

# Nutrition SPOTLight

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## Folic Acid – Companion of Carbohydrate

It's been a real success story – the addition of B-vitamin folic acid to grain foods in the U.S. has aided the dramatic decrease in the incidence of spina bifida, a type of birth defect affecting the infant's brain and spinal cord. Fortification of foods began in this country in January, 1998, and to date, the number of children born with neural tube defects is markedly decreased. Other benefits are also attributed to folic acid or its naturally occurring form, folate.

Research has shown that men who consume relatively large amounts of folic acid are at significantly lower risk of developing an ischemic stroke than men with the lowest folic acid intake. Scientists at Tufts University in Boston and Michigan State University found that just one cup of fortified breakfast cereal daily significantly increased B vitamin levels and decreased homocysteine concentrations. High homocysteine and low B vitamin concentrations have been linked to the risk of vascular disease, stroke, and dementia and are relatively common in older adults.

Additionally, a Canadian research team has shown that folic acid food fortification has resulted in a 60% reduction in the incidence of neuroblastoma, a deadly childhood cancer. Research has shown that this cancer can be prevented through the maternal diet. These dramatic nutrition

discoveries are real success stories – but there is a real risk at hand, according to researchers conducting folic acid studies.

That risk is the popularity of low-carbohydrate diets, which shun foods that are high in both the synthetic form of the vitamin, folic acid, including bread, pasta, breakfast cereals and products; and those high in folate – the naturally occurring form, found in leafy green vegetables, orange juice and legumes like lentils and kidney beans. By closely following a low carbohydrate diet, a person could very effectively circumvent the healthful benefits of folic acid supplementation.

Dr. Gideon Koren of Toronto Hospital for Sick Children directs folic acid research and is concerned about women of childbearing age following low carbohydrate diets. While trying to do something good for her own health, a mother could negatively affect her child's health, Koren believes. With one in nine adults in North America presently following a low carbohydrate diet, and at least twice as many planning to begin in the next two years, there could be serious risks, Koren said.

The recommended intake of folic acid for females of childbearing age is 400 mcg/day from supplements or fortified foods, in addition to intake of food folate from a varied diet. An increase to 600 mcg/day is recommended for women during pregnancy. Males are

advised to consume 400 mcg/day.

*Sources: National Academy of Sciences (2000). Dietary Reference Intakes: Recommended intakes for individuals.*

*Picard, A. (2004, March 19). Low-carb diet could hurt fetuses. Globe and Mail, p. 1.*

*Greer, L. (2003, September 25). Sick Kids researchers link maternal folic acid intake to decrease in deadly childhood cancer. Retrieved 9/26/03 from [http://www.eurekalert.org/pub\\_releases/2003-09/uot-skr092503.php](http://www.eurekalert.org/pub_releases/2003-09/uot-skr092503.php) (SP)*

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# DASH—The Fruit and Vegetable Way to Cardiovascular Health

It's true—consuming fruits and vegetables in generous amounts contributes to lower blood pressure, improved cholesterol, increased insulin sensitivity and even improved bone mineral status. The key word is “generous.” The current recommendation from the *Food Guide Pyramid* is to eat at least five servings of fruits and vegetables a day. The *DASH (Dietary Approach to Stop Hypertension) Eating Plan*, while very similar to USDA Pyramid recommendations, promotes consumption of eight to ten servings of fruits and vegetables a day. DASH also emphasizes increasing low-fat dairy, whole grain products and reducing sodium intake.

We know that a diet low in some nutrients like calcium, potassium and magnesium but high in sodium can contribute to high blood pressure. Many of the processed foods today fit this description. That's where DASH can help. By eating lots of fruits and vegetables along with low fat dairy and whole grain foods, there is greater likelihood that a diet will be rich in calcium, potassium and magnesium and lower in sodium. Many of these foods are powerhouses of energy because of their high carbohydrate content. In addition they contain other important micronutrients essential for maintaining normal blood pressure or even preventing high blood pressure. Here are some examples. Potassium, which is found in fruits and vegetables (such as oranges and orange juice, bananas, cantaloupe, spinach, broccoli, carrots, potatoes and cooked dried beans), is important in counter-balancing sodium in the diet. Magnesium, important in

muscle and enzyme function is found readily in some of the same foods (potatoes and spinach). Vitamin C is provided by many fruits and vegetables and plays a role in helping regulate blood pressure. People following the DASH eating plan often lower their blood pressure from 7 to 12 mmHg (the higher the blood pressure the more likely it will decrease with DASH). The DASH eating plan is more effective in lowering blood pressure than merely eating more fruits and vegetables. It is the “complete package” that seems to make the difference.

This plan is based on 2000 calories, but can easily be adjusted for more or less calories. The 2000 calorie diet calls for 7-8 servings of grains (including a several whole grains), 5 servings each of fruits and vegetables, 3 servings of low-fat dairy products, 2 servings of meat or legumes, nuts and/or seeds 4-5 times a week, and finally 2 servings of fats and oils. If a vegetarian diet is desired, the DASH diet can easily be adapted by substituting beans or legumes for the servings of meat.

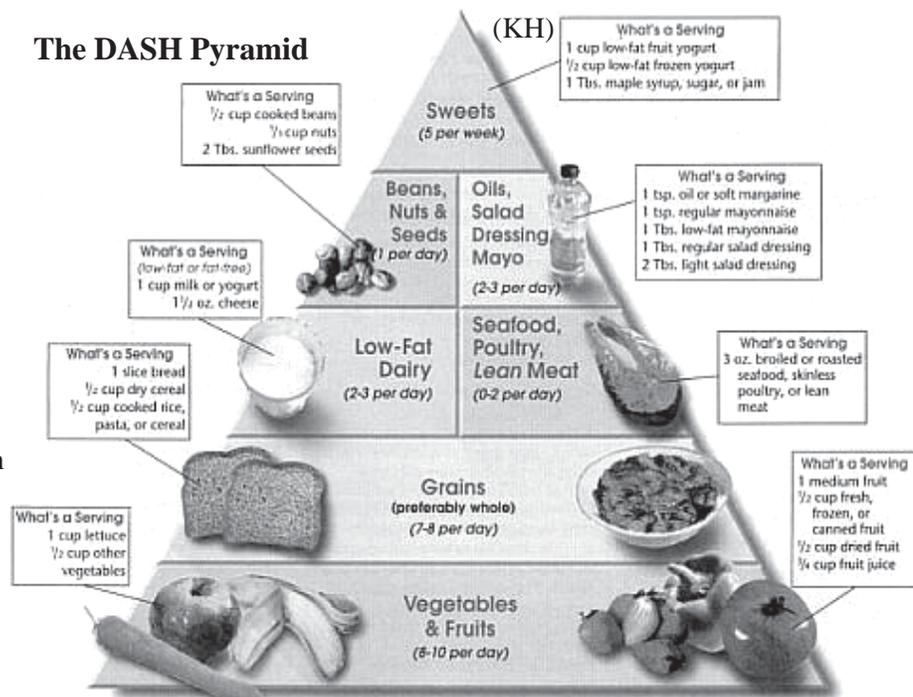
Because fruits, vegetables and whole grains are high in fiber, some people may experience minor bloating. To avoid this, increase these foods gradually in the diet. This could be accomplished by adding a serving of vegetables at both lunch and dinner and substituting fruit for a more traditional, high calorie dessert.

Although DASH is an aid to people concerned about their blood pressure, it is appropriate for almost everyone. It is incorporated into the American Heart Association guidelines. More information about this eating plan, including menus and recipes can be found at the National Institute of Health's website:

[http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/new\\_dash.pdf](http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/new_dash.pdf)

Sources: Krause's *Food, Nutrition, & Diet Therapy 11<sup>th</sup> ed.* Mahan, L Kathleen. Escott-Stump, Sylvia. Saunders Publishing Co. 2004. page 905.  
Sacks F, et al (2001). *Effects on blood pressure of reduced dietary sodium and dietary approaches to stop hypertension (DASH) diet.* *New England Journal of Medicine*, 344(1): 3-10.

## The DASH Pyramid



## Spotlight on K-State's Human Nutrition (HN) faculty: An interview with Dr. Weiqun (George) Wang, Assistant Professor

Phytochemicals – beneficial plant substances including phytoestrogens, lignans, flavonoids and others – have been the common theme of research questions posed by Dr. George Wang for the past two decades. He has recruited subjects ranging from healthy volunteers to cancer patients, and from milk cows to mice.

Wang joined K-State's Dept. of Human Nutrition faculty in 2002. His current research focuses on cancer prevention. In one project, Wang is studying phytochemicals in fruits and vegetables. He and his students are measuring the amount of beneficial phenolic substances in both organically-grown and conventionally-grown greens, primarily lettuce. In an earlier study, Wang researched antioxidants and other phytochemicals in vegetables using both cell studies and small-animal models.

Another of Wang's active research projects involves measuring cancer prevention properties of lignan and the lignan content in various cultivars of wheat bran.

"Other scientists studying lignans have focused on flax seed. We are the first group to link it to wheat bran and we are very excited since we are trying to engineer high-lignan wheat," Wang said.

Using animal models, Wang and his team have found that restricting calories and exercising lean mice to produce an underweight condition leads to a decrease in certain hormones, such as growth factor, and subsequently reduces their cancer risk. Thus, weight control can have a beneficial effect on cancer prevention.



One of Wang's completed research projects investigated how to track cancer risk in humans. He and his team have developed many laboratory research methods over the years.

Wang's research is supported by grants from the National Institutes of Health-Center of Biomedical Research Excellence, National Cancer Institute, K-State's Johnson Center for Basic Cancer Research, the College of Human Ecology and the K-State Agricultural Experiment Station.

Wang presently advises four graduate students, with two more to start this fall. In addition, he works with undergraduate honors students, a high school student, a Kansas community college professor and a visiting professor from the University of Illinois.

Wang co-teaches HN 620, Nutrient Metabolism, a required course for all undergraduates majoring in Human Nutrition or Dietetics. He also co-teaches HN 812, Advanced Micronutrient Metabolism, which is a graduate level course offered fall semester. He is preparing a new course for graduate students, HN 820 - Functional Foods and Chronic Disease Prevention, which will be taught by nine professors this fall.

Wang has published 29 research papers in peer-reviewed journals. His research has led him to collaborate with scientists in his own department of Human Nutrition and also with researchers in Horticulture, Grain Science, Plant Pathology and others.

Wang, originally from China, graduated from Nanjing University in biochemistry. He worked for two years making biological vaccines before returning to school and earning a Ph.D. in biochemistry and biophysics from Nanjing Agricultural University. He moved to Manhattan after spending seven years at the University of Hawaii and five years at Iowa State University.

Wang and his wife have three children, two girls and a boy, ages 14, 9 and 3 years. He enjoys fishing for crappie, bass and walleye.

(MH)

# Dietary Reference Intake (DRIs) for Carbohydrate

(Recommended Dietary Allowances for Carbohydrate)

## Males

0-6 mo	60g/day
7-12 mo	95g/day
≥1 yr	130g/day

## Females

0-6 mo	60g/day
7-12 mo	95g/day
≥1 yr	130g/day
Pregnant	175g/day
Nursing	210g/day

Adequate consumption of carbohydrates is needed to have a balanced diet. Consuming less than the recommended dietary allowance may lead to deficiencies in nutrients commonly associated with carbohydrates such as fiber, B vitamins, vitamin A, vitamin C, vitamin D, folate, potassium, magnesium, zinc, and calcium.

Source: *Nutrition: Science and Application, 4<sup>th</sup> ed. Smolin Lori A. & Grosvenor, Mary B. John Wiley & Sons, Inc. 2003.* (TK)

## Glycemic Index and Glycemic Load: Pros and Cons

The glycemic index is a system for classifying foods. It quantifies how much 50 grams of a carbohydrate-containing food, when eaten by itself, will cause blood sugar to rise during the first two hours after eating. The more the blood sugar rises, the higher is the food's "glycemic index." A glycemic index of 70 or more is considered high while a glycemic index of 55 or less is considered low.

The glycemic load is a food-classifying method that takes into consideration not only the glycemic index but also the amount of carbohydrates in a typical serving size of a food. A glycemic load of 20 or more is considered high and a glycemic load of 10 or less is considered low. Low glycemic index foods also have a low glycemic load. However, other foods range from low to high in their glycemic load, depending on the amount typically eaten and the carbohydrate content (see chart). For example, while carrots have a high glycemic index, their glycemic load is

low.

Choosing low glycemic index or low glycemic load foods is not the best way to select a health-promoting diet, since neither reflects the whole nutrition picture. For example, they do not give any indication of the amount of saturated or trans fat, the quality of the protein, or levels of vital nutrients. A food's glycemic index changes when one eats more than one food at a time, which is usually the case at mealtime. Many other factors affect one's glycemic response. Also, while sucrose, premium ice creams and soft drinks, for instance, are low or moderate glycemic index foods (see chart), they have few to none of the essential vitamins, minerals, fiber, antioxidants and

phytochemicals recommended for good health. On the other hand, some foods that are high in vitamins, fiber, minerals and antioxidants also have a high glycemic index, for example, popcorn, bran flakes, shredded wheat and carrots. Nutrition and health are more complicated than either of these two systems for categorizing foods would suggest.

Rather than looking at the glycemic index of foods, available research shows that a more effective intervention for normalizing blood sugars in people with diabetes is to count the total amount of carbohydrates in each meal or snack. The glycemic index may be helpful for achieving small adjustments to blood sugars for those individuals with diabetes who know which foods contain carbohydrates, portion sizes, and how many servings to select for meals and snacks, but the data

reveal no clear trend in outcome benefits.

### Glycemic Index

#### Examples

#### based on glucose = 100

#### Glycemic Load

Premium ice cream	38 low	3 low
Coca cola	63 medium	16 medium
Sucrose	68 medium	7 low
Popcorn	72 high	8 low
Bran flakes cereal	74 high	13 medium
Shredded wheat cereal	75 high	15 medium
Carrots	92 high	5 low

References: American Diabetes Association Position Statement: Evidence-based nutrition principles and recommendations for the treatment and prevention of diabetes and related complications. 2003. *Diabetes Care* 26(1):S51-S61.

Foster-Powell et al. 2002. International table of glycemic index and glycemic load values: 2002. *American J. Clinical Nutrition* 76:5-56.

(MH)

## Whole Grains – Carbs of a Higher Order

In the U.S., most of the grain foods we eat are made with fortified refined grain, but Americans are urged to eat more whole grain foods. The current Dietary Guidelines for Americans recommend that we “choose a variety of grains daily, especially whole grains” and Healthy People 2010 advises consuming at least three whole grain products daily.

Whole grain foods contain the bran, endosperm and germ. Eating the entire grain allows the beneficial factors of all three parts to work together, so that the benefits exceed those that come from eating just certain parts. By comparison, refined grain foods contain only the endosperm. When the germ and bran portions are removed during milling, the nutrient content is reduced by 25 to 90 percent.

Whole grains – like many other complex carbohydrates – are high in fiber, plant protein, vitamins, minerals, phytonutrients, antioxidants and many other healthful substances. Eating one to three servings a day reduces the risk for bowel disorders, cancer, heart disease, high cholesterol, stroke, high blood pressure, obesity and type 2 diabetes. Compared to refined grains, whole grains satisfy hunger better.

To find a whole grain food, look for the words “WHOLE GRAIN” in large letters on the package, or for the claim: “Diets rich in whole grain foods and other plant foods, and low in total fat, saturated fat and cholesterol, may reduce the risk of heart disease and certain cancers.” Another method is to look at the list of ingredients for the word “whole” to be named first, such as “whole wheat.”

Whole grains contribute a subtle taste to foods that is often described as “nutty.” They are easy to include in your daily diet. The serving sizes for whole grain foods are the same as those of refined-flour foods. For instance, one portion of whole grain cereals is 1/2 cup cooked or 1 ounce of ready-to-eat, and for bread, one portion is a slice or 1 ounce. Two cups of popcorn, three or four small whole grain crackers, and 1/2 cup cooked brown rice or whole grain pasta also count as a serving.

The most commonly-eaten whole grain foods in the U.S. are whole grain yeast breads; ready-to-eat breakfast cereals; regular, quick, or instant oatmeal; whole grain crackers; and popcorn. Other popular whole grain foods include regular and instant brown rice, buckwheat or kasha, cracked wheat or bulgur, pearl barley and whole grain cornmeal (not the de-germinated type).

For more information about whole grains, visit our web site [www.oznet.ksu.edu/humannutrition/wholegrains.htm](http://www.oznet.ksu.edu/humannutrition/wholegrains.htm)

(MH)

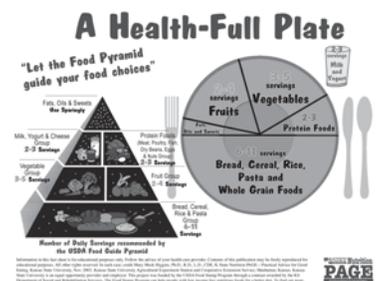
### A Health-Full Plate

*A Health-Full Plate* is a new two-page nutrition education graphic developed at K-State for people of all ages.

Page one shows a plate divided into sections in proportion to that advised by the USDA Food Guide Pyramid (shown in miniature on the left) for the various food groups. Each section of the plate is filled with pictures of foods to show examples of the variety of choices that can be made within each food group.

Page two uses the same plate divided into sections in proportion to the Food Pyramid, but uses words instead of picture to convey the number of daily servings recommended from each food group. A larger version of the Food Guide Pyramid is shown on the left.

*A Health-Full Plate* is available in English and Spanish on the web site, [www.oznet.ksu.edu/humannutrition/freshfruitsandvegetables.htm](http://www.oznet.ksu.edu/humannutrition/freshfruitsandvegetables.htm)



## Make Those Liquid Carbs Count!

Carbohydrates should be the main source of energy that fuels our bodies. Ask any fitness expert or athlete where they get their energy from; they are likely to say whole grains, fruits, vegetables, and liquids. Liquids that not only include water, but fruit juice, sports drinks, and milk as well. All are great sources of essential “energy generating” carbohydrates while simultaneously contributing other nutrients to the diet. So, is being aware of carbohydrate intake from liquids only for those that are athletes? Of course not, it is necessary for everyone. The bottom line is to ensure that those carbohydrates gained from liquids are of the highest quality and are counted into the daily nutrient intake.

Carbohydrates are primarily sugars or starches and are present in most beverages other than water and some diet drinks. Many of these drinks contain simple sugars, which can directly affect the body’s glucose levels. Because of this, it is important to know both the carbohydrate content of the beverage and the type of carbohydrate it contains. Another reason to keep track of carbohydrate intake from liquids is

that one’s major source of carbohydrate consumption should be from solid foods such as whole grains, fruits and vegetables, not from liquids. Liquids are essential for the hydration of the body, but those that contain carbohydrates and other nutrients should be counted into the daily dietary intake.

It is recommended that 55% to 60% of a person’s daily caloric intake consist of carbohydrates — primarily complex carbs that provide energy and a nutrient punch to the body. For a 2000 to 2500 calorie diet, that means 300g to 375 g of carbohydrate a day. Many drinks, especially those commercially prepared, contain large amounts of corn syrup. Simple sugars such as these provide energy but no nutrient benefit. These sweet drinks are attractive to many consumers but can be damaging to their nutritional health. Being aware of the amount of carbohydrate in liquids is essential in optimizing nutrient intake. For example, a 12 oz cola contains 38 g of carbohydrate, mostly from corn syrup, and 152 calories but has no other nutrient benefit. Drinks such as this can cause an individual to fill their stomach foregoing the

solid foods necessary for good health maintenance. Children are especially prone to this scenario. When they are provided soft drinks, fruit drinks, and excessive amounts of juice they will generally turn down their meals or consume less than necessary for their growing bodies. Below is a table listing some popular beverages, the caloric count, carbohydrate content and the extra bonus nutrients or their lack of. This will assist in the comparison of common beverages. For a more extensive list of foods, drinks and their nutrients search the USDA Nutrient Database at: <http://www.nal.usda.gov/fnic/foodcomp/search/>

Remember, carbohydrates are efficient sources of energy that should comprise the majority of our daily dietary intake. The trick is to make them count! Don’t fill up on empty-calorie soft drinks — have water for hydration, a glass of 100% fruit juice or milk for carbohydrates, vitamins and minerals. Your body will love ~~you~~ for it.

Sources: *Duyff R. Dietary reference intakes. American Dietetic Association Complete Food and Nutrition Guide (2<sup>nd</sup> ed.), pp.628-631. United States Department of Agriculture, Agriculture Research Service, Nutrient Data Laboratory available at: <http://www.nal.usda.gov/fnic/foodcomp/search/>*

How do your drink choices add up?	Calories	Carbohydrate (g)	Additional Benefits Protein (g)	Fiber (g)	Calcium (mg)	Vitamin C (mg)
<b>Beverage Name</b>						
Apple Juice-8 oz	117	29	<1	<1	17	2
Cola-12 oz	152	38	0	0	11	0
Fruit Punch Drink-8 oz	117	29	0	<1	20	7.3
Grape Drink-8 oz	125	32	<1	<1	7	40
Grape Juice-8 oz	128	32	<1	<1	10	60
Koolade® w/sugar-8 oz	97	25	0	0	42	31
Lemon-lime soda-12 oz	147	38	0	0	7	0
Lemonade-8 oz	99	26	<1	<1	7	10
Milk-Chocolate 1% -8oz	158	26	9	1	288	2
Milk-Skim-8 oz	85	12	8	0	301	2
Milk-Whole-8 oz	150	11	8	0	290	2
Orange soda-12 oz	179	46	0	0	19	0
Orange Juice-8 oz	112	27	2	<1	22	297
Vegetable Juice Cocktail 8 oz	46	11	2	2	27	67
<b>Sports Drinks-12 oz</b>						
All Sport®	120	30	0	0	0	0
Gatorade®	76	22	0	0	0	0
Powerade®	105	29	0	0	0	0

## Wild Rice Casserole

Makes 6 1-cup servings

1 cup uncooked brown rice  
 ½ cup uncooked wild rice  
 1 green bell pepper, chopped  
 1 carrot, sliced  
 1 zucchini, sliced  
 1 celery stalk, sliced  
 1 teaspoon garlic powder  
 2 teaspoons minced onion  
 1 teaspoon chicken bouillon  
 1 to 2 tablespoons margarine  
 2 cups water

1. Preheat oven to 350 degrees.
2. Lightly coat a 2-quart casserole or 9 x 13-inch baking dish with cooking spray.
3. Combine all ingredients in baking dish and cover with foil.
4. Bake 45 to 60 minutes or until rice is cooked. Check after 45 minutes to see if more water needs to be added. Stir well before serving and season with salt and pepper.

### Rice Facts:

Brown rice is the whole grain of rice with only the inedible outer husk removed. Unlike refined white rice, brown rice still contains the bran, germ and endosperm parts of the grain. Since it is a whole grain, brown rice has 1.5 grams of fiber per half cup which is about three times the fiber of white rice.

Despite its name, wild rice is the seed of a long-grain marsh grass. As a seed, it is higher in protein and is a good source of fiber. Wild rice is more expensive than brown or white rice but adds a nice nutty flavor to dishes. Wild rice may not be located with rice in grocery stores, so ask for direction.

(KW)

## Fruits and Vegetables Add Far More Than Just Carbs

Fruits and vegetables contribute pretty colors, delicious tastes and a variety of textures to our meals and snacks. Very colorful plant foods have healthful pigments along with many vitamins, minerals, antioxidants and phytochemicals which help maintain health and protect against damage to cells. These include vitamin C, carotenoids, beta-carotene, lycopene, lutein, zeaxanthin, vitamin E, selenium, flavonoids and other beneficial substances. Fruits and vegetables contribute complex carbohydrates, which are excellent energy sources. They also provide dietary fiber and reduce risk for cancer, heart disease, high blood pressure, stroke and some eye diseases.

The Dietary Guidelines for Americans recommend choosing a variety of fruits and vegetables daily. We are advised to eat five or more servings of fruits and vegetables each day – with at least two servings of fruits and at least three servings of vegetables. People with higher calorie needs – such as men and active women – should choose six to nine (or more!) servings daily. Try to include at least one serving of vitamin A-rich, vitamin C-rich and fiber-rich fruits or vegetables a day, and several servings a week of cruciferous vegetables (these are cabbage-family vegetables such as bok choy, broccoli, Brussels sprouts, cauliflower, kale, radishes and turnips).

There is no need to limit yourself to fresh fruits and vegetables. Keep dried, frozen and canned types and 100% fruit or vegetable juices available to use at your convenience.

## Nutrition Facts

Serving Size 1 cup (120g)  
 Servings Per Container 6

Amount Per Serving

**Calories** 200      **Calories from Fat** 30

% Daily Value\*

**Total Fat** 3g      **5%**

Saturated Fat 0.5g      **3%**

**Cholesterol** 0mg      **0%**

**Sodium** 105mg      **4%**

**Total Carbohydrate** 38g      **13%**

Dietary Fiber 3g      **13%**

Sugars 2g

**Protein** 5g

Vitamin A 30%      •      Vitamin C 40%

Calcium 2%      •      Iron 6%

\*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:

Fat 9 • Carbohydrate 4 • Protein 4

**K-State Research and Extension  
Human Nutrition  
Room 207 Justin Hall  
Manhattan, KS 66506**

Questions or concerns about this publication? Contact Shelly Burklund, 207 Justin Hall, Manhattan, KS 66506, Phone: (785) 532-1670, FAX: (785) 532-1678

**Cooperative Extension Service**  
K-State Research and Extension  
Department of Human Nutrition  
207 Justin Hall  
Manhattan, Kansas 66506-1422



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## **Fruits and Vegetables** (continued from page 7)

Standard serving sizes are moderate. One serving is a medium piece of fruit, 1 cup raw leafy vegetables, 1/2 cup fruit or vegetables (raw, cooked, canned or frozen), 3/4 cup 100% fruit or vegetable juice, or 1/4 cup dried fruit.

To help remind yourself and family members to eat them, store fruits and vegetables where you will see them often. For instance, put a mixture of fresh fruits with boxes of dried fruits in a bowl on the kitchen table. Place ready-to-eat vegetables and fruits in see-through containers in a prominent place in your refrigerator.

Invite the children in your life to help choose and prepare fruits and vegetables for meals and snacks. They are more likely to eat what they have helped to prepare. You might also want to plant vegetable seeds in a garden or a few patio containers with your child.

For more information about fruits and vegetables, visit our web site [www.oznet.ksu.edu/humannutrition/freshfruitsandvegetables.htm](http://www.oznet.ksu.edu/humannutrition/freshfruitsandvegetables.htm)

## **Contributors**

### **Shelly Burklund**

Spotlight Producer

### **Sandy Procter, MS, RD, LD**

Spotlight Editor and  
Coordinator, Expanded Food and Nutrition  
Education Program (EFNEP)

### **Mary L. Meck Higgins, PhD, RD, LD** *Mary L. Higgins*

Extension Specialist, Nutrition Education

### **Karen Hudson, MEd, RD, LD**

Coordinator, Family Nutrition Program (FNP)

### **Kathy Walsten**

Nutrition Educator, FNP and EFNEP

### **Toni Bryant**

Assistant Coordinator, Family Nutrition Program

### **Tanda Kidd, MS, RD, LPN**

Extension Associate

### **Judy Speer**

Graphic Design and Layout

(MH)