Nutrition and Labelling for the Canadian Baker

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BC COOK ARTICULATION COMMITTEE

Contents

Preface

This book is intended to give students a basic understanding of nutritional information and labelling in the baking industry. In particular, there is a focus on Canadian regulations regarding labelling and merchandising of baked goods, as well as baking for customers with special diets, allergies, and intolerances.

Nutrition and Labelling for the Canadian Baker is one of a series of Culinary Arts books developed to support the training of students and apprentices in British Columbia's food service and hospitality industry. Although created with the Professional Cook and Baker programs in mind, these have been designed as a modular series, and therefore can be used to support a wide variety of programs that offer training in food service skills.

Other books in the series include:

- Basic Kitchen and Food Service Management
- Food Safety, Sanitation, and Personal Hygiene
- Human Resources in the Food Service and Hospitality Industry
- Meat Cutting and Processing for Food Service
- Modern Pastry and Plated Desserts
- Understanding Ingredients for the Canadian Baker
- Working in the Food Service Industry
- Workplace Safety in the Food Service Industry

The series has been developed collaboratively with participation from public and private postsecondary institutions.

PART 1

Nutrition and Labelling

Canada's Food Guide

Learning Objectives

- Describe the basic nutritional elements and properties of food
- Describe the nutritional requirements of a healthy diet
- Understand the nutrition facts tables (NFT)

Most Canadians have been introduced at one point or another to Canada's Food Guide for a balanced diet. The latest version, adapted in 2007, includes changes and improvements based on recent studies and focuses on eating more wholesome foods. The four food groups are:

- Vegetables and fruit
- Grain products
- Milk and alternatives
- Meat and alternatives

Depending on a person's gender and age, Canada's food guide recommends the number of servings in each food group that a person should consume (Tables 1a-1d). It also contains information about what is considered a serving of different types of food.

Children Girls and Boys

Food	2-3 years old	4-8 years old	9-13 years old
Vegetables and Fruit	4 servings	5 servings	6 servings
Grain Products	3 servings	4 servings	6 servings
Milk and Alternatives	2 servings	2 servings	3-4 servings
Meat and Alternatives	1 serving	1 serving	1-2 servings

Table 1a: Recommended servings of each food group

Teens: 14-18 years old

Food	Female	Male
Vegetables and Fruit	7 servings	8 servings
Grain Products	6 servings	7 servings
Milk and Alternatives	3-4 servings	3-4 servings
Meat and Alternatives	2 servings	3 servings

Table 1b: Recommended servings of each food group

Adults: 19-50 years old

Food	Female	Male
Vegetables and Fruit	7-8 servings	8-10 servings
Grain Products	6-7 servings	8 servings
Milk and Alternatives	2 servings	2 servings
Meat and Alternatives	2 servings	3 servings

Table 1c: Recommended servings of each food group

Adults: 51+ years old

Food	Female	Male
Vegetables and Fruit	7 servings	7 servings
Grain Products	6 servings	7 servings
Milk and Alternatives	3 servings	3 servings
Meat and Alternatives	2 servings	3 servings

Table 1d: Recommended servings of each food group

Nutrients in Food

Nutrients are divided into two groups: the **macronutrients** (carbohydrates, fats, proteins) and **micronutrients** (vitamins and minerals). Table 2 shows Health Canada's recommendations for the daily diet of macronutrients for males and females over 19 years of age. For the recommended daily caloric requirement for youth and other ages, refer to Canada's Food Guide.

Nutrient	**% of Diet (total kcal per day)**
Carbohydrate	45%-65%
Protein	20%-35%
Fat	5%-10%

Table 2: Percentage of macronutrients in a balanced diet

Percent Daily Value

The terms *Reference Standards* and *Daily Value (DV)* relate to the daily intake of specific nutrients except vitamins and minerals. The *Recommended Daily Intake (RDI)* refers to the intake of vitamins and minerals. A list of the DV and RDI for various nutrients is found in Table 3.

Percent daily value (% DV) was developed to reflect the nutritional content of food products and provide the recommended daily amounts adults need as a part of a healthy diet. The % DV is used to convey how much of the daily amount of each nutrient is found in food products.

Daily Values

Nutrient	Daily Value (DV)
Fat	65 g
Saturated and trans fats	20 g
Cholesterol	300 mg
Sodium	2400 mg
Carbohydrate	300 g
Fibre	25 g
Sugars	no DV
Protein	no DV
Vitamin A	1000 RE
Vitamin C	60 mg
Calcium	1100 mg
Iron	14 mg

Note: RE = retinol equivalents

Table 3: Recommended Daily Intake

For a consumer buying finished or prepared foods, it is important to read the nutrition labels in detail on all products. For example, it is better to choose foods with a low % DV of nutrients such as fat, sodium, and saturated and trans fats. A higher % DV is recommended for products high in nutrients such as fibre, vitamin A, calcium, and iron. More detail about the requirements of labels and the **nutrition facts table (NFT)** is found in the last section of this chapter. For more information consult the CFIA website for Information within the Nutrition Facts Table.

Carbohydrates

Carbohydrates are the main nutritional component in most plants. They are the most easily obtained nutrient and most readily digestible form of fuel for the body. They can be stored by the body and released when the body needs energy. Carbohydrates are either simple (sugar) or complex (starch and fibre). **Simple carbohydrates** include single sugars (called monosaccharides) such as:

- Glucose (grape sugar and corn sugar)
- Fructose (fruit sugar and honey)
- Galactose (part of milk sugar)

Glucose is the body's most important source of energy and many cells cannot be fuelled by any other carbohydrate. Other simple carbohydrates are double sugars (called disaccharides) and include:

- Sucrose (table sugar)
- Lactose (milk sugar)
- Maltose (malt sugar)

Naturally sweet foods such as fruits, some vegetables, sugar cane, and honey are the main sources of simple carbohydrates in nature. Many naturally sweet foods (particularly fruits and vegetables) contain other nutrients required for good health. However, the most common simple carbohydrate in North American diets is refined sugar, which provides virtually no benefit to the human body other than a high energy (caloric) value. Refined simple carbohydrates are often referred to as "empty calories"; that is, there is little nutritional value in these sugars beyond their caloric content.

Complex carbohydrates are composed of long chains of simple sugars. Starch is a complex carbohydrate. Complex carbohydrates are found in grain products such as cereals, flour, and pasta; legumes such as beans and peas; and tubers such as potatoes. Complex carbohydrates contain other recommended nutrients such as vitamins and minerals. Starches must be broken down into glucose and fructose during digestion before they can be absorbed in the small intestine and become usable fuels for the body.

There are ways of increasing consumption of complex carbohydrates:

- Eat unsweetened whole grained breakfast cereals and sweeten them, if you must, with fresh fruit or raisins instead of refined sugar. Read cereal box labels to verify that what you are eating is as nutritious as you

think it is. For example, granola has the reputation of being a healthy morning cereal, but some brands contain large amounts of fat and sugar and so may be high in calories.

- Eat fruits as desserts. Fresh fruit can be present in a number of ways including baking, poaching, or making it into a fruit compote. Read the labels on canned fruit. Try to find fruits packed in natural juices and avoid fruits canned in heavy syrup.
- Eat rolls, breads, muffins, and other baked goods that are made from whole grains. Try to avoid using overly sweet jams and other spreads.
- Try to eat entrées or side dishes based on legumes and grains. This includes rice, beans, pasta, and potatoes.

Sugar

Current nutrition facts tables for sugar do not show the % DV as there is no recommended daily amount for healthy diets. (Read about upcoming changes proposed by Health Canada in the next chapter, Labelling and Packaging Requirements.) The most recent guidelines published by the World Health Organization (2015) suggest restricting daily intake of free sugars to less than 10% of the total energy intake. The aim is to further reduce the suggested daily intake to 5%, equivalent to 25 g or 6 teaspoons per day. Free sugars include syrups and commercially manufactured icings as well as sugar naturally occurring in honey, maple syrup, fruit juices, and concentrates. As per the World Health Organization guidelines “intrinsic sugars are those incorporated within the structure of intact fruit and vegetable and sugars from milk (lactose and galactose)” (World Health Organization, 2015). A guideline on sugar intake for adults and children is available at the WHO Media Centre.

Fibre

Complex carbohydrates often contain indigestible fibre. There are two types of fibre; insoluble and soluble. **Insoluble fibre** does not dissolve in water and promotes efficient intestinal functioning by improving the elimination process. Cellulose, lignin, and hemicellulose are the main fibres in this category.

The second type is **soluble fibre**, which does dissolve in water. Like insoluble fibre, this fibre is not digested; however, soluble fibre acts as sponge, slowing the digestion of food in the stomach and intestines and absorbing fats and other chemicals. Some research suggests that soluble fibre absorbs cholesterol and will lower blood cholesterol levels. The main soluble fibres are pectin and gums.

Water must be present for either fibre to perform any useful function in the human body. Without water, both types of fibre are simply dry irritants that cannot be passed from the body.

The types of fibres and their sources are shown in Table 4.

Fibre	Type	Sources
Cellulose	Insoluble	Wheat flour, beans, cabbage family, apples, root vegetables (including beets, carrots, potatoes, turnips, and yams)
Hemicellulose	Insoluble	Whole grains, cereals, bran
Lignin	Insoluble	Cereals, mature vegetables, eggplant, green beans
Pectin	Soluble	Apples, grapes, squash, citrus fruits, strawberries
Gums	Soluble	Oat bran, lentils, dried beans, legumes

Table 4: Types of dietary fibre

Health Canada recommends that Canadian women need 25 g of **dietary fibre** daily and men need 38 g daily. Health Canada also states that men are only getting half of the suggested amount (Health Canada, Do Canadian Adults Meet Their Nutrient Requirements Through Food Intake Alone?, 2012). Such information provides opportunities for the food industry to offer products that contain dietary fibre. Some suggested ingredients for increasing fibre are fruit and vegetables, whole grain flour, nuts, and seeds.

Fats

Although both animal and plant foods contain fats (or **lipids**), much of the fat consumed by North Americans comes from animal products in the form of meat, fatty fish, eggs, and dairy products such as butter, cream, cheese, and whole milk. Vegetable fats are found in vegetable oils and vegetable shortenings.

Fats are an essential nutrient and have many beneficial functions in the body. They supply a steady source of energy, regulate certain body functions, contribute to the feeling of "fullness" after eating, and absorb and transport fat-soluble vitamins. There are two main types of fat: saturated and unsaturated. Saturated fats come from animal and tropical plants sources while unsaturated fats come from plant sources and fish. Unsaturated fats are further divided into monounsaturated and polyunsaturated fats.

The classification of a fat depends on its atomic structure. Fat is composed of carbon and hydrogen atoms bound together in long chains. If the chain has as many hydrogen atoms as it can possibly have, the fat is said to be saturated. If there is room on the chain for more atoms of hydrogen, the fat is unsaturated. The difference in atomic structure means that at room temperature most saturated fats are solid and unsaturated fats are liquid. If there is one double space free of hydrogen atoms in the chain, the unsaturated fat is monounsaturated. If there are two or more double spaces free of hydrogen atoms in the chain, the fat is classified as polyunsaturated. The best sources of polyunsaturated fats are fish and most vegetable oils, including corn oil, safflower oil, and sunflower oil.

One way of viewing the difference between saturated and unsaturated fats is to consider the atomic structure of fat to be like a sponge. If the "sponge" is totally full of hydrogen atoms, the fat is saturated. If the "sponge" can still hold more hydrogen atoms, the fat is unsaturated. Knowing the molecular structure of fat is not as important as knowing that saturated fats tend to have negative health effects; polyunsaturated fats are better for us than saturated fats, and mono-unsaturated fats may even be more beneficial. Another point to remember about lipids is that, in general, animal fats are saturated while most plant fats are unsaturated. However, lipids in tropical oils tend to be saturated fats. This means that cocoa butter, coconut oil, palm kernel oil, and palm oil are saturated oils. The best sources of polyunsaturated fats are fish and most vegetable oils including corn oil, safflower oil, and sunflower oil.

Fatty fish such as mackerel, tuna, salmon, trout, and herring are rich in special fatty acids belonging to the omega-3 group. There is some evidence that one of the omega-3 chemicals, eicosapentaenoic acid (or EPA for short), helps to prevent coronary heart disease, provides relief for arthritis victims, and may reduce the frequency and intensity of migraine headaches (Harvard Medical School Patient Education Centre, 2015). Inconsistent findings in nutritional research suggest there is some controversy about the validity of medical claims for fish oils.

Significant amounts of monounsaturated fats are found in olive oil, almond oil, canola oil, and peanut oil. The types of fatty acids found in a variety of oils are shown in Table 5.

Type of Lipid (15 mL)	Total Fat (g)	SFA (g)	MUFA (g)	PUFA (g)
Coconut	13.6	11.8	0.8	0.2
Corn	13.6	1.7	3.3	8.0
Olive	13.5	1.8	9.9	1.1
Palm	13.6	6.7	5.0	1.3
Peanut	13.5	2.3	6.2	4.3
Canola	14.0	1.0	8.5	3.8
Safflower	13.6	1.2	1.6	10.1
Soybean	13.6	2.0	5.0	5.1
Sunflower	13.6	1.4	2.7	8.9
Lard	12.8	5.0	5.8	1.4
Butter	11.4	7.1	3.3	0.4

Note: SFA = Saturated fatty acid, MUFA = Monounsaturated fatty acid, PUFA = Polyunsaturated fatty acid

Table 5: Amount of fatty acids in a variety of fats

Saturated fat and trans fats have one combined % DV in the nutrition facts table. Both may have negative effects on blood cholesterol levels and health.

Below is an excerpt from Healthy Eating Canada that explains how the % DV for saturated and trans fat is calculated.

> The combined Daily Value in nutrition labelling is based on 20 g of saturated and trans fats for a reference diet. For example, in the Nutrition Facts table below (Figure 1), the food product has 7 g of saturated and 0.5 g of trans fats for a total of 7.5 g. The product would therefore, have a % Daily Value for saturated and trans fats of 38 %. (7.5 g ÷ 20 g) × 100 = 38%

Nutrition Facts: Per burger (85 g)

Amount	**% Daily Value**		
Calories 210			
Fat 18 g	28 %		
Saturated 7 g + Trans 0.5 g	38 %		
Cholesterol 55 mg			
Sodium 330 mg	14 %		
Carbohydrate 1 g	1 %		
Fibre 0 g	0 %		
Sugars 12 g			
Protein 12 g			
Vitamin A	0 %	Vitamin C	0 %
Calcium	2 %	Iron	10 %

Figure 1: Sample Nutrition Facts table

Remember: 5% DV or less is a little and 15% DV or more is a lot for all nutrients" (Government of Canada, *Healthy Eating*, 2015, para 8).

Canada has implemented measures to control the amount of trans fat over the past several years. Although initiated in 2004 by Jack Layton of the New Democratic Party, it took several years to be mandated. In 2008, Calgary was the first city in Canada to ban trans fats, and British Columbia was the first province to mandate that that trans fat be limited, following a June 2006 recommendation by "a task force co-chaired by Health Canada and the Heart and Stroke Foundation of Canada [which] recommended a limit of 5% trans fat (of total fat) in all products sold to consumers in Canada (2% for tub margarines and spreads)" (Trans Fat Task Force, 2006).

Although measures to reduce the amount of trans fats are in effect, it is still not well understood by the general public which trans fats may be bad (i.e., contribute to high cholesterol and should be avoided), and which trans fats may have a positive health effect. It has, however, become more and more known that naturally occurring trans fats are not the culprit, negatively affecting cholesterol, but hydrogenated fats (man-made by changing an oil to a hard fat) are. You can find more information on hydrogenated fats in the *Understanding Ingredients for the Canadian Baker* open textbook.

Cholesterol

Cholesterol is a type of lipid found in the blood and in the diet. It has many functions and is a structural part of all body cells, and is an essential component of brain and nerve tissue. It is needed to form hormones, bile, and vitamin D. Many foods contain cholesterol, but mostly it is found in foods of animal origin. Some meats are higher in cholesterol than others, and generally speaking, fish is lower. However, shrimp is high in cholesterol (Grosvenor, Smolin, & Bedoya, 2014).

The human body produces two types of cholesterol: low density lipoprotein (LDL) and high density lipoprotein (HDL). The “bad” cholesterol is LDL. Some research (Harvard Medical School Patient Education Centre, 2015) suggests that if your LDL level should drop by 1%, your risk of heart disease will drop by 1% to 2%. However, if your HDL level should increase by 1%, your risk of heart disease will decrease by 2% to 4%. There is some research suggesting that HDL and LDL levels are influenced by diet (Harvard Medical School Patient Education Centre, 2015). In particular, fibre may raise HDL levels, but this research is not conclusive. Other researchers have concluded that fish oils may also reduce serum cholesterol levels.

Table 6 provides the fat and cholesterol content of selected foods.

Food	Total Fat (g)	Saturated Fat (g)	Cholesterol (mg)
Meats 88 g (3 oz.)			
Beef, top round	6	2	84
Beef, short ribs (braised)	18	8	93
Beef liver	4	2	333
Lamb, shoulder lean (roasted)	8	3	83
Pork tenderloin (roasted)	4	1	61
Chicken, breast meat only (roasted)	3	tr	73
Chicken, breast meat with skin (roasted)	8	2	82
Chicken, drumstick meat only (roasted)	5	1	82
Salmon, fresh baked with butter	7	2	43
Sardines, canned in oil	9	2	118
Trout, broiled or baked	13	6	58
Oysters, raw	2	tr	45
Shrimp, canned	tr	tr	135
Eggs			
Large fried in butter	6	2	278
Large scrambled with milk and butter	7	3	282
White raw	tr	0	0
Yolk raw	6	2	272
Dairy products			
Milk			
2% (250 mL)	5	3	19
Skim (250 mL)	tr	tr	5
Buttermilk (250 mL)	2	1	9
Whole (250 mL)	9	5	35
Cream			
Cereal – 12% (250 mL)	31	19	99
Cereal – 12% (15 mL)	2	1	6
Coffee – 18% (250 mL)	46	28	155
Coffee – 18% (15 mL)	3	2	9
Whipping – 35% (250 mL)	88	55	*322*
Whipping – 35% (15 mL)	5	3	19
Cheese (45 g)			

Cheddar	15	9	47
Feta	10	7	41
Gouda	13	8	52
Gruyère	15	9	50
Mozzarella	10	6	37
Mozzarella (partly skimmed)	7	5	27
Swiss	12	8	41
Cottage, creamed (250 mL)	10	7	34
Cottage, 2% (250 mL)	5	3	20
Cottage, dry curd 0.4%	trace	trace	10

Table 6: Fat and cholesterol content of selected foods

Protein

Protein is one of the macronutrients that does not show the %DV on the food labels because most people get their daily value in their diet. It is, however, valuable to know how much protein consumption is needed on an individual level.

The required daily protein intake is estimated at 50 g to 145 g daily based on the total body weight, or 0.8 g for each kg of body weight. For instance, a person weighing 56.8 kg (125 lb.) would require approximately 45 g of protein per day (56.8 kg x 0.8 = 45.44 g). The range is wide because people who take part in competitive sports or exercise strenuously require more protein than those who are less active.

Proteins are made up of long chains of compounds called **amino acids**. When proteins are eaten, they cannot be digested and carried into the bloodstream in their original molecular form. During digestion, a protein is broken down into amino acids that can pass into the bloodstream and travel to tissues and cells throughout the body. The amino acids recombine within the cells. The proteins can then form cell structures, enzymes, and hormones. They also repair body injury and supply the building blocks for growth. There are about 20 amino acids found in either of the two types of protein: complete and incomplete. Complete proteins contain nine amino acids (so-called "essential" amino acids) that the body cannot produce by itself. Complete proteins often contain other amino acids in addition to the essential ones. Proteins that do not contain all the essential amino acids are called incomplete proteins.

Meat, fish, dairy products, and eggs contain all the essential amino acids and so are complete proteins. Unfortunately, these complete sources of essential amino acids also contain large amounts of saturated fats. No single vegetable or plant food contains all the essential amino acids. However, as **vegetarians** (people whose diet does not include meat, poultry, and fish products) know, by combining two or more incomplete proteins, you can produce complete protein vegetarian dishes that contain all the essential amino acids. For example, a mixture of rice and black beans (a staple in many Latin American diets) produces the same quality complete protein as any meat dish. Other plant food combinations that supply complete protein are the following:

- Legumes combined with grains often produce a complete protein. That is, if beans, lentils, peas, or soybeans are combined with rice, wheat, or corn, all the essential amino acids will be present in the product. The same applies to menu items like lentil soup served with whole wheat bread or rice crackers, baked beans with bread, beans and rice casseroles, and bean fillings in corn tortillas.
- Grains can be combined with dairy products. For example, breakfast cereals with milk, pasta with cheese sauce, corn chowder, grilled cheese sandwiches, and rice pudding all contain complete proteins.

- Legumes can be mixed with seeds. The Middle East dish of hummus (chick peas and sesame seeds) is an example of such a combination. A snack of raisins, peanuts, and sunflower seeds can also supply all the essential amino acids.

Micronutrients

Micronutrients are those nutrients that do not provide calories or energy, such as vitamins and minerals.

Vitamins

Vitamins are organic compounds containing hydrogen and carbon. Some vitamins also contain oxygen, nitrogen, and/or sulphur. With the possible exception of vitamin K, our bodies cannot produce vitamins. We must acquire these **essential nutrients** either through the foods we eat or by taking vitamin supplements. The body needs vitamins to ensure proper nervous system functions, to build strong bones, and to form blood cells. In addition, vitamins are needed to convert food into energy and so are essential for basic **metabolism**.

Vitamins fall into two classifications: fat soluble and water soluble. Fat soluble vitamins include vitamins A, D, E, and K. These vitamins enter the body by being absorbed with fat in the lower intestine. Fat soluble vitamins that are not immediately used are stored in fat tissues or in the liver. Because they can be stored in the body, fat soluble vitamins do not have to be in our daily diet, but they must be taken on a regular basis so they are stored.

Water soluble vitamins are the B and C vitamins. The B vitamins, often called the B complex, include thiamine (B1), niacin, riboflavin (B2), pyroxidine (B6), pantothenic acid (once called B3), B12, folic acid, and biotin. None of these vitamins can be stored in the body in adequate amounts, so they must be provided daily through dietary intake.

Cooking techniques affect the quality and quantity of vitamins, especially the water soluble ones. For example, vitamin C is easily destroyed if green vegetables (an important source of the vitamin) are overcooked in too much water. In general, high-cooking temperatures and lengthy cooking times can destroy vitamins.

Minerals

Minerals are inorganic substances that do not contain carbon. Minerals come from the earth and cannot be made by the body. They are found in plant matter, meats, and/or dairy products. They can also be bought and consumed in pure form as supplements or, as in the case of sodium, as a flavour enhancer. Minerals are needed for bone growth, water balance, normal muscle functioning, and other functions.

There are two categories of minerals: major minerals (sometimes called macrominerals or bulk minerals) and

trace minerals (sometimes called microminerals). The major minerals include calcium, phosphorus, magnesium, sodium, and potassium. The most important trace minerals are iron, zinc, and iodine.

Calcium

Calcium, along with phosphorus and magnesium, is needed to build and maintain bones and teeth. Calcium is the body's most abundant mineral that gives strength and rigidity to bones and teeth. It also replenishes blood calcium if needed. Dairy products are the main source of calcium, although small whole fish such as sardines and dark green vegetables, beet greens, and broccoli contain significant amounts of calcium. There is some controversy about how much calcium should be in an adult's diet. From the mid-1990s, research suggested that postmenopausal women should take calcium supplements to prevent bone loss and osteoporosis, while more recent studies have found that calcium supplements may not prove to be effective (Brody, 2013).

Phosphorous

Phosphorous is also a major factor in building healthy bones and teeth. Phosphorous combines with calcium to form the skeleton structure. It is also needed for cell growth and repair, kidney function, nutrient metabolism, muscle contraction, and the digestion of two B vitamins: riboflavin and niacin. Phosphorus is found in meats, whole grain flour and cereals, nuts, eggs, fish, poultry, and cheese. Phosphorus is usually found in foods high in calcium, although the best source is meat.

Magnesium

Magnesium helps bones form and grow. It is also important for cardiac muscle function and maintenance, and plays an important role in the chemical reactions of many enzymes. Magnesium is mainly found in green leafy vegetables, legumes (including nuts), seafood, cocoa, and whole grains.

Sodium

Salt, or sodium chloride, consists of approximately 40% sodium and 60% chloride. Sodium intake should be monitored in the daily diet. Most salts are ingested from processed, pre-packaged, and ready-to-serve foods, which amounts to 77% of daily salt consumption. While 12% is naturally present in food, 5% is added during cooking, and 6% is added during meals as shown by the sodium detector. Salt is a contributing factor to chronic diseases such as cardiovascular disease and high blood pressure.

Sodium (along with potassium) is needed for the normal functioning of nerves and muscles. Both minerals are critical components in maintaining water balance and mineral concentration levels in cells.

Although sodium is needed by the body, it is a mineral that most people get too much of in their daily diet. Health Canada suggests that individuals should refrain from adding salt to their food and should purchase commercial foods that are low in salt. The government faces ongoing challenges to convince food manufacturers to reduce the amount of sodium added to processed and prepared foods.

Potassium

Potassium works in harmony with sodium to regulate water balance and heartbeat. Potassium is found inside body cells while sodium is found in the liquid surrounding the outside of cells. A balance between the concentration of potassium and the concentration of sodium in the body may be a key factor in the prevention of high blood pressure, although the research in this area is inconclusive and may even be contradictory (Harvard School of Public Health, Shifting the Balance of Sodium and Potassium in Your Diet, n.d.). The potassium-sodium balance is affected when there is a substantial loss of both minerals during heavy exercise or when experiencing diarrhea or vomiting.

The replacement of lost minerals is best accomplished from natural food sources. However, a person may have to take salt pills or potassium supplements when large amounts of fluid are lost due to vomiting, diarrhea, or excessive sweating (caused by hard labour or exercise). The best dietary sources for potassium include green leafy vegetables, bananas, oranges and orange juice, potatoes, apricots, raisins, and cantaloupe.

Iron

Iron is an important component of hemoglobin, which is the part of a red blood cell that carries oxygen from the lungs to the cells and waste products from the cells back to the lungs for exhalation. Iron is also needed for the efficient functioning of many parts of the enzyme system. Iron deficiency is one of the most common nutritional deficiencies in North America, particularly among women and young children. A lack of iron can lead to iron-deficiency anemia, a disease that is characterized by muscle weakness, fatigue, and listlessness. Iron deficiency in children has been associated with irritability, hyperactivity, and a less than adequate attention span. Too much iron in the system can also lead to problems such as toxic accumulations in the heart, liver, and pancreas.

Dietary iron is in two forms: heme and non-heme. The heme form is more easily absorbed by the body. Heme iron is only found in animal tissue where it typically makes up about 40% of all the iron found in the meat. Dietary iron has a difficult time entering the blood system as only a small percentage of the available iron is absorbed. The richest sources of iron are the organ meats (such as kidneys and liver), fish, poultry, shellfish, legumes, dried fruits, eggs, and whole grain breads and cereals. Although some leafy vegetables such as spinach are iron rich, it is non-heme iron and so is not easily absorbed into the body. The actual iron requirements per day are about 1 mg, but because of iron’s poor absorption rate, Health Canada recommends a dietary intake eight to ten times more than that. Table 7 gives the recommended daily iron requirements.

Age (Years)	Sex	Total Iron Requirement (mg/day)	Dietary Intake (mg/day)
1-2	M/F	0.7	6.0
3-5	M/F	0.7	6.0
6-11	M/F	1.0	8.0
12-15	M	1.2	10
12-15	F	1.6	13
16-18	M	1.2	10
16-18	F	1.4	12
19+	M	1.1	9.0
19+	F	1.7	13
Post-menopausal	F	1.0	8.0
65+	M/F	1.0	8.0

Table 7: Iron requirements

Vitamin C may increase the amount of dietary iron absorbed in the digestive tract. Some grains as well as tannic acid found in coffee and tea may bind dietary iron and eliminate it before the body can absorb it. Antacids and aspirin can cause iron deficiencies.

Zinc

Zinc is found in over 70 enzymes in the body including those involved in synthesizing protein, digesting food, transporting carbon dioxide and absorbing vitamins. Zinc also helps in the formation of insulin and the building of cell membranes. Zinc plays a crucial role in the development of the reproductive organs, and a zinc deficiency can lead to low sperm counts in males.

Zinc is found in both animal and vegetable products but is more readily available in animal sources. Meat, liver, seafood (particularly raw or smoked oysters), eggs, brewer's yeast, wheat germ, pumpkin seeds, and nuts are all good sources of zinc. However, vegetarians must include enough dietary zinc to compensate for the fact that the body cannot easily absorb vegetable zinc. Vegetarians should note that there is some evidence suggesting that fibre and phytates (a compound commonly found in grains, legumes and nuts) binds zinc and so impedes its absorption by the body (Hunt, 2003). This means vegetarians should include enough dietary zinc to compensate for the amount of zinc that may pass through the digestive tract without being absorbed.

Iodine

Iodine is essential for the normal functioning of the thyroid gland, which produces the hormone thyroxine, which in turn regulates energy metabolism in the body. A lack of iodine can lead to goiter problems: the reduction of mental reactions, lethargy, and obesity. Iodine deficiencies are rare in North America because table salt is iodine fortified. Other dietary sources of iodine include fish, shellfish, kelp, some mushrooms, and garlic.

Water

Water is unique. Although not considered a micronutrient, it is a nutrient nonetheless as it has many functions in the body. Water is considered to be an essential nutrient not because it has high nutritional value but because it performs many essential jobs. Although some water gets into the body through foods, it should be consumed in large amounts for adequate hydration (Grosvenor, Smolin, & Bedoya, 2014).

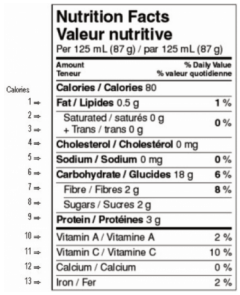
Water is present in all body tissue, it transports nutrients to cells and waste away from cells, and provides a method for the excretion of wastes from the body. Water aids in digestion, regulates body temperature, and is the liquid medium for all body fluids such as blood, perspiration, and urine. The body acquires water from fluids ingested, moisture in foods, and as an end product of the metabolism in the body of the macronutrients. In temperate climates, such as those found in much of Canada, the body needs the equivalent of about 2.5 L of water a day. Under severe physical conditions, the body's need may increase by several litres a day depending upon the amount of fluid lost through sweating and evaporation through the lungs.

Consumption of water for good health should not be confused with the consumption of beverages. The majority of people have a beverage when they eat a meal at home or in another setting. Favourite beverages include soft drinks, bottled waters, juices, coffee, tea, and alcoholic beverages. Many of these contain ingredients that have an impact on the health of the body. Caffeine as a dietary side-product deserves special mention. About 60% of ingested caffeine in Canada is from coffee, with 30% from tea and 10% from cola and chocolate drinks. Although the research is not totally consistent, caffeine increases the frequency and prevalence of headaches, heart palpitations, and tremors while also increasing alertness during times of fatigue. Caffeine is addictive. After several hours of avoiding caffeine, heavy users can suffer withdrawal symptoms such as headaches, irritability, muscle tension, and nervousness — all of which disappear if caffeine is then consumed. Additionally, beverages that contain caffeine (and alcohol) act as diuretics and will actually draw water out of the body. The long-term effects of caffeine and the relationship between caffeine and chronic disease have not been fully established. However, the evidence linking coffee consumption (not necessarily caffeine consumption) with heart disease has prompted Health Canada to suggest that coffee should be consumed in moderation. (Health Canada, Caffeine in Foods, n.d.).

The Nutrition Facts Table

Under Government of Canada regulations, the nutrition facts table (NFT) must provide serving size, calories, and 13 core nutrients, including fat, sodium, and sugar (Figure 2). The list of micronutrients, which includes cholesterol, folate, magnesium, niacin, phosphorus, potassium, riboflavin, selenium, thiamine, vitamin B12, vitamin B6, vitamin D, vitamin E, zinc, and other vitamins and minerals, is optional (Health Canada, 2004a). Reading and understanding the NFT is essential for choosing food products that meet the dietary needs of individuals. It is important to consider the % DV and to understand what "less than 5% DV" and "15% DV" mean. For an interactive NFT, visit the Health Canada website.

The NFT displays the % DV so consumers can determine the amount of a certain nutrient in one serving. The list of ingredients is mandatory on most packaged foods that contain more than one ingredient, and ingredients are listed in order of weight. In general, it is mandatory to show both official languages of Canada (French and English) on labels, with some exceptions (e.g., specialty foods, local foods, test market foods, and shipping containers) as long as the products are not resold to consumers.



Nutrition Facts
Valeur nutritive
Per 125 mL (87 g) / par 125 mL (87 g)

Amount / Teneur	% Daily Value / % valeur quotidienne
Calories / Calories 80	
Fat / Lipides 0.5 g	1 %
Saturated / saturés 0 g + Trans / trans 0 g	0 %
Cholesterol / Cholestérol 0 mg	
Sodium / Sodium 0 mg	0 %
Carbohydrate / Glucides 18 g	6 %
Fibre / Fibres 2 g	8 %
Sugars / Sucres 2 g	
Protein / Protéines 3 g	
Vitamin A / Vitamine A	2 %
Vitamin C / Vitamine C	10 %
Calcium / Calcium	0 %
Iron / Fer	2 %

Figure 2: Sample Nutrition Facts table (bilingual standard). Image courtesy Health Canada

Allergens

"Allergen Declarations and Gluten Sources" is the declaration on the label that includes the top 10 priority food allergens. They are set by Health Canada and include egg, soy, sesame seeds, milk, seafood, tree nuts (including peanuts), sulphites, wheat, and mustard. If any of these priority food allergens are present, they must be listed in the ingredients and/or in a statement that begins with "contains" or "may contain" on a food product label. It is

prudent for any consumer to read the food labels, and it is paramount for a person who either has allergies, or produces food for someone with allergies. Note that companies can change ingredients without telling consumers, thus the responsibility remains with the consumer or end user to read labels.

Best Before and Expiry Dates

The best before date indicates the anticipated amount of time an unopened food product keeps its freshness, taste, nutritional value, or any other qualities claimed by the company, when stored properly and unopened. As soon as the product is opened, the best before date no longer applies. In addition, the best before date does not guarantee product safety.

The best before date must appear on packaged foods that have a shelf life of 90 days or less such as milk, yogurt, or bread. Best before date products still can be purchased or eaten after these dates.

Packaged foods that show an expiration date must be consumed before that date or discarded after the expiry date. The expiry date must not be mistaken for the best before date.

Food packaging plays an important part in the food industry; it keeps the products fresh, prevents them from becoming contaminated, and inhibits bacteria growth. As stated by Health Canada, “all materials used for packaging foods is controlled under Division 23 of the Food and Drugs Act and Regulations, Section B.23.001 of which prohibits the sale of foods in packages that may impart harmful substances to their contents. This regulation puts the onus clearly on the food seller (manufacturer, distributor, etc.) to ensure that any packaging material that is used in the sale of food products will meet that requirement” (Health Canada, 2010, September 9).

Other Claims on Food Labels

The Canadian Food Inspection Agency (CFIA) requires that packaged goods, including baked products, be pulled off the shelves if their labels are missing ingredients or have misleading information. Baked products such as whole grain bread and whole wheat bread must be labelled as such. What constitutes whole wheat bread in Canada? The definition of whole wheat breads states that, “under the Food and Drug Regulations, up to 5% of the kernel can be removed to help reduce rancidity and prolong the shelf life of whole wheat flour. The portion of the kernel that is removed for this purpose contains much of the germ and some of the bran. However, according to the American Association for Cereal Chemists International definition, it is only when all parts of the kernel are used in the same relative proportions as they exist in the original kernel, that the flour can be considered whole grain” (Health Canada, 2007). In addition, claims about the composition of a food product must be identifed. This section of a food label is voluntary, but a company may choose to highlight or emphasize an ingredient or flavour in a product, such as no added preservatives or artificial flavours, or “made with 100% fruit juice.” Such claims do not guarantee that there are no food additives present in a product. Food additives, food colourings, gelling agents, bleaching, maturing or dough conditioners (e.g., azodicarbonamide), which is banned in some countries, and emulsifying agents in amounts not exceeding government guidelines do not need to be listed. A complete list of allowable additives is available on Health Canada’s website. Many foods are exempt from declaration when used as ingredients in other foods; however, exempt components that contain any allergen, gluten source, or sulphites must be declared.

The Canadian Food Inspection Agency states that components "may be declared in the list immediately in parentheses after the ingredient which they are component of or in the 'Contains' statement immediately following the list of ingredients. If nutrients components are also required to be declared by section D.01>007 (1) (a) and D.02005, the nutrient components should be declared in separate brackets after the allergen, gluten source or sulphite declarations. For example: enriched flour (wheat), (niacin, thiamine, riboflavin, iron) or wheat flour (niacin, thiamine, riboflavin, iron)." (Canadian Food Inspection Agency, 2013).

Compliance with Labelling Regulations

Only nutrition facts and the ingredient list are mandatory in Canada. The nutrition facts table (NFT) includes the "specific amount of food on which all nutrient information is based: calories and 13 core nutrients; the actual amount of a nutrient, in grams or milligrams; the % Daily Value" (Health Canada, 2015). Although the NFT is helpful for consumers making informed food choices, it is the food manufacturer (i.e., baker/business owner) who needs to be in compliance with the labelling regulations. Customers must take caution when reading health facts, in particular if a product lists certain health claims that may be based on marketing schemes and or sales promotions. A recent documentary broadcasted on CBC Marketplace investigated food product labels. See the story, "Food fiction."

Nutrition and Health Claims

Nutrition and health claims, when made, must follow specific rules from Health Canada to ensure the claims are consistent and not misleading. A nutrient claim may provide information on calorie counts, or on whether a product is a "good source of fibre" or "trans fat free." Other nutrition claims may inform consumers if a product is high in calcium. A health claim on labels promotes or claims health effects of certain foods (e.g., "a healthy diet rich in fruit and vegetables may help to reduce the risk of some types of cancer"). Health or nutrition claims of products must meet specific criteria determined by Health Canada regulations. In order to "use these nutrition claims, the food product must meet specific criteria."

For example:

- for "sodium free," the product must have less than 5 mg of sodium per specific amount of food and per a pre-set amount of food specified in the regulations, the reference amount;
- in order to be able to say the product is "low in fat," the product must have 3 g or less of fat per specific amount of food and per reference amount. (Health Canada, 2015).

Methods of Production

Methods of production claims are voluntary and provide information about how products where grown, produced, or handled. Such claims provide consumers with information on how cattle were raised, fed, transported, or slaughtered and whether they were given growth hormones or antibiotics. Other claims may show whether eggs are organic or **free range,** and the type of feed given to the hens. All claims must be truthful and not misleading, and are required to meet additional criteria.

Country of Origin

If a product is imported from another country, its country of origin must be on the label. If products are produced in Canada, they must include the name and address of the responsible company. Food products that say "Product of Canada" must follow specific guidelines. For example, a "Product of Canada" must have most (generally 98%) of its food, processes, and labour originating in Canada. This means these foods were grown or raised by Canadian farmers, and are prepared and packaged by Canadian food companies.

> [The] claim "Made in Canada" means that the manufacturing or processing of the food occurred in Canada. A claim can be made on a label if the last substantial step of the product occurred in Canada, regardless if the ingredients are domestic or imported. For example, the processing of cheese, dough, sauce, and other ingredients to create a pizza would be considered a substantial step. If the food product contains some food grown by Canadian farmers, it can use the claim "Made in Canada" with domestic and imported ingredients. If all of the ingredients have been imported, it can use the claim "Made in Canada" from imported ingredients. All other origin claims such as "Distilled in Canada", "Roasted in the United States", and "Refined in France" that describe the country's value-added may be used as long as they are truthful and not misleading for consumers. (Canadian Food Inspection Agency, 2015d).

Consumers play an important role in food labelling in that they make an effort to read and understand the labels of all the food products they buy. If questions arise and more information on a product is needed, consumers should get in touch with the company directly. However, if there are any safety concerns or apprehensions about an unlabelled allergen, the complaint needs to be reported to Canadian Food Inspection Agency (CFIA).

Other processes such as high pressure processes (HPP) where foods have gone through high pressure processing exposure of "87,000 psi/600 MPa for up to 9 minutes does not cause a significant compositional change in the treated food, nor have there been any safety concerns raised regarding the use of this process for fruit and vegetable-based juices. On this basis, mandatory labelling requirements are not necessary in this case" (Health Canada, Food and Nutrition, 2015).

Learning Activities

Learning Activities

Learning Activity 1:

How much vegetable and fruit, grain products, milk and alternatives does a male have to consume to meet the required amount of 38 g of fibre? Follow the links in The World's Healthiest Foods to help you complete this exercise.

Learning Activity 2:

Using Canada's Food Guide:

- Identify the four food groups
- Describe four to six foods in each group and determine the size of each recommended group
- Determine the number of each food serving recommended per day.

Based on Canada's Food Guide:

1. Determine how much food and how many calories are needed for a sedentary person of 19-30 years of age.

2. Calculate the difference in calories needed at an active level. Choose a variety of foods that can be eaten to make up the difference in calories. Information on additional foods is available on The World's Healthiest Foods website.

3. Follow the online information to familiarize yourself with the nutrition fact table (NFT) to understand serving size and to test your knowledge of % Daily Value and to Understand Serving Size. Before you continue, take the online nutrition label interactive quiz.

Learning Activity 3:

1. Based on the calorie values below, establish a balanced meal for one day with a calorie count of

2500 using the three macronutrients listed and Canada's Food Guide. Use appropriate information from the Health Canada Dietary\Health Intake table to complete the exercise.

2. Determine the type of products and the amount one person can eat to easily exceed the recommended fat intake on a daily basis.

Energy yield of macronutrients:

Carbohydrate = 4 kcal/g
Protein = 4 kcal/g
Fat = 9 kcal/g

Learning Activity 4:

Create a personal Food Guide for one day that reflects your dietary and nutritional needs, noting the total amount of sugar intake. Discuss how easy or challenging it is to stay within the suggested new guidelines from the World and Health Organization. Use this list of whole foods.

PART 2

Labelling and Packaging Requirements

Introduction to Understanding Labelling Rules and Regulations

Learning Objectives

- Describe product labelling procedures and regulations
- Describe nutritional information required on labels and packages
- Describe types of packaging, uses, and regulations

Food labels are often not well understood by consumers. The Canadian government has, however, made efforts to create labels that provide necessary information for consumers. It is important for consumers to become knowledgeable about how to read and interpret food labels in order to make informed choices about healthy and safe products.

Health Canada is responsible for constructing policies to meet the standards set by the Food and Drug Act (FDA). Other governing bodies, such as the Canadian Food Inspection Agency (CFIA), have responsibilities for administering food-labelling policies as well as managing the Consumer Packaging and Labelling Act. Beyond this, food producers such as bakers play an important role in the food industry by producing great tasting products that are high in nutritional value and meet customers' needs. Food producers, including bakers, who produce food sold locally, nationally, or internationally must meet governmental labelling requirements.

Mandatory food labelling applies to almost all food products, and most food products require a list of ingredients. Labelling of foods and ingredients is mandatory for foods that have undergone irradiation if the total irradiated ingredients constitute more than 10% of the final food product. Some of the foods that may be irradiated and sold in Canada are potatoes and onions to prevent sprouting during storage; wheat, flour, and whole wheat flour to control insect infestation; whole or ground spices; and dehydrated seasoning preparation to reduce microbial load. Additional strict standards apply and guidelines must be adhered to for product labels where companies want to make a certain health and nutrition claim. All food labels must be truthful and not mislead consumers. Recent "innovative marketing" by companies may have fallen under the "misleading and being untruthful phenomenon" (CBC, 2015). Watch the first 16 minutes of this video from CBC Marketplace.

Most prepackaged food labels must include the nutrition facts table (NFT), a list of ingredients, allergen statements, and expiration and best before dates. On most packaged food products, the NFT is mandatory, with the exception of some food items, alcoholic beverages, and products that have few nutrients, such as coffee and spices.

Labelling Requirements for Grain and Bakery Products

The Canadian Food and Inspection Agency (CFIA) oversees the labelling of grain and bakery products. Included in this governmental policy are specialty breads, flour, breakfast cereal, and bakery products with common names. A *common name* what a product is generally known as if it is not defined by regulations (Canadian Food Inspection Agency, 2014). For example, the common name *shortbread*, in connection with biscuits and cookies, can stand on its own, as it should be recognized as a type of biscuit. It has been used in association with biscuits and cookies for many years and has a distinct identity of its own.

Table 8 is an extracted list of bakery products that fall under the same labelling requirement.

Type of Bread	Specialty Ingredient	Minimum amount of Specialty Ingredient as % of Flour
Graham bread	Graham flour	150
Milk bread	Milk solids	6 [B.13.022, *(d)*, FDR]
Potato bread	Potato flour	5
Honey bread	Honey	5
Cheese bread	Cheese	12
Oatmeal bread	Oats	20
Cracked wheat bread	Cracked wheat	20
Wheat germ bread (bread with wheat germ)	Wheat germ	2
Egg bread	Whole egg solids	1.5
Fruit bread or loaf	Fruit	40
Triticale bread	Triticale flour	20
Rye bread	Rye flour	20
Raisin bread	Seedless raisins	50 [B.13.025, FDR]
Raisin bread	OR A mixture of raisins and currants	35 plus 15 (maximum)
Bran bread	> 2 g dietary fibre from wheat bran per serving	> 2 g dietary fibre from wheat bran per serving
Protein bread	Must have a protein rating of 20 or more	Must have a protein rating of 20 or more

Table 8: Labelling requirements for certain bakery products

Baked products, when sold on premises, are exempt from labelling. Voluntary labelling should be available on a customer's demand. More information on the exemption of labelling on baked products can be found in the Bakers Journal and on the Health Canada website.

The following food preparations and mixtures are exempted from listing when used as ingredients in other foods:

- Food colour preparations
- Flavouring preparations
- Artificial flavouring preparations
- Spice mixtures
- Seasoning or herb mixtures
- Vitamin preparations
- Mineral preparations

- Food additive preparations
- Rennet preparations
- Food flavour-enhancer preparations
- Compressed, dry, active, or instant yeast preparations

Additional information can be found on the CFIA website and in the List of Ingredients and Allergens.

Proposed Changes to Labelling

Food labelling is a shared responsibility between Health Canada and the Canadian Food Inspection Agency (CFIA). Currently, there is an effort to improve food labelling to make labels easier to understand. Once the proposed regulations take effect, food manufacturers will incur the cost of changing their packaging to comply. For example, proposed changes will show serving sizes that are closest to the reference amount and should, if possible, be the same weight so consumers can make a quick comparison in nutritional value.

Health Canada is also proposing new serving guidelines in order to make comparing food products easier. Currently, for example, a serving size of one or two slices of bread may vary greatly in weight, thus making it difficult to compare the nutritional value of similar products. The proposed change is to have a serving size of bread be two slices, as Health Canada claims that most people eat two slices of bread in one serving. Other proposed changes are how micronutrients will be listed. For example, vitamin D and potassium will be mandatory, but not vitamins A and C, and the listing of iron and calcium will remain the same.

Another proposed change is for the labelling of sugar, which will now be listed as added sugar. As sugar consumption in Canada is an ongoing concern, Health Canada has suggested listing all sugars under the common name "sugar" and in descending order. Some of the common sugars are honey, molasses, glucose, and fructose. In addition, Health Canada proposes to establish a daily value of sugar consumption in the nutrition facts tables (NFT) of 100 g, arguing that "approximately half of Canadians consume more than 20% of their energy as sugars, with the highest intakes reported in younger age groups (<19 years)" (Health Canada, 2014). The proposed amount is double the World Health Organization's recent recommendation of a total daily energy intake of 10% sugar.

These changes will result in added costs for food manufacturers, including bakers, as they implement new labelling and revise the nutritional analyses of their products.

Figure 3 compares the current NFT with the proposed one.

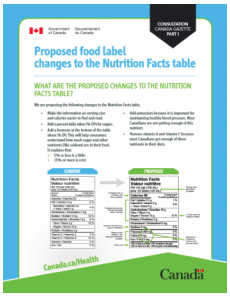


Figure 3: Proposed changes to the Nutrition Facts table. Retrieved from http://www.healthycanadians.gc.ca/alt/pdf/health-system-systeme-sante/consultations/food-label-etiquette-des-aliments/nutrition-facts-valeur-nutritive-eng.pdf

Changes or improvements to the nutrition facts tables have not been finalized yet, but the aim is to have the new regulations implemented sometime in 2015. The application of the new labelling policy may be at a later date as the proposed changes have only completed the consultation and consumer feedback stage. A full report is available on Health Canada's website under What We Heard.

For more general information, see Health Canada, Food and Nutrition.

Learning Activity

Learning Activity

Learning Activity 5:

Take two or more nutrition facts tables (NFT) of similar food products and compare their nutritional value. Use this interactive tool to compare two similar products.

1. What is the main difference? What nutritional facts are the same or similar? Based on your comparison, which would be a better product to purchase? Give reasons for each product.

2. Compare two similar products and determine which one is more nutritious. Determine why a product with a higher calcium % DV should be chosen over a product that has a high % DV of saturated fat. Why is a product with a low sodium content preferred? Explain the function of sodium and its health benefits.

PART 3

Special Diets, Allergies, Intolerances, Emergent Issues, and Trends

Introduction to Special Diets, Allergies, Intolerances, Emergent Issues, and Trends

Learning Objectives

- Describe food allergies and intolerances
- Describe a variety of special diets
- Identify ingredients appropriate for special diets, allergies, and intolerances
- Discuss emergent issues and trends

Bakers prepare food for a wide audience, and that means addressing nutritional and dietary concerns has to be a top priority. The majority of issues facing bakers are related to allergies and intolerances to particular ingredients, such as gluten and lactose. Bakers and pastry chefs must also be aware of other dietary restrictions, such as the variety of vegetarian diets ranging from **ovo-lacto vegetarians** who eat eggs and dairy to **vegans** who do not consume any animal products, including honey. Religion-based diets, such as **kosher** and **halal,** are also important to consider when producing baked goods that contain meat and dairy products, as is the ever-changing landscape of personal preferences and fad diets.

Food Allergies and Intolerances

This section focuses on food allergies and intolerances, which are areas of great concern in the food service industry. Bakers must pay close attention to how they accommodate food allergies and intolerances in their products, and may need to offer alternatives such as gluten-free baking.

Allergies and Allergic Reactions

Currently, about seven million Canadians self-identify as having a food allergy. Food and other allergies are on the rise, and many Canadians may have a reaction to certain foods but do not know which component in these foods triggers an allergic response.

It is the immune system that reacts to certain foods. An "allergic reaction occurs when the immune system produces antibodies to a substance, called an allergen, which is present in our diet or environment" (Grosvenor, Smolin, & Bedoya, 2014). The most common food allergies that Canadians suffer from are triggered by wheat, nuts (including tree nuts and peanuts), milk, eggs, mustard, seafood, sesame, soy, and sulphites.

Food Intolerances and Food Sensitivities

The terms *food intolerances* and *food sensitivities* can be confusing as some sources use them interchangeably, while others claim that food intolerance allows some people to eat a small amount of the food without having a reaction. Health Canada defines the terms as follows:

- A food intolerance is a food sensitivity that does not involve the individual's immune system. Unlike food allergies, or chemical sensitivities, where a small amount of food can cause a reaction, it generally takes a more normal sized portion to produce symptoms of food intolerance. While the symptoms of food intolerance vary and can be mistaken for those of a food allergy, food intolerances are more likely to originate in the gastrointestinal system and are usually caused by an inability to digest or absorb certain foods, or components of those foods. For example, intolerance to dairy products is one of the most common food intolerances. Known as lactose intolerance, it occurs in people who lack an enzyme called lactase, which is needed to digest lactose (a sugar in milk.) Symptoms of lactose intolerance may include abdominal pain and bloating and diarrhea.
- A food sensitivity is an adverse reaction to a food that other people can safely eat, and includes food allergies, food intolerances, and chemical sensitivities.

- Chemical sensitivities occur when a person has an adverse reaction to chemicals that occur naturally in, or are added to, foods. Examples of chemical sensitivities are reactions to: caffeine in coffee, tyramine in aged cheese and flavour enhancer monosodium glutamate. (Health Canada, 2007b)

Allergies can trigger anaphylactic reactions in which the immune system strongly reacts to a particular protein or irritant. Such life-threatening reactions require immediate medical attention. Additional information on severe allergic reactions and on how to minimize risks can be found on the Health Canada website.

People, who are sensitive to certain foods can also have reactions to food additives, such as monosodium glutamate (MSG), a flavour enhancer. Many food additives claim to make food more palatable, safer, longer lasting, flavourful, and better tasting, as well as enhance its nutritional value (Grosvenor, Smolin, & Bedoya, 2014). Consumers who have food sensitivities, food intolerances, or food allergies need to be extra vigilant when purchasing processed or semi-processed food products because many food additives or flavours are exempt from labelling if they fall under the government exemption standard.

Food allergens, however, must be labelled as such. Sulphites, for example, are on the top-ten list of priority food allergens. They may be added to foods in the form of “potassium bisulphite, potassium metabisulphite, sodium bisulphite, sodium dithionite, sodium metabisulphite, sodium sulphite, sulphur dioxide and sulphurous acid. These can also be declared using the common names sulfites, sulphites, sulfiting agents or sulphiting agents” (Health and Nutrition, 2012d).

Many Canadians suffer from an autoimmune disorder that can cause **celiac disease** and must follow a gluten-free diet. Others who are faced with digestive problems, such as irritable bowel syndrome (IBS), may benefit from a gluten-free diet. Health Canada (2008, July 18) states over 300,000 Canadians may have celiac disease, and the Canadian Digestive Health Foundation (CDHF) claims only 110,000 get diagnosed. Other sources also confirm that this disease is not easily diagnosed, leaving a large number of Canadians wondering if they too have celiac disease. The CDHF further states more than 20 million Canadians suffer from digestive disorders and over 25,000 Canadians die of digestive diseases each year.

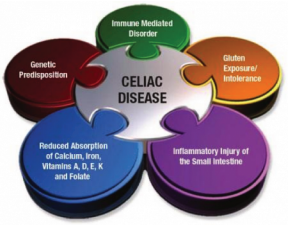


Figure 4: Celiac disease and the gluten connection retrieved from Health Canada (2009).

Figure 5 illustrates how many Canadians are gluten avoiders, thus confirming that the popularity of gluten-free diets is based on a lifestyle choice. Gluten-free is the fastest-growing market segment addressing food intolerances, and will continue to increase over the coming years. People who suffer from celiac disease may be eligible to have their medical expenses reimbursed for the incremental cost of gluten-free products.

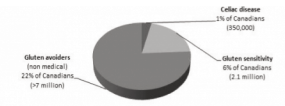


Figure 5: Consumers of gluten-free products by type. Source: http://www.agr.gc.ca/eng/industry-markets-and-trade/food-regulations/food-policy-and-regulatory-issues/reports-and-resources/gluten-free-claims-in-the-marketplace/?id=1397673574797

Additionally, many Canadians suffer from diabetes and require sucrose substitutes in their diet. Every year, more than 60,000 Canadians are diagnosed with Type 2 diabetes, a type of diabetes where the body produces insulin, a hormone that helps in regulating the glucose (sugar) in the blood, but cannot use it properly. Type 2 diabetes may be slowed or even prevented by monitoring the intake of daily sugars, whereas Type 1 diabetes cannot be prevented. People with Type 1 diabetes do not produce any insulin. People with either type of diabetes can benefit from using a sugar substitute in their diet. However, consumption of a sugar substitute must remain within safety limits. The Government of Canada has approved many sugar substitutes.

Wheat-free – Gluten-free

Gluten is found in wheat, such as whole wheat, kamut, rye, triticale, barley, oats, and other non-stream grains (see the Grains and Flours chapter in the *Understanding Ingredients for the Canadian Baker* open textbook). Recent studies suggest that people with celiac disease may have some tolerance to eating oats. Health Canada has published a review and it can be found under Celiac Disease and the Safety of Oats.

Gluten-free or non-gluten grains include rice, corn, millet, and pseudo grains such as amaranth, buckwheat, and quinoa. Many food products may contain gluten, such as deli meats, salad dressings, soup mixes, and many processed and premade meals. Some teas may contain malt, which is made from barley. Other food products and candies may contain gluten (Fenster, 2008). For example, unexpected sources of wheat include Werther's Original Hard Candies (and other Werther candies), coffee substitutes, soy sauce, and pasta sauces. A number of chocolate bars may also contain wheat (gluten). Glucose is widely used in gluten-free baking, but bakers must pay attention to its origin as it can be made from wheat or corn.

Anecdotal information from bakers based on their practical experiences, coupled with findings of some research, suggest long fermentation processes in sourdough breads can "cut gluten"; in other words, long fermentation decreases the concentration/intensity of gluten. Read this CBC article, which includes interesting facts and suggests that breads manufactured through a long fermentation process may be acceptable for some people with digestive intolerances. This article does not suggest, however, that people with celiac disease can freely eat sourdough breads. However, one of the European studies by Luigi Greco (2011) and his team shows promising results for the use of food-grade sourdough lactobacilli which have an effect on gluten during an extended fermentation. More scientific studies are needed to examine gluten in depth to determine whether gluten concentration can be reduced to the point where people with celiac disease could consume these gluten-containing breads safely. Until such time, gluten-free products are the best choice for those suffering from celiac disease.

Gluten-Free and Special Diet Baking Using the Critical Thinking Framework

Baking gluten-free products requires ingredient knowledge and an understanding of ingredient function in order to adapt existing baking formulas or to design new recipes. It is important to highlight that people with high levels of food allergies or food intolerances should be aware of Canadian labelling polices (covered earlier), and should take personal responsibility for informing themselves in order to decide which food products and growing and processing conditions can result in safe consumption. The same applies to bakers: they should be well informed of potential challenges with gluten-free ingredients and know the origin of their baking ingredients. More information is available under Co-Mingling in Agricultural Grain Products as a Possible Source of Food Allergens. A Canadian government website has useful information for Canadians with a soy allergy. If bakers are members of the Baking Association of Canada (BAC), they can refer to that organization, which is collaborating with Health Canada and the Canadian Food Inspection Agency (CFIA) on when to use the precautionary labelling.

Beginning to bake gluten-free can be overwhelming when unfamiliar ingredients are being used, such as gluten-free flours, various gums, stabilizers, or emulsifiers. The Critical Thinking Framework (CTFW) is a tool that can be used in baking or product design to critically analyze finished products or solve problems. Figure 6 shows how interconnected each element (ingredient, method, and environment) is and how changing one element means the other two must also be considered to achieve a desired outcome.

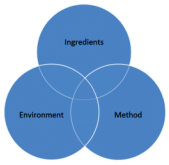


Figure 6: Critical Thinking Framework designed by Findlay, S. (2009)

When first learning how to bake gluten-free, it is vital to start by making simple products such as cookies, muffins, or simple cakes, using familiar ingredients. One of the first steps in designing a formula or recipe is to consider the texture required. Should the product be soft, chewy, or crunchy? Or should it be tender and moist? Using the diagram above, a baker should ask himself or herself the following questions:

- What are the functions of the ingredients used in a particular product?
- How is the environment contributing to the product (e.g., temperatures of ingredients or baking tempera-

tures)?

- What method should be applied to obtain best results?

Once a product is finished, the next steps are:

- Investigate or examine the outcome of the product.
- Identify reasons for what has worked and what has not.
- Analyze the product and assess what can be improved or changed.
- Review the analysis and determine what discoveries have been made.

Figure 7 is intended to assist the baker in the continuous designing, trouble-shooting, improving, or perfecting of any baking formulas.

Figure 7: Continuous designing, trouble-shooting, improving, or perfecting of any baking formulas.

Using CTFW, it is possible to produce gluten-free products that are as tasty and satisfying as conventional wheat-based products. Moreover, bakers and food manufacturers need to consider their market when creating products to suit their customers' needs. Besides applying the theoretical and practical knowledge, another key element in gluten-free baking is choosing good quality ingredients to produce great and nutritious products.

Gluten-Free Flours

There are a number of specially formulated gluten-free flours. The books *Professional Baking* (Gisslen, 2013) and *Gluten-Free Baking* (Richard & Coppedge, 2008) have a list of flours that are suitable for gluten-free baking. To become efficient and successful at gluten-free baking, it is advised that the baker make flour blends that can easily be mixed into a product. It is common for bakers to have flour blends for yeast dough products, biscuits, or fillings. Premixed flour blends and premade bases that include sugar, salt, or fats and that are formulated and standardized by bakers can improve efficiency and mitigate scaling errors. Fenster (2008) states that most of the flour blends she makes include sorghum (also called milo). Her blend consists of 35% sorghum flour, 35% potato starch/cornstarch, and 30% tapioca flour. This formula may lend itself well to some products but not to others. Other blends consist of flours with a high protein content and blends of nut flours that are high in fat content. The blending of the various flours is subject to the type of product desired as well as to the personal tastes and preferences of the consumer. Successful gluten-free baking requires commitment, adaptations, and improvements to baking formulas and methods. The baker must be patient and willing to perform many trials, and face those fraught with errors, in order to perfect and standardize gluten-free recipes.

Many recipes use volume measurements. While volume measurements work, the use of a balance or digital scale in either the imperial or metric weight version will provide more accurate yields. Attention needs to be given when converting volume measures to imperial or metric. Careful documentation of the conversions performed should be made so they can be referred to later.

Binding and emulsifying agents are widely used in gluten-free baking to give structure and stability to food products. These binding and emulsifying agents are often referenced as hydrocolloids and some resources include starches. Following are a few of the most used hydrocolloids in gluten-free baking. More information on these ingredients can be found in the *Understanding Ingredients for the Canadian Baker* and the *Modern Pastry and Plated Desserts* open textbooks. In gluten-free baking, hydrocolloids are used for binding or gelling purposes. They bind with free waters in products that are high in water activity (aw). It is best to calculate the weight of hydrocolloids in relation to the liquid used in a product.

Common Gums and Starches

Xanthan gum is a polysaccharide that can be made from various carbohydrates, most commonly from corn, by introducing a plant microbe called *Xanthomonas campestris* (Fenster, (2008). It is used as a thickener, stabilizer, emulsifier, and also as an ice crystal retarder and foaming agent. It can therefore be used in many gluten-free baking formulas because of its versatility.

Other hydrocolloids or binding agents used are guar gum and methycellulose. All of them increase stretchability and are used in doughs, mixes, or batters where extensibility is desired. Guar gum can be replaced with xanthan gum at a slightly higher amount as suggested by Fenster (2008). Methylcellulose is also used in egg-free baking, replacing egg whites. Locust bean gum is extracted from the kernels of the carob tree and the gum is similar to guar gum but has a lower viscosity and is thermo-irreversible. It is used in in ice creams, various dairy products such as yogurt, and in cream cheese to aid the spreadability. It is suitable in various gluten-free baking products.

Many other gelling or binding agents can be used, including pectin (vegetarian) and gelatin (animal derivative), which is available in powder or leaf form. Both pectin and gelatin are used in yeast doughs and mousses for stability. Agar can be used to replace xanthan gum and guar gum. Starches including tapioca, corn, and potato are used for thickening and to provide formation of structure.

Liquids

Liquid ingredients can vary from tap, distilled, or carbonated water to dairy milks, fruit juices, nut milks, and many non-dairy milks. Non-dairy milks include soy, rice, coconut, and others that can be used in non-dairy and nut-free diets.

Liquids are used to combine ingredients, soften doughs and batters, or assist gums and hydrocolloids in their gelling functions. Diamonds and Hemanson (2014) have proposed dividing the liquids into two categories, non-protein and protein-containing, to build a recipe. However, by using the CTFW approach, a baker would analyze the liquid, its consistency and properties (fluidity or viscosity), and examine the ingredients (e.g., if non-dairy milks are used). Many of these liquids contain thickeners, gums, and emulsifiers not acceptable to celiac, diabetes, or lactose-intolerant diets. Depending on the liquids used, a baker would have to anticipate their effect on other

ingredients in a product. For example, if buttermilk is used, chemical leaveners would need to be adapted because buttermilk is acidic.

Leaveners in Gluten-Free Baking

Some leaveners contain gluten as a part of the production process. For instance, baking powder contains a starch. For gluten-free baking, it is important to know if the starch in the baking powder was made from non-gluten grains.

Yeast, an organic leavener, needs sugar to ferment and leaven and salt to control fermentation. For gluten-free yeast dough, xanthan gum or gelatin is commonly used to hold the structure so that carbon dioxide produced by the yeast is not lost during the fermentation and baking processes.

Commercial Flour Blends

For bakers who want a quick start in making gluten-free products but cannot invest the time to develop their own formulas and recipes, gluten-free flour blends are available from various suppliers such as Robin Hood. Their Nutri Flour Blend consists of rice flour with sugar beet fibre, potato, and tapioca starch. More information and access to recipes are available on the Robin Hood website. Many flour blends include garbanzo bean flour, potato starch, tapioca flour, sorghum flour, and fava bean flour. Other gluten-free flour blends are sold by Highwood Crossing and are available in several local food stores and online. Pre-blended commercial flour combinations may not be cost-efficient and have other disadvantages because they may not lend themselves well to a variety of products.

Substitute Ingredients for Common Allergies

Substituting ingredients to accommodate allergies and intolerances may have other implications. For instance, gluten free products may not be as nutritious because wholesome ingredients are often replaced with starches that are broken down by the digestive system into sugars, thus stored as fat, if not used as energy. It is possible to produce good and nutritious products to accommodate most diets but it requires re-developing baking formulas. Psyllium powder (high absorption rate), carob flour and mesquite flour are high in dietary fibres. Carob flour is suitable to replace cocoa powder and is a preferred ingredient in vegan baking or cooking. Chia and flax seeds contain omega-3 fats, are high in fibre, and provide good binding and absorption qualities. Eggs, although not desired in low cholesterol diets, have essential amino acids and provide structure, support binding, and contribute to volume. Butter is used to aim for rich and tender products and can be replaced with various plant or vegetable oils for vegan friendly baking. Nut flours consisting of hazelnut, macadamia, cashew, and walnut are excellent sources if high protein and complex fibre products are desired, but these flours typically have higher fat content. Other ingredients that are high in calcium are almonds, Brazil nuts, various bean, and lentil flours as well as flax and teff. Fruit and berries, dry or fresh, are great alternatives to sugars and some have significant amounts of antioxidants. These ingredients and various seeds such as pumpkin, sesame, and numerous low fat nuts enhance the nutritious value of wholesome products.

Milk Allergies

Many Canadians suffer from milk allergies and are lactose intolerant. According to the Canadian Digestive Health Foundation more than 7 million are affected. People with lactose intolerance need to follow a lactose-restricted diet. Instead of butter, several nut butters such as almond or seed butters. including pumpkin or tahini (made from sesame seeds), can be used. Instead of using milk, numerous non-dairy milks lend themselves well to baking. Applesauce, mashed bananas, and soft tofu are good replacements for yogurt in baking.

Egg Allergies

People who have allergies to either egg yolks or egg whites, or both, follow egg-free diets. Soy emulsifiers are suitable for replacing egg yolks. Powders made from soy and methylcellulose are suitable for whipping and are a good replacement for eggs. They can be used with water in genoise or cake batters. Since eggs have leavening properties and egg yolks contain fat and emulsifiers, leavening agents and fats need to be added to certain baking formulas. Many nutritious egg-free products can be made without eggs. These include granola bars, slices and squares, and desserts that are fruit based.

Substituting Sugar with Other Sweeteners

Due to many consumers' concerns about processed and refined sugars, the use of "natural sugars" is on the rise in the food industry. The term *natural* can be misleading, and it is used here to refer to non-conventional sugars, which include maple syrup, honey, agave sugar, date, coconut, and muscovado sugar (also known as Barbados sugar). Honey is sweeter than granulated sugar; other non-conventional sugars are less sweet. Agave sugar gained popularity in the food industry because it is more affordable than maple syrup. All these sugars can be used to replace granulated sugar, but some modifications in the baking formulas are required. For example, if granulated sugar is replaced with maple syrup or agave syrup, a baker needs to take the moisture in these sugars into account. Some manufacturers of maple syrup and agave syrup claim these sugars have a low glycemic index (GI) and antioxidant properties. Brown sugars can also be used to replace granulated sugars. These are granulated sugars that have molasses added, which is a by-product of sugar production. Brown sugar is an appropriate choice for molasses-flavoured products. Many ingredients such as berries, fruit, and purees can also be added to products to replace some sugar without significantly changing baking formulas.

Health Canada and the Canadian Diabetes Association, however, consider all sugars to be the same. Still, non-conventional sugars are preferred by many Canadians who are health conscious, want to reduce their daily sugar consumption, and prefer to consume sugars that have some nutritional properties. Recent recommendations by the World Health Organization to reduce sugar intake afford the baking industry an opportunity to not only reduce the use of granulated sugars but meet customer demand for non-conventional sugars.

Although there are many sugar substitutes available for diabetic diets, it is important to use them following the manufacturers' guidelines as some exceed the sweetness of granulated sugars. Sugar substitutes are considered to be additives and many can pose health risks if consumed in high amounts. Government guidelines must be adhered to in order to declare a food product sugar free. Nutritious food products can be produced for diabetic diets when wholesome ingredients that have a low glycemic index are used. It is important, however, to list all ingredients in such products as well as those in any food products intended for people with dietary restrictions.

Emergent Food Issues and Topics

The food industry is a vast and complex industry that includes neighbourhood bakeries, chocolate and confection specialty stores, full-service bakeries such as cafés, and large food producers and food growers. The Government of Canada has established many food regulations and policies for food labelling, food safety, and other food-related issues. For example, in order to be approved as a permitted food, products must undergo rigorous safety assessments by Health Canada; only then can they be made available to consumers. Currently, probably the most talked-about issue is genetically modified foods.

Genetically Modified Foods

Health Canada "assesses the safety of all genetically-modified and other novel foods proposed for sale in Canada. Companies are required to submit detailed scientific data for review and approval by Health Canada, before such foods can be sold" (Health Canada, 2014b). In addition, Health Canada is, under the Food and Drugs Act and its Regulations, responsible for public health, food safety, and nutrition. Health Canada works to protect the health and safety of Canadians through science-based regulation, guidelines, and public health policy, as well as through health risk assessments concerning chemical, physical, and microbiological contaminants, toxicants, and allergens in the food supply. Health Canada also conducts pre-market evaluations to assess the safety and nutritional adequacy of "novel foods" proposed for sale in Canada, including foods derived from biotechnology.

Biotechnology is an umbrella term that covers a broad spectrum of scientific tools and techniques, including genetic modification and genetic engineering. In Canada, foods commonly referred to as genetically modified (GM) or genetically engineered (GE) foods are considered to be one class of novel foods. "Health Canada regulates the sale of novel foods in Canada through a pre-market notification requirement which is specified under Division 28 of Part B of the Food and Drugs Regulations (Novel Foods)" (Health Canada, 2005a).

To date, there are no regulations requiring GM foods to be labelled, although Canada has a voluntary labelling standard for them. Proponents of GM foods suggest that voluntarily labelling has negative connotations, implying that GM foods are immoral. Opponents are lobbying for GM food declarations stating that they would benefit consumers, artisanal bakers, and organic grain and produce growers.

A complete list of GM foods approved by Health Canada is available and includes varieties of soybean, corn, canola, cotton, sugar beet, papaya, and the Arctic apple. There are currently no GM wheat varieties permitted for sale in Canada. Watch the CBC video on the debate over GM wheat.

Many Canadians are seeking easily accessible information on genetically modified foods, such as whether it promotes or hinders food security and sustainability. They have unanswered questions about the environmental impact of GM foods. They want to know about already-known consequences or scientific evidence for or against GM foods. Genetically modified food topics trigger many opposing and supporting views and discussions. Learn more about this contentious topic through David Suzuki and Thierry Vrain, and by reading Growing Resistance Canadian Farmers and the Politics of Genetically Modified Wheat.

Other Trends

Food diet fads have come and gone. One popular food diet followed by many Canadians is the Mediterranean diet, which consists mostly of whole grains, dairy, fish, poultry, fruit, and vegetables, and includes legumes and nuts with the occasional serving of **red meat**. This diet promotes eating as many whole foods as possible. Bakers can support this diet by producing nutritious products that use whole grains and wholesome ingredients.

Food Issues in the News

Students in the food industry will find many educational opportunities outside the classroom. Below are documentaries and recent publications in the news. Many more can be accessed online.

The Secret of Sugar – the Fifth Estate (45 minutes)

The Big Fat Surprise – Fat doesn't make you fat (25 minutes)

Reduction of salt needed – High Sodium Restaurant Meals

Ban on food scraps – Vancouver city bylaw

http://vancouver.ca/home-property-development/food-isnt-garbage-2015-organics-ban.aspx

Additional reading

- Read Chapter 27 in *Professional Baking* by Gisslen (6ed)
- Familiarize yourself with the Health Canada website and its content on nutrition
- Read Visualizing Nutrition by Grosvenor, M.B.; Smolin L.A.; Bedoya D.L. Canadian Edition (2014)

Key Terms

Key Terms

Brown sugar

A blend of sucrose, molasses and molasses flavoured syrup. Used for its distinctive flavour and/or for colouring.

Calorie

Unit of energy produced by food

Carbohydrate

Simple or complex sugars and starches

Celiac disease

An autoimmune disorder of the small intestine that is caused by a reaction to a gluten protein found in wheat, and to similar proteins found in other common grains such as barley and rye

Cholesterol

A sterol found in all animal tissues and animal fats. There are two types: low density lipoproteins (LDL or "bad" cholesterol) and high density lipoproteins (HDL or "good" cholesterol)

Complex carbohydrate

Nutrient in food mainly found in vegetables, whole-meal breads, and cereals, consisting of a chemical structure that is made up of three or more sugars, which are usually linked together to form a chain.

Fructose

A simple sugar found in fruits and honey

Genetically modified

Foods that have had specific changes introduced into their DNA by genetic engineering techniques.

Glucose

See dextrose

Gluten

A protein composite present in cereal grains, especially wheat, but also found in barley, oats and rye. Com-

posed mainly of two proteins, gliadin and glutenin. Gluten contributes to elasticity and texture in bread doughs and other products containing wheat.

Honey

An invert sugar (i.e. a monosaccharide) made by bees from flower nectar. Used as a sweetener for its distinctive flavour. It is hygroscopic – i.e. keeps products moist. Components of honey are levulose and dextrose (there is a tiny fraction of sucrose).

Insoluble fibre

Insoluble element in food that aids in digestive and intestinal processes

Lactose A sugar naturally occurring in milk and other dairy products

Micronutrients

Nutrients that do not provide calories or energy, such as minerals and vitamins

Minerals

Inorganic elements, such as calcium, iron, magnesium, potassium, or sodium, that are essential to the functioning of the human body and are obtained from foods.

Nutrients

Substances in foods that provide nourishment to the body

Nutrition facts table (NFT)

A list of nutrients found on all packaged foods that shows the percent daily value (% DV) and recommended portion size

pH

Potential Hydrogen. A scale which measures acidity and alkalinity. The lower the pH the more acidic, and the higher the pH the more alkaline. Substances above 8 are considered alkaline and substances below 6 are considered acidic. Substances between 6 and 8 are considered neutral.

Protein

Element in plant or animal tissue supplying essential amino acids to the body

Simple carbohydrate

Sugars that provide very little nutritional value to the body found in processed sugars and refined cereals, with a chemical structure that is composed of one or two sugars.

Sodium

An essential nutrient that regulates blood volume, blood pressure, osmotic equilibrium and pH. Most of the sodium in the diet comes from salts and processed foods.

Sucrose

‘Ordinary’ sugar, a disaccharide, it is the form of sugar most familiar to us, coming in various sizes of granulation.

Vegetarian

A diet that excludes meat, poultry, and fish products; a person whose diet does not include these food products

Vitamin

Substances that are essential, in small quantities, for the normal functioning of metabolism in the body

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