



United States  
Department of  
Agriculture

# USDA FoodData Central: Platform and Integrated datasets description



# USDA FoodData Central

- FoodData Central is the USDA-based food-composition information web center.
- It is an integrated data system that presently provides 5 distinct types of data in one place.
- Each data type has a unique purpose.
- The five data types are:
  - **SR Legacy:** National Nutrient Database for Standard Reference
  - **GBFPD:** Global Branded Food Products Database
  - **FF:** Foundation Foods Database
  - **FNDDS:** Food and Nutritional Database for Dietary Studies
  - **EF:** Experimental Foods Database

	<b>Foundation Foods</b>	<b>Experimental Foods</b>	<b>Food and Nutrient Database for Dietary Studies (FNDDS)</b>	<b>Branded Foods</b>	<b>SR Legacy</b>
<b>Definition</b>	Data and metadata on individual samples of commodity/commodity-derived minimally processed foods with insights into variability	Data on food published in peer-reviewed journals supported by or in collaboration with USDA	Data on nutrients and portion weights for foods and beverages reported in What We Eat in America, NHANES	Data from labels of national and international branded foods collected by a public-private partnership	Historic data on food components including nutrients derived from analyses, calculations, and published literature
<b>Data Source</b>	<b>USDA:</b> based on analytically derived values	<b>Researchers:</b> based on scientific publications	<b>USDA:</b> compiled based on values from FDC data types	<b>Manufacturers:</b> based on food label information	<b>USDA:</b> based on Standard Reference originally available via the USDA National Nutrient Database (NNDDB)
<b>Update Frequency</b>	April and October of each year	April and October of each year as data are available	Every two years in concert with WWEIA, NHANES release	Monthly	Final release April 2018



# USDA FoodData Central – Online View

A banner image showing various food items like bread, tomatoes, nuts, and meat on a wooden surface. A dark semi-transparent box is overlaid on the center with the text "FoodData Central Search Results".

## FoodData Central Search Results

**Foundation Foods (13)**

SR Legacy Foods (211)

Survey Foods (FNDDS) (283)

Branded Foods (123,911)

Experimental Foods (7)

### Foundation Foods

- Data for food components including nutrients derived from analyses, and metadata for a range of single foods and ingredients providing insights into various food categories. Foundation Foods highlight information on samples and acquisition details.
- Documentation and further details about Foundation Foods [https://fdc.nal.usda.gov/docs/Foundation\\_Foods\\_Documentation\\_Apr2021.pdf](https://fdc.nal.usda.gov/docs/Foundation_Foods_Documentation_Apr2021.pdf)

Milk

[Search Operators](#)

Require All Words

Reset

Search

# Timeline: human nutrition search and SR Database

- The USDA was the first federal agency to conduct human nutrition search starting at the end of the 19<sup>th</sup> century.
- For more than a century since then, USDA's ARS has continued to analyze foods and determine the consumption and dietary patterns of Americans.
- This work resulted in the creation of **USDA's National Nutrient Database for Standard Reference (SR)**. This database is the major source of food composition data in the United States.
- SR provides (**for now**) the foundation for most food composition databases in the public and private sectors (FNDDS – WWEIA included).

# SR online view

## Chicken breast tenders, breaded, cooked, microwaved

SR Legacy, released in April 2018, is the final release of this data type and will not be updated. For more recent data, users should search other data types in FoodData Central.

Data Type: SR Legacy

Food Category: Poultry Products

FDC ID: 171514

NDB Number: 5326

FDC Published: 4/1/2019

**Nutrients**

Measures

Portion:

100g



Name	Amount	Unit	Deriv. By	n	Samples	Min	Max	Median	Footnote	Last Updated
Water	51.3	g	Analytical	1						2/1/2007
Energy	252	kcal	Calculated							3/1/2007
Energy	1050	kJ	Calculated							3/1/2007
Protein	16.4	g	<a href="#">Analytical</a>	1						2/1/2007
Total lipid (fat)	12.9	g	Analytical	1						2/1/2007
Ash	1.87	g	Analytical	1						2/1/2007
Carbohydrate, by difference	17.6	g	Calculated							3/1/2007

# SR updating and relevance continuation

- Throughout the years, SR database has been continuously and effectively updated.
- Effort was put in keeping pace with the evolution in analytical approaches, technology, and agricultural practices that have occurred since the first results had been published.

# SR database obsolescence and replacement decision

- **HOWEVER:**

In 2012, the USDA Office of National Programs and the Beltsville Human Nutrition Center decided that

“The existing approach to assembling the SR was **no longer viable**, given the demands of the US food supply and the limits of USDA's resources, and dramatic change in the USDA National Nutrient Database” (...)

Hence..

(...) **“Dramatic change was needed”**.



# Reasons for approach change decision

- Massive increase in the number of prepared and proprietary food products available to consumers

combined by

- Rapid and frequent changes in formulations or recipes

makes it

- Impossible to analytically determine the composition of all, or even the most important, foods in the food system.

# The Global Branded Food Products Database (GBFPD)

- The USDA Global Branded Food Products Database (BFPD) is the result of a Public-Private Partnership, whose goal is to enhance public health and the open sharing of nutrient composition of branded and private label foods provided by the food industry. Members of the Public-Private Partnership are:
  - Agricultural Research Service (ARS), USDA ([www.ars.usda.gov](http://www.ars.usda.gov))
  - International Life Sciences Institute ILSI North America ([www.ilsina.org](http://www.ilsina.org))
  - GS1 US ([www.gs1us.org](http://www.gs1us.org))
  - 1WorldSync ([www.1worldsync.com](http://www.1worldsync.com))
  - Label Insight ([www.labelinsight.com](http://www.labelinsight.com))
  - University of Maryland, Joint Institute for Food Safety and Applied Nutrition ([jifsan.umd.edu](http://jifsan.umd.edu))

# GBFPD online view

## CHICKEN BREAST

**Data Type:** Branded    **Food Category:** Pepperoni, Salami & Cold Cuts    **Brand Owner:** Tyson Foods, Inc.    **Brand:** TYSON    **Sub-Brand:**    **FDC ID:** 2092152  
**GTIN/UPC:** 023700038326  
**FDC Published:** 10/28/2021    **Available Date:** 7/14/2017    **Modified Date:** 7/14/2017    **Market Country:** United States    **Package Weight:** 14 oz/396.9 g

Powered by [Label Insight](#)

Information provided by food brand owners is label data. Brand owners are responsible for descriptions, nutrient data and ingredient information. USDA calculates values per 100g or 100ml from values per serving. Values calculated from %DV use current daily values for an adult 2,000 calorie diet (21 CFR 101.9(c)).

**Nutrients**

**Update Log**

**Portion:**

100g



Name	Amount	Unit	Data Prov. Deriv. Method	Deriv. By
Energy	143	kcal	UNKNOWN	Calculated from value per serving size measure
Protein	14.3	g	UNKNOWN	Calculated from value per serving size measure
Total lipid (fat)	8.93	g	UNKNOWN	Calculated from value per serving size measure
Carbohydrate, by difference	3.57	g	UNKNOWN	Calculated from value per serving size measure
Fiber, total dietary	0	g	UNKNOWN	Calculated from a daily value percentage per serving size measure

**Ingredients:** CHICKEN BREAST WITH RIB MEAT, WATER, CONTAINS 2% OR LESS OF: VINEGAR, MODIFIED FOOD STARCH, SALT, CARRAGEENAN, MALTODEXTRIN, SODIUM PHOSPHATES, ONION POWDER, YEAST EXTRACT, GARLIC POWDER, DRIED CHICKEN SKIN, DRIED CHICKEN, CHICKEN BROTH, SPICES EXTRACTIVES.

# Approach Change – The advent of Foundation Foods

- The advent of GBFPD prompted a change in the USDA's internal approach to data collection, analysis, and transparent presentation.
- Updates to SR were halted and the last version was labeled SR Legacy and released in 2018.
- The focus of USDA's internal data acquisition and analysis shifted to commodities and single-ingredient foods, or **the foundation foods that are the building blocks of the complex foods in the GBFPD.**

# Approach Change – The advent of Foundation Foods

- The emphasis is on the analysis of individual samples of foods rather than composites.
- The user can easily access the variety, location, time of acquisition, and other critical metadata associated with each food.
- The result is a focus on single-ingredient foods and a dramatic increase in the amount of data for each food.



# Foundation Foods

- Foundation Foods is a new food composition data type in the U.S. Department of Agriculture's (USDA) FoodData Central system.
- Foundation Foods contains **expanded nutrient and food component profiles and metadata** on a range of foods and ingredients.
- The data include the **individual data points** behind the mean values and **metadata** that include the number of samples, location, dates on which samples were obtained, analytical methods used, and, if appropriate, agricultural information such as cultivar and production practices.

# Foundation Foods VS SR Database:

## Expanded information on foods

- A key feature of Foundation Foods is the ability to see the specific values associated with each independent sample and hence the variability of the analyzed values for each component.
- For samples obtained at retail locations, Foundation Foods contains metadata on sample acquisition, including city and state of purchase or manufacture, purchase date, expiration date (if applicable), product lot number, and UPC code (when available).
- For samples obtained from agricultural locations, metadata include information such as location (GPS coordinates), cultivar, weather, agricultural practices (e.g., conventional or organic farming), and analytical methodology.

# Foundation Foods VS SR Database:

## Expanded information on foods

- Less emphasis will be placed on mixed dishes or prepared foods.
- The inclusion of metadata related to FF will facilitate researchers' ability to link food-composition data with other important USDA datasets [e.g., Nutrient Uptake and Outcomes Network, the Agricultural Collaborative Research Outcomes System (AgCROS), and Economic Research Service].
- FF represents the future of USDA food information because of access to metadata and links to agricultural and production information available across USDA and other federal agencies. One of the goals is to develop systems to include information from nongovernmental sources.

# Foundation Foods online view

## Chicken, broiler or fryers, breast, skinless, boneless, meat only, cooked, braised

Data Type: Foundation

Food Category: Poultry Products

FDC ID: 331960

NDB Number: 5746

FDC Published: 4/1/2019

**Components**

Individual Samples

Measures

Other Information

Portion:

100g



Name	Average Amount	Unit	Deriv. By	n	Samples	Min	Max	Median	Footnote	Initial Year Acquired
<b>Proximates:</b>										
Water	65.3	g	Analytical	6	<a href="#">Samples</a>	64.4	66.5	65.3		2012
Energy (Atwater General Factors)	158	kcal	<a href="#">Calculated</a>							
Energy (Atwater Specific Factors)	166	kcal	<a href="#">Calculated</a>							
Nitrogen	5.13	g	Analytical	6	<a href="#">Samples</a>	5.01	5.27	5.13		2012
Protein	32.1	g	<a href="#">Calculated</a>			31.3	32.9	32.1		
Total lipid (fat)	3.24	g	Analytical	6	<a href="#">Samples</a>	2.17	3.99	3.26		2012
Total fat (NLEA)	3.05	g	Summed							

# Foundation Foods online view

Nitrogen 5.13 g Analytical 6 [Samples](#) 5.01 5.27 5.13 2012

Samples for Nitrogen							
Analysis Details				Acquisition			
				Samples with a single location, regardless of how many containers have been acquired, have not been composited. If more than one location is shown, the acquired samples were composited			
Amount/100g	Unit	Technique	Method	City	State	Acquisition Date	FDC Sample ID
5.01	g	Kjeldahl	<a href="#">AOAC 991.20</a>	FLUSHING	NY	11/12/2012	<a href="#">331900</a>
				Alexandria	IN	10/22/2012	<a href="#">331899</a>
5.11	g	Kjeldahl	<a href="#">AOAC 991.20</a>	CARRBORO	NC	10/21/2012	<a href="#">331907</a>
				Pleasanton	CA	10/23/2012	<a href="#">331906</a>
				Chapel Hill	NC	11/12/2012	<a href="#">331905</a>



# Foundation Foods online view

## INDIVIDUAL SAMPLE 331900: Chicken breast, non-enhanced, braised, PERDUE (NY) - 17a-23SU-CB

Subtype: Sample      Food Category: Poultry Products      FDC Sample ID: 331900

FDC Published: 4/1/2019      Acquisition Date: 11/12/2012

<u>Components</u>	Acquisition Details	Measures			
<u>Name</u>		<u>Amount/100g</u>	<u>Unit</u>	<u>Technique</u>	<u>Method</u>
Ash		1.12	g	Gravimetric	<a href="#">AOAC 945.46</a>
Calcium, Ca		7	mg	ICP	<a href="#">AOAC 985.01 + 984.27</a>
Copper, Cu		0.045	mg	ICP	<a href="#">AOAC 985.01 + 984.27</a>
Iron, Fe		0.47	mg	ICP	<a href="#">AOAC 985.01 + 984.27</a>
MUFA 15:1		0	g	GLC	<a href="#">AOAC 996.06</a>
MUFA 16:1 c		0.21	g	GLC	<a href="#">AOAC 996.06</a>

# Foundation Foods online view

Samples for Nitrogen							
Analysis Details				Acquisition Samples with a single location, regardless of how many containers have been acquired, have not been composited. If more than one location is shown, the acquired samples were composited			
Amount/100g	Unit	Technique	Method	City	State	Acquisition Date	FDC Sample ID
5.01	g	Kjeldahl	<a href="#">AOAC 991.20</a>	FLUSHING	NY	11/12/2012	<a href="#">331900</a>
				Alexandria	IN	10/22/2012	<a href="#">331899</a>
5.11	g	Kjeldahl	<a href="#">AOAC 991.20</a>	CARRBORO	NC	10/21/2012	<a href="#">331907</a>
							<a href="#">331906</a>
							<a href="#">331905</a>

  

Lab Method Details	
Short Description:	AOAC 991.20
Technique:	Kjeldahl
Long (original) Description:	991.20 Nitrogen (Total) in Milk
Link:	<a href="http://www.aoac.org/aoac_prod_imis/AOAC/AOAC...">http://www.aoac.org/aoac_prod_imis/AOAC/AOAC...</a>

  

Protein	
Total lipid (fat)	2012
Total fat (NLEA)	
Ash	2012

# Expansions to new areas of food information

- The evolution of GBFPD and FF also identified 2 additional areas of expansion and consolidation of data accessibility.
- Food-composition data within the context of an experimental design or derived from new analytical methodology research do not typically appear in public databases but would be beneficial to researchers if more broadly accessible.
- That need identified data for **Experimental Foods (EF)**.
- Another data type developed by Beltsville Human Nutrition Research Center's (BHNRC's) Food Surveys Research Group and specific to national nutrition monitoring is the **Food and Nutrient Database for Dietary Studies (FNDDS)** that has been released every 2 y in concert with the 2-y release of What We Eat in America as part of the NHANES. Including FNDDS as a data type supported the goal of centralized availability. Together, these 5 data types comprise USDA's FoodData Central (FDC).

# Food and Nutrient Database for Dietary Studies (FNDDS)

- FNDDS provides nutrient values for the foods and beverages reported in What We Eat in America, the dietary intake component of the NHANES.
- FNDDS data facilitate analyses of dietary intakes reported in NHANES as well as many other dietary research studies.
- The nutrient profiles of a majority of foods and beverages in FNDDS 2017–2018 were generated using a recipe calculation process utilizing 2 or more ingredient codes from FF and SR Legacy data in FDC.
- FNDDS includes documentation of the FDC source of each nutrient value for ingredients used in FNDDS and is publicly available.

# FNDDS online view

## Chicken breast, grilled with sauce, skin not eaten

Data Type: Survey (FNDDS)

FDC ID: 2341376

Food Code: 24123311

Start Date: 1/1/2019

End Date: 12/31/2020

Food Category: Chicken, whole pieces

FDC Published: 10/28/2022

**Nutrients**

Portions

Other Information

Ingredients

Ingredient Nutrient Values

Details about FNDDS 2019-2020 development, content, and Excel files can be found at:

<https://www.ars.usda.gov/northeast-area/beltsville-md-bhnrc/beltsville-human-nutrition-research-center/food-surveys-research-group/docs/fndds-download-databases/>

Portion:

100g

Name	Amount	Unit
Water	61.2	g
Energy	178	kcal
Protein	24.3	g
Total lipid (fat)	4.93	g
Carbohydrate, by difference	7.34	g
Fiber, total dietary	0.2	g
Sugars, total including NLEA	5.98	g



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<u>Portion Description</u>	<u>Weight (g)</u>	<u>Portion Code</u>
1 cup, cooked, diced	165	10049
1 small breast	140	64698
1 medium breast	165	64699
1 large breast	185	64700
1 breast, NS as to size	165	64697
1 small or thin slice	30	62138
1 medium slice	60	61398
1 large or thick slice	85	61039

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**Food Code:** 24123311

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<u>Ingredient Description</u>	<u>Ingredient Code</u>	<u>Ingredient Weight (g)</u>	<u>Retention Code</u>
Vegetable oil, NFS	82101000	2	
Sauce, barbecue	6150	18	
Chicken breast, baked, broiled, or roasted, skin not eaten, from raw	24122131	80	

# Experimental Foods

- Data that do not appear in any other dataset searchable from FoodData Central. The overall goal of this data type is to allow users to focus on the research aspects and deeper understanding of factors related to food composition.
- Generally, data presented are those that:
  - 1) exist within the context of an experimental design; 2) are derived from new analytical methodology; and/or 3) are based on innovative sampling procedures.
- In some cases, data presented may expand information about a specific food that appears in other data types.

# Experimental Foods online view

## Effect of varying quantities of lean beef as part of a Mediterranean-style dietary pattern on lipids and lipoproteins: a randomized crossover controlled feeding trial

Experimental Foods are for research purposes and may not be appropriate as a reference for the consumer or for diet planning.

**Data Type:** Experimental

**Food Category:** Effect of varying quantities of lean beef as part of a Mediterranean-style dietary pattern on lipids and lipoproteins: a randomized crossover controlled feeding trial

**FDC ID:** 2265119

**FDC Published:** 4/28/2022

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### Effect of varying quantities of lean beef as part of a Mediterranean-style dietary pattern on lipids and lipoproteins: a randomized crossover controlled feeding trial

**Abstract:** Background: It remains unclear whether red meat consumption is causatively associated with cardiovascular disease (CVD) risk, and few randomized controlled studies have examined the effect of incorporating lean beef into a healthy dietary pattern. Objectives: To evaluate the effects of a Mediterranean (MED) diet (carbohydrate 42%, protein 17%, fat 41%, SFAs 8%, MUFAs 26%, PUFAs 8%) with 14 (MED0.5; 0.5 oz), 71 (MED2.5; 2.5 oz), And 156 (MED5.5; 5.5 oz) g/d/2000 kcal lean beef compared with an average American diet (AAD; carbohydrate 52%, protein 15%, fat 33%, SFAs 12%, MUFAs 13%, PUFAs 8%) on lipid and lipoprotein concentrations, particle number, and size. Methods: This was a multicenter, 4-period controlled feeding, randomized crossover study. Fifty-nine generally healthy males and females (BMI 20–38 kg/m<sup>2</sup>; age 30–65 y) consumed each diet for 4wk with a ≥1-wk washout between the diets. Fasting blood samples were collected at baseline and at the end of each 4-wk period. Lipid subfractions were measured by NMR. Results: Compared with the AAD, all 3 MED diets decreased LDL cholesterol (MED0.5: −10.3 mg/dL; 95% CI: −5.4, −15.7 mg/dL; MED2.5: −9.1 mg/dL; 95% CI: −3.9, −14.3 mg/dL; MED5.5: −6.9 mg/dL; 95% CI: −1.7, −12.1 mg/dL; P < 0.0001). All MED diets elicited similar reductions in total LDL particle number compared with baseline (P < 0.005); however,

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About Study Design **Results** Supplemental Information

**Table 3. Lipid, lipoprotein, and apolipoprotein concentrations after 4 wk of consuming each test diet<sup>1</sup>**

Outcome	Baseline	AAD	MED0.5	MED2.5	MED5.5	Diet main effect <i>P</i> value
TC,mg/dL	192.6 ± 4.8	185.0 ± 4.4 <sup>a</sup>	172.8 ± 4.1 <sup>b</sup>	174.4 ± 4.4 <sup>b</sup>	178.3 ± 3.9 <sup>b</sup>	<0.0001 <sup>†</sup>
Non-HDL cholesterol, mg/dL	137.5 ± 4.6	133.5 ± 4.4 <sup>a</sup>	123.0 ± 4.1 <sup>b</sup>	124.1 ± 4.3 <sup>b</sup>	126.9 ± 3.9 <sup>b</sup>	<0.0001 <sup>†</sup>
LDL cholesterol, mg/dL	109.4 ± 3.5	108.5 ± 3.8 <sup>a</sup>	98.7 ± 3.5 <sup>b</sup>	99.8 ± 3.8 <sup>b</sup>	102.0 ± 3.2 <sup>b</sup>	<0.0001 <sup>†</sup>
HDL cholesterol, mg/dL	55.0 ± 1.9	51.6 ± 1.5	49.8 ± 1.5	50.3 ± 1.5	51.4 ± 1.5	0.0341
TG, mg/dL	105.4 ± 7.9	92.9 ± 5.6	94.2 ± 5.5	93.9 ± 6.4	88.5 ± 5.3	0.0437



# References

- The American Journal of Clinical Nutrition, Volume 115, Issue 3, March 2022, Pages 619–624, <https://doi.org/10.1093/ajcn/nqab397>
- Food Data Central <https://fdc.nal.usda.gov/>
- FNDDS <https://www.ars.usda.gov/northeast-area/beltsville-md-bhnrc/beltsville-human-nutrition-research-center/food-surveys-research-group/docs/fndds/>



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