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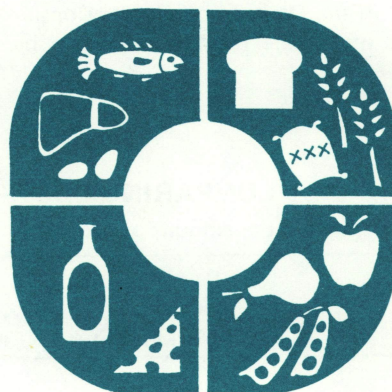
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Protein in Perspective



What are proteins?

Proteins are a type of nutrient necessary for life. They are found in all body tissues such as skin, bones, muscles, and nerves. Proteins, carbohydrates, and fats are all organic compounds containing carbon, hydrogen, and oxygen. In addition, proteins contain nitrogen.

There are many different kinds of proteins in every plant or animal. Proteins are commonly classified as being either plant or animal proteins.

Amino acids

When proteins are digested they are broken down into 20 different kinds of nitrogen-containing substances known as amino acids. Each protein is very exact in the amino acids it contains and their arrangement. All forms of life have the capacity to put amino acids together to make their own unique proteins.

Why do I need proteins?

Proteins are necessary in many ways:

- to build and repair cell walls and structures
- to be a part of compounds necessary for normal functions—digestion, carrying oxygen, water balance, etc.
- to supply energy

Proteins are constantly being made in the body from amino acids. These amino acids come from the food we eat, from other proteins in the body, or are made brand new. Eight amino acids cannot be made but must be obtained from the food we eat. To avoid excessive breakdown of body

proteins, some amino acids must come from proteins in food each day.

Amino acids cannot be stored in the body. If they are not used in a few hours, they will lose their nitrogen and the rest of the amino acids will be used for energy or converted to fat and stored.

To use protein most efficiently, protein foods should be eaten throughout the day. Skipping meals or eating meals without protein is a poor practice.

Differences in proteins

Some food proteins are more valuable to humans than others because of the kinds and amounts of amino acids they contain. In general, animal proteins more efficiently supply the body's needs than vegetable proteins because they are more nearly like human proteins. Gelatin and soybeans are exceptions. Gelatin, an animal protein, is lacking or low in some amino acids. Soybeans, in contrast to most vegetable proteins, have good amounts and the right variety of amino acids for humans.

One food protein high in a certain amino acid can supplement another protein that is low in the same amino acid.

To insure an adequate supply of amino acids, you can:

- (1) Eat animal proteins in the form of meats, eggs, milk, and cheese.
- (2) Combine animal with vegetable proteins in the same meal.
- (3) Choose vegetables with proteins that supplement each other e.g. legumes and cereals (dried beans and rice).

This publication is adapted from a Kansas State University Cooperative Extension Service leaflet written by Mary P. Clark, Extension specialist in nutrition education.

How much protein?

Adult needs for protein vary according to body size and state of health. A large person will need more protein than a small one. The Recommended Dietary Allowances (RDA) published by the Food and Nutrition Board, National Research Council for a normal adult man and woman are as follows:

Woman, 19 years or over, 128 lbs. 46 grams
 Man, 23 years or over, 154 lbs. 56 grams

The above recommendations do not allow for additional protein needs for pregnancy or nursing mothers, adjustment for abnormal health conditions, or larger size.

The normal body's protein needs easily can be met by the food recommended in the Daily Food Guide. Consuming extra protein does not make one healthier and can be an unnecessary expense.

Protein in the DAILY FOOD GUIDE

All foods in the DAILY FOOD GUIDE (also called the Basic 4) contain some protein. Foods from the Meat Group ordinarily contribute one-half or more of the day's protein recommendations. The Milk, Bread and Cereal, and Fruit and Vegetable Groups follow in declining order. Pure sugars and starches and fats and oils contain no proteins.

Grams of Protein Recommended in DAILY FOOD GUIDE

Meat Group, 2 two ounce servings 28 grams
 Milk Group, 2 cups 16 grams
 Bread and Cereal Group, 4 servings 8 grams
 Fruit and Vegetable Group, 4 servings 4 grams
 Total 56 grams

This amount of protein meets the Daily Food Guide recommendations for both a 128-pound woman and a 154-pound man.

COMPARING COSTS OF 14 GRAMS OF PROTEIN

(14 grams is the amount of protein in 1 two ounce serving of meat from Meat Group)

Food	Market unit	Costs per market unit	Percent of unit for 14 g. protein	14 grams protein ready-to-eat*	Costs per 14 grams protein
Dry beans, (2 lb.)	lb.	\$.36	18	1 cup cooked	\$.06
Peanut butter	28 oz.	1.49	7	4 Tb. (2 oz.)	.10
Milk, dry, nonfat, 14 qt.	qt.	.27	38	1½ c.	.10
Ground beef, regular	lb.	.70	16	2 oz.	.11
Beef liver	lb.	.62	18	2 oz.	.11
Eggs, large	doz.	.77	17	2	.13
Chicken, whole, ready to cook	lb.	.48	29	2 oz.	.14
Milk, whole, fluid (½ gal.)	qt.	.43	38	1½ c.	.16
Cottage cheese	24 oz.	.98	17	½ c.	.17
Beef stew meat	lb.	1.22	15	2 oz.	.18
American process cheese, sliced	12 oz.	1.14	17	2 oz.	.19
Ocean perch, frozen fillet	lb.	1.32	15	2 oz.	.20
Turkey, ready to cook (12-13 lb.)	lb.	.73	29	2 oz.	.21
Tuna, canned, chunk light	6½ oz.	.65	33	2 oz.	.21
Bologna, chunk	lb.	.96	25	4 oz.	.24
Beef, rump roast, boned	lb.	1.44	17	2 oz.	.24
Beef, chuck roast, arm bone in	lb.	.90	27	2 oz.	.24
Round beef steak, boneless	lb.	1.18	21	2 oz.	.25
Ham, shanks, half	lb.	1.12	26	2 oz.	.28
Sirloin beef steak	lb.	1.58	19	2 oz.	.30
Haddock, frozen fillet	lb.	1.72	19	2 oz.	.33
Frankfurters	lb.	1.32	25	4 oz.	.33
Pork loin end roast	lb.	1.39	29	2 oz.	.40
Porterhouse beef steak	lb.	1.84	23	2 oz.	.42
Ham, canned, 3 lb. size	lb.	2.99	16	2 oz.	.48
Pork, chops, center cut loin	lb.	1.89	27	2 oz.	.51
Pork sausage	lb.	1.93	34	3 oz.	.66
Bacon, sliced	lb.	1.95	37	8-9 slices	.72

*For Meat, amount of lean cooked.

Costs of different sources of protein vary according to their production costs and popularity. The amounts recommended in this table for 14 grams of protein do not include waste such as bone or visible fat on meat.

Prices in the table are averages calculated from stores in one community in 1976. You can easily adjust these figures to current prices in your community:

- (1) Obtain the costs per market unit in cents.
- (2) Multiply by the percent of unit to give 14 grams protein. Be sure the market unit size is the same.

The answer will be the current cost per 14 grams of protein in cents. You can easily determine if a food is more or less expensive than formerly.



MEAT GROUP

Daily Needs — Two or more servings.
14 grams protein per serving (2 oz.).

Serving Size

- 2 oz. lean, cooked meat, fish, or poultry (no fat or bone)
- 2 large eggs
- 1 cup cooked dry beans or peas
- 4 level tablespoons peanut butter



MILK GROUP

Daily Needs — Varies with age and needs:

Servings

Children	2 to 3
Teenagers	4 or more
Adults	2 or more
Pregnant Women	3 or more
Nursing Mothers	4 or more
8 grams protein per serving.	

Serving Size

- 1 cup whole or skim milk
- 1 cup buttermilk
- 1/3 cup non-fat dry milk powder
- 1 oz. cheddar-type cheese
- 1/4 cup cottage cheese
- 1 1/2 cups ice cream

NOTE To get the **CALCIUM** equivalent of 1 cup of milk, use —

- 1 1/3 oz. cheddar cheese
- 1 1/3 cup cottage cheese
- 1 2/3 cups ice cream

BREAD AND CEREAL GROUP

Daily Needs — Four or more servings.
2 grams protein per serving.

Serving Size

- 1 slice bread (whole grain or enriched)
- 1 biscuit
- 1 oz. ready-to-eat cereal
- 1/2 cup to 3/4 cup cooked cereal, cornmeal, grits macaroni, rice, or spaghetti



FRUIT AND VEGETABLE GROUP

Daily Needs — Four or more servings.
1 gram protein per serving.

Serving Size

- 1/2 cup fruit or vegetable (raw or cooked)
- 1 medium orange, apple, banana, or potato
- 1/2 medium grapefruit or cantaloupe



Select fruits and vegetables for these additional needs:

- 1 dark green or deep yellow vegetable or fruit every other day for Vitamin A.
- 1 good or 2 fair sources of Vitamin C daily.
 - Good source:** grapefruit, oranges, cantaloupes, broccoli raw strawberries, sweet green and red peppers, and brussels sprouts.
 - Fair source:** asparagus tips, cauliflower, raw cabbage, honeydew melons, watermelons, greens of all kinds, white and sweet potatoes, rutabagas and tangerines.
- 2 other fruits or vegetables, daily.

About Soybeans

Soybeans are the basis of a number of products including textured vegetable proteins. They can be purchased as flour or grits (with varying levels of fat), concentrates, or isolates with about 45 percent, 70 percent, and 90 percent protein respectively. Some of these products can be made to resemble meat by extrusion and spinning techniques. The isolates often contain egg white or wheat gluten.

Raw soybeans contain antinutritional factors that can interfere with how the body digests foods. Thoroughly cook soybeans to destroy these factors and improve the nutritional value of the beans. Cooked soybeans are rich in protein, carbohydrates, fat, vitamins, minerals and liver. They are relatively high in calories, and can cause excess intestinal "gas" in some persons.

Consequences of Using Textured Vegetable Protein Foods:

1. The quality of protein compares favorably with lean meat, poultry, and fish.
2. Textured proteins are low in saturated fat and cholesterol, but they will absorb and hold animal fat if added to meat foods. Therefore, such foods as ground beef and soybean patties will be moist and juicy but can contain more calories than broiled beef patties.
3. Vegetable protein foods do not have all the same amounts and kinds of nutrients as animal protein foods. Substituting all or a majority of animal foods with vegetable ones can be hazardous to health.
4. Textured vegetable proteins may be higher in sodium and potassium than desirable for some individuals.
5. Dry granules of textured vegetable protein are convenient to store and use. After moisture is added, they should be treated as animal foods and stored in the refrigerator.
6. Textured proteins are versatile, and may be substituted or added to many recipes. Adjust seasoning as desired.

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