

What's in Your Food? A Data-Driven Nutrient Analysis

By Alina Yildir



Please read more at

<https://medium.com/@yildir.a.mdsa/whats-in-your-food-a-data-driven-nutrient-analysis-e3a0f7a5c553>

Introduction

According to Canada's Food Guide, maintaining a balance of nutrients such as protein, fibre, carbohydrates, and potassium contributes to better overall health. At the same time, reducing the intake of saturated fat, trans fat, sugar, sodium, and cholesterol plays a key role in minimizing health risks.

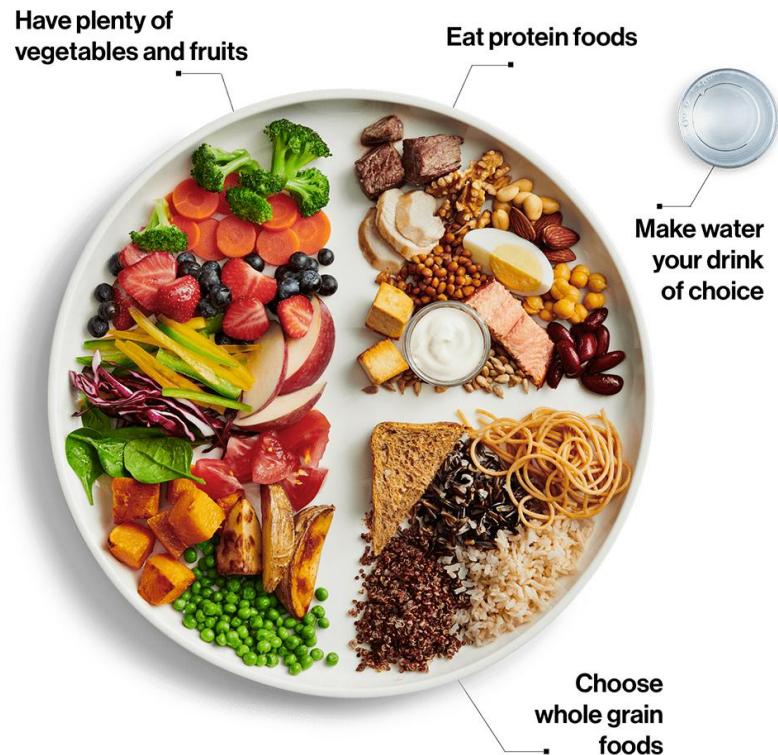


Image source: Canada's Food Guide, Government of Canada.
Retrieved from <https://food-guide.canada.ca/en/>.

Objectives

- Identify food categories with the highest and lowest levels of key nutrients per serving. *This helps compare nutrient-rich and nutrient-poor foods for better dietary choices.*
- Analyze subcategories within a food category to find the highest and lowest levels of a selected nutrient per serving. *This helps refine food selection by highlighting more nutritious options within a category.*
- Determine which individual foods in a subcategory have the highest and lowest levels of a selected nutrient per serving. *This helps pinpoint the best and worst sources of specific nutrients for informed decision-making.*
- Find food subcategories with the highest and lowest protein and fat content per serving. *This helps identify the best protein sources for balanced diets and meal planning.*
- Compare food categories based on nutrient density per calorie, focusing on protein, fat, and non-sugar carbohydrates. *This helps optimize dietary choices by selecting foods with more nutrition per calorie consumed.*

Nutrition Facts Valeur nutritive

Per 1 cup (250 mL)
pour 1 tasse (250 mL)

Calories 110	% Daily Value* % valeur quotidienne *
Fat / Lipides 0 g	0 %
Saturated / saturés 0 g	0 %
+ Trans / trans 0 g	
Carbohydrate / Glucides 26 g	
Fibre / Fibres 0 g	0 %
Sugars / Sucres 22 g	22 %
Protein / Protéines 2 g	
Cholesterol / Cholestérol 0 mg	
Sodium 0 mg	0 %
Potassium 450 mg	13 %
Calcium 30 mg	2 %
Iron / Fer 0 mg	0 %

*5% or less is a little, 15% or more is a lot

*5 % ou moins c'est peu, 15 % ou plus c'est beaucoup

Image source: Nutrition Facts Tables,
Government of Canada. Retrieved from
<https://www.canada.ca/en/health-canada/services/food-nutrition/nutrition-labelling/g/nutrition-facts-tables.html>.

Data Preprocessing

Dataset: *The Canadian Nutrient File* (Health Canada) – provides nutrient data for 1,000+ commonly consumed foods, covering 19 key nutrients.

Original Format: 17 separate CSV files (one per food category).

Preprocessing Steps (applied to each file individually):

- Removed unnamed rows/columns with missing values.
- Flattened multi level headers and retained relevant subheadings.
- Selected 12 nutrients based on *Nutrition Facts Table* guidelines.
- Standardized column names to match Health Canada format.
- Replaced "tr" (trace amounts) with 0.
- Added missing + Trans (g) column where necessary.
- Retained only relevant columns and reordered them.



Final Merged Dataset:

- Total Entries: 1,098 foods
- Columns: 16, including *Food Name, Calories, Fat, Carbohydrates, Protein, Sodium, Iron, etc.*

Please read more at

https://github.com/yildiramdsa/nutrient_composition_of_common_foods_in_canada_analyzing_the_canadian_nutrient_file/blob/main/notebooks/data_preprocessing.ipynb.

Question 1. Which food categories contain the highest and lowest levels of nutrients listed on the Nutrition Facts table per serving?

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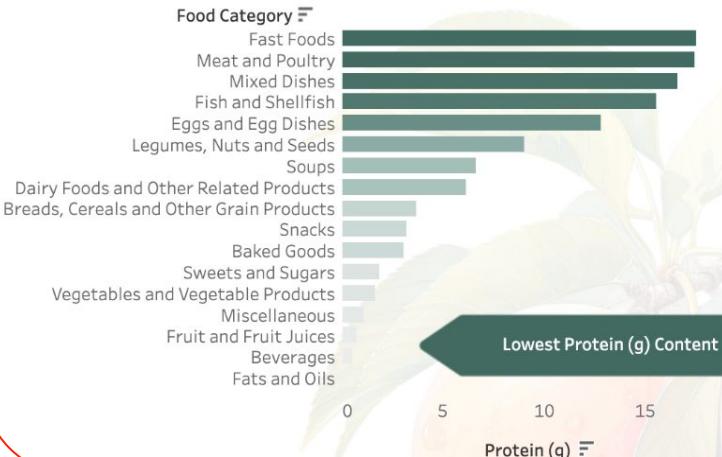
What's in Your Food?

A Data-Driven Nutrient Analysis



- Select a Nutrient to Analyze:
- Calories
 - Fat (g)
 - Saturated (g)
 - + Trans (g)
 - Carbohydrate (g)
 - Fibre (g)
 - Sugars (g)
 - Protein (g)
 - Sodium (mg)
 - Potassium (mg)
 - Calcium (mg)
 - Iron (mg)
 - Cholesterol (mg)

Average Protein (g) Content by Food Category

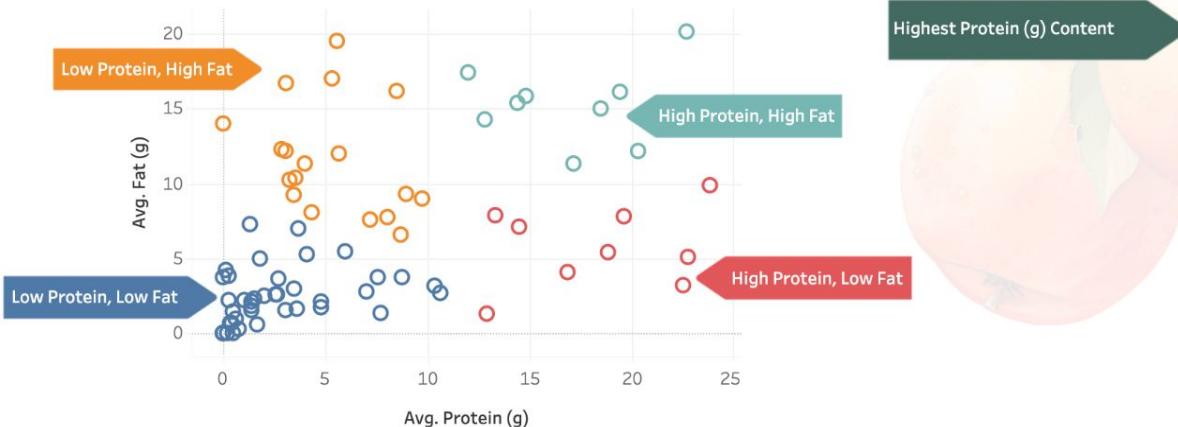


Average Protein (g) Content by Food Subcategory



Protein vs. Fat in Food Subcategories:

Best Protein Sources



Average Protein (g) Content by Food Name

Food Name	Calories
General Tao/Tso chicken (250ml, 258g)	50.0
Caesar salad with chicken (500mL, 327g)	41.0
Hot chicken sandwich (1, 284g)	40.0
Eggs benedict (2 eggs, 310g)	34.0
Chicken sandwich, grilled chicken + condiments + vegetables (1, 169g)	33.0
Club sandwich (1, 246g)	32.0
Hamburger, double patty + condiments (1, 215g)	32.0
Wrap sandwich, chicken ranch (1, 249g)	32.0
Quesadilla with meat (1, 184g)	31.0
Cheeseburger, double patty + condiments + vegetables (1, 228g)	30.0
Inside (top) round steak, lean + fat, braised (75g, 75g)	30.0
Submarine sandwich (6 inches), with tuna (1, 256g)	30.0
Chicken sandwich, breaded chicken + condiments + vegetables (1, 228g)	29.0
Outside (bottom) round steak, lean + fat, braised (75g, 75g)	29.0

Question 2. Within a selected food category, which subcategories have the highest and lowest levels of the selected nutrient per serving?

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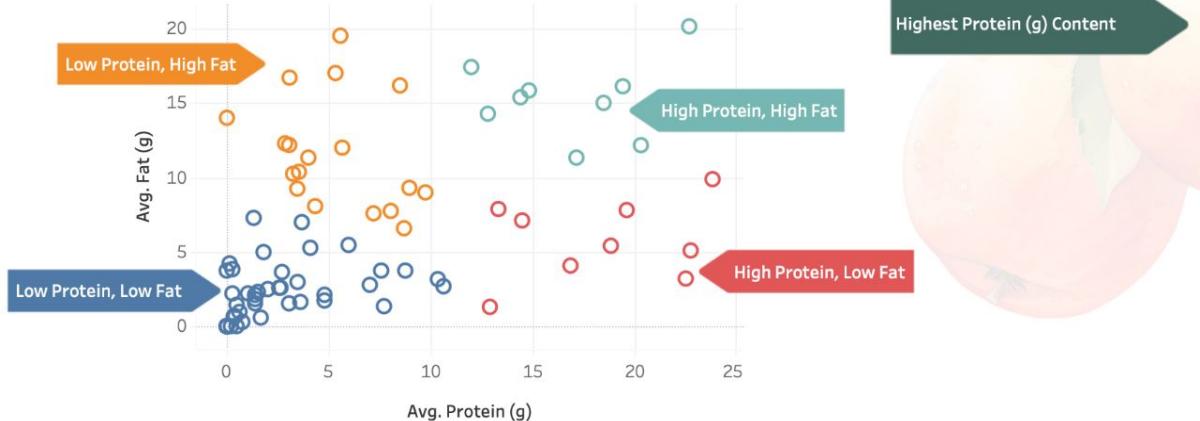
A Data-Driven Nutrient Analysis



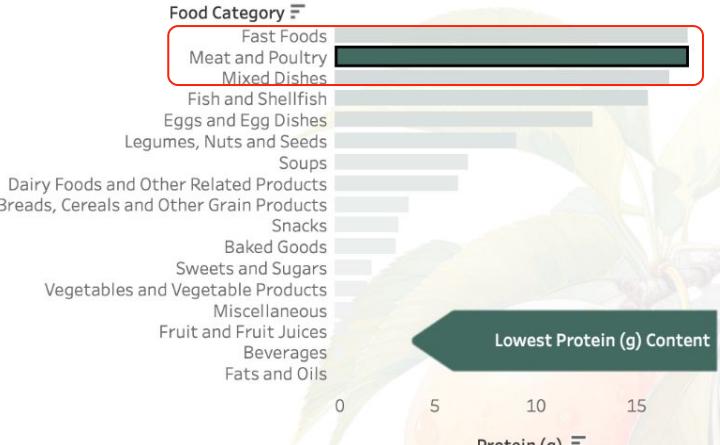
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- Calories
 - Fat (g)
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 - Fibre (g)
 - Sugars (g)
 - Protein (g)
 - Sodium (mg)
 - Potassium (mg)
 - Calcium (mg)
 - Iron (mg)
 - Cholesterol (mg)

Protein vs. Fat in Food Subcategories:

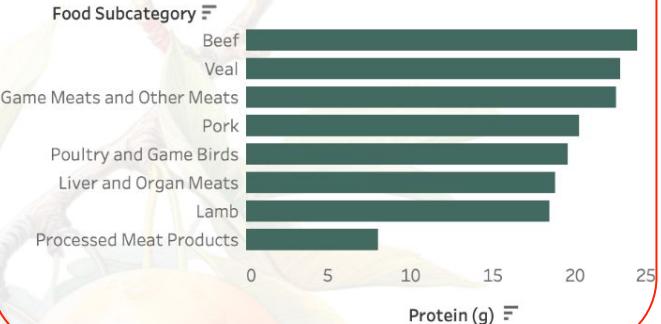
Best Protein Sources



Average Protein (g) Content by Food Category



Average Protein (g) Content by Food Subcategory



Average Protein (g) Content by Food Name

Food Name	Avg. Protein (g)
Inside (top) round steak, lean + fat, braised (75g, 75g)	30.0
Outside (bottom) round steak, lean + fat, braised (75g, 75g)	29.0
Cutlets, milk-fed, pan-fried (75g, 75g)	28.0
Eye of round steak, lean + fat, braised (75g, 75g)	28.0
Stewing beef, lean, simmered (75g, 75g)	28.0
Cross rib roast, lean + fat, braised (75g, 75g)	27.0
Cutlets, grain-fed, pan-fried (75g, 75g)	27.0
Blade roast, lean + fat, braised (75g, 75g)	26.0
Moose, roasted (75g, 75g)	26.0
Seal meat, boiled (75g, 75g)	26.0
Stewing meat, lean, braised (75g, 75g)	26.0
Chicken, broiler, breast, meat, roasted (75g, 75g)	25.0
Composite, steak, lean + fat, cooked (75g, 75g)	25.0
Flank steak, lean + fat, braised (75g, 75g)	25.0

Question 3. Within a selected subcategory, which individual foods contain the highest and lowest levels of the selected nutrient per serving?

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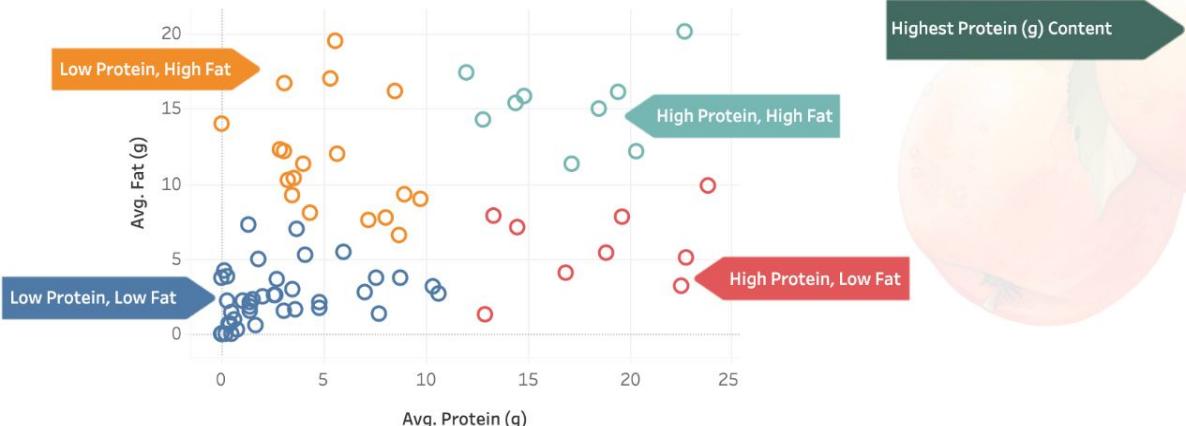


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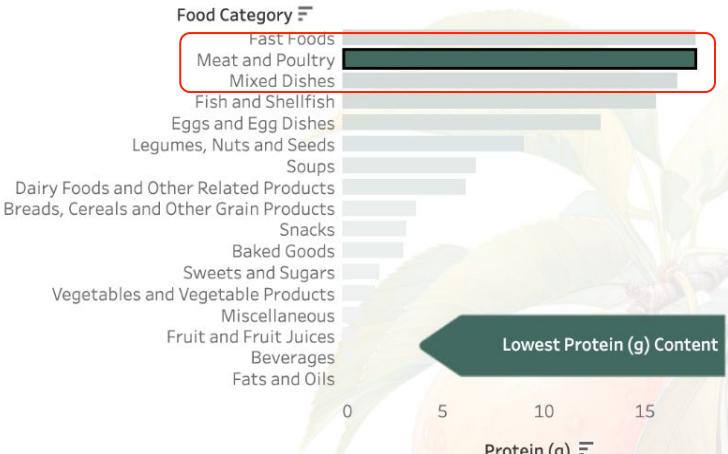


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 - Fibre (g)
 - Sugars (g)
 - Protein (g)
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 - Potassium (mg)
 - Calcium (mg)
 - Iron (mg)
 - Cholesterol (mg)

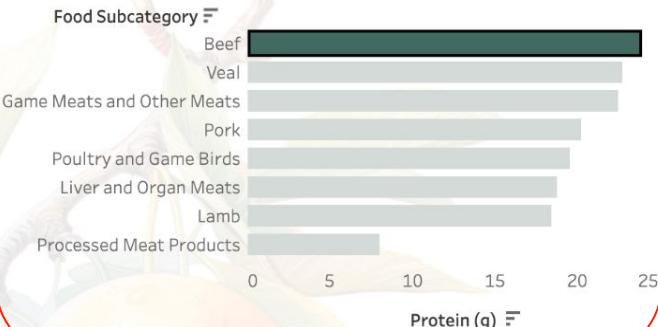
Protein vs. Fat in Food Subcategories: Best Protein Sources



Average Protein (g) Content by Food Category



Average Protein (g) Content by Food Subcategory



Average Protein (g) Content by Food Name

Food Name	Avg. Protein (g)
Inside (top) round steak, lean + fat, braised (75g, 75g)	30.0
Outside (bottom) round steak, lean + fat, braised (75g, 75g)	29.0
Eye of round steak, lean + fat, braised (75g, 75g)	28.0
Stewing beef, lean, simmered (75g, 75g)	28.0
Cross rib roast, lean + fat, braised (75g, 75g)	27.0
Blade roast, lean + fat, braised (75g, 75g)	26.0
Composite, steak, lean + fat, cooked (75g, 75g)	25.0
Flank steak, lean + fat, braised (75g, 75g)	25.0
Outside (bottom) round roast, lean + fat, roasted (75g, 75g)	25.0
Sirloin tip roast, lean + fat, roasted (75g, 75g)	25.0
Composite, roast, lean + fat, cooked (75g, 75g)	24.0
Eye of round roast, lean + fat, roasted (75g, 75g)	24.0
Inside (top) round roast, lean + fat, roasted (75g, 75g)	24.0
Tenderloin, steak, lean + fat, broiled (75g, 75g)	24.0

Question 4. Which food subcategories contain the highest and lowest levels of protein and fat per serving to identify the best protein sources?

<https://public.tableau.com/app/profile/alina.yildir/viz/WhatsinYourFoodAData-DrivenNutrientAnalysis/AData-DrivenNutrientAnalysis>



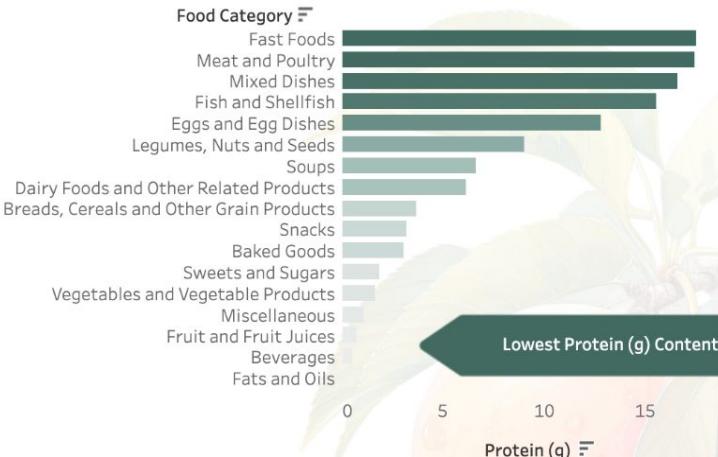
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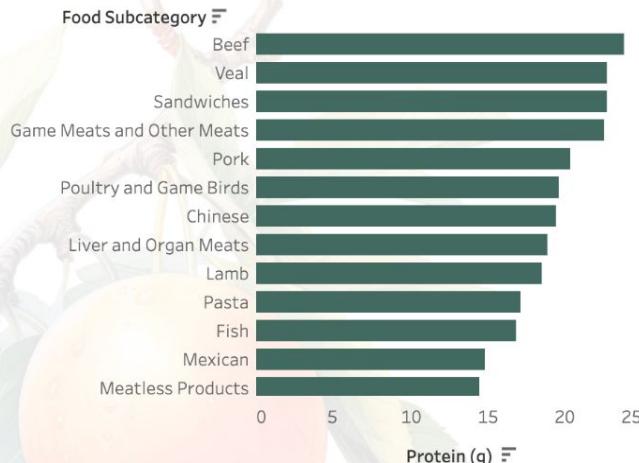


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 - Iron (mg)
 - Cholesterol (mg)

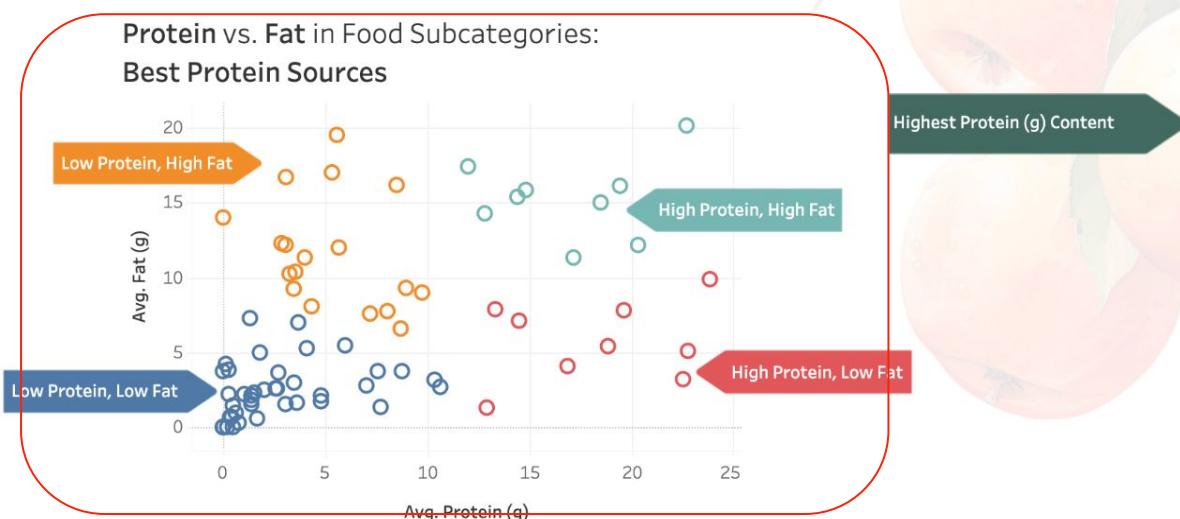
Average Protein (g) Content by Food Category



Average Protein (g) Content by Food Subcategory



Protein vs. Fat in Food Subcategories: Best Protein Sources



Average Protein (g) Content by Food Name

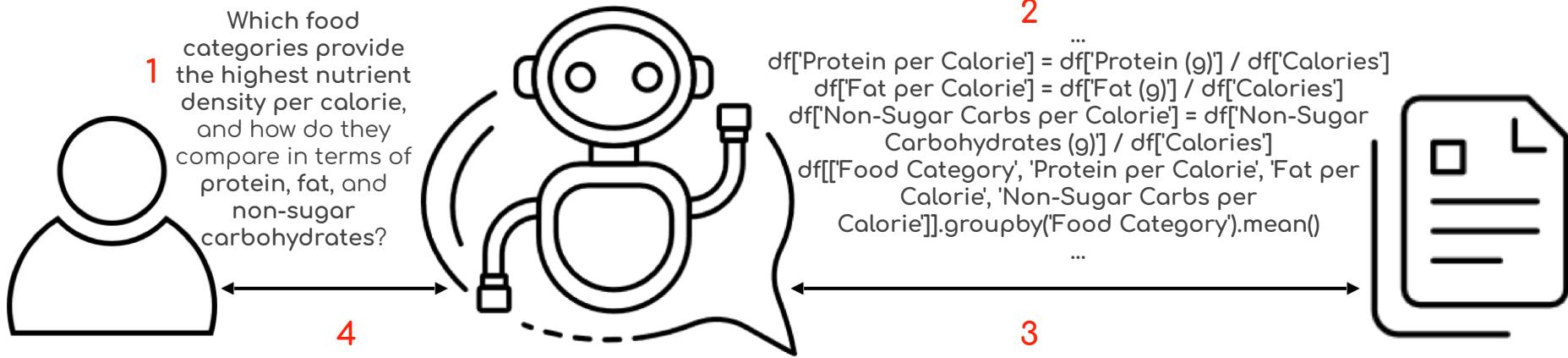
Food Name	Avg. Protein (g)
General Tao/Tso chicken (250ml, 258g)	50.0
Caesar salad with chicken (500mL, 327g)	41.0
Hot chicken sandwich (1, 284g)	40.0
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Chicken sandwich, breaded chicken + condiments + vegetables (1, 228g)	29.0
Outside (bottom) round steak, lean + fat, braised (75g, 75g)	29.0

Question 5. Which food categories provide the highest nutrient density per calorie, and how do they compare in terms of protein, fat, and non-sugar carbohydrates?

<https://yildiramdsa-nutrient-composition--csv-chatbotcsv-chatbot-kdmzcd.streamlit.app>



Database Chatbots: Interacting with CSV Data



Based on the analysis of nutrient density per calorie, the "Fish and Shellfish" category provides the highest protein density per calorie among all food categories. When comparing protein, fat, and non-sugar carbohydrates per calorie:

- "Fish and Shellfish" has the highest protein per calorie (0.154300).
- "Fats and Oils" has the highest fat per calorie (0.097236).
- "Breads, Cereals and Other Grain Products" has the highest non-sugar carbohydrates per calorie (0.166838).

Food Category	Protein per Calorie
Baked Goods	0.015058
Beverages	0.003933
...	...
Food Category	Fat per Calorie
Baked Goods	0.015058
Beverages	0.003933
...	...
Food Category	Non-Sugar Carbs per Calorie
Baked Goods	0.095682
Beverages	0.078777
...	...

Ask the Nutrition Chatbot

Enter your question:

Which food categories provide the highest nutrient density per calorie, and how do they compare in terms of protein, fat, and non-sugar carbohydrates?

Get Answer

Chatbot Answer:

Based on the analysis of nutrient density per calorie, the "Fish and Shellfish" category provides the highest protein density per calorie among all food categories. When comparing protein, fat, and non-sugar carbohydrates per calorie:

- "Fish and Shellfish" has the highest protein per calorie (0.154300).
- "Fats and Oils" has the highest fat per calorie (0.097236).
- "Breads, Cereals and Other Grain Products" has the highest non-sugar carbohydrates per calorie (0.166838).

Summary

- Identified food categories with the highest and lowest nutrient levels per serving to guide healthier choices.
- Analyzed subcategories to highlight the most and least nutrient-dense options.
- Pinpointed individual foods with the highest and lowest levels of key nutrients for informed decisions.
- Compared protein and fat content to identify the best protein sources.
- Assessed nutrient density per calorie to optimize food selection for better nutrition.



References

Government of Canada. (n.d.). *Canada's food guide*. Retrieved from <https://food-guide.canada.ca/en/>.

Government of Canada. (n.d.). *Nutrition facts tables*. Retrieved from <https://www.canada.ca/en/health-canada/services/food-nutrition/nutrition-labelling/nutrition-facts-tables.html>.

Government of Canada. (n.d.). *Canadian nutrient file*. Retrieved from <https://open.canada.ca/data/en/dataset/a289fd54-060c-4a96-9fcf-b1c6e706426f>.



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