Chapter 18
Baking for Health and Wellness

How Baking Works

Words, Phrases, and Concepts

- Dietary Guidelines
- Glycemic index
- Sodium
- Polyols/sugar alcohols
- ALA omega-3's
- Anaphylaxis
- Gluten-free
- Silken tofu

Introduction

- Man’s first dessert was fruit.
- Today, many baked goods are made primarily of white flour, fat, and sugar.
- In U.S., two-thirds of Americans are overweight or obese; affects health and well-being.
- Many diseases can be prevented or controlled by diet, including
  - Heart disease.
  - Stroke.
  - Some cancers.
  - Diabetes.

Healthful Baking

Guidelines for baking with health in mind.

1. Determine which of your formulas are already healthful or might be easy to modify.
   - Banana nut bread, for example.

2. Before changing important ingredients, be sure you understand its functions in your product.
   - Remember, for example, the importance of balancing toughenerers and tenderizers, moisteners and driers.

Healthful Baking

3. Begin with highly-flavored products, for ease in substituting.
   - Example: It is easier to remove butter from chocolate cookies than from plain sugar cookies.

4. Keep it simple.
   - Stay away from formulas with multiple expensive and exotic specialty ingredients that are not in your current inventory.
   - Example: if your goal is a low-fat brownie, agave syrup and spelt flour are probably unnecessary additions.

     Note: these ingredients, however, might be of value to certain customers for their perceived health benefits or for other reasons.

Healthful Baking

5. Make step-wise changes to your products.
    - If your wheat bread currently contains 40 percent whole wheat, try 50 percent, then maybe try a higher level.

6. Think holistically, but it's okay if one product doesn't satisfy all health needs.
    - Example: Pastry made with trans-free fat isn't necessarily better if it is now higher in saturated fats; however, product doesn't need to also be gluten free, lactose free, low in sugar, etc. to be healthful.

Healthful Baking

7. Try different brands of important ingredients, since they can vary in surprising ways.
   - Example: Different brands of whole wheat flour will act differently.

8. Consider adding healthful ingredients rather than focusing entirely on removing unhealthful ones.
   - Example: Consider adding more fruit, nuts, seeds, whole grains, spices to your baked goods. This adds value to your products, something many customers will pay extra for.

Healthful Baking

9. Add more fruit on plated desserts.
    - Example: If a plated dessert is garnished with one mango slice, consider adding additional ones.

10. Watch portion size.
    - If your offerings are really flavorful and priced right, smaller sizes will be acceptable, and often appreciated.

11. Know which ingredients provide real health benefits and those that are marketing ploys.
    - Be careful about using sweeteners that only make us feel better about eating sugar but are no more healthful than regular granulated sugar. Example: semi-refined cane sugar.

Healthful Baking

12. Remember that organic ingredients are not necessarily healthier.
    - Organic practices have value, but they are intended primarily as a means of protecting the environment. Organic ingredients have not been shown to consistently have health advantages.
13. When changing a formula, always prepare the original, too, and compare products side by side.
    - This is the best way to identify how your changes affect your product.

Healthful Baking

14. Have nutrition information available for customers, to substantiate any nutrition claims.
    - This is required by law.
    - Nutrition claims include the following: low-fat, sugar-free, high in fiber, etc.
    - Information can be provided orally, but have it available in writing, too.
15. Refer to dietary guidelines for North Americans when creating products for customers.
    - Know the difference between good nutrition and fads.

Guidelines for a Healthful Diet

The following nine dietary guidelines for North Americans are

- Easy to follow ways for preventing disease and improving overall health.
- Based on the latest nutrition research.
- Will evolve as new research presents additional findings, or as the environment presents new challenges for Americans.

Source of guidelines:

- U.S. Department of Health and Human Services and U.S. Department of Agriculture *Dietary Guidelines for Americans*.
- Health Canada *Canada's Food Guide.*

Guidelines for a Healthful Diet

1. Choose fiber-rich fruits, vegetables, and whole grains often.
   - At least half of grain products should come from whole grains, for a minimum of three whole grain servings a day.
2. Consume a variety of fruits and vegetables each day.
   - In particular, consume at least one dark-green and one orange vegetable.
3. Consume 3 cups of fat-free or low-fat milk or equivalent milk products per day.

Guidelines for a Healthful Diet

4. Select meat, poultry, dry beans and dairy products that are lean, low fat, or fat free.
5. Keep fat intake between 20 and 35 percent of total calories.
   - Most fats should come from sources of polyunsaturated and monounsaturated fats, such as fish, nuts, and vegetable oils.
6. Limit intake of fats and oils high in saturated and/or trans fatty acids to less than 10 percent of calories.
   - Keep trans fat consumption as low as possible.

Guidelines for a Healthful Diet

7. Limit cholesterol to less than 300 mg per day.
   - This is equivalent to just over one egg yolk per day.
8. Limit intake of added sugars or caloric sweeteners.
   - This includes all sweeteners, such as honey, molasses, agave syrup, etc.
9. Limit intake of added salt.
   - At the same time, consume potassium-rich foods such as fruits and vegetables.

Strategies for Healthful Baking

Increasing whole grains

- Begin by blending whole wheat flour with white flour.
- Consider using white whole wheat flour instead of regular (red) whole wheat flour.
  - Lighter in color and milder in flavor.
  - Start with 30 percent whole white wheat flour.
- Brands vary; try different ones, if possible.
- For yeast-raised doughs:
  - Use coarse-grained hard wheat flours.
  - Add 2-5 percent vital wheat gluten, for strengthening.
  - Reduce mix times, to minimize weakening the gluten.
  - Increase the amount of water added.
- For pastries:
  - Use fine-grained soft wheat flours.
  - Add baking powder to lighten and tenderize pie crusts.

Strategies for Healthful Baking

Reducing sodium

- Common sources of sodium in the bakeshop:
  - Table salt (sodium chloride)
    - Main source of sodium in the bakeshop.
    - Provides several functions in baked goods, but primary function is enhancing flavor.
      - » Salt adds depth and balance, minimizes off-flavors.
      - » The main effect of reducing salt is altering flavor.
  - Baking soda (sodium bicarbonate).
  - Baking powder.
  - Margarine.
  - Peanut butter.
- Potassium helps counterbalance sodium's harmful effects.

Strategies for Healthful Baking

Strategies for lowering sodium and increasing potassium:

- Lower salt in baked goods by 10 percent or more.
  - Start slowly, but small changes rarely affect flavor.
- Try different brands of baking powder.
  - Regular SAPP baking powder is higher than most in sodium.
- Add more fruits, especially apricots, bananas, cantaloupes, oranges, peaches, and plums, to increase potassium.
- Use more dairy ingredients, to increase potassium.
- Use molasses, the darker the better, to increase potassium.

Strategies for Healthful Baking

Reducing sugar

- Reduce all sweeteners, including honey, brown rice syrup, agave syrup, maple syrup, molasses, etc.
- Sugar is difficult to eliminate completely, since it provides many important functions in the bakeshop, including
  - Sweetening
  - Tenderizing
  - Retaining moistness and improving shelf life
  - Contributing brown color and caramelized flavors
  - Assisting in leavening
  - Providing bulk to confections
  - Stabilizing meringues
  - Providing food for yeast fermentation

Strategies for Healthful Baking

Strategies for reducing sugar:

- Use fruits to sweeten, whenever possible.
  - Raisins, dates, applesauce, bananas, etc.
- Replace some sugar with high-intensity sweeteners, such as sucralose (Splenda) or rebiana (Truvia).
  - High intensity sweeteners, however, provide only one function: sweetness.
- Replace some or all sugar with polyols (sugar alcohols), such as sorbitol or isomalt.
  - Polyols are carbohydrates but are not fully absorbed; each gram counts as one-half gram of carbohydrate for diabetics.
  - *Caution*: most polyols have a laxative effect and can cause diarrhea when consumed in large quantities.

Strategies for Healthful Baking

Using fats in healthful baked goods

- Focus on baked goods with moderate amounts of fat.
  - Avoid reformulating high-fat croissants, puff pastry.
- Fats are difficult to eliminate completely, since they provide many important functions in the bakeshop, including
  - Tenderizing
  - Providing flakiness
  - Assisting in leavening
  - Contributing moistness
  - Preventing staling
  - Adding a rich, longer-lasting flavor

Strategies for Healthful Baking

Strategies for using fats in healthful baked goods:

- Use liquid oils instead of animal fats or hydrogenated fats, whenever possible.
  - Will reduce saturated fats, trans fats, cholesterol.
  - Consider canola oil as a general all-purpose oil.
- Do not eliminate fats completely; best to produce lower-fat products.
  - When fat is reduced, also reduce toughening such as egg.
- For the bottom crust of pies, try a formula that uses oil.
- For cookies, cakes, icings, etc., blend butter with more healthful fats.

Strategies for Healthful Baking

Strategies for using fats (cont.):

- For cookies, use oil; replace some or all of flour with cake or bread flour, to counteract the added spread.
- For lower-fat moist, tender cakes, use high-ratio shortening instead of butter or AP shortening.
- For low-fat cheesecakes, icings, etc., use low-fat instead of regular cream cheese, sour cream, etc.
- For all baked goods, replace some or all whole eggs with egg whites.
- Use finely ground healthful nuts or nut oils; reduce added fat.
  - Walnuts and flaxseeds are an excellent source of healthful ALA omega-3 fatty acids.
  - *Caution*: nuts are expensive and are a source of allergies.

Strategies for Healthful Baking

Fat replacers

- Common fat replacers
  - Dried plum paste; used in highly flavored chewy products, such as fudge brownies or soft molasses cookies.
  - Applesauce; used in muffins, cakes, cake-like brownies.
  - Black beans; used in brownies or chocolate cake.
- Difficult for any single fat replacer to accomplish all the functions of fat.
  - Often a mix of two or more replacers works best.
- To decide which replacers to try,
  - Decide which functions the fat provides in the product.
  - Select one or more fat replacers that performs those same functions.

Strategies for Healthful Baking

TABLE 18.1 FAT REPLACERS IN BAKED GOODS

TYPE	EXAMPLE	FAT FUNCTION
Butter flavor	Natural and artificial butter flavorings	Adding flavor
Emulsifiers	Mono- and diglycerides	Adding moistness, tenderness, aeration; delaying staling
Certain fruits	Prune paste, applesauce, mashed bananas	Adding aeration (from steam, if high in moisture), moistness, tenderness; delaying staling
Pureed beans	Black or cannellini (white) beans	Adding moistness, tenderness, aeration (from steam); delaying staling
Gums	Pectin, cellulose gum, xanthan gum	Adding tenderness, aeration, creamy mouthfeel
Nondigestible lipids	Olestra	Assisting in heat transfer (frying); adding moistness, fatty mouthfeel
Oat-based ingredients	Oatmeal, oat flour	Tenderizing low-moisture products; delaying staling
Starches and starch by-products	Potato starch, maltodextrins	Tenderizing low-moisture products
Sugars and sweeteners	Dextrose, granulated sugar	Adding moistness and tenderness

Food Allergies

Each year, millions of Americans have allergic reactions to foods.

- Most are mild reactions.

TABLE 18.2 COMMON SYMPTOMS OF ALLERGIC REACTIONS TO FOODS

Red bumpy rash on the skin
Redness and swelling around the mouth
Cramps, diarrhea, nausea, vomiting
Runny nose, itchy watery eyes, sneezing
Weakness and fainting

- Severe allergic reaction is called anaphylaxis and can lead to death.
- Only way to prevent an allergic reaction is to totally avoid the food that causes it.
  - Even trace amounts of an allergen can trigger a response.

Food Allergies

TABLE 18.3 EIGHT MAJOR SOURCES OF FOOD ALLERGENS

ALLERGEN	EXAMPLES
Wheat	All wheat flours, including durum semolina, spelt, kamut, triticale, einkorn, and emmer
Soy	Soy flour, tofu, soy lecithin, but not soybean oil
Milk	All milk and dairy products, including cream, yogurt, cheese, whey proteins, whey solids, and butter
Eggs	Includes all parts of the egg
Peanuts	Includes peanut butter
Tree nuts	Almonds, cashews, hazelnuts, macadamia nuts, pecans, pine nuts, pistachios, and walnuts
Fish	Salmon, cod, haddock, tilapia
Crustaceans	Shrimp, lobster, crab

Any food can cause an allergic reaction in a person, but these eight foods trigger over 90 percent of food allergy cases. Additional food allergens of concern include sesame seeds and sulfites.

Food Allergies

When preparing food for those with allergies,

- Use separate work surfaces, equipment, and utensils, if possible.
  - If this is not possible, thoroughly clean work surfaces after use, to prevent inadvertent cross-contamination.
- Avoid reusing parchment paper, which could unintentionally transfer allergens from one product to another.
- Be sure all baked goods are clearly labeled, if they contain potential food allergens.
- Garnish food items with allergen; e.g., garnish banana walnut muffins with walnuts, as a visual cue.

Food Allergies

Wheat-free and gluten-free products

- Wheat allergies and celiac disease are different.
  - Wheat allergies can result in anaphylaxis and death.
  - Celiac disease (gluten intolerance) causes inflammation of the intestines and the inability to properly absorb nutrients.
- Gluten-free products are also wheat-free.
  - Wheat, rye, barley, and oats must be avoided by celiacs.
- In place of wheat flour, use a mix of rice, potato, and tapioca starches.
  - Soy or garbanzo bean flour can be added, for protein.
  - Xanthan gum is added to trap air and allow for leavening.
    - Xanthan gum also improves dough cohesiveness and flexibility.

Food Allergies

Xanthan gum improves cohesiveness and flexibility of doughs.

Food Allergies

Milk-free products

- Milk allergies and lactose intolerance are different.
  - Milk allergies can result in anaphylaxis and death.
    - All milk products must be avoided completely.
  - Lactose intolerance causes intestinal discomfort.
    - Lactose intolerance is fairly common in North America.
    - Low or moderate amounts of milk are often tolerated.
- Many baked goods are milk-free already.
  - This includes many formulas for brownies, cookies, soufflés, pies, sponge cakes, pound cakes, breads.
- Milk is not an essential ingredient in many baked goods and can be easily eliminated or substituted.
  - Can start by replacing milk with water.
  - To be milk-free, product cannot contain butter or cream, either.

Food Allergies

To produce milk-free and lactose-free products:

- Use margarine instead of butter.
  - Check label; some margarines contain milk or whey ingredients.
- Eliminate all milk and white chocolates; check label on bittersweet dark chocolates.
  - All milk and white chocolates contain milk; some dark chocolates contain small amounts of butter.
- Most cakes, muffins, biscuits, and scones contain milk but can be made with water.
  - Plain-flavored products made without milk have a raw flour taste; to compensate, add citrus zest, spices, vanilla, etc. to batter/dough.
- Yogurt, buttermilk, and other cultured dairy products are low in lactose.
  - Lactic acid bacteria convert lactose into lactic acid.
  - Cultured dairy products are unacceptable for those with milk allergies but are often tolerated by those with lactose intolerance.

Food Allergies

Milk substitutes

- Rice milk, almond milk, cashew milk, soymilk often serve as milk substitutes.
  - Made by soaking in hot water, then blending and filtering out solids.
- Most common milk substitutes are soy-based.
  - Several products available: soymilk, silken tofu, soy cream.
    - Silken tofu has a soft, custard-like gelled texture; use it to replace milk and eggs in puddings, creams, and custard-based desserts.
  - Like milk, soy-based milk substitutes contain nutritionally valuable protein.
  - Brands vary in appearance, flavor, mouthfeel.
  - Many contain added sweeteners, gums, vitamins and minerals, etc., to better simulate dairy products.

Strategies for Healthful Baking

Egg-free products

- Eggs have many important functions in baked goods:
  - Providing structure/Is a toughener
  - Contributing to leavening through aeration and added moisture
  - Emulsifying and binding ingredients together
  - Contributing flavor
  - Contributing color
  - Adding nutritional value
- Surprisingly, they can often be successfully replaced.
  - Start with formulas that are already low in eggs.
    - Avoid choux paste, sponge cakes, angel food cakes.

Strategies for Healthful Baking

Strategies for preparing egg-free products:

- For structure-building and binding, use additional flour or starches.
  - If necessary, reduce the fat or other tenderizers, to rebalance toughenerers and tenderizers.
- For aeration (steam) and moistening, use water, milk, or another source of liquid.
  - Eggs contain proteins that act as driers, so less liquid is needed than expected.
    - Use 5-7 ounces (50-70 grams) liquid for every 10 ounces (100 grams) egg.
  - Fruit and bean purees, flaxseed mixture, provide multiple functions: they are high in moisture, are thick and hold in air, and bind batters.

Strategies for Healthful Baking

Strategies for preparing egg-free products (cont.):

- For oatmeal cookies, use quick oats, which thicken and bind better than old-fashioned or steel-cut oats.
- For yellow color, add finely ground yellow corn flour.
  - Replace 10-20 percent white flour with corn flour.
- For pastry cream, cream pie fillings, cheesecake, etc., use silken tofu.
  - Blend to a smooth consistency in blender or food processor.
  - To mask raw bean taste, use with strong flavors, like chocolate, coffee, caramel. Allow one or two days, for flavors to blend.
- Serve panna cotta (made with gelatin) in place of egg-based custards and flans.

Strategies for Healthful Baking

TABLE 18.4 EGG REPLACERS IN BAKED GOODS

EGG REPLACER	EGG FUNCTION
Water alone	Moistening/hydrating driers; providing steam for leavening
Water plus dried milk solids	Moistening hydrating driers; providing steam for leavening; adding nutrition; improving flavor and browning
Starches such as potato, rice, tapioca, precooked corn Flours and grains such as cake flour, oatmeal Starch-based egg replacer powder, with added vegetable gums	Providing structure; binding batters and doughs; thickening, to hold in air for leavening
Yellow corn flour	Adding yellow egg color to baked goods; providing structure
Silken tofu	Moistening; thickens; providing steam for leavening; adding nutrition; adding emulsifiers (lecithin); also functions as milk substitute
Flaxseed, ground and beaten into water	Moistening; providing steam for leavening; adding nutrition; binding batters and doughs; thickening, to hold in air for leavening
Fruit (banana, applesauce) and bean (black or cannellini) purees	Moistening; providing steam for leavening; adding nutrition; binding batters and doughs; also functions as partial fat substitute