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## Vegetarian diets

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### Quick Facts

Vegetarianism has become popular in the United States in the second half of this century.

Vegetarians can be divided into different categories depending on which animal foods are restricted in the diet.

People adopt vegetarian diets for many reasons, including health, ecology, economics, ethics and religion.

Vegetarians can be well nourished if they plan their diets carefully.

The nutrients most likely to be lacking in a strict vegetarian diet are riboflavin, vitamin B-12, vitamin D, calcium and iron; vegetarians need to consume plant foods rich in these nutrients.

The American Medical Association warns against following the more extreme forms of zen macrobiotic diets, these diets are high in cereals and low in other food sources; they lack many nutrients and may result in serious nutrient deficiencies.



The practice of vegetarianism among adults has been found to be compatible with good health. The National Academy of Sciences' Food and Nutrition Board has emphasized that vegetarians can be well nourished if they select their diets carefully and give attention to nutrients that may be lacking in vegetarian diets. However, there are studies that report nutrient deficiencies of certain vegetarian diets, especially among infants and young children. In addition, adverse health effects from strict and unplanned vegetarian diets have been reported. For these reasons, it is important that vegetarians understand the principles necessary to practice safe and healthy vegetarianism.

### Types of Vegetarian Diets

A vegetarian is a person who does not eat some or any foods of animal origin. A vegetarian primarily eats foods that come from plants. Such foods include grains, legumes, fruits and vegetables. Vegetarians have different dietary practices, but most can be categorized into one of the following groups.

Vegetarianism is a widespread practice. In fact, a large part of the world's population subsists on vegetarian diets. In many parts of the world people are vegetarians for reasons of inadequate income, lack of available animal products and traditional religious and cultural beliefs. However, vegetarianism has been practiced in American society among a small proportion of the population for a long time. Only within the second half of this century has there been an increase in the popularity of vegetarianism in the United States.

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**Semi-vegetarians** eat plant foods, milk, milk products, eggs, and more or less limited amounts of seafood and poultry. Red meat usually is avoided.

**Pesco-vegetarians** eat plant foods and fish but exclude red meats.

**Pollo-vegetarians** eat plant foods and poultry but exclude red meats.

**Lacto-ovo-vegetarians** eat plant foods, milk, milk products, and eggs, but avoid flesh foods (meat, poultry and fish).

**Lacto-vegetarians** eat plant foods, milk and milk products, but avoid eggs and flesh foods.

**Ovo-vegetarians** eat plant foods and eggs, but avoid milk, milk products and flesh foods.

**Total vegetarians**, also called vegans, eat plant foods only. No foods of animal origin are consumed.

## Why People Become Vegetarians

Americans become vegetarians for a variety of reasons. People generally adopt vegetarian diets for one or more of the following reasons.

**Health.** Many people believe they will be healthier if they are vegetarians. Vegetarian diets tend to be lower in saturated fat, cholesterol and sodium than the typical American diet. Some studies have found that in some people these dietary characteristics are associated with reduced risk of heart disease and high blood pressure. Vegetarian diets tend to be high in fiber. Fiber is beneficial in the diet because it rapidly moves food through the intestinal tract. Hence, there may be less time for carcinogens (cancer-causing substances) to be absorbed into the body. However, the National Academy of Sciences reports that the cancer/-fiber link appears doubtful at this time.

Though there are positive health benefits of vegetarianism, studies have shown that vegetarians are not necessarily more healthy or less healthy than meat-eaters. Vegetarianism cannot prevent or cure disease and vegetarians should continue to seek necessary medical care.

**Ecology.** Individuals who turn to vegetarianism for ecological reasons feel that one way to combat world hunger is to eat lower on the food chain. These vegetarians feel the practice of growing food to feed animals is wasteful. Instead, many more people could be fed if crops were used to feed people rather than animals.

**Economics.** Economic reasons for vegetarianism focus on the fact that it generally is less expensive not to eat meat. It has been estimated that the cost of meat accounts for about one-third of the average food bill. Most plant foods are cheaper than animal foods. The expense of eating meat may limit the amount people eat.

**Ethics.** Ethical reasons for vegetarianism include philosophies such as nonviolence and reverence for life. Some people are opposed to

killing animals for food. Thus, they abstain from eating meat, poultry and fish.

**Religion.** Some religious groups have traditionally been vegetarian. Several Indian religious groups include vegetarianism among their tenets of faith. In the United States Seventh Day Adventists are the largest traditional group following vegetarianism. Followers of this faith generally are lacto-ovo-vegetarians. Some vegetarians are members of new religious groups with diet-related taboos. Though these groups vary in beliefs and dietary habits, they tend to believe vegetarianism is a way of cleansing the body and promoting a proper spiritual balance.

## Planning a Nutritious Vegetarian Diet

Individuals consuming vegetarian diets generally receive adequate amounts of most nutrients. The nutrients that may be low in vegetarian diets and that require special attention are protein, calories, riboflavin, vitamins B-12 and D, calcium and iron.

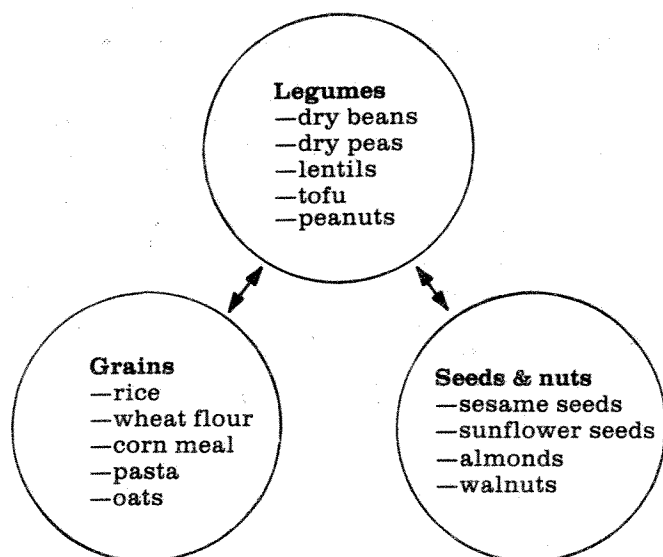
**Protein** is needed for growth and maintenance of body tissues. Protein also is necessary for enzymes, hormones, antibodies and milk production in lactating women. Protein is required throughout life. Each day protein must be supplied by the foods people eat.

Animal and plant foods supply protein, but the protein in plant foods is of a lower quality. Protein quality refers to the amino acid composition of a food. Amino acids are the building blocks that make up all proteins. The body needs a total of 20 amino acids to make protein. Twelve of the amino acids are non-essential amino acids. That is, the body can make these amino acids if they are not present in the foods a person eats. The other amino acids are essential. The body cannot make these amino acids; they must be obtained from food.

Animal foods, such as milk and meat, are complete proteins. This means they contain all nine of the indispensable amino acids needed for growth and good health. A person who eats foods of animal origin on a daily basis gets all of the indispensable amino acids. Plant foods, such as grains and legumes, are incomplete proteins. These foods lack one or more of the indispensable amino acids. For example, grains do not have enough of the amino acid lysine, and legumes lack methionine. Therefore, a vegan who relies only on plant foods for protein may not receive all of the indispensable amino acids.

A vegan can get all of the essential amino acids in one of two ways. First, two sources of plant protein, when eaten together, may supply all of the indispensable amino acids. This is called protein complementation.

The following chart demonstrates how plant foods can be eaten in combination to supply all of the essential amino acids.



For example, when a peanut butter sandwich is eaten the bread supplies more of the methionine which the peanut butter is low in and the peanut butter supplies the lysine which the bread is low in. Some other complementary combinations are:

- rice-bean casserole
- corn tortillas and beans
- pea soup and rye bread
- baked beans and brown bread
- garbonzo beans and rice
- black eyed peas and rice
- peanut butter on crackers
- lentil and rice soup
- sunflower seeds and peanuts
- sesame seeds in bean casserole
- bean burritos

The second way a vegan can get all of the essential amino acids is to use textured vegetable protein (TVP) and meat analogues. TVP is made from soybeans and is fortified with amino acids so it contains all of the essential amino acids. TVP is sold in a dehydrated form and must be reconstituted with water. TVP is used primarily in casseroles.

Meat analogues are meat-like foods made from vegetable protein, usually soybeans. Like TVP, meat analogues are fortified with amino acids so they are complete proteins. Meat analogues are purchased either canned or frozen and come in a variety of flavors, such as beef, chicken and bacon.

**Energy** is needed to sustain all body processes and also is needed for physical activity. The energy in food is measured in units called calories. Calories are supplied by fat, carbohydrate and protein in food. Vegetarians tend to consume fewer calories and to be thinner than meateaters. This is because vegetarians eat plant foods that are bulky and low in calories.

Most vegetarians do not have difficulty in eating enough food to meet their energy needs. Children also will receive enough calories if they drink milk, eat milk products and eggs on a daily basis. However, because infants, young children

and pregnant and lactating women have high needs for calories they may have difficulty consuming enough energy on a vegan diet. Protein also is a potential problem for these special groups. For this reason vegan diets are not recommended for these groups unless the diets are carefully planned and supervised by a registered dietitian or other qualified health professional.

**Riboflavin** helps the body break down carbohydrates, proteins and fats so that they can be used for energy. Riboflavin also is necessary for healthy skin, eyes and clear vision. The best sources of riboflavin are liver, milk products and red meats. When these foods are restricted or avoided in the diet, riboflavin must come from such other sources as green leafy vegetables and fortified or enriched grains.

**Vitamin B-12** is needed for normal red blood cell formation and normal nerve function. This vitamin is needed in the body in very small amounts and can be stored in the body in large amounts. Therefore, a deficiency of vitamin B-12 takes a long time to develop, maybe several years. Once a deficiency of the vitamin does develop, it results in irreversible nerve damage. Therefore, vegetarians need to give special attention to this nutrient.

At this time it is believed that vitamin B-12 is found only in animal foods. Foods of plant origin are not thought to contain any vitamin B-12. There are only three exceptions. Three different groups of foods may provide varying amounts of vitamin B-12. These are:

- fermented soybean products, such as tempeh, miso and natto.
- single cell proteins, such as microalgae and yeasts that are grown in a medium rich in vitamin B-12.
- sea vegetables, such as kelp, dulse, kombu and arame.

It is essential to remember that it is not known how much vitamin B-12 these foods contain. It may be a very small and insignificant amount. Therefore, these foods should not be relied upon for a single source of vitamin B-12.

Vegetarians who eat milk products and eggs on a daily basis will consume adequate amounts of vitamin B-12. Vegans, however, will have little or no vitamin B-12 in their diets. They must obtain the vitamin through regular use of vitamin B-12 fortified soy milk or yeast or a vitamin B-12 supplement.

**Vitamin D** is required for the absorption of calcium from the digestive tract and for the incorporation of calcium into bones and teeth. Very few foods contain large amounts of vitamin D. The best sources—fortified milk, egg yolks and liver—are all of animal origin. Therefore, vegetarians, especially vegans, may not consume enough vitamin D.

A second source of vitamin D is sunlight. Sunlight on the skin enables the body to make vitamin D. A person who is regularly exposed to sunlight can get enough vitamin D without having any

come from food. However, exposure to sunlight can be limited by several factors. Dark skin, pollution and northerly climates may decrease sunlight exposure and, therefore, vitamin D production. It is recommended that when exposure to sunlight is limited and a diet is devoid of animal products that a vitamin D supplement be taken.

**Calcium** plays several roles in the body. It is needed for strong bones and teeth and for normal blood clotting. Calcium also is needed for normal muscle and nerve function. Most calcium in the American diet comes from milk and milk products. When these foods are avoided in the diet, calcium must come from other sources. Dark green leafy vegetables are the plant foods that provide the most calcium. It is often more difficult for people to eat dark green vegetables in sufficient quantities on a daily basis to meet the calcium needs. Careful menu planning becomes essential.

**Iron** combines with protein to form hemoglobin, the substance in the blood that carries oxygen and carbon dioxide. An adequate intake of iron is necessary to prevent anemia. Many Americans, both meat-eaters and vegetarians, have a difficult time consuming enough iron. Iron is found in animal and plant foods, however, the iron in animal foods is more easily absorbed by the body. Also, the iron in plant foods may be less available to the body because of the high fiber content of plant foods. Fiber is not absorbed into the body. It may tie up minerals, such as iron and they too will not be absorbed. For these reasons vegetarians may be at a higher risk for developing iron deficiency. Because women need more iron than men, they especially need to give special attention to consuming adequate iron.

Dark green leafy vegetables have the highest iron content. Dried fruits, such as raisins, apricots, peaches and prunes, also are high in iron. It is recommended that a food high in vitamin C (brussel sprouts, strawberries, citrus fruits, broccoli, collard greens, mustard greens, cantaloupe) and a food high in iron be eaten at the same meal. Vitamin C increases the availability of iron in the intestinal tract. When vitamin C and iron are eaten together more iron is absorbed into the body.

## Zen Macrobiotics

The vegetarians generating the most concern among health professionals are the Zen Macrobiotics. Members of macrobiotic groups eat diets based on a philosophy with origins in the late 19th century. The macrobiotic diet consists of 10 dietary regimens. In the progression from lower to higher regimens, foods are eliminated from the diet. At the highest level only brown rice is eaten. This diet is claimed to help individuals achieve a state of well-being and to prevent all diseases known to humans.

The American Medical Association's Council on Foods and Nutrition has emphasized that the higher macrobiotic dietary regimens are extremely dangerous. Individuals who follow the more rigid of the macrobiotic diets are in danger of develop-

ing severe nutrient deficiencies. Cases of scurvy, anemia, starvation and loss of kidney function have been reported, some have resulted in death.

## Using Legumes

Vegetarians, as well as meat-eaters, will find that legumes are an excellent food to either extend or replace meat. Legumes are low in cost and high in nutritive value. They contribute iron and B vitamins to the diet. Although the protein quality of legumes is low, they can be combined with small amounts of animal food, such as milk, eggs or cheese, or with other plant foods to yield high quality proteins.

The term legumes refers to dry beans, dry peas and lentils. Legumes usually are found on grocery store shelves in a plastic bag. Look for legumes that are uniform in size and bright in color. Legumes can be stored for six to eight months. Keep them in the original package. Once opened, store them in a tightly covered container in a cool, dry place.

**Dry beans** are rich in iron, calcium, phosphorus and potassium. Many varieties of dry beans are available, including black beans, garbanzo beans (also called chick peas), kidney beans, lima beans, navy beans and pinto beans. Unless the beans are slow-cooked all day, they should be soaked before cooking. They can be soaked overnight or brought to a boil for three minutes, removed from heat, covered, and soaked one to four hours. For each cup of beans use two to three cups of water. Test for doneness by piercing with a knife. Cooked beans can be used in many recipes.

**Dry peas** are good sources of protein, iron, potassium and thiamin. Dry peas are green or yellow and can be purchased split or whole. Whole peas are prepared similar to beans, as described above. Split peas may be soaked for a shorter period of time.

**Lentils** are disc-shaped legumes similar in size to peas. Lentils are rich in protein, iron, potassium, calcium and phosphorus. Lentils do not need to be pre-soaked and they cook faster than beans and whole peas.

## Summary

A vegetarian diet can meet daily nutrient needs. Vegetarians need to know which nutrients may be lacking in a vegetarian diet. The fewer animal foods eaten, the greater the likelihood of nutrient deficiency. Vegetarians need to give special attention to obtaining enough riboflavin, vitamin B-12, vitamin D, calcium and iron. Total vegetarians, or vegans, need to regularly eat vitamin B-12 fortified foods or take a vitamin B-12 supplement.

In addition, if exposure to sunlight is limited, a vitamin D supplement also is recommended. To consume high quality protein, vegans need to practice protein complementation. Lastly, because it may be difficult for infants, young children and pregnant and lactating women to get enough calories, vegan diets are not recommended for these groups unless the diet is planned and supervised by a qualified health professional.