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**NUTRIENT CONSERVATION IN CANNED, FROZEN
AND FRESH FOODS**

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SUMMARY

Americans' food choices have changed in the last 20 years, reflecting health issues that have been reported in the media. While health professionals recommend an increase in the amount of fruits and vegetables eaten by all segments of the population, it appears these recommendations have not been acted upon by the American public. Nutritional labeling has made more information available to consumers, but provides no comparative basis for making choices. The safety of canned foods is unquestioned, but their nutritional value is underestimated by consumers and health professionals alike.

In 1995, the University of Illinois Department of Food Science and Human Nutrition did a comparative nutritional analysis of a number of canned, fresh and frozen vegetables and fruits that received a great deal of attention. We have updated that study and provided additional information that can be used for consumer education and to answer the questions posed by the media, as well as health professionals.

In this current study, we have provided information about 35 canned fruits, vegetables, legumes, poultry and fish. The nutrient listings have been expanded and now include folate and fiber values for all of the products, as well as thiamin for the legumes. Canned foods can provide substantial contributions of folate, an essential vitamin that is not included on the nutritional label, but is present in fruits and vegetables. Fiber, another essential nutrient provided by fruits and vegetables in the diet, is as high in canned products as in its fresh counterparts. **Our study confirms canned foods are comparable to, and sometimes better than, fresh and frozen varieties in their nutritional contribution to the American diet.**

Key findings contained in this study include:

- **Dietary Fiber** – Many fruits and vegetables are important sources of dietary fiber. The canning process does not affect fiber content, making them comparable to fresh and frozen varieties. In fact, the heating process appears to make the fiber more soluble and, therefore, more useful to the body.
- **Vitamin A** – Many canned fruits and vegetables are high in vitamin A. Since little of the vitamin is lost during the canning process, canned products have vitamin A levels similar to their fresh and frozen counterparts. In some cases, such as canned pumpkin, the vitamin A levels actually are higher.
- **Carotenes** – Vitamin A is present in many fruits and vegetables as carotenes – antioxidants that provide protection for the body's cells. Tomatoes, in particular, contain an important

carotenoid called lycopene, which appears to be effective in cancer prevention. Some analyses show lycopene is effective when consumed after it is heated or canned.

- **Folate** – Beans are an excellent source of folic acid, which recent studies indicate plays a critical role during pregnancy. Since folate holds up well during the canning process, making them similar to dried varieties that are cooked from scratch.
- **Vitamin C** – Apricots, asparagus, oranges, grapefruits, pineapple, strawberries, spinach and tomatoes are all significant sources of vitamin C. Although small amounts of the vitamin are lost during heat treatment, most of what is lost ends up in the liquid in which the product is packed. The vitamin C retained after canning remains stable during the one to two-year shelf life of the canned product.
- **Protein** – Canned poultry and fish – considered protein foods – are comparable to their fresh-cooked counterparts in nutritional value, since protein is not affected by heat treatment. This makes the canned varieties convenient alternatives to fresh-cooked, since they require much less preparation time.

Other advantages of canned foods are their convenience, as well as their safety. Knowing their nutritional value is as high as their fresh or frozen counterparts, we can use them with confidence either straight from the can or in recipes. We have provided five recipes for popular foods made with fresh or canned ingredients. The nutritional analyses for *Chili*, *Tomato Vegetable Soup*, *Spaghetti Sauce*, *Peach Cobbler* and *Pineapple Upside-Down Cake* show you can take advantage of canned foods' convenience and safety to make delicious and nutritious recipes quickly.

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BACKGROUND

"5 A Day for Better Health"

A 1991 survey conducted by the National Cancer Institute (NCI) determined that on average Americans eat less than three servings of fruits and vegetables a day. As a result in 1992, the NCI, along with the Produce for Better Health Foundation (PBH), launched a public education program titled "5 A Day for Better Health" to increase consumer awareness about the importance of fruits and vegetables in the diet. Fresh fruits and vegetables are not the only way to achieve the "5 A Day" goal, but consumers and health professionals tend to focus on these forms (1,2).

The NCI/PBH survey indicated consumers were listening to the message, and follow-up surveys show the percentage of consumers aware of the "5 A Day" goal rose 27 percent from 1991 to 1996. However, the United States Department of Agriculture's (USDA) Economic Research Service found only a three percent increase in vegetable consumption since 1978, and the recommended yellow and green vegetables consumption was low (3,4,5,6). According to a recent investigation, fewer than one percent of young Americans meet the overall recommended guidelines for a healthy diet, and only about one-third ate the recommended amounts of vegetables (3). Survey data from the 5-A-Day program indicated 3.5 servings of fruits and vegetables was the median for most adults, and less than one-quarter ate five servings (6).

Consumer Attitudes About Nutrition and Canned Foods

When consumers make choices about food, they select what they eat on the basis of criteria other than nutritional value. In the 1990s, more people are eating away from home and consuming more combination foods like pizza and more fat-free items, though not necessarily fewer calories (3). Data from USDA surveys as well as other polls conducted by health organizations, indicate Americans know about healthy eating and can define nutritional concerns. But in spite of this, most fail to apply these principles in selecting a diet, and opt instead for the latest food fad. Despite what government and health agencies advocate, fruit and vegetable consumption is not increasing substantially. Perhaps this is because consumers seem to believe fresh fruits and vegetables provide more vitamins and fiber than their canned counterparts. Processing is thought to destroy nutrients and add preservatives, indicating a lack of understanding about how foods are handled for canning (or freezing).

The Canning Process

Canning is one of the best studied forms of food preservation (7,8). Using heat to cook or can foods of all types destroys microorganisms that can cause food spoilage or foodborne illnesses. The sterilization process occurs inside the can as the food uniformly is heated; no preservatives are used or needed. Selecting the conditions for heat treatment is done

to maintain the food's taste, texture, nutritional value and microbiological safety. The commercial canning process, developed by Nicolas Appert more than a century ago, is essentially unchanged. Home and commercial canning are similar, though commercially

the temperatures and containers used are more carefully controlled. Steel cans can withstand the high heat, pressure and movement that occurs inside the big pressure cookers (called “retorts”) used in processing plants. Steel cans also conduct the heat to the food rapidly and allow penetration of heat to the center of the product. This means canned foods are the safest form of food, because the conditions used are designed to preserve microbiological safety as well as nutritional and sensory quality.

Canned Foods Preserved Naturally

No additives are needed to preserve canned foods. When salt (sodium chloride) is added, it is only for flavor, and it can be eliminated without compromising food safety. Calcium chloride sometimes is added to tomatoes or other vegetables because it helps to maintain their shape. The added benefit is that calcium is an essential nutrient.

Packed With Nutrients

Vegetables and fruits are canned when they are at their peak of quality to ensure they will look and taste good. Generally, the time between harvest and processing is minimized by having processing plants located close to the growing areas. Fresh produce, on the other hand, may spend seven to 14 days on the road and in the supermarket before it reaches the consumer’s home.

Many consumers do not realize canned fruits and vegetables are good sources of nutrients, in spite of nutrition labels. Nutritional labels are used more often by consumers to determine how much fat or calories are provided. Using nutritional labels for comparison among fruits and vegetables – as well as between forms (fresh vs. canned vs. frozen) – is not important to most consumers and may not be considered trustworthy sources of information.

For most consumers, nutritional labeling is the major point-of-contact information source. However, consumers seem to be suspicious of information provided by manufacturers. A recent survey of label accuracy by the Food and Drug Administration (FDA) showed more than 90 percent of the labels are accurate. When there were discrepancies between laboratory analysis and label values, these could be attributed to analytical difficulties in determining a nutrient. This is why many manufacturers underestimate the amount of a nutrient in a canned food product.

Canned is the Key Ingredient

A perusal of cookbooks and cooking magazines reveals canned foods are important ingredients, particularly in today’s fast food preparation society. Consumers who use canned foods cut preparation and cooking time, while obtaining a wide variety of fruits, vegetables, legumes and meats all year long.

The Nutritional Labeling and Education Act (NLEA)

The FDA, under the Nutritional Labeling and Education Act (NLEA) of 1990, implemented a variety of new nutrition labeling regulations. The rules, which came into practice

in 1994, were designed to offer the consumer a more complete, accurate and easier-to-read nutritional label for packaged foods. The following information is covered under the NLEA regulations: nutrition labeling for almost all foods, “voluntary point-of-purchase” nutrition information and health-related claims (9,10).

Almost all foods are covered under the NLEA regulations. Meats and poultry are the exceptions. These products are the responsibility of the USDA, which enforces regulations similar to those of the FDA.

The FDA’s “voluntary point-of-purchase” nutrition information program provides nutrition information for the 20 most commonly eaten fresh fruits and vegetables. This voluntary nutrition information usually is provided to the consumer in the produce department of the grocery store.

Health-related claims often made by the manufacturer, such as “low-fat,” “light” and “high fiber,” now are defined and regulated by the FDA and outlined in the NLEA to ensure the terms have similar meaning between products. Similarly, claims about fat and calcium content and their relationships to cancer, heart disease and osteoporosis also are regulated by the NLEA. These claims are a result of careful examination of existing scientific data supporting the concept and must be approved by the FDA.

What’s on the Label?

The nutrient values that appear on the food label are based on two sets of dietary standards: Daily Reference Values (DRVs) and the Reference Daily Intakes (RDIs). The values obtained for this study were based on both the DRVs and RDIs established by the FDA. Not all of the nutrients listed in Tables 1 and 2 are on the labels, however. The FDA requires only a limited number of the nutrients. Any additional information is at the discretion of the manufacturer.

DRVs are presented on the label as Percent Daily Values. The Percent Daily Values are calculated from the DRVs and usually are based on a 2,000 calorie diet for adults and children over the age of four. Table 1 is a list of the current DRVs based on a 2,000 calorie diet.

In the past, the U.S. Recommended Dietary Allowances (RDAs) were used as standards for labeling purposes. RDIs now have replaced the U.S. RDAs on the nutrition labels. In developing the new nutrition labels, the FDA wanted to avoid the possibility of confusion between the U.S. RDAs and the values on which they were based, the RDAs. Table 2 is a list of the RDIs.

Table 1. Daily Reference Values (DRVs) for Food Components

Food Component	DRV
Fat*	65 grams (g)
Saturated Fatty Acids*	20 grams (g)
Cholesterol*	300 milligrams (mg)
Total Carbohydrate*	300 grams (g)
Fiber*	25 grams (g)
Sodium*	2,400 milligrams (mg)
Potassium	3,500 milligrams (mg)
Protein*	50 grams (g)

*Required on the nutritional label as percent of the daily value.

Table 2. Reference Daily Intakes (RDIs) for Nutrients Based on a 2,000 Calorie Per Day Diet

Nutrient	RDI
Vitamin A*	5,000 International Units (IU)
Vitamin C*	60 milligrams (mg)
Calcium*	1,000 milligrams (mg)
Iron*	18 milligrams (mg)
Vitamin D	4,000 International Units (IU)
Vitamin E	30 International Units (IU)
Vitamin K	80 micrograms (mcg)
Thiamin	1.5 milligrams (mg)
Riboflavin	1.7 milligrams (mg)
Niacin	20 milligrams (mg)
Vitamin B ₆	2 milligrams (mg)
Folate	400 micrograms (mcg)
Vitamin B ₁₂	6 micrograms (mcg)
Biotin	300 micrograms (mcg)
Pantothenic Acid	10 milligrams (mg)
Iodine	150 micrograms (mcg)
Magnesium	400 milligrams (mg)
Zinc	15 milligrams (mg)
Selenium	70 micrograms (mcg)
Copper	2 milligrams (mg)
Manganese	2 milligrams (mg)
Chromium	120 micrograms (mcg)
Molybdenum	75 micrograms (mcg)
Chloride	3,400 milligrams (mg)

*Required on the nutritional label as percent of the daily value.

Why Are the Listed Nutrients Important to Us?

Although there are RDIs for many nutrients, only a selected group appear in our tables and on the labels. Those listed below with a brief explanation of their functions in the human body are shown in our tables (11).

Explanation of Nutrients

Vitamin A

Vitamin A in the diet comes in one of two forms: retinoids, found in animal products, and carotenoids (over 500 forms found in plants). This vitamin is important in both night and color vision. In addition, vitamin A is critical for the activity of mucus-forming cells in the human body. Carotenoids are classified as antioxidants, which provide protection for the cells of the body. Vitamin A values in the tables are expressed as IUs or International Units; carotenoid content is converted to these values. Fruits and green and yellow vegetables, such as apricots, carrots, peaches, pumpkin, spinach and sweet potatoes are all high in carotenes that can be converted to vitamin A in the body. Tomatoes contain an important carotenoid called lycopene that has been suggested as an anticarcinogen, particularly for prostate cancer.

Vitamin C

Vitamin C has a variety of functions in the human body. Also known as ascorbic acid, it is critical for collagen synthesis, acts as an antioxidant, enhances iron absorption and plays a role in the synthesis of vital compounds within the body's cells. Apricots, berries, oranges, pineapple, potatoes, spinach and tomatoes are good sources of vitamin C.

Calcium

Calcium is essential for the human body. This mineral plays a role in cell regulation, nerve transmission and the maintenance of strong teeth and bones. In general, fruit and vegetable products provide only small amounts of calcium. However, taken in the context of a varied diet, canned vegetables and legumes can add to calcium intake. Canned salmon is a very good source of calcium because it contains some of the small bones that are softened by the heating process.

Iron

Iron is a part of both hemoglobin and myoglobin. This nutrient is essential for the uptake and release of oxygen in the body. Cooked peas, spinach, navy beans and red kidney beans are all good sources of iron.

Thiamin

Thiamin, a B vitamin, is important for enzymatic activities in the body's cells when in its coenzyme form. It participates in carbohydrate and energy metabolism. Green beans, peas and dried beans are all very good sources of thiamin.

Folate

Folate plays a key role in the formation of the bases used in the genetic material RNA and DNA. Recent evidence has shown it is a particularly important nutrient for the fetus during gestation, and pregnant women should consume increased amounts of this vitamin (12). Additional research shows a relationship between elevated homocysteine levels in the blood and cardiovascular disease and stroke in the elderly, and folate plays an

important role in the metabolic homocysteine pathway (13,14). Cooked beets, asparagus, pinto beans and spinach, as well as raw spinach, are all important sources of folate.

Serving Sizes – Putting Fresh, Frozen and Canned on the Same Plane

The NLEA defines a serving size as “the amount of food customarily eaten at one time.” The serving sizes listed on the package are based on the “Reference Amounts Customarily Consumed Per Eating Occasion,” which were developed by the FDA. The NCI, in promoting “5 A Day for Better Health,” has developed an easy-to-follow list of serving sizes for common fruits and vegetables. The following are the serving sizes recommended by the NCI, and are considered to be equivalent servings. Our tables are based on 1/2 cup of cooked or canned food product, whenever that information is available.

- 1 medium fruit (e.g., 1 peach)
- 1/2 cup chopped, cooked or canned fruit (1/2 cup peach slices)
- 3/4 cup of 100 percent fruit or vegetable juice (3/4 cup peach nectar)
- 1/4 cup dried fruit (1/4 cup dried peaches)
- 1/2 cup raw non-leafy or cooked vegetables (1/2 cup peas)
- 1 cup raw leafy vegetables (1 cup raw spinach)
- 1/2 cup cooked leafy vegetables (1/2 cup cooked spinach)
- 1/2 cup cooked beans or peas

STUDY METHODOLOGY

The objective of this study was to compare the available nutritional information for canned, fresh and frozen products. We used readily accessible data, as well as nutrition labels, for the values presented.

Foods Analyzed

Fruits: Applesauce, Apricots, Blackberries, Blueberries, Grapefruit, Mandarin Oranges, Peaches, Pears, Pineapple, Purple Plums, Strawberries, Sweet Bing Cherries, Tomatoes: Stewed & Whole and Ripe Olives

Vegetables: Asparagus, Beets, Carrots, Corn, Green Beans, Mushrooms, Peas, Pumpkin, Spinach, Sweet Potatoes and White Potatoes

Beans: Black Beans, Black-Eyed Peas, Garbanzo, Navy, Pinto and Kidney Beans: Red & White

Poultry and Fish: Breast of Chicken, Chunk Light Tuna and Pink Salmon

Recipe Analysis: Chili, Peach Cobbler, Pineapple Upside-Down Cake, Spaghetti Sauce and Tomato Vegetable Soup

Nutrient Composition Data Sources

In the 1995 study, Nutritionist IV – a software program that uses various sources of compositional data including the USDA Handbook 8 – was used for the fruit and vegetable nutrient tables. In the current study, two databases were used to collect nutrient information. The USDA Nutrient Composition Tables (electronic version of Handbook 11, which can be found on the World Wide Web at <http://www.nal.usda.gov/fnic/foodcomp>) was used. The information for the individual tables for the fruits, vegetables, beans and poultry and fish comes from the current USDA Nutrient Composition Tables. Data bank values are “representative” and are weighted averages from many sources of information, such as research by university and government laboratories. The values have been collected over many years and are not intended to reflect what is in a specific can. Thus there may be differences between the data bank value and the amount listed on the cans.

Data from labels of major fruit and vegetable processors were compared directly with the nutrient data information. Processors or distributors obtain their nutritional information from direct analyses of a sampling of their products. Values on the nutritional labels are the minimum amount that is present in the food as consumed. To be on the safe side, manufacturers often underestimate what is present so they meet FDA requirements.

Data in the tables are presented as concentrations (e.g., milligrams per 1/2 cup of food) and as percent of the RDI or DRV. This entailed calculating the concentrations in the labeled foods and the percentages for the values from the nutrient data bank. The FDA’s listed RDIs or DRVs were used for this.

The recipes were analyzed using Nutritionist IV (which uses the USDA Nutrient Composition data and manufacturers’ information), and the percentage RDAs given for the recipes are based on the requirements for females, 25 to 50 years old. These RDAs vary slightly from the FDA

listings, and were obtained from the Nutritionist IV program. Note vitamin A is given in RE or retinol equivalents, rather than IUs (International Units), another way of expressing its activity.

Nutrients Included and Comparisons

Based on responses to our earlier comparative study, we included some other nutrients in our listings. Food components included are fat, cholesterol, total carbohydrate, fiber, sodium, potassium (see Table 1) and selected nutrients (see Table 2), depending on the food. For example, fruits and vegetables are excellent sources of vitamins A and C, but are unimportant sources of thiamin; beans, on the other hand, are excellent sources of thiamin, but not A and C.

The nutrient content is expressed as both the amount (e.g., mg vitamin C) and the percentage of the RDI provided by a recommended serving of the food.

STUDY FINDINGS: COMPARISON OF SELECTED FRESH, CANNED AND FROZEN FRUITS, VEGETABLES, LEGUMES AND PROTEIN FOODS

What Makes this Study Different from the 1995 Analysis?

In our 1995 comparative nutritional analysis of canned, frozen and fresh fruits and vegetables, we confirmed canned fruits and vegetables are, in general, nutritionally equivalent to their fresh

and frozen counterparts. The information presented came from the existing USDA nutrient data bank and other sources, as accessed by a popular software program used by nutritionists. In addition, we gathered data from labels provided by manufacturers. The values presented in that study still are valid. However, the RDIs used for the calculation of the percent RDI were based on a proposed change in the RDIs which did not take place. The present comparison uses the values currently in effect. We also used the USDA nutrient data base exclusively, since that is now available electronically on the Internet, making it a resource available to many more individuals.

We have included a number of nutrients not shown in the 1995 study; for example, potassium and folate – two nutrients that are dietarily important and provided by fruits and vegetables. Information on calcium and iron is presented consistently.

The number of foods in the study was expanded to include 12 fruits, 14 vegetables, seven legumes and three protein foods (chicken, tuna and salmon). Fresh, fresh-cooked and canned products are in the tables where possible. Examples of commercial brands are included for all foods, being representative of the products available to the consumer.

Another addition to this study is the nutritional analysis of five popular recipes that can be made with fresh, frozen or canned ingredients. Since canned foods provide convenience in preparation, as well as comparable quality in finished products, it is important to know how well they stack up nutritionally.

How Do the Canned Foods Compare?

From a nutritional standpoint, fruits and vegetables are low in calories and fat, and are important dietary sources of vitamins (particularly vitamins A and C and folic acid), minerals (potassium, in particular) and fiber. They contain no cholesterol and can contribute substantially to fiber intake, a food component almost always low in American diets. Conventional wisdom has said fresh produce always is better than processed. Our findings in this (as well as our 1995) study show canned fruits and vegetables generally stack up very well against fresh. Although there is some loss of vitamin C content during heat processing, canning usually results in stable levels of most essential nutrients (8). The amount of a vitamin or mineral or fiber in canned food remains the same, even after one to two years of storage. Detailed nutrient information about selected fruits and vegetables are given in the tables and the brief summaries that follow.

Vitamin A

Some canned fruits and vegetables high in vitamin A are apricots, carrots, pumpkin, spinach and sweet potatoes. Vitamin A is present as carotenes, specifically B-carotene, which have both vitamin and antioxidant activity. Carotenes are very stable during the canning process and little is lost. In fact, some analyses indicate carotenes are more available for measurement and use by the body following heat treatment. Lycopene, a carotene that occurs in tomatoes, seems to be more effective in preventing prostate cancer when it is consumed after heating or canning (15,16).

Vitamin C

Good to excellent sources of vitamin C among the fruits and vegetables are apricots, asparagus, grapefruit, oranges, pineapple, spinach, strawberries and tomatoes. Although some vitamin C is lost during the heat treatment, much of it dissolves in the cooking liquid and can be recovered by using the liquid in soups and sauces. The vitamin C that is retained in the product remains stable during the shelf life (usually two years) of canned food.

Folate

Most vegetables and dried, cooked or canned beans also are very good sources of folate or folic acid. Much less information is available about the stability of this important nutrient during processing, and no label information is required for comparison. However, looking at the information available from the USDA nutrient composition database, we see canned vegetables and beans can provide 20 to 40 percent or more of the RDI for folate. Folic acid is similar to vitamin C in stability, so we can probably assume it is still there when the can is opened. Some vegetables that are not great sources of vitamins A and C can be very good sources of folate – beets and peas, as well as dried beans, are good examples.

Thiamin

Thiamin, one of the B-complex vitamins, is obtained by eating meats or legumes. Although this is a B-vitamin that is not particularly stable to heating, it survives the canning process well. This makes canned meats and beans comparable to freshly cooked food. All dried beans must be cooked for hours to soften and make them palatable. For this reason, canned beans compare favorably with home-cooked.

Potassium

Another essential nutrient that is not often referred to in nutrition articles and not always on the label is potassium. Together with sodium, potassium helps to regulate fluid retention in the body and influences blood pressure and kidney function. Fruits, vegetables and legumes often are excellent sources of potassium. This mineral is retained during canning, making canned foods as good of a source as fresh or frozen.

Dietary Fiber

Dietary fiber in fruits, vegetables and beans is essential in boosting fiber intake to recommended levels. Apples, blackberries, blueberries, cherries, carrots, pears, beans and peas provide this non-caloric food component in the form of cellulose and pectins. Canning does not affect the content of dietary fiber and may even make it more soluble, and therefore more useful.

Protein and Calcium

Canned poultry and fish are comparable to fresh-cooked poultry and fish in their nutritional value. These foods are considered to be protein sources. Canning does not

affect their protein content in any way. A benefit of canning fish is that there is calcium in the small bones that are cooked sufficiently enough to soften them so they are consumed. Therefore, canned fish has more calcium than the fresh-cooked product.

Are There any Surprises in the Study?

From a scientific standpoint, the results obtained in the second study confirm our findings from the 1995 analysis. Although the databases differed somewhat, the values for concentrations of nutrients were very similar. The percentages are somewhat altered because some of the RDIs and DRVs used in the current analysis were slightly different. The expanded lists provide a different array of foods – legumes and poultry/fish and some additional nutrients. Regardless of which food and what nutrients we examine, the bottom line is the same. Canned foods are an excellent alternative to fresh and frozen, because they provide the nutrients we expect from any specific food group.

What Can We Tell Consumers?

For the layperson, reading nutritional labels can be a challenge. Although many consumers say they read labels, they usually are checking for calories or fat content. Only a limited number of vitamins or minerals can be listed. Consumers may believe this means other nutrients are not present. Sometimes the importance of a particular food lies in the missing nutrient. **Consumers should be confident that if a food is suggested as being “high in nutrient X,” then the form (canned, frozen or fresh) will not alter that.**

Food Safety

Canning is one of the safest ways to preserve foods. The high heat process, used for many decades, kills microorganisms that cause foodborne illnesses. Rarely is an outbreak of food-related sickness caused by commercially canned products. The rapid heating methods, high temperatures, the integrity of the can and its conductivity all contribute to the success of the process. Shelf life of canned foods is at least two years.

Preservatives

No preservatives are used in canning. Fruits may have sugar or syrup added to enhance flavor and maintain texture, so caloric value is increased. Alternative packing liquids, such as juice, give consumers a choice. Salt (sodium chloride) is added to some vegetables, beans, meats and mixed foods (such as soup), in part because consumer testing has shown the taste of salt is important to most people, so it routinely is added. If reducing sodium intake is a health concern, many manufacturers have low-sodium alternatives. Calcium chloride, often found in canned tomato products, is added to maintain texture in whole or diced pieces. The calcium then becomes available as a nutrient. Mixed foods will contain flavorings and spices that enhance flavor.

Can Canned Foods Be Used as Ingredients in Cooked Foods, Like Soups, and Still Maintain Their Nutritional Value?

Using canned vegetables and beans in soups and stews provides the same nutritional value as the fresh ingredients likely would provide. Because canned foods already are cooked, they require only minimal further cooking time. Research studies in scientific journals show that once processed, little additional loss of nutrients occurs in subsequent cooking steps. Therefore, using canned foods in casseroles, soups and stews saves preparation and cooking time, as well as energy, while providing the same nutritional value as fresh foods.

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NUTRIENT ANALYSIS OF FIVE POPULAR RECIPES

Canned foods are convenient, time-saving ingredients in many recipes. We have selected several to show the positive nutritional benefits of these flavorful dishes, easily made with canned fruits, vegetables or legumes. The nutritional analyses were based on the RDAs for a 25 to 50 year-old woman, so there will be some differences in percentages for some nutrients compared to the individual product tables. However, it still is apparent recipes made with canned ingredients provide excellent nutritional values.

Recipes were analyzed using fresh, canned and frozen ingredients when applicable. Some ingredients only are available in canned form, such as tomato sauce. The ingredients indicated in bold are those the consumer can select either fresh, canned or frozen varieties and produce tasty dishes without losing any nutritional benefits. Keep in mind many canned products come in low- or no-sodium varieties for the sodium-conscious consumer.

A Look at the Analysis

The ***Chili*** recipe contains 24 percent of the recommended amount of vitamin A, 51 percent of vitamin C, 38 percent of iron, 26 percent of folate and 20 percent of thiamin, as well as 9 grams of fiber (about 1/3 of the recommended amount) for an adult woman in one serving. And most of these nutrients come from the canned products, used in this 20-minute recipe.

Spaghetti Sauce and ***Tomato Vegetable Soup***, like the ***Chili***, have good vitamin A, C and folate contents. The addition of a can of beans would make them similar to the ***Chili*** in fiber and thiamin as well. Convenience from the pantry makes them quick to prepare, since few ingredients have to be sliced or diced.

Peach Cobbler provides fiber, vitamin A and C in an easy-to-make form. Peaches are ready-peeled and sliced and available year round. ***Pineapple Upside-Down Cake*** has a little less of these nutrients, but still provides some of the benefits of eating fruits. These desserts are good sources of nutrients and have taste appeal.

CHILI

Ingredients:

3/4 pound ground beef (meat substitute may be used)
1 large onion, chopped (1 cup)
1/2 cup green pepper, chopped
1 tablespoon (2 cloves) garlic, minced
16-ounces **tomatoes**, diced
16-ounce **dark red kidney beans**, drained
1 can (8-ounces) tomato sauce
2 to 3 teaspoons chili powder
1/2 teaspoon dried oregano, crushed
1/4 teaspoon salt
1/4 teaspoon pepper

Preparation:

In large saucepan, cook ground beef, onion, green pepper and garlic until meat is brown. Drain fat. Stir in undrained tomatoes, kidney beans, tomato sauce, chili powder, oregano, salt and pepper. Bring to boil: reduce heat. Cover; simmer for 20 minutes.

Servings: Four

Nutrient Analysis for *Chili*

	Fresh	Canned
Wt/svg (g)	440.6	440.6
Kcal/svg	429.0	392.8
Fat (g)	15.2	14.8
Cholesterol (mg)	70.0	70.0
Total Carbohydrate (g)	42.0	36.9
Fiber (g)	9.4	9.3
Sodium (mg)	559.4	1,205.0
Potassium (mg)	1,266.0	1,128.0
Protein (g)	33.5	30.3
Vitamin A (RE/svg)	202.1	194.5
Vitamin A (% RDA)	25.0	24.0
Vitamin C (mg/svg)	56.0	51.5
Vitamin C (% RDA)	93.0	85.0
Calcium (mg/svg)	74.5	107.1
Calcium (% RDA)	9.0	13.0
Iron (mg/svg)	6.8	5.8
Iron (% RDA)	45.0	38.0
Folate (mcg/svg)	189.9	48.2
Folate (% RDA)	105.0	26.0
Thiamin (mg/svg)	0.36	0.23
Thiamin (% RDA)	33.0	20.0

svg=serving; RE=retinol equivalents; g=grams; mg=milligrams;

RDA: Recommended Dietary Allowances for a 25 to 50 year-old woman.

Source: University of Illinois Department of Food Science and Human Nutrition.

Analysis for “fresh” ingredient recipe is for beans cooked with no added salt.

Salt contains 2,325 mg sodium per teaspoon.

SPAGHETTI SAUCE

Ingredients:

2 tablespoons olive oil
1 Tablespoon garlic, minced (about 2 large cloves)
1/2 cup onion, chopped
1 teaspoon dried basil
1 teaspoon dried parsley flakes
1/2 teaspoon black pepper
1/2 teaspoon dried oregano
1 teaspoon salt
28-ounces **crushed tomatoes**
29-ounces **tomato puree**

Preparation:

Heat olive oil over medium-low heat in a 3-quart saucepan. Add garlic. Stir, and cook until golden brown. Add onion, and cook until soft and golden, stirring frequently. Add seasonings and tomato products. Bring to boil at medium-high. Reduce to low; cover loosely. Simmer 30 minutes, stirring occasionally.

Servings: Twelve

Nutrient Analysis for *Spaghetti Sauce*

	Fresh	Canned
Wt/svg (g)	144.9	144.9
Kcal/svg	52.3	65.5
Fat (g)	2.7	2.5
Cholesterol (mg)	0.0	0.0
Total Carbohydrate (g)	7.1	10.6
Fiber (g)	1.8	2.4
Sodium (mg)	203.6	312.9
Potassium (mg)	318.1	543.4
Protein (g)	1.3	1.9
Vitamin A (RE/svg)	85.6	135.0
Vitamin A (% RDA)	10.0	16.0
Vitamin C (mg/svg)	26.5	31.5
Vitamin C (% RDA)	44.0	52.0
Calcium (mg/svg)	14.4	35.2
Calcium (% RDA)	1.0	4.0
Iron (mg/svg)	0.76	1.2
Iron (% RDA)	5.0	7.0
Folate (mcg/svg)	21.5	14.0
Folate (% RDA)	11.0	7.0
Thiamin (mg/svg)	0.08	0.08
Thiamin (% RDA)	7.0	7.0

svg=serving; RE=retinol equivalents; g=grams; mg=milligrams;

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Source: University of Illinois Department of Food Science and Human Nutrition.

TOMATO VEGETABLE SOUP

Ingredients:

One can (14 1/2-ounces) **diced tomatoes** with juice
2 1/2 cups canned chicken broth (not condensed)
1 cup water
1 large rib celery, chopped (about 1/2 cup)
1 medium potato, cut in 1/2-inch cubes
1 small onion, chopped (1/4 cup)
1 clove garlic, minced
1/4 teaspoon salt
1/2 teaspoon dried thyme
Pinch of black pepper
1/2 cup sliced **carrots**
1/2 cup cut **green beans**

Preparation:

Bring tomatoes, broth and water to boil in 3-quart saucepan. Add celery, potato, onion, garlic, salt, thyme and pepper, and simmer for 20 minutes, or until potatoes are almost tender. Add carrots and green beans, and cook additional 10 minutes, until all vegetables are tender. (Less time is needed for the canned vegetables to heat through.)

Servings: Six

Nutrient Analysis for *Tomato Vegetable Soup*

	Fresh	Canned	Frozen
Wt/svg (g)	231.2	226.5	226.3
Kcal/svg	62.1	55.2	59.4
Fat (g)	0.87	0.78	0.98
Cholesterol (mg)	0.59	0.59	0.59
Total Carbohydrate (g)	10.9	9.2	10.0
Fiber (g)	2.3	1.9	2.3
Sodium (mg)	437.0	593.5	439.2
Potassium (mg)	492.5	437.7	436.2
Protein (g)	3.8	3.7	3.8
Vitamin A (RE/svg)	548.1	215.1	271.6
Vitamin A (% RDA)	68.0	26.0	33.0
Vitamin C (mg/svg)	21.0	12.9	19.7
Vitamin C (% RDA)	35.0	21.0	32.0
Calcium (mg/svg)	29.7	40.5	28.5
Calcium (% RDA)	3.0	5.0	3.0
Iron (mg/svg)	1.2	1.2	1.1
Iron (% RDA)	7.0	7.0	7.0
Folate (mcg/svg)	26.0	19.8	24.9
Folate (% RDA)	14.0	10.0	13.0
Thiamin (mg/svg)	0.09	0.06	0.08
Thiamin (% RDA)	8.0	5.0	7.0

svg=serving; RE=retinol equivalents; g=grams; mg=milligrams;

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Source: University of Illinois Department of Food Science and Human Nutrition.

PEACH COBBLER

Ingredients:

Filling:

- 1/3 cup sugar
- 1 tablespoon cornstarch
- 1/2 cup water (or juice from canned peaches)
- 4 cups **peaches (peeled and sliced)**, drained
- 1/4 teaspoon almond extract (optional)

Topping:

- 1 cup flour, all-purpose
- 1/4 cup sugar
- 1 teaspoon baking powder
- 1/2 teaspoon ground cinnamon or 1/4 tsp nutmeg
- 3 tablespoons margarine or butter
- 1 egg, beaten
- 3 tablespoons milk

Preparation:

Preheat oven to 400°F. Lightly grease an 8x8x2 inch baking pan. Prepare filling by combining sugar, cornstarch and water in a saucepan. If using fresh or frozen peaches, add them now. If using canned peaches, add after cooking the sugar, water, cornstarch mixture. Cook over medium heat, stirring, until mixture boils and is thick. Add canned peaches. Keep the filling warm while you prepare the topping.

To prepare topping, mix flour, sugar, baking powder and spice. Cut in margarine until mixture resembles coarse crumbs. Combine egg and milk. Add to flour mixture, stirring just to moisten.

Pour filling into prepared pan. Drop topping into 6 mounds on top of hot filling. Bake in 400°F oven 20 to 25 minutes or until toothpick inserted into topping comes out clean. Serve warm with whipped topping or ice cream (optional).

Servings: Six

Nutrient Analysis for *Peach Cobbler*

	Fresh	Canned	Frozen
Wt/svg (g)	219.2	238.6	240.6
Kcal/svg	280.8	287.5	374.9
Fat (g)	7.0	7.0	7.0
Cholesterol (mg)	33.3	33.3	33.3
Total Carbohydrate (g)	52.9	55.0	76.6
Fiber (g)	3.4	2.3	4.7
Sodium (mg)	93.3	101.3	104.0
Potassium (mg)	335.5	170.9	265.5
Protein (g)	4.4	4.0	4.4
Vitamin A (RE/svg)	168.5	134.5	137.1
Vitamin A (% RDA)	21.0	16.0	N/A
Vitamin C (mg/svg)	9.8	5.1	156.9
Vitamin C (% RDA)	16.0	8.0	261.0
Calcium (mg/svg)	36.1	36.8	32.8
Calcium (% RDA)	4.0	4.0	4.0
Iron (mg/svg)	1.3	1.6	1.7
Iron (% RDA)	8.0	10.0	11.0
Folate (mcg/svg)	14.4	14.9	14.8
Folate (% RDA)	7.0	8.0	8.0
Thiamin (mg/svg)	0.13	0.14	0.13
Thiamin (% RDA)	11.0	12.0	11.0

svg=serving; RE=retinol equivalents; g=grams; mg=milligrams;

RDA: Recommended Dietary Allowances for a 25 to 50 year-old woman.

Source: University of Illinois Department of Food Science and Human Nutrition.

PINEAPPLE UPSIDE-DOWN CAKE

Ingredients:

Pineapple base:

- 2 tablespoons margarine or butter
- 1/3 cup brown sugar, packed
- 1/4 teaspoon cinnamon
- One can (8-ounces) **pineapple slices**, drained
- 4 maraschino cherries (optional)

Batter:

- 1 1/3 cup all-purpose flour
- 2/3 cup sugar
- 1/4 teaspoon cinnamon (optional)
- 2 teaspoons baking powder
- 2/3 cup milk
- 1/4 cup margarine
- 1 egg
- 1 teaspoon vanilla

Preparation:

Preheat oven to 350°F before starting. Melt 2 tablespoons margarine in 9x1-1/2 inch round baking pan or 9 to 10-inch oven-proof skillet. Stir in brown sugar, cinnamon and 1 tablespoon water. Arrange pineapple (and cherries if using) in pan, halving slices if necessary.

To prepare batter, combine flour, sugar, cinnamon (if using) and baking powder in a bowl, and mix with fork. Add milk, margarine, egg and vanilla. Beat with wooden spoon, egg beater or electric mixer on low speed until combined. Beat for additional minute.

Spoon batter over pineapple in prepared pan. Bake in a 350°F oven for 30 to 35 minutes, or until toothpick inserted near center comes out clean. Cool on wire rack for 5 minutes. Loosen sides, and invert cake onto plate. Serve warm with whipped topping (optional).

Servings: Eight

Nutrient Analysis for *Pineapple Upside-Down Cake*

	Fresh	Canned	Frozen
Wt/svg (g)	114.1	114.1	114.1
Kcal/svg	284.5	283.0	292.3
Fat (g)	9.7	9.7	9.7
Cholesterol (mg)	26.0	26.0	26.0
Total Carbohydrate (g)	46.4	46.3	48.8
Fiber (g)	0.66	0.91	1.3
Sodium (mg)	140.2	139.1	139.4
Potassium (mg)	129.1	129.7	128.2
Protein (g)	3.7	3.6	3.7
Vitamin A (RE/svg)	129.3	129.6	130.2
Vitamin A (% RDA)	16.0	16.0	16.0
Vitamin C (mg/svg)	4.3	1.6	2.5
Vitamin C (% RDA)	7.0	2.0	4.0
Calcium (mg/svg)	53.3	54.0	52.5
Calcium (% RDA)	6.0	6.0	6.0
Iron (mg/svg)	1.3	1.3	1.3
Iron (% RDA)	8.0	8.0	8.0
Folate (mcg/svg)	9.3	10.6	12.3
Folate (% RDA)	5.0	5.0	6.0
Thiamin (mg/svg)	0.13	0.13	0.14
Thiamin (% RDA)	11.0	12.0	12.0

svg=serving; RE=retinol equivalents; g=grams; mg=milligrams;

RDA: Recommended Dietary Allowances for a 25 to 50 year-old woman.

Source: University of Illinois Department of Food Science and Human Nutrition.

EXPLANATION OF TABLES

FRUITS

Fruits provide readily available energy in the form of sugars (both natural and added), as well as some vitamin A and vitamin C, depending on the fruit. Generally, fruits are good sources of fiber, most contributing about two grams or eight to 10 percent of the DRV. Canning and freezing don't do much to the fiber, so canned fruits are good sources for this vital compound. Choose fruits carefully for vitamins and minerals; but canned, fresh or frozen are comparable.

Applesauce (Table 1)

Applesauce is a good source of fiber, providing 1.5 to two grams per 1/2 cup serving. Applesauce is popular, but should not be regarded as a very good source of either vitamin A or C.

Apricots (Table 2)

Apricots are very good sources of vitamin A (as carotene), providing 35 to 40 percent of the RDI per serving. Canned apricots are approximately equivalent to raw in their vitamin A content, and only slightly lower in vitamin C. Del Monte[®] brand, for example, provides 40 percent of the RDI for vitamin A and eight percent of the vitamin C, according to the label. The labeled values for Libby's[®] in juice may reflect conservative estimates of vitamin content or variety chosen by the processor.

Blackberries (Table 3)

Blackberries are very good sources of fiber, providing three to six grams per 1/2 cup serving, making them an excellent source. Canned blackberries provide six to eight percent of the RDI for vitamin C, and more vitamin A than raw berries.

Blueberries (Table 4)

Blueberries provide about two grams of fiber – canned or raw – per 1/2 cup serving. The vitamin A content is low in both raw and canned, because blueberries do not contain any carotenes. The higher vitamin C in fresh blueberries may be due to a varietal difference, as well as the effect of heat processing.

Grapefruit (Table 5)

This breakfast favorite is an excellent source of vitamin C, providing between 30 and 66 percent of the RDI per 1/2 cup serving. Although the canned fruit is lower in vitamin C than the fresh/raw, it is still high. Grapefruit also provides valuable amounts of folate and potassium. In addition, grapefruit is low in fat and calories, providing only about 40 calories per the same 1/2 cup serving.

Mandarin Oranges (Table 6)

According to values from the data bank, canned mandarin oranges are good sources of vitamin C and vitamin A, comparable to raw. The nutrition label for Dole[®] canned oranges indicates they are good sources of vitamin C, providing 35 percent of the RDI per 1/2 cup serving. No values are shown on the label for vitamin A, implying they do not contain any. But canned mandarin oranges are good sources of carotene, as indicated by the data bank values.

Peaches (Table 7)

A fresh-sliced peach (1/2 cup) weighs less than 1/2 cup of canned peaches. This is primarily because the canned peaches in syrup have absorbed the syrup and, therefore, weigh more and have more calories. Both fresh and canned peaches provide about the same percentage of the RDI for vitamin A (more than 300 percent of the RDI for carotene) and vitamin C, according to the nutrition labels. Values from the data bank are a little lower because they do not reflect actual analytical values as do can labels. Note the high amount of vitamin C in frozen comes from added ascorbic acid, used to maintain color.

Pears (Table 8)

Pears, like apples, are good sources of fiber, providing one to two grams per 1/2 cup serving, whether fresh or canned. The vitamin and mineral content is comparable regardless of form.

Pineapple (Table 9)

Fresh and canned pineapple are both very good sources of vitamin C, providing more than 12 percent of the RDI according to the data bank, and more than 20 percent according to the Dole[®] label. Calorie content of juice-packed pineapple is comparable to fresh. Canning in heavy syrup doubles the calories, but the vitamin content remains stable.

Purple Plums (Table 10)

This less common, but tasty fruit is a very good, unexpected source of vitamin A – especially canned, providing 20 percent of the RDI per 1/2 cup serving. In general, the vitamin and mineral content is comparable, regardless of form.

Ripe Olives (Table 11)

Botanically, these are fruits, but we use them as a vegetable or garnish. Ripe olives are similar to mushrooms in that their value comes as an addition to recipes, enhancing their color, texture and flavor.

Strawberries (Table 12)

This ever-popular fruit is a good source of vitamin C, providing between 35 and 136 percent of the RDI per 1/2 cup serving. In addition, strawberries are a good source of fiber and iron, providing about two percent and 3.5 percent respectively per 1/2 cup serving.

Sweet Bing Cherries (Table 13)

Sweet Bing cherries are a good source of fiber, providing approximately two grams per 1/2 cup serving. Like many other fruits, raw and canned cherries are not good sources of vitamins or minerals, but add to the color and flavor variety available.

Tomatoes: Stewed and Whole (Table 14)

Canned tomatoes are among the most popular canned “fruits.” There is not much difference based on the form (diced or whole) or between canned and fresh-cooked tomatoes. Vitamin A content is similar, and vitamin C content is only slightly lower. Calcium is contributed by the added calcium chloride used to keep the tomato pieces firm. Although it is not on the label, canned tomatoes contain their carotene in the form of lycopene, which nutritionists believe is important in fighting prostate cancer. Some of the convenience products come with and without salt added; so if it is important to monitor sodium intake, choose the low-salt variety.

VEGETABLES

Vegetables are more nutrient-dense than fruits and provide more vitamins and minerals per calorie because they have less sugars. Generally, vegetables are good sources of fiber, vitamins A and C, potassium and occasionally folate. Some contribute iron to the diet, an important consideration, particularly for vegetarians.

Asparagus (Table 15)

The canning process usually results in some loss of vitamin C, due to the heat treatment the vegetables receive. In the case of asparagus, the canned form is very comparable and may be higher than fresh-cooked asparagus when comparisons are made on the basis of approximately the same weight of vegetables. Very little of the vitamin A or C is lost, so nutritionally, canned asparagus is very similar to fresh-cooked and frozen asparagus. The folate content – a nutrient identified as being important for pregnant women but not a label requirement – is high, contributing 20 to 48 percent of the RDI per serving.

Beets (Table 16)

Beets, in general, are not very nutrient-dense. A serving of cooked or canned beets provides about five percent of the RDI for vitamin C. But the folate content of beets is good, ranging from 8 to 18 percent of the RDI per 1/2 cup serving. Overall, beets probably add more to the aesthetics of the dinner plate than to nutrient intakes, but their high folate content distinguishes them.

Carrots (Table 17)

Everyone knows carrots provide carotene. And canned carrots are likely to provide at least 100 percent of the RDI for vitamin A as carotene, more than the frozen variety. According to the nutrition labels, Del Monte[®] carrots provide 300 percent of the RDI for vitamin A, and other brands were similar. Differences between the database and commercial label values may be due to varietal differences or methodologies in determining the vitamin. Some manufacturers may be conservative about their estimations for labeling purposes.

Corn (Table 18)

Corn is a favorite vegetable that provides less than 10 percent of the RDI for vitamin A and C. However, the fact that corn eaters often consume more than 1/2 cup as a serving makes it a reasonable source of vitamin C. Corn also provides folate, between 7 to 12 percent of the RDI, and has high niacin (another B-vitamin not included on the label). Canned, frozen and fresh values are similar.

Green Beans (Table 19)

Green beans are another favorite vegetable that provide relatively small amounts of vitamin A and vitamin C per serving. However, the percent of the RDI provided by canned green beans is comparable to fresh-cooked and frozen. About five to 10 percent of the RDI of vitamins A and C per serving is provided in canned green beans. Since these are popular vegetables, more than one serving is likely to be eaten at a sitting.

Mushrooms (Table 20)

Mushrooms are favored vegetables in many mixed dishes. They are valued for their flavor, texture and appearance in enhancing recipes. However, they do provide small amounts of vitamins and minerals.

Peas (Table 21)

Cooked or canned peas provide similar amounts of vitamins A (four to 10 percent of the RDI) and C (10 to 20 percent) and are also a good source of folate and iron.

Pumpkin (Table 22)

Pumpkin is an excellent source of vitamin A (as carotene), providing over 300 percent of the RDI. And canned pumpkin appears to have much more vitamin A than fresh-cooked pumpkin. This may be due to the fact canned pumpkin has more water cooked out of it than boiled pumpkin, and the varieties used for canning have intense orange color, a sure sign of carotene. Pumpkin is a good source of fiber and adds a little iron and folate to the diet as well.

Spinach (Table 23)

Spinach is an excellent example of a nutrient-dense vegetable. Whether it is cooked, canned or frozen, spinach provides at least 50 percent of the RDI for vitamin A and 15 to 30 percent of the RDI for vitamin C. It also is a good source of iron, calcium and especially folate, whether it is fresh-cooked or canned.

Sweet Potatoes (Table 24)

Canned or fresh sweet potatoes are excellent sources of vitamin A, providing between 200 and 400 percent of the RDI. In addition, cooked or canned sweet potatoes are a fairly good source of both vitamin C and folate.

White Potatoes (Table 25)

White potatoes supply vitamin C in reasonable quantities, whether the product is fresh-cooked or canned. About 15 to 19 percent of the RDI is provided by a serving of canned potatoes. White potatoes also are a fairly good source of folate, providing between 1.7 and 2.4 percent of the RDI.

LEGUMES

As a class, beans are an excellent meat substitute and provide good quality protein, as well as many other nutrients. Their contribution to fiber intake is important, and they also are an important iron source, particularly in vegetarian diets.

Black Beans, Black-Eyed Peas, Garbanzo, Navy, Pinto and Kidney Beans: White and Red (Tables 26 - 32)

Legumes differ very little in their composition between varieties. In general, beans are very good sources of protein, fiber, iron, folate and thiamin. They are relatively poor sources of vitamins A and C. Data bank values for cooked beans are without salt added, so sodium levels tend to be higher in canned versions. Adding salt when cooking dry beans will add approximately 300 mg per serving (salt contains 2,315 mg sodium per teaspoon).

POULTRY AND FISH

These products provide a convenient source of high-protein foods. Like their fresh-cooked counterparts, they are eaten for their protein content, as well as for flavor and texture.

Breast of Chicken, Chunk Light Tuna and Pink Salmon (Tables 33 - 35)

In general, both poultry and fish are low in sodium and cholesterol. The chicken, tuna and salmon provide between 16 and 26 grams of protein per three-ounce serving. In addition, all three products are relatively low in fat and calories. It is especially important with the canned tuna, that the health-conscious consumer choose the water-packed instead of the oil-packed varieties.

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