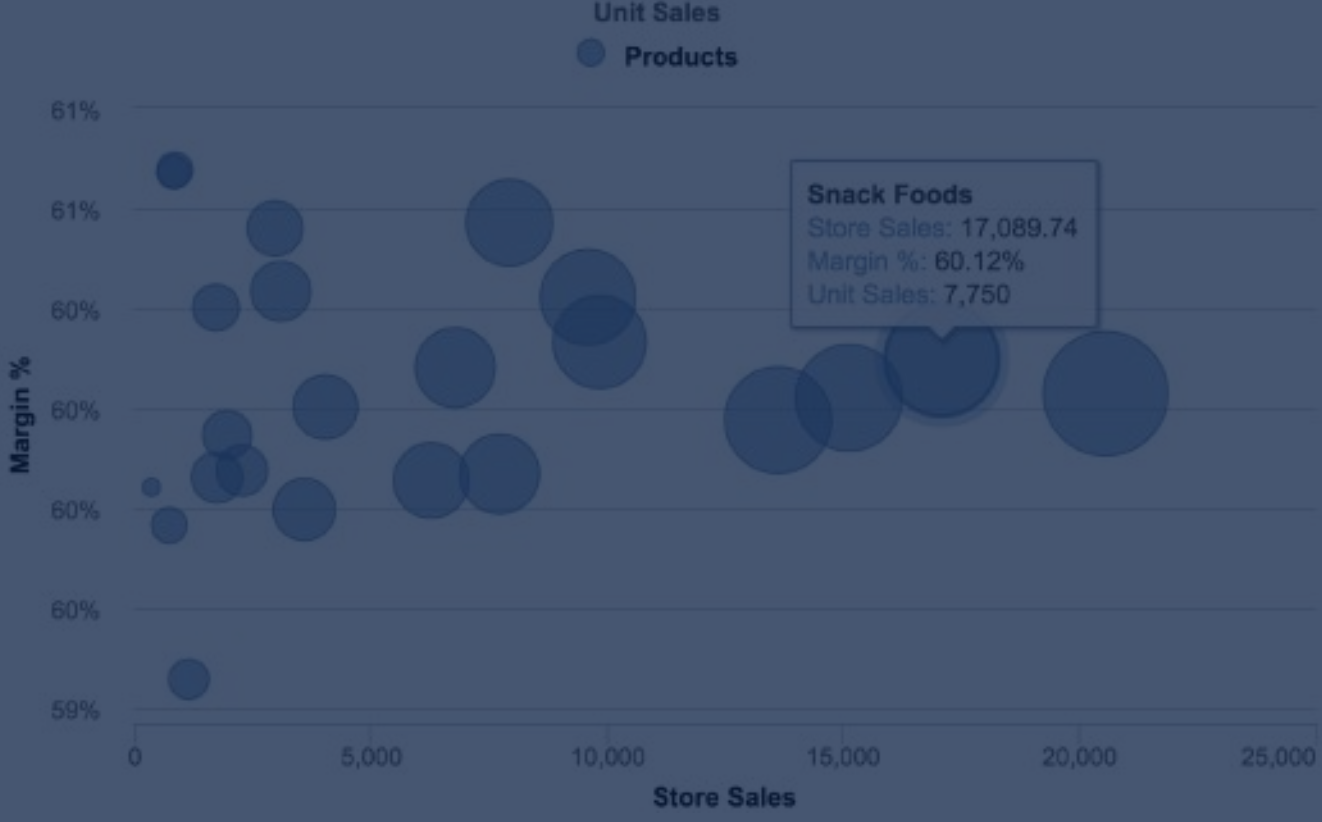
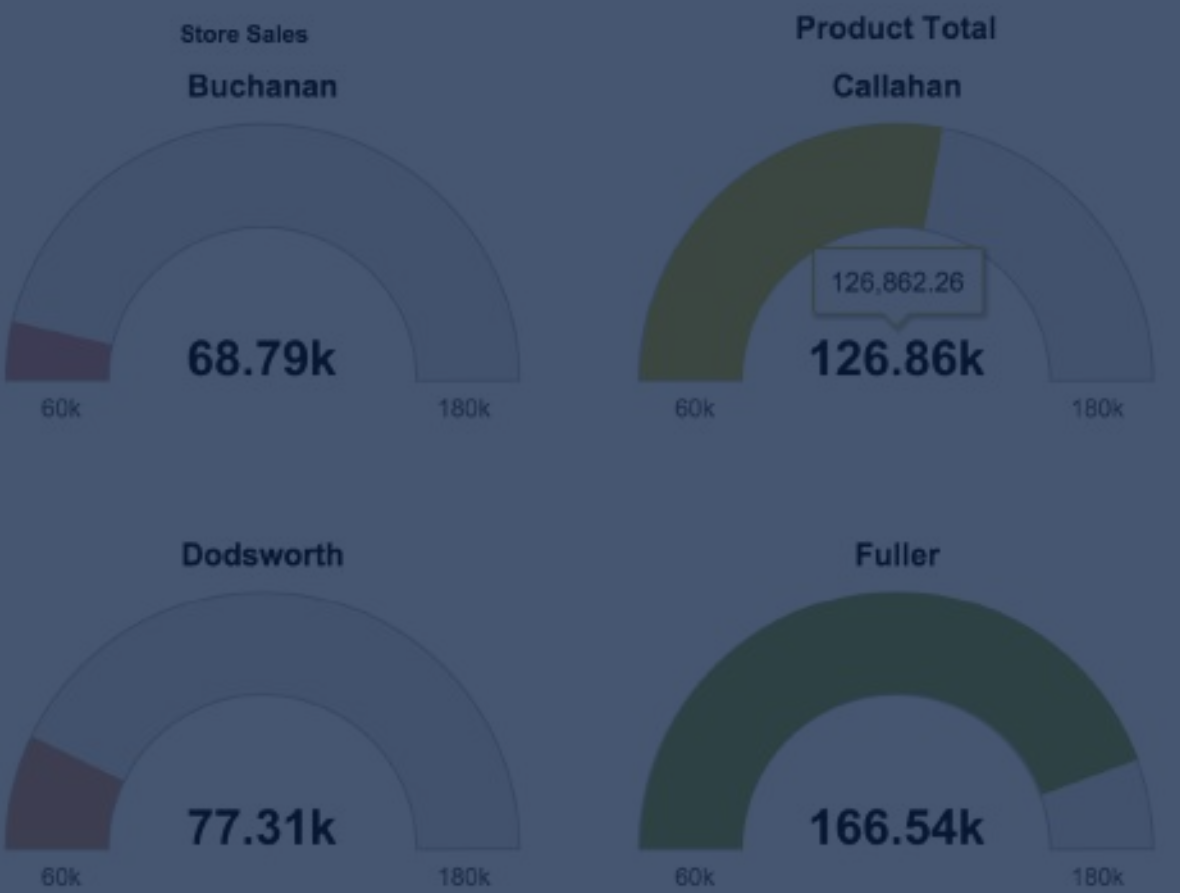




# Mixed Charts

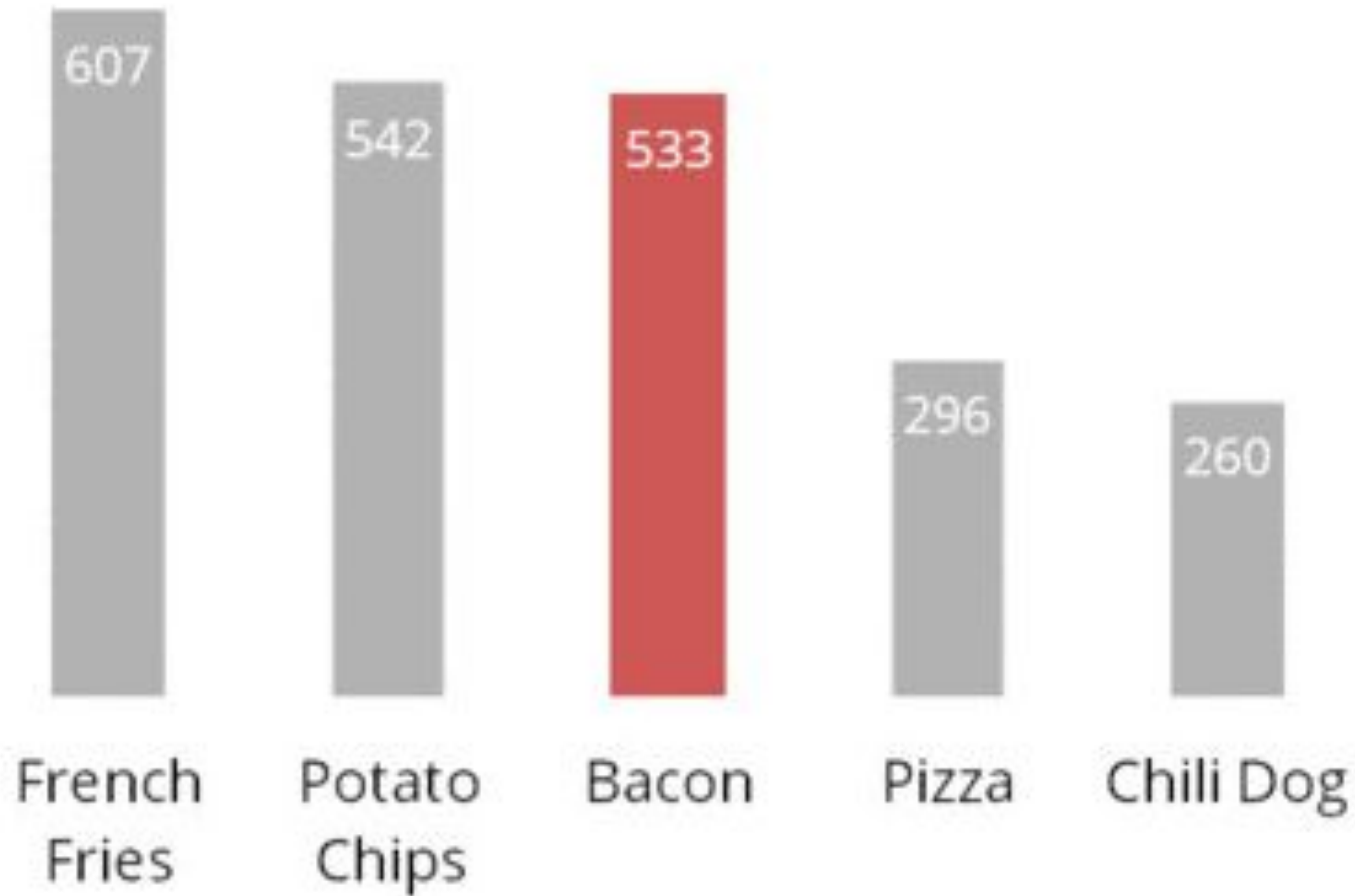


	Store Sales	Store Cost	Unit	Average
— All Customers	139,628.35	55,752.240	↗ Drill across	
— USA	139,628.35	55,752.240	→ Select this	
+ CA	36,175.20	14,431.085	⊞ Remove	
— OR	40,170.29	16,081.073	⌵ Order by	
+ Albany	4,491.26	1,782.817	⌵ Top rows	
+ Beaverton	2,407.97	950.358	⌵ Bottom rows	
+ Corvallis	5,695.13	2,281.248	⌵ Filter rows	
+ Lake Oswego	2,262.56	907.6483	⌵ Cell formatting	
+ Lebanon	5,934.62	2,390.0872		1,102 6.41
+ Milwaukie	2,892.32	1,155.6925		2,826 6.49
+ Oregon City	2,324.62	929.6752		1,113 6.55
+ Portland	2,122.12	847.5187		1,001 6.65
+ Salem	4,251.81	1,697.9039		2,104 6.28
+ W. Linn	2,161.61	871.0418		1,041 6.59

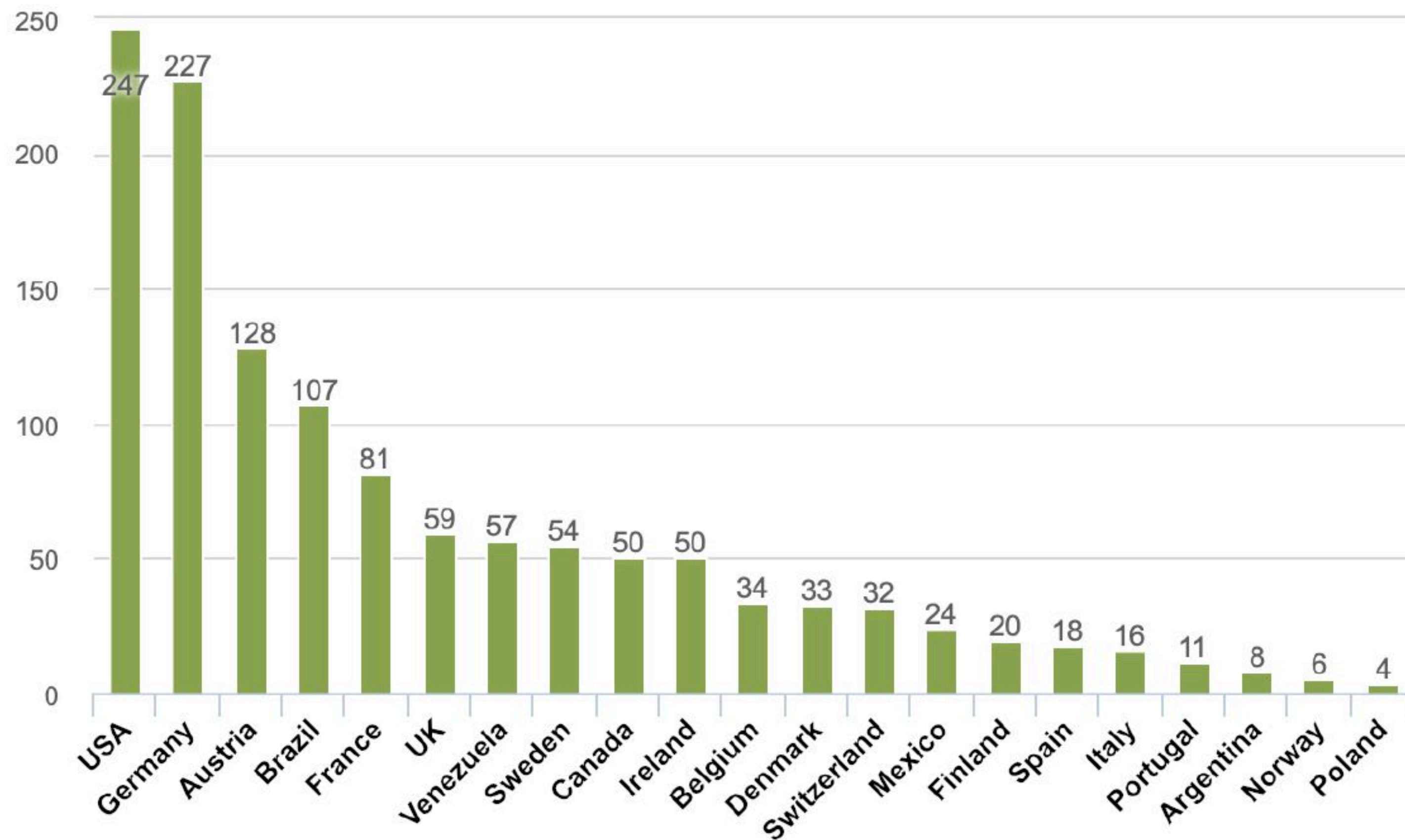




Calories per 100g

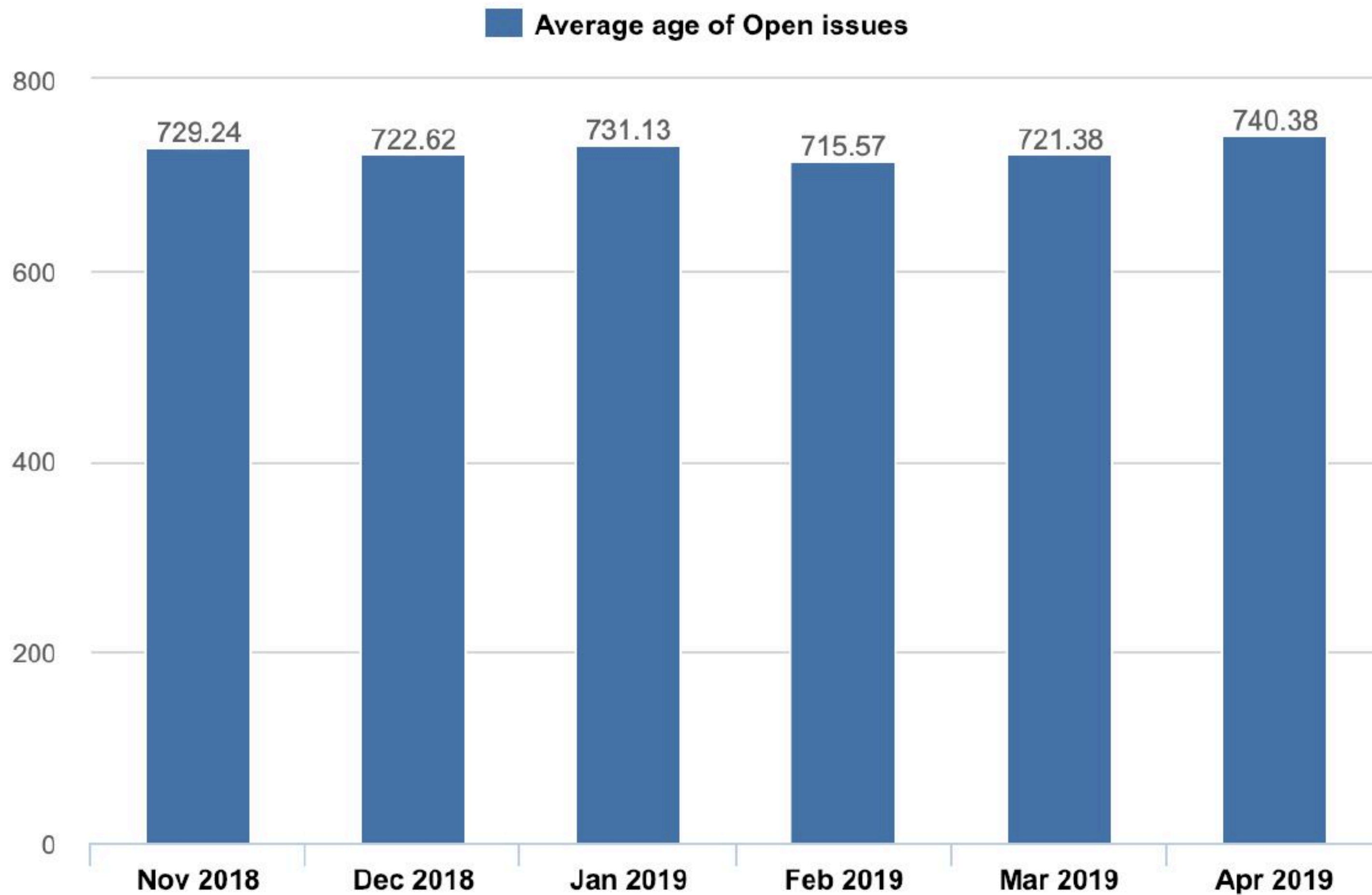


**Remove excess  
information – lines,  
colors, text – if not  
adding value.**



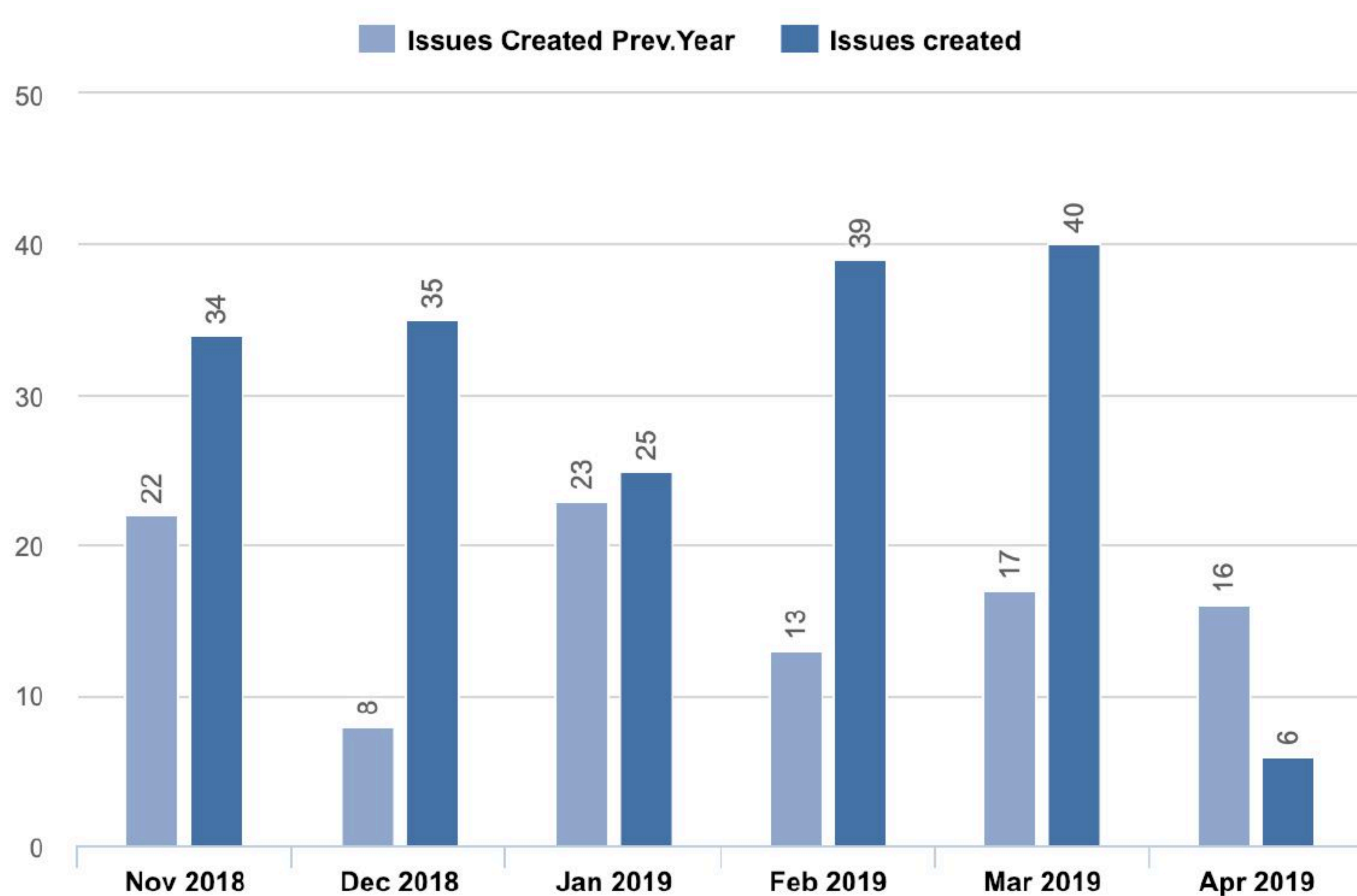
Sort by the **value**,  
not by **name**  
(except for time dimension)





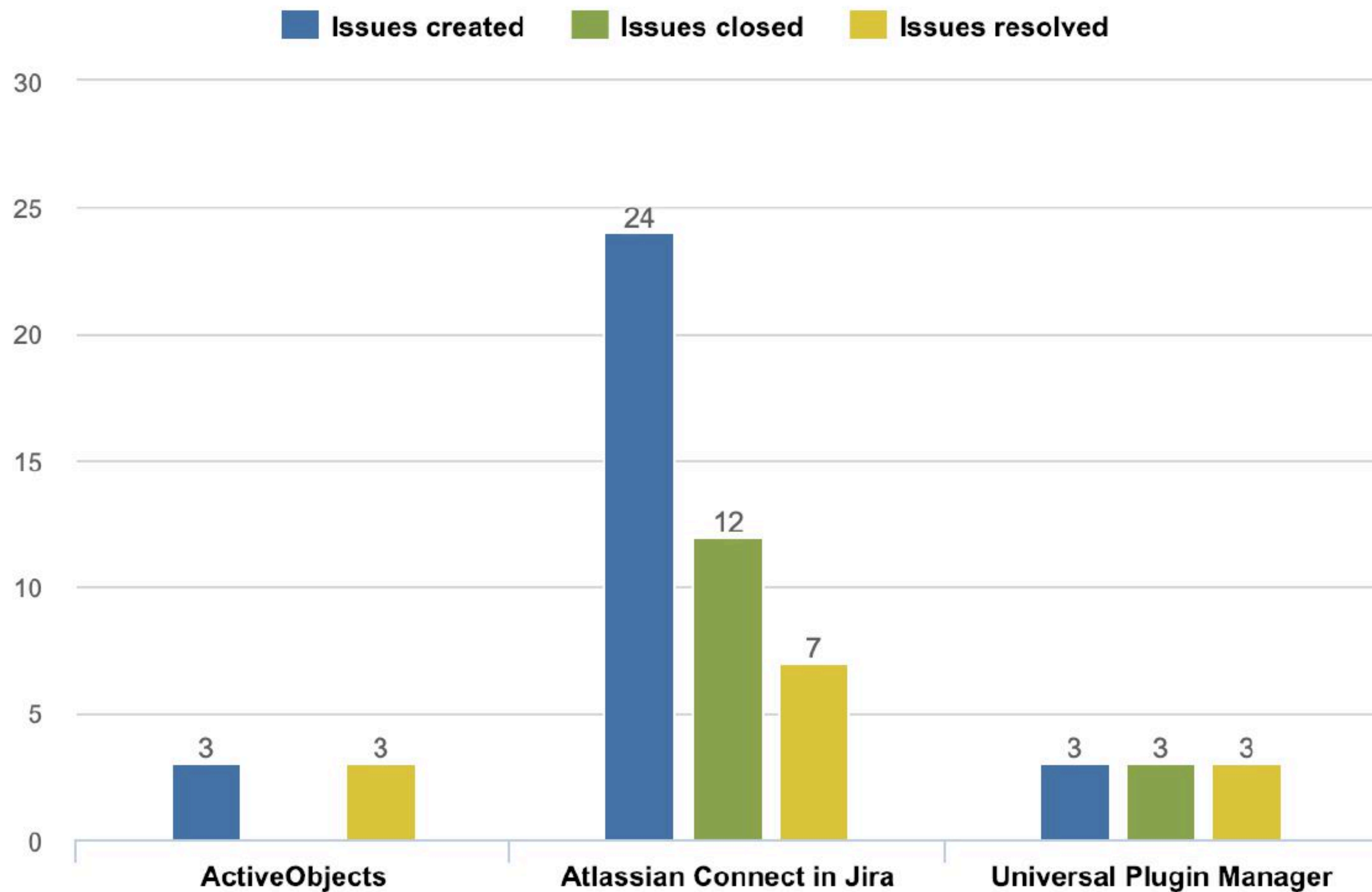
**Use labels directly  
when possible**

**line, column, bar, pie,  
charts**

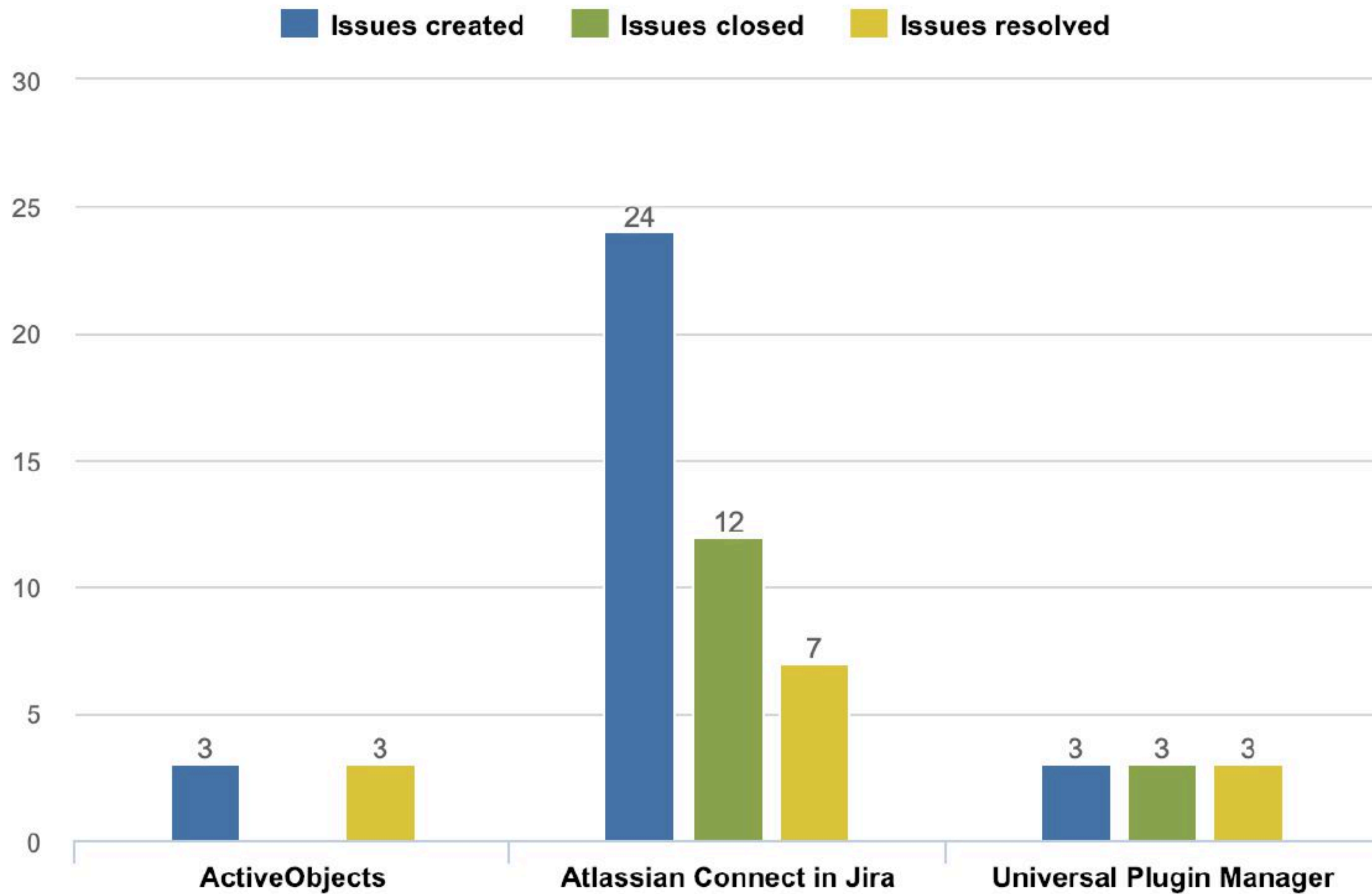


Use **same color** in different intensity to compare to previous periods.



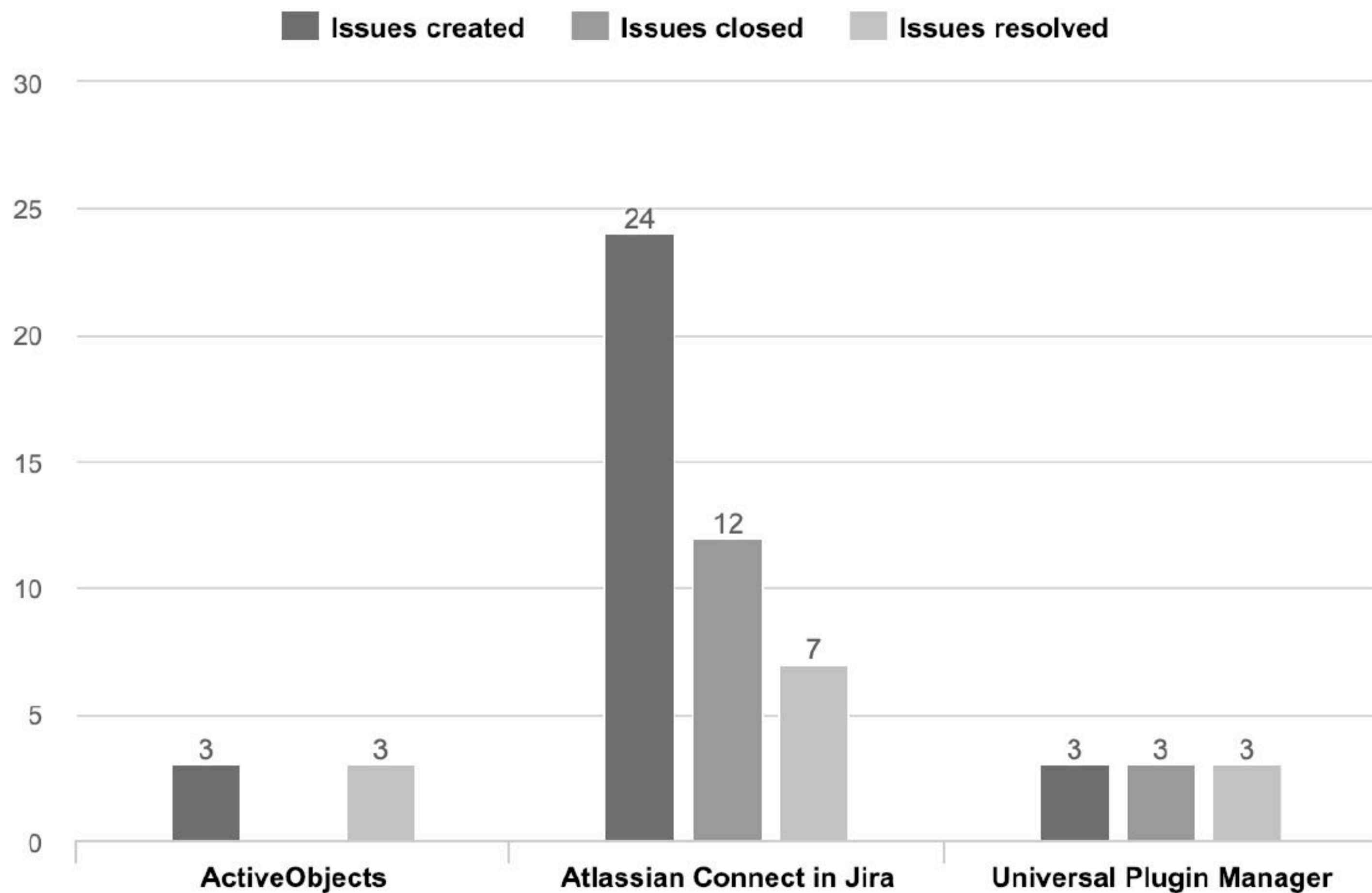


Use **different colors**  
for different  
measures.

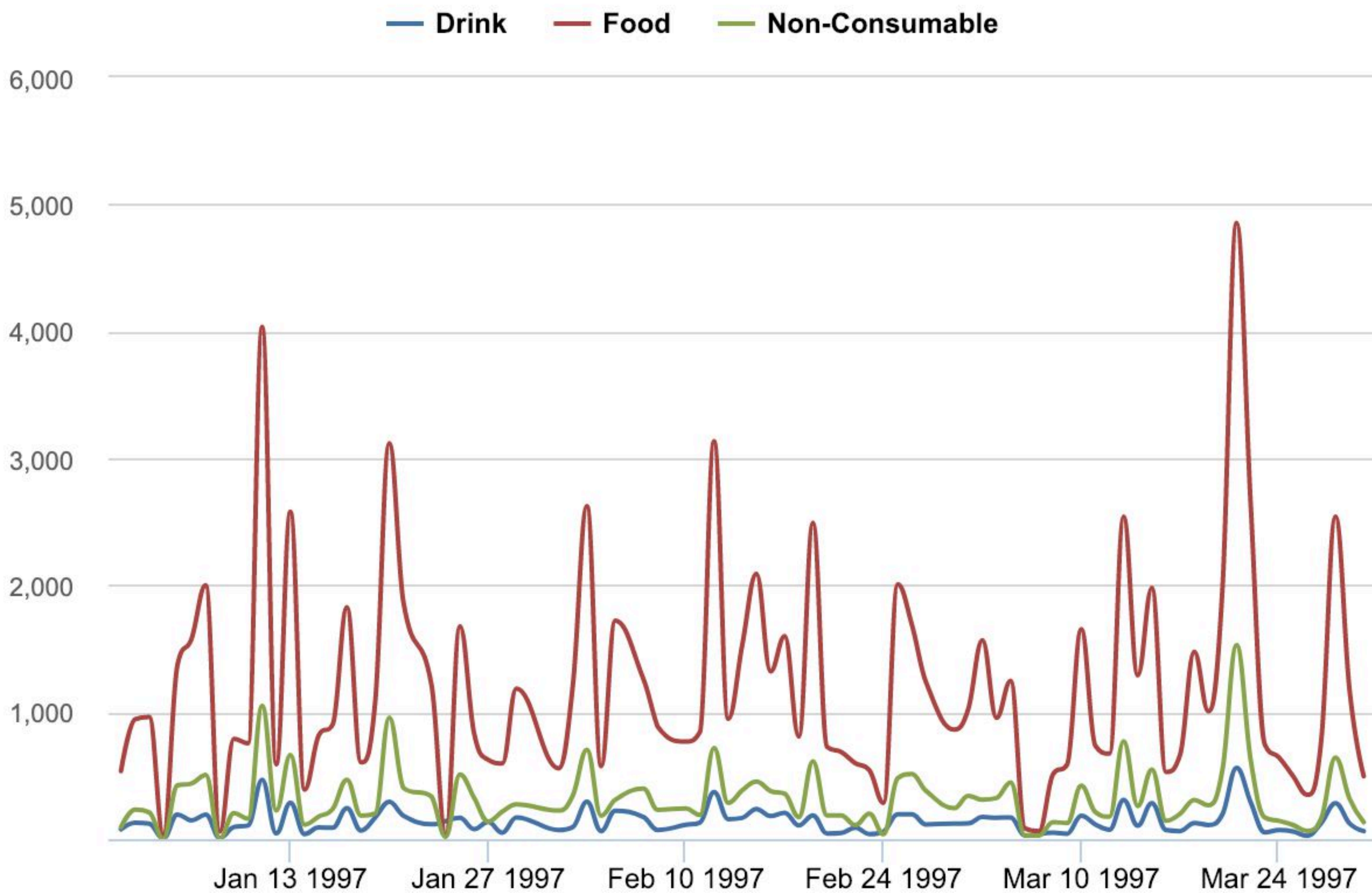


Use the **same color**  
for a measure  
**across reports.**





**Make charts  
readable for color-  
blind people.**

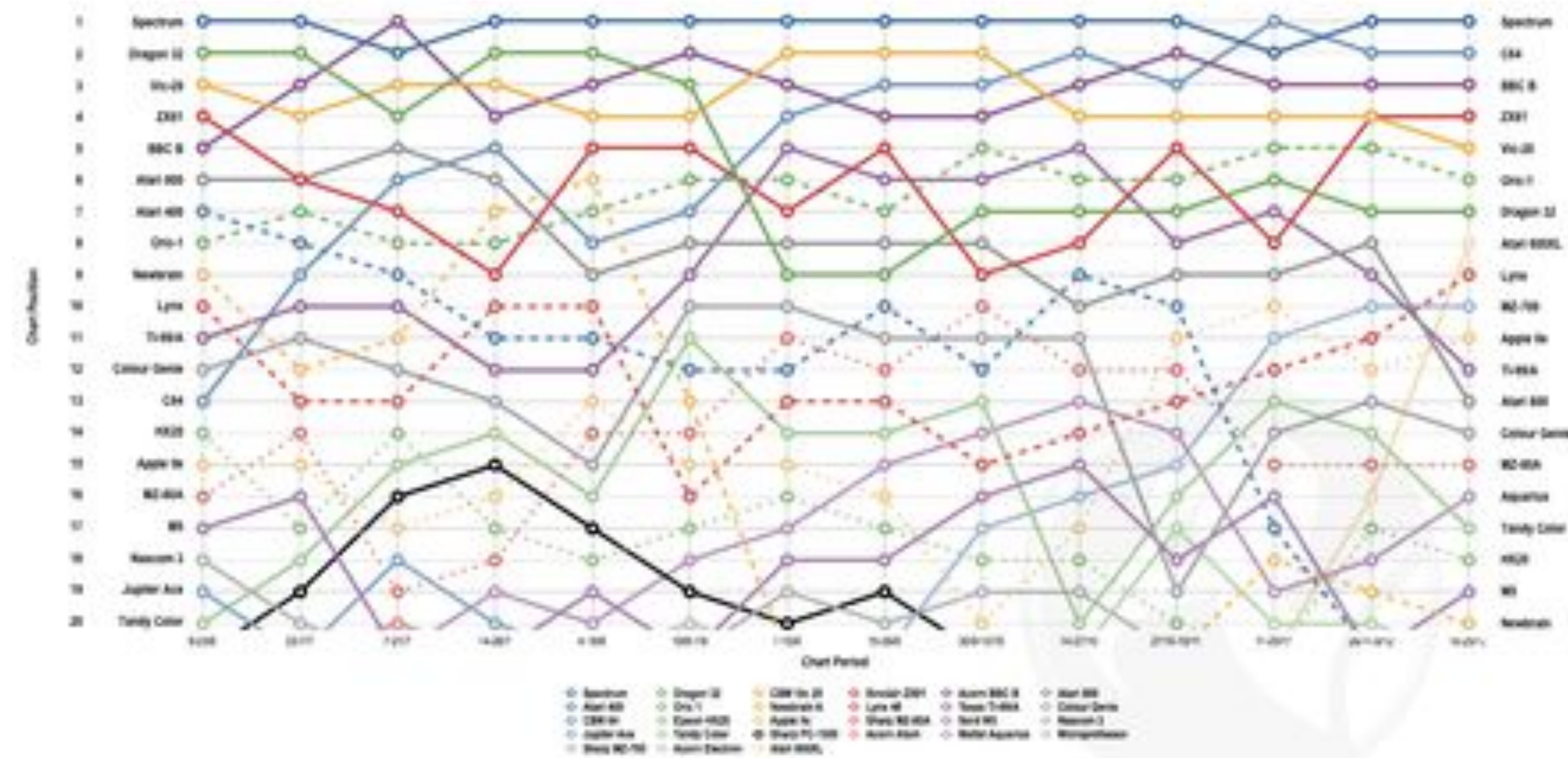


**Use Time on  
horizontal axis.**

**Left to right.**

**Don't skip periods.**





Don't  
overcomplicate  
your charts.





# Questions?

[community.eazybi.com](https://community.eazybi.com)

[support@eazybi.com](mailto:support@eazybi.com)



An aerial photograph of a city at night, showing a dense grid of illuminated buildings and streets. The image is overlaid with a gradient that transitions from a deep red on the left side to a dark blue on the right side. The text "Thank you!" is centered in the middle of the image in a large, white, sans-serif font.

# Thank you!