Lab Manual to Accompany

Food Science: An Ecological Approach
(with additional international recipes for cultural competency)

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DIRECTIONS FOR THE STUDENT

You, the student, are embarking on a journey through food science. This lab manual will help you learn the principles of food science that have been discussed in the classroom and/or are noteworthy additional experiments that complement your study.

Each lab has the headings listed below. Some of the contents under each heading will be for you to fill out and some will be provided. Please read the description of each and add them to your laboratory report accordingly. Please alert your instructor if you have a food allergy.

OBJECTIVE: Each lab will provide the student with an objective.

LAB INFORMATION: Background notes are provided for the student.

METHODS AND MATERIALS: Ingredients and directions for the lab are listed.

REVIEW OF LITERATURE AND DISCUSSION: The student will add this information.

RESULTS: Students will post the data and results from the lab.

CONCLUSION: Students will summarize their lab findings.

REFERENCES: The APA style, as shown below, requires each reference to be numbered and superscripted (e.g., 1,2) in the review of literature/discussion section.

Book

Journal Article

Newspaper/Magazine

Internet Site

OPTIONAL: Make your own food label from your lab final recipe: www.nutritiondata.com.
LAB SAFETY

Due to the wide range of labs students may perform, this manual cannot cover every safety hazard. It is the responsibility of the individual instructor to form needed policies, procedures, and oversight for lab safety.

Personal Safety

Eye protection. When chemicals are to be handled, chemical splash goggles meeting the OSHA-approved ANSI Z87.1 standard (imprinted on the goggle) for impact and splash protection must be worn over the eyes at all times. Contact lenses should not be worn in laboratories. When food is being cooked over the stove, goggles or eyeglasses may be worn to prevent liquid splashes to the eye area.

Clothing. Clothing must be worn that covers the entire leg, from the waist to the ankle, and that covers the torso from the waist to the neck. Shoulders must be completely covered, and sleeves must be worn that cover the arm from the shoulder to at least halfway to the elbow. The wearing of lab coats and aprons is encouraged; however, the wearing of a lab coat or apron cannot be substituted for the wearing of proper clothing. Loose clothing that might come into contact with hot liquids or chemicals or get caught in apparatus or machinery must be avoided.

Footwear. Shoes must be worn at all times in the laboratory. The foot must be completely covered. Open-toed or backless shoes and sandals are unacceptable. Uppers made of woven material should not be worn.

Hair. Hair coverings must be worn at all times.

Gloves. Gloves should be worn when handling food and chemicals and discarded after use.

Fume hoods. Whenever an experiment is likely to produce vapors that might exceed the permissible exposure limit for any chemical involved, the experiment must be confined to an operating fume hood.

Material Safety Data Sheets (MSDS). Laboratories must have MSDS for all chemicals used in that laboratory available at all times. Laboratory personnel should read and understand the MSDS for any chemical before using it for the first time.

Training. All personnel working in laboratories are required to know laboratory safety principles. Students will be trained in class by the instructor prior to entering the lab.

Accidents. All accidents, injuries, and hazardous situations occurring in the laboratory must be reported to the appropriate department and other supervisory personnel within the institution.
Chemical Safety

Storage
a. All laboratories must have a complete, accurate, and up-to-date inventory of all the chemicals in the lab.
b. Keep chemicals in dated containers appropriate for them, preferably the same container in which they were received.
c. Chemical containers must be clearly and accurately labeled.
d. Liquid chemicals must be stored below eye level.
e. Incompatible chemicals must be stored separately from each other, following published guidelines.
f. Chemicals must be arranged for storage according to reactivity.
g. Flammables and corrosives should be stored in cabinets designed to hold them.
h. All chemicals should be returned to storage when not in actual use.
i. Chemicals must not be kept for long times in storage. Any chemical not in active use must be removed from storage and disposed of as waste.

Transfer and Transportation
All pipetting must be done with a bulb or pump, never by mouth.

Disposal
Chemical waste must be stored in the immediate vicinity of the related work process. Chemical waste may not be moved to a different room or work area for storage. Chemicals that are incompatible must be segregated. This waste should be red-bagged and disposed of based on institutional policy.

Equipment
Emergency equipment. Know the location and use of all safety equipment (fire extinguisher and first aid kit) and the exits from the laboratory. Students should be trained to use them in addition to Stop, Drop, and Roll.

Spill kit. Every laboratory must have a spill kit available. Its location must be clearly marked and available to all personnel. The kit must contain sufficient types and amounts of materials to enable personnel to clean up a spill of the largest-size container of any chemical in the lab.

First aid kit. Every laboratory must have a first aid kit available. Its location must be clearly marked and available to all workers. The kit must be inspected periodically, and its contents replenished as needed.

Refrigerators. Any refrigerator used to store flammable chemicals must be rated as suitable for storage of such materials.

Electrical equipment. Motor-driven electrical equipment cannot be used where flammables are present unless equipped with a nonsparking induction motor. Hot plates, unless designed as explosion-proof, cannot be used in conjunction with flammables. Equipment with frayed cords or other damage must be taken out of service until repaired.
BLOODBORNE PATHOGEN STANDARDS

None of the labs in this lab manual involve the handling of blood or bodily fluids. The following information is presented to inform participants of standards by the Occupational Safety and Health Administration (OSHA) for handling blood and bodily fluids.

Bloodborne pathogens are microorganisms in human blood that can cause disease in humans.

These pathogens include, but are not limited to, the hepatitis B virus (HBV) and the human immunodeficiency virus (HIV), which causes AIDS. As a nutrition student, you will participate in care-giving activities and therefore may be exposed to HBV, AIDS, and other infectious and/or communicable diseases. To reduce your risk of exposure, follow the guidelines detailed below.

All students are expected to follow universal precautions to prevent direct contact with blood. All blood is considered to be potentially infected. A nurse should be available when blood will be handled, and all research used from blood draws should be cleared in advance with the Institutional Review Board.

The universal precautions are as follows:
1. All students and the nurse will be expected to wash their hands with soap and water before and after exposure to blood and after removal of contaminated gloves or other personal protective equipment (PPE).
2. All nutrition students will use disposable latex gloves when handling blood and blood-testing supplies.
3. Needles and other contaminated “sharps” will be discarded as soon as feasible in appropriately labeled, closable, puncture-resistant, leak-proof containers. Glucose strips will be discarded in “red bags,” which denote biological hazard risk.
4. Work surfaces will be disinfected after use.
Sensory Lab
Lab 1

Sensory Evaluation

OBJECTIVES

• Describe the appearance, taste, flavor, and texture of various food samples by using the human senses, specifically:
  1. Identify a taste and a flavor.
  2. Conduct a paired-comparison test and participate as a sensory panelist.
  3. Conduct a triangle test and participate as a sensory panelist.
  4. Conduct a duo-trio test and participate as a sensory panelist.
  5. Conduct a ranking test and participate as a sensory panelist.

LAB INFORMATION

Sensory evaluation is a scientific testing method for accurate measurement of human responses as perceived by the five senses. Because sensory evaluation provides valuable information for consumer reaction toward a food product, it is often applied in many situations in food research and development. It can be used for new product development, quality control, process change, storage stability, selection of a new supplier, recipe modification, panelist training, and correlation with objective test data. The specific sensory characteristics that will be evaluated in this lab include appearance, taste, flavor, and texture. Flavor is the combined sense of taste, aroma, and mouthfeel.

MATERIALS AND METHODS

Part A: Identification of Food Samples with Descriptive Terms

Ingredients and Equipment
Bite-size samples of a breadstick, a gummy-bear, a tortilla chip, a marshmallow, and an American cheese slice
1 Tbsp. of tapioca pudding (other foods may be substituted)
3 oz. sample cups or plates

Methods
Evaluate the appearance, taste, flavor, and texture of each food sample using the following descriptive terms. Record your answers in Table 1.
Appearance: pale, burnt, rounded, pebbled, curdled, light brown, dark brown, transparent, opaque, dull, shiny, glossy, dry, smooth, rough, grainy, fizzy
Taste: sweet, salty, sour, bitter
Flavor: peppery, astringent, spicy, minty, eggy, fatty, rancid, metallic, nutty, fruity, soapy, floury, pungent, puckery, flowery, stale, pasty, musky, astringent, tangy, sharp
Texture: adhesive, cohesive, chewy, hard, tender, dense, crispy, brittle, smooth, firm, viscous, gummy, gritty, springy, pasty, rubbery, tough, flaky, mealy, rough, crackly, crusty, limp, creamy
Table 1. Evaluation of Food Samples Using Descriptive Terms

<table>
<thead>
<tr>
<th>Food Sample</th>
<th>Appearance</th>
<th>Taste</th>
<th>Flavor</th>
<th>Texture</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

Part B: Identification of Flavor and Taste

*Ingredients*
2 flavored jellybeans (e.g., jalapeno and buttered popcorn or other flavored jelly beans)  
2 oz. sample cups

*Methods*
1. Pinch your nose and put a jelly bean in your mouth. Chew the jellybean with your nose still pinched. Record the intensity of the jellybean’s sweetness.
2. Now release your nose and notice the change in these sensations. What is the flavor of the jellybean?
3. Record the flavor of the jelly bean in Table 2 and evaluate the intensity of the flavor.
4. Repeat these steps for the second jellybean.

Table 2. Jelly Bean Test Score Sheet

**First sample**

Sample code: _______

**Jellybean Sweetness:**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
</table>
|   |   |   |   |   |   |   |   |   | Strong        Weak

**Jellybean Flavor:**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---| Strong        Weak

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Second sample
Sample code: ________

Jellybean Sweetness:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
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<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Strong</td>
<td></td>
<td>Weak</td>
</tr>
</tbody>
</table>

Jellybean Flavor:

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<tr>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td></td>
<td></td>
<td>Strong</td>
<td></td>
<td>Weak</td>
</tr>
</tbody>
</table>

Part C: Paired Comparison Test

The paired comparison test is a test of difference in which a specific characteristic is designated. The panelist is asked to test the two samples presented to identify the sample with the greater amount of the characteristic being measured. The subject has a 50% chance of being right by chance alone in paired comparison testing.

Ingredients and Equipment
Two similar beverage products coded with three-digit random numbers (1 fl oz.)
2 oz. sample cups
Drinking water, napkins

Methods
1. Taste the samples. Rinse your mouth with water between samples and wait for 30 seconds before you taste next sample.
2. Determine which sample has a greater intensity in sweetness.
3. Write down the code of the sweeter sample on Table 3.

Table 3. Paired Comparison Test Score Sheet

<table>
<thead>
<tr>
<th>Sample code: __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample code: __________</td>
</tr>
<tr>
<td>Which sample is sweeter? __________</td>
</tr>
</tbody>
</table>

Part D. Triangle Test

All three samples are presented simultaneously. The panelist is served three coded products and
is asked to indicate which one is odd. Two samples are alike and one is different in the triangle test; however, the difference in this method of presentation reduces the chance of guessing the right answer to 33.3% (1 in 3).

*Ingredients and Equipment*

Two identical food or beverage samples coded with three-digit random numbers  
One similar food or beverage sample coded with three-digit random number  
2 oz. sample cups  
Drinking water, napkins

*Methods*

1. Taste each of the three coded samples from left to right. Rinse your mouth with water between samples and wait for 30 seconds before you taste next sample.
2. Identify which sample differs from the other two in Table 4.
3. Count the total number of panelists who correctly identified the odd sample in the class.

*Table 4. Triangle Test Score Sheet*

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Please taste the samples from left to right. Two samples are same and one is different. Circle the number of the sample that is different.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample codes:</td>
<td>_______ _______</td>
<td>_______</td>
</tr>
</tbody>
</table>

**Part E. Duo-Trio Test**

The duo-trio test is another test of difference. In this test, the reference sample is presented first. It is followed by two other samples, one of which is the same as the reference. The panelist is requested to identify which of the last two samples is the same or different from the reference. There is a 50% chance of being right by chance alone in a duo-trio test.

*Ingredients and Equipment*

Two identical food samples: one is coded as a reference and the other is coded with a three-digit random number  
One similar food sample coded with a three-digit random number  
2 oz. sample cups  
Drinking water, napkins

*Methods*

1. Place the reference in back and the two samples in front.
2. Taste the reference first and then the two samples, from left to right. Rinse your mouth with water between samples and wait for 30 seconds before you taste next sample.
3. Identify which sample is the same as the reference in Table 5.
4. Count the actual number of panelists who correctly matched the sample to the reference in the class.
Table 5. Duo-Trio Test Score Sheet

Taste the samples from left to right. The left-hand sample is the reference. Circle the number of the sample that matches the reference. If no difference is apparent between the two unknown samples, you must guess.

Reference | Sample code: ______ | Sample code: ______

Part F. Ranking Test

A ranking test is a difference test in which more than two samples are simultaneously presented and the panelists rank the samples according to the intensity of the particular characteristics being evaluated. The sample with the greatest intensity is ranked as number 1.

Ingredients and Equipment
1/4 slice of three types of cheese coded with three-digit random numbers
2 oz. sample cups
Water crackers and napkins

Methods
1. Taste each of the three coded samples from left to right. Eat a bite-sized water cracker to cleanse your mouth between samples and wait for 30 seconds before you taste the next sample.
2. Rank the three samples in descending order of preference in Table 6. No ties are allowed in the ranking. The most preferred sample is ranked as 1.

Table 6. Ranking Test Score Sheet

Taste each of the coded samples in the set in the sequence presented, from the left to right. Please cleanse your mouth with a bite-sized water cracker between samples and wait for 30 seconds before you taste the next sample. Rank the three samples in descending order of preference. You may re-taste any of the samples while ranking the samples according to preference. No ties are allowed in the ranking. Remember that the most preferred sample should be ranked as 1.

Sample code: (1) ______ | Sample code: (2) ______ | Sample code: (3) ______
CONCLUSION

REFERENCES
Meat and Meat Substitutes Labs
Lab 2

Sensory and Objective Comparisons of Ground Meat Patties

OBJECTIVES
- To determine preferences for ground meat patty types
- To objectively measure differences among ground meat patties

LAB INFORMATION
The main component of meat, and what most people desire when they consume meat, is the actual muscle tissue. Muscle tissue is made up of roughly 75% water, 18% protein, 4–10% fat (depending on the animal and the cut), and minimal carbohydrate. Besides the muscle tissue, other components of meat cuts include bone, including bone marrow; connective tissue; and fat.

Because most consumers select their meat based on the cut's muscle tissue, it is important to understand how muscle tissue is constructed. Most of the muscle tissue is actually composed of water. Upon heating, the meat will shrink in size. This is partially due to the fact that the water in the muscle tissue evaporates. Shrinkage is also the result of actions of the muscle proteins.

MATERIALS AND METHODS

Ingredients and Equipment
Several varieties of ground meat products (e.g., turkey, chicken, beef, lamb, pork with and different percentages of fat)
Baking sheet
Scales
Meat thermometer

Procedure
1. Preheat oven to 350°F (176°C).
2. Obtain 90 grams of each variety of ground meat.
3. Form all portions into patties of approximately equal dimensions (diameter and thickness).
4. Arrange the patties on parchment paper on baking sheets.
5. Insert a meat thermometer into the center of mass of one of the patties and place this patty near the front of the baking sheet so that you can read the thermometer when looking into the oven.
6. Bake the patties until an internal temperature of 165°F (74°C) is achieved for 15 seconds.
7. Weigh each cooked patty and determine cooking loss by using the following equation:
   \[
   \left(\frac{\text{Raw weight} - \text{cooked weight}}{\text{raw weight}}\right) \times 100 = \text{percent cooking loss}
   \]
8. Report cooking loss as mean percentage ± standard deviation.
9. Code and serve the hot samples to your group for tasting. Use Table 1 to record the score for each sample.
10. Calculate the average sensory scores and report it as the mean.
RESULTS
Score each meat for tenderness, flavor, aftertaste, and overall acceptability using a 9-point hedonic scale:

1 = like extremely
2 = like very much
3 = like moderately
4 = like slightly
5 = neither like nor dislike
6 = dislike slightly
7 = dislike moderately
8 = dislike very much
9 = dislike extremely

Table 1. Comparison of Meats After Cooking

<table>
<thead>
<tr>
<th>Meat Variety</th>
<th>Tenderness</th>
<th>Aftertaste</th>
<th>Flavor</th>
<th>Overall Acceptability</th>
<th>Cooking Loss</th>
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REVIEW OF LITERATURE AND DISCUSSION
Lab 3

Texturized Vegetable Protein Patties, Soy Cubes, and Legumes

OBJECTIVES
• To determine preferences for different types of meat substitutes
• To objectively measure nutritional differences among types of meat substitutes

LAB INFORMATION
Due to personal preference, health issues, and food and environmental concerns, many people have turned to using meat alternatives. Soy-based alternatives, particularly textured soy proteins (TSPs), are commonly marketed to consumers who avoid eating animal-based products. When making TSPs (also known as textured vegetable protein, or TVP), soy flour or soybeans are defatted and their proteins isolated. The protein-rich concentrate produced by this process is then dehydrated. The final product is shelf-stable for nearly 12 months when stored in an airtight container.

Nutritionally, TSPs are an excellent meat alternative due to their high protein content. By weight, TSPs are at least 50% protein, and the proteins found in TSPs are complete proteins because they contain all of the amino acids not able to be synthesized in the human body.

MATERIALS AND METHODS

Ingredients
Texturized vegetable protein (available from Bob’s Red Mill)
Flour
Olive oil
Extra firm tofu
Bread crumbs or Shake-n-Bake
Legumes (any type)
Vegetables (any type)

Methods
To make TVP patties:
1. Boil 1/2 cup water and add 1/2 cup TVP and the cut up vegetable of your choice.
2. After all the water is absorbed, set the mixture aside to cool.
3. Mix in 1 1/2 Tbsp flour.
4. Form a patty and cook it in a small amount of olive oil until done.

To make soy cubes:
1. Slice extra-firm tofu into 1 1/2-inch cubes.
2. Coat the cubes with bread crumbs or Shake-n-Bake.
3. Place the coated cubes on a foil-lined cookie sheet and bake at 350°F (177°C) for 10 to 15 minutes.

To make legumes:
1. Soak dried legumes in a bowl overnight or use canned legumes.
2. Drain soaked legumes. (Not needed for canned product.)
3. Cook until tender in water (about 1 hour and 30 minutes). (Not needed if canned product.)

RESULTS
See Table 1 and score each item for flavor, texture, aftertaste, and overall acceptability using a 9-point hedonic scale:

1 = like extremely
2 = like very much
3 = like moderately
4 = like slightly
5 = neither like nor dislike
6 = dislike slightly
7 = dislike moderately
8 = dislike very much
9 = dislike extremely

Table 1. Comparison of Meat Substitutes After Cooking

<table>
<thead>
<tr>
<th>Meat Substitute</th>
<th>Texture</th>
<th>Aftertaste</th>
<th>Flavor</th>
<th>Overall Acceptability</th>
<th>Calories/Protein/Fat (from package label or food table)</th>
</tr>
</thead>
<tbody>
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</table>
REVIEW OF LITERATURE AND DISCUSSION
CONCLUSION

REFERENCES
Lab 4

How to Cut-up a Whole Chicken and Prepare a Healthy Product

OBJECTIVE
• To participate in cutting up a whole chicken and removing excess fat to make a healthier final product

LAB INFORMATION
The type and style of poultry must be selected before preparation. Types of poultry include fresh, frozen, canned, dehydrated, and sliced. The degree of processing makes poultry available as dressed, ready-to-cook, convenience cuts, such as boneless, skinless breasts or thighs, and processed forms, such as chicken nuggets or sausage. Age is the determining factor for choice of cooking method. Young birds, such as broiler/fryers, are naturally tender and may be prepared by either moist or dry cooking methods. Older poultry has tougher flesh and should be cooked using moist heat or roasted at low temperatures to tenderize the meat. All poultry must be cooked to an internal temperature of 165°F (74°C) to destroy harmful microorganisms.

MATERIALS AND METHODS

Ingredients
1 whole chicken
1/2 cup milk
1 cup of high-fiber cereal or whole wheat flour
1/2 cup butter, melted

Methods
1. Preheat oven to 375°F (190°C). Lightly grease a baking dish.
2. Cut up the chicken.
3. Skin the chicken pieces.
4. Pour the milk into a medium bowl. Dip each chicken piece into the milk, then roll it in the whole wheat flour to coat. Arrange the chicken in the prepared baking dish.
5. Bake until the chicken is no longer pink and the juices run clear.

RESULTS
Score for flavor, texture, aftertaste, and overall acceptability using a 9-point hedonic scale:
1 = like extremely
2 = like very much
3 = like moderately
4 = like slightly
5 = neither like nor dislike
6 = dislike slightly
7 = dislike moderately
8 = dislike very much
9 = dislike extremely

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<table>
<thead>
<tr>
<th>Chicken</th>
<th>Texture</th>
<th>Aftertaste</th>
<th>Flavor</th>
<th>Overall Acceptability</th>
<th>Calories/Protein/Fat (research on a food table)</th>
</tr>
</thead>
</table>

**REVIEW OF LITERATURE AND DISCUSSION**
CONCLUSION

REFERENCES
Lab 5

How to Prepare a Whole Fish and Cook the Fillets

OBJECTIVE

- To participate in deboning and dressing a whole fish

LAB INFORMATION

Fish has less collagen than other meats, and its chemical structure is different from that of animal or bird connective tissue. The amount of hydroxyproline, an amino acid, is lower in fish, which denatures more easily when cooked. Prolonged cooking or cooking at high temperatures will overcook the fish, creating stringy, dry flesh that falls apart. Fat content is the major determinant of moist or dry heat cooking methods. Fatty fish can be baked, broiled, poached, or steamed to maximize its firm texture and stronger flavor. The more delicate muscle structure of lean fish and its mild flavor benefit from frying, broiling, poaching, and steaming. Fish is done when it just flakes when touched and has reached 145°F (63°C).

MATERIALS AND METHODS

Ingredients and Equipment

1 whole fish
1/2 cup milk
1 cup of high-fiber cereal or whole wheat flour
1/2 cup butter, melted
Sharp, thin-blade knife
Sharp, flat-blade knife
Cutting board

Methods

1. Preheat oven to 375°F (190°C). Lightly grease a baking dish.
2. Place the fish on the cutting board with the back of the fish toward you. Use a sharp knife to cut through the back of the head to the backbone while putting pressure on the knife as you work down the backbone to the tail.
3. Using small strokes with the knife, lift the fillet from the rib cage.
4. Turn the fish over and repeat steps 2 and 3 on the other side.
5. Using a flat-bladed knife, slice a bit of the skin away from the fillet and cut a hole in the loosened skin to fit your finger through.
6. With your finger, hold the skin through the finger hole and pull the skin away from the fillet, using the knife to hold the fillet down. Hold the knife at a 45-degree angle and feel for any bones. Pull the bones out of the fillets.
7. Eventually, the fish should be cut all the way through, and you can spread the fillets out for the left and the right side. Remove all the bones and organs from the fillets.
8. Remove the head and tail.
9. Turn the fillets over and scrape off the scales with the flat-bladed knife.
10. Pour the milk into a medium bowl. Dip each fish fillet into the milk and then roll it in the
whole wheat flour to coat. Arrange the fillets in the prepared baking dish.

11. Bake until the fillets flake when touched and the internal temperature is at least 145°F (63°C).

**RESULTS**

Score for flavor, texture, aftertaste, and overall acceptability using a 9-point hedonic scale:

- 1 = like extremely
- 2 = like very much
- 3 = like moderately
- 4 = like slightly
- 5 = neither like nor dislike
- 6 = dislike slightly
- 7 = dislike moderately
- 8 = dislike very much
- 9 = dislike extremely

<table>
<thead>
<tr>
<th>Fish Fillets</th>
<th>Texture</th>
<th>Aftertaste</th>
<th>Flavor</th>
<th>Overall Acceptability</th>
<th>Calories/Protein/Fat (research on a food table)</th>
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</thead>
<tbody>
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</table>
REVIEW OF LITERATURE AND DISCUSSION
CONCLUSION

REFERENCES
Lab 6

Sushi

OBJECTIVE
- To prepare sushi and learn about sushi-grade fish that has been deemed safe for raw consumption

LAB INFORMATION
Sushi-grade fish, or sashimi, refers to cooked or raw fish that has been sliced extremely thin. In the case of raw sashimi, special handling prevents bacterial contamination. Fish that is to be used for sashimi are killed instantly and the brain tissue removed to prevent lactic acid production in the fish flesh. Sushi is intended to be eaten with a vinegar or brine-like dip to kill any bacteria that are present. Patrons of sushi need to be especially careful in purchasing authentic sashimi and preparing it using the most sanitary methods possible.

MATERIALS AND METHODS

Ingredients
- Sheets of sushi nori (seaweed)
- Sashimi-grade fish (e.g., salmon, squid, shrimp, tuna, mackerel, octopus, tuna, yellowtail and scallop) or smoked salmon (purchased as lox), which is a safe and more economical choice compared to sashimi

Select any of the following ingredients; other foods may be added based on individual preference:
- **Protein:** Extra-firm tofu, cooked egg, cooked crab/deveined shrimp, turkey, chicken, or red meat
- **Rice:** Short-grain white or brown rice
- **Vegetables:** Cucumbers, scallions, lettuce, avocado, tomato, spinach leaves, mushrooms, peppers
- **Fruits:** Melon, citrus sections, apple, grapes
- **Other ingredients:** wasabi, soy sauce, rice vinegar, cream cheese, sugar, salt
- **Dip:** Wasabi or soy sauce
Methods
Rice preparation:
1. In a saucepan, over medium heat combine 3 cups of uncooked rice, 3 Tbsp. of rice vinegar, 2 Tbsp. sugar, and 2 tsp. salt. When the sugar melts into the mixture, turn off the burner and let the rice soften and cool.
2. Rinse the rice with cold water in a colander and drain off the liquid. Place the rice in a bowl and add 3 Tbsp. of rice vinegar. Mix by folding over with a spatula.
3. Place the nori sheets over aluminum foil on a baking sheet. Pour the rice onto the nori sheets and press the rice into a thin, uniform layer.

Sushi preparation:
1. Cut up any of the desired ingredients into small pieces or strips.
2. Spread the strips and small pieces of fish over the rice mixture to make a thin, firm second layer.
3. If making finger or California rolls, begin rolling the nori sheets in one continuous roll, similar to rolling up a rug. Cut the roll in 1- to 2-inch sections for your finished product. See the picture at the beginning of the lab.
4. If making nori fans, cut through to the nori seaweed sheet to make squares the size of your hand. Take each square and roll to make a cone that has one small end and one large end. See the picture at the beginning of the lab.
5. Use the dip if desired when eating the sushi.

RESULTS
Score for flavor, texture, aftertaste, and overall acceptability using a 9-point hedonic scale:
1 = like extremely
2 = like very much
3 = like moderately
4 = like slightly
5 = neither like nor dislike
6 = dislike slightly
7 = dislike moderately
8 = dislike very much
9 = dislike extremely

<table>
<thead>
<tr>
<th>Sensory Objective</th>
<th>Sushi Type:</th>
<th>Sushi Type:</th>
<th>Sushi Type:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall taste</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Acidity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Astringency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predominant flavor</td>
<td></td>
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</tbody>
</table>
REVIEW OF LITERATURE AND DISCUSSION
Lab 7

Milk Alternatives for Lactose Intolerance

OBJECTIVE

• To develop a nutritious and fortified pudding product for persons with lactose sensitivity or intolerance

LAB INFORMATION

Lactose intolerance is the inability, or insufficient ability, to digest lactose, a sugar found in milk and milk products. Lactose intolerance is caused by a deficiency of the enzyme lactase, which is produced by the cells lining the small intestine. Fortunately, milk alternatives are available. Consumers have the choice of purchasing rice, soy, almond, and coconut milks, all of which have fortified (and many flavored) options. Silk soymilk and Rice Dream rice milk undergo UHT (ultra-high temperature) pasteurization to ensure that they are free of harmful microorganisms.

Silk soymilk uses all-natural evaporated cane juice, (unrefined sugar) as its sweetener. Rice milk is unsweetened, but has a slight sweet taste due to the breakdown of the rice chains. Soy provides naturally occurring omega-3 essential fatty acids. Soymilk can also be a source of calcium, offering 45% of the daily recommendation per 8-ounce serving. Tricalcium phosphate is the calcium source in rice milk; 30% of the daily recommendation of calcium can be consumed in an 8 oz. serving.

In this lab, three different products will be used to determine whether it can be used to produce an acceptable pudding product: 1% cow’s milk, soy milk, and plain rice milk. See Table 1 for nutritional information. Note that 1% milk will be used instead of whole-fat milk because its consistency is similar to that of rice and soymilk and it has similar nutritional benefits, including being low in fat and calories.

MATERIALS AND METHODS

Ingredients

3 packages of chocolate instant pudding (label should not have a milk ingredient)
3 packages of vanilla instant pudding (label should not have a milk ingredient)
1% cow’s milk
Fortified soy milk (plain)
Fortified rice milk (plain)

Methods
1. Before starting, label each dish as soy milk, rice milk, or cow’s milk so you do not become confused as to which pudding has been mixed with which liquid. The different products will not change the color of the final pudding product.
2. Pour each dry pudding mix into a separate bowl. Add 1 cup of each milk (1%, soy, and rice milk) into the labeled dishes. Note that there will be six bowls total: chocolate pudding made with cow’s milk, soy milk, and rice milk and vanilla pudding made with cow’s milk, soy milk, and rice milk.
3. Whisk each product until smooth and creamy, about 5 minutes. Note that some finished pudding products may not become smooth or creamy and may appear thin and chunky no matter how long they are stirred. Stir for the complete 5 minutes to ensure that the product is given a chance to gelatinize.
4. Have participants taste and give feedback as to which product they prefer and reasons why. Inform participants of the milk product, soy product, and rice product in case of any allergies.

RESULTS
Using Table 1 and the Nutrition Facts panel of the pudding product, total the nutrients in each final pudding and compare them.

Table 1. Nutritional Values for Cow’s Milk, Rice Milk, and Soy Milk

<table>
<thead>
<tr>
<th>Nutritional Information</th>
<th>1% Milk (Cow)</th>
<th>Plain Rice Milk</th>
<th>Plain Soy Milk</th>
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</thead>
<tbody>
<tr>
<td>Serving size</td>
<td>8 oz.</td>
<td>8 oz.</td>
<td>8 oz.</td>
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<tr>
<td>Calories</td>
<td>110</td>
<td>120</td>
<td>90</td>
</tr>
<tr>
<td>Calories from fat</td>
<td>20</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Total fat</td>
<td>2.5 g</td>
<td>2.5 g</td>
<td>3.5 g</td>
</tr>
<tr>
<td>Saturated fat</td>
<td>1.5 g</td>
<td>0 g</td>
<td>0.5 g</td>
</tr>
<tr>
<td>Trans fat</td>
<td>0 g</td>
<td>0 g</td>
<td>0 g</td>
</tr>
<tr>
<td>Polyunsaturated</td>
<td>n/a</td>
<td>0.5 g</td>
<td>2 g</td>
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<tr>
<td>Monounsaturated</td>
<td>n/a</td>
<td>1.5 g</td>
<td>1 g</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>15 mg</td>
<td>0 mg</td>
<td>0 mg</td>
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<tr>
<td>Sodium</td>
<td>125 mg</td>
<td>100 mg</td>
<td>120 mg</td>
</tr>
<tr>
<td>Total carbohydrate</td>
<td>13 g</td>
<td>23 g</td>
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<tr>
<td>Dietary fiber</td>
<td>0 g</td>
<td>0 g</td>
<td>1 g</td>
</tr>
<tr>
<td>Sugar</td>
<td>12 g</td>
<td>10 g</td>
<td>6 g</td>
</tr>
<tr>
<td>Protein</td>
<td>8 g</td>
<td>1 g</td>
<td>6 g</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Calcium</td>
<td>30%</td>
<td>30%</td>
<td>45%</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>25%</td>
<td>25%</td>
<td>30%</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>n/a</td>
<td>15%</td>
<td>n/a</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>10%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Iron</td>
<td>0</td>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>B12</td>
<td>n/a</td>
<td>25%</td>
<td>50%</td>
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</tbody>
</table>
Ingredients in each milk product:

- **1% cow’s milk:** Low-fat milk, ascorbic acid (vitamin C), vitamin A palmitate, vitamin D2.
- **Plain rice milk:** Filtered water, organic brown rice (partially milled), organic expeller pressed safflower and/or canola oil, tricalcium phosphate, sea salt, vitamin A palmitate, vitamin D2, vitamin B12.
- **Plain soy milk:** (Filtered Water, Whole Soybeans), all natural evaporated cane juice, calcium carbonate, sea salt, natural flavors, carrageenan, vitamin A palmitate, vitamin D2, riboflavin (B2), vitamin B12.

Score each product using a 9-point hedonic scale:
1 = like extremely  
2 = like very much  
3 = like moderately  
4 = like slightly  
5 = neither like nor dislike  
6 = dislike slightly  
7 = dislike moderately  
8 = dislike very much  
9 = dislike extremely

### Table 2. Pudding Results

<table>
<thead>
<tr>
<th>Sensory Objective</th>
<th>Chocolate/1% Milk</th>
<th>Vanilla/1% Milk</th>
<th>Chocolate/Rice Milk</th>
<th>Vanilla/Rice Milk</th>
<th>Chocolate/Soy Milk</th>
<th>Vanilla/Soy Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall taste</td>
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<td></td>
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<tr>
<td>Taste described</td>
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</tr>
<tr>
<td>Acidity</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Astringency</td>
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<tr>
<td>Solid texture</td>
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<tr>
<td>Liquid consistency</td>
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<tr>
<td>Predominant flavor</td>
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</tbody>
</table>
REVIEW OF LITERATURE AND DISCUSSION
CONCLUSION

REFERENCES
Lab 8

Homemade Ricotta Cheese

OBJECTIVE
- To observe the effects of different types of acids and milk products on the flavor of ricotta cheese

LAB INFORMATION
Cheese can be categorized as unripened (or fresh) or ripened cheese. There are four categories of ripened cheeses: soft, semisoft, firm, and hard. Although the different varieties of cheese differ in flavor, aroma, age, and shape, they are all produced similarly. Most cheese begins as milk (typically sheep, goat, or cow). The milk protein, called casein, is then coagulated by the addition of an enzyme or acid. As the milk coagulates, it separates into solid curds and liquid whey. After draining off the whey, the curds can be made into fresh cheese or pressed into different shapes and aged, depending on the variety. The most popular fresh cheeses include cottage, cream, pot, and ricotta.

MATERIALS AND METHODS

Ingredients and Equipment
1 gallon whole milk
1 gallon 2% milk
1 gallon UHT milk
Other types of milk, as desired
2 Tbsp. white vinegar (acid)
2 tsp. cream of tartar (acid)
2 Tbsp. lemon juice (acid)
Muslin cloth
Gram scale

Methods
1. For each type of milk, pour three 2-cup samples and label each with the type of milk and the type of acid (vinegar, cream of tartar, or lemon juice) to be added.
2. Add each type of acid to each type of milk. Stir the acid in slowly. Continue to stir the
mixture slowly for 2 minutes and then let it sit for 8 more minutes.

3. Each sample should have produced curds. Pour each sample through a muslin cloth that has been draped and secured over a colander.

4. After the liquid has drained away, rinse the curds with tap water.

5. Weigh and then taste each curd sample.

RESULTS

Table 1. Cheese from Different Milk–Acid Combinations

<table>
<thead>
<tr>
<th></th>
<th>White Vinegar (weight and taste)</th>
<th>Cream of Tartar (weight and taste)</th>
<th>Lemon Juice (weight and taste)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole milk</td>
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<td></td>
<td></td>
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<tr>
<td>2% milk</td>
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<td></td>
<td></td>
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<tr>
<td>UHT Milk</td>
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<tr>
<td>Other: ________</td>
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<tr>
<td>Other: ________</td>
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</tbody>
</table>
Lab 9

Ice Cream Variations

OBJECTIVE
• To demonstrate the conversion of liquid to solid ice crystals by making ice cream

LAB INFORMATION
Ice cream is made by combining various dairy products. It typically includes cream mixed with fresh, condensed, or dry milk; a sweetening agent (honey, corn syrup, or sugar); and sometimes solid additions, such as chocolate pieces, fruit, or nuts. According to FDA guidelines, plain ice cream (without solids) must contain at least 10% milk fat, whereas ice cream with solid additions must contain a minimum of 8% milk fat. Many commercial brands contain stabilizers to help create a creamier texture and a fuller mouthfeel and to help slow melting. Ice milk is made using the same method to make ice cream except that it contains less milk fat and milk solids. This results in a product that is lower in fat and calories with a lighter, less creamy texture.

MATERIALS AND METHODS

Ingredients for Each Batch
1 1/2 cups whole milk
1 1/8 cups granulated sugar
3 cups heavy cream
1 1/2 Tbsp. pure vanilla extract
Additives, such as sprinkles or flavoring

Variations can be made by substituting milk and cream with lower-fat milk or soy, rice, or almond milk. Yogurt and half-and-half can also be used.

Methods (or follow the directions on your ice cream maker)
1. In a medium mixing bowl, use a hand mixer on low speed to combine the milk and granulated sugar until the sugar is dissolved, about 1 to 2 minutes.
2. Stir in the heavy cream and vanilla. Turn the machine on. Pour the mixture into the freezer bowl and let it mix until thickened, about 20 to 25 minutes. The ice cream will have a soft, creamy texture. If a firmer consistency is desired, transfer the ice cream to an
3. Remove from freezer about 15 minutes before serving.

RESULTS
Score each product using a 9-point hedonic scale:
1 = like extremely
2 = like very much
3 = like moderately
4 = like slightly
5 = neither like nor dislike
6 = dislike slightly
7 = dislike moderately
8 = dislike very much
9 = dislike extremely

Table 1. Ice Cream Variations

<table>
<thead>
<tr>
<th>Milk Product or Substitution</th>
<th>Cream Product or Substitution</th>
<th>Additional Ingredient (e.g., chocolate sprinkles)</th>
<th>Sensory Rating</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
REVIEW OF LITERATURE AND DISCUSSION
Lab 10

Linespread Testing

OBJECTIVE
• To evaluate viscosity through the use of a linespread test

LAB INFORMATION
Viscosity is a desirable physical property in many foods that contributes to texture and mouthfeel. In this lab, you will explore the impact of the ratio of flour to milk on the consistency of a white sauce and/or pudding.

MATERIALS AND METHODS

Ingredients
Flour
Butter
Salt
Milk
Granulated sugar
Cornstarch
Whole milk/1% milk
Vanilla extract

Equipment
Whisk
Spatula
Measuring cups
Linespread diagram (see Resources at the end of this student workbook)
2-inch cylindrical cup

Methods
White sauce:
1. Melt 2 Tbsp. of butter in a small pot on low heat.
2. Add 2 Tbsp. of flour and 1/2 tsp. salt. Blend to form a mixture.
3. Slowly stir in 1 cup of milk, blending well. Keep stirring with a whisk until the sauce...
thickens.
4. Once thick, continue to stir for 2 minutes.
5. Allow to cool to roughly 120°F (49°C) for the linespread test.
6. Put a plastic covering over the linespread diagram found in the Resources section of this manual.
7. Place a hollow cylinder (try a cookie cutter) over the center of the linespread diagram and fill it with the white sauce (the control). Lift the cylinder and allow the sauce to spread for 30 seconds.
8. Take two readings of the number points that are listed throughout the circumference of the circles. Record these values in Table 1. Average the two values.
9. Make second variation of the white sauce with only 1 Tbsp. instead of 2 Tbsp. of flour.
10. Allow to cool, and repeat two linespread tests. Record the values in Table 1.
11. Make a third variation of the white sauce, with 3 Tbsp. instead of 2 Tbsp. of flour.
12. Allow to cool, and repeat two linespread tests. Record the values in Table 1.
13. Make a fourth variation of the white sauce, with 4 Tbsp. instead of 2 Tbsp. of flour.
14. Allow to cool, and repeat two linespread tests. Record the values in Table 1.

Vanilla pudding:
1. Mix 1/3 cup granulated sugar, 3 Tbsp. cornstarch, and 1/8 tsp. salt in a small pot.
2. Gradually stir in 2 cups of 1% milk. Cook over medium heat, whisking continuously.
3. Bring to full boil briefly for 1 minute and then remove the pudding from the heat source.
4. Stir in 1 Tbsp. of butter and 1 Tbsp. of vanilla extract and then let chill.
5. Put a plastic covering over the linespread diagram found in the Resources section of this lab manual.
6. Place the hollow cylinder (try a cookie cutter) over the center of the linespread diagram and fill it with the control pudding. Lift the cylinder and allow the sauce to spread for 30 seconds.
7. Take two readings of the number points that are listed throughout the circumference of the circles. Record the readings in Table 2. Average the two readings.
8. Make the second variation of the pudding. Use only 2 Tbsp. of cornstarch instead of 3 Tbsp.
9. Allow the pudding to cool. Conduct two linespread tests. Record the values in Table 2 and find the average.
10. Make the third variation of the pudding. Use 4 Tbsp. of cornstarch instead of 3 Tbsp.
11. Allow the pudding to cool. Conduct two linespread tests. Record the values in Table 2 and find the average.
12. Make the fourth variation of the pudding. Use 5 Tbsp. of cornstarch instead of 3 Tbsp.
13. Allow the pudding to cool. Conduct two linespread tests. Record the values in Table 2 and find the average.

RESULTS
In your description of the appearance of each product in Tables 1 and 2, indicate if the sample was thick or thin, smooth, clear, gel-like, soft, gritty, spongy, or grainy. Also note whether it holds its shape and whether it shows syneresis, or retrogradation.
Table 1. White Sauce

<table>
<thead>
<tr>
<th>Linespread Value and Description</th>
<th>Control (2 Tbsp. flour)</th>
<th>Sample 1 (1 Tbsp. flour)</th>
<th>Sample 2 (3 Tbsp. flour)</th>
<th>Sample 3 (4 Tbsp. flour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
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<td></td>
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<tr>
<td>Test 2</td>
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<tr>
<td>Average</td>
<td></td>
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</tr>
</tbody>
</table>

Table 2. Pudding

<table>
<thead>
<tr>
<th>Linespread Value and Description</th>
<th>Control (3 Tbsp. cornstarch)</th>
<th>Sample 1 (2 Tbsp. cornstarch)</th>
<th>Sample 2 (4 Tbsp. cornstarch)</th>
<th>Sample 3 (5 Tbsp. cornstarch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
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<td></td>
</tr>
<tr>
<td>Test 2</td>
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<tr>
<td>Average</td>
<td></td>
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</tr>
</tbody>
</table>
REVIEW OF LITERATURE AND DISCUSSION
CONCLUSIONS

REFERENCES
Egg and Egg Replacement Labs
Lab 11

Egg Foams: Soufflés

OBJECTIVE

• To become familiar with making egg foam in order to create a soufflé

LAB INFORMATION

The traditional soufflé consists of a sauce blended with beaten egg yolks and leavened by stiffly beaten egg whites. Many types of soufflé are possible, including ones that include cheese, seafood, or vegetables. These types are typically served hot. Dessert soufflés have sugar and other ingredients, such as chocolate or fruit. Dessert soufflés are often served cold or frozen.

The process of making an egg foam involves trapping air into egg whites as they are beaten with a whisk to yield a light, airy mixture. Ovalbumin (the major protein in the white) is easily denatured by both heat and mechanical action. The whisking of air into the egg whites denatures the proteins, causing them to coagulate. This causes the foam to stiffen and the air bubbles to stabilize.

The foam should be transferred carefully into a greased ovenproof soufflé dish. A soufflé dish has a special design. Its straight sides and circular shape facilitate the soufflé's rising. The soufflé dish is placed into a larger bowl of water that steams when it gets hot.

There are four stages of egg white foam:

1. **Foamy**: Foam is unstable and has a large air-cell volume. It is transparent, and the bubbles coalesce if the beating is halted. Cream of tartar (an acid) is added at this stage to coagulate the proteins around the air cells.

2. **Soft rounded peaks**: The air cells subdivide in size and are whiter. The volume of the foam increases. Sugar is added at this stage.

3. **Stiff pointed peaks**: The foam has many small air cells. The volume of the foam increases. Egg protein coagulates around the small air cells. At this point, the foam is ready for most food applications and can be used for hard meringue.

4. **Dry peak foam**: The foam is now brittle and inelastic. The foam loses volume as the air cells break and the proteins become denatured. Water escapes that foam, and it takes on a flocculated, overcoagulated, and curdled appearance.
MATERIALS AND METHODS

**Ingredients**
- 2 Tbsp. all-purpose flour
- 1/4 tsp. salt
- 2/3 cup milk
- 1 Tbsp. butter
- 1/4 cup shredded cheddar cheese or 1/4 cup chopped vegetables of your choice
- 2 large eggs, white and yolks separated

Low-fat variations: Substitute low-fat cheese or vegetables, low-fat butter, and skim milk

**Methods**
1. Preheat the oven to 350°F (177°C) or plan on placing the prepared soufflé in the microwave for 3 minutes.
2. Blend flour and salt together in a sauce pan. Add cold milk gradually and stir until the flour is evenly dispersed.
3. Place on the sauce over heat and bring to a quick boil with constant stirring. Boil for 1 minute, until the sauce is thick. Remove the sauce from heat.
4. Add butter and shredded cheese to the hot sauce. Stir until the cheese has melted.
5. Add the unbeaten egg yolks to the sauce. Stir until blended.
6. Beat the egg whites until they begin to form stiff peaks. Record your “before baking” observations in Table 1.
7. Combine the sauce and the beaten egg whites in a bowl. Fold the mixture with a spatula until all the ingredients are blended.
8. Lightly butter the bottom of a small baking dish. Pour in the soufflé mixture. Set the dish in a pan of warm water. Note that water should be same depth as the soufflé in the baking dish.
9. Place the soufflé in the preheated oven and bake until a knife inserted in the center comes out clean. If a microwave is used, microwave the soufflé for 3 minutes.
10. Record your observations of the finished soufflé in Table 1.

**RESULTS**

**Table 1. Foam Formation Before and After Baking**

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Texture</th>
<th>Volume</th>
<th>Tenderness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before baking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After baking</td>
<td></td>
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<td></td>
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</tbody>
</table>
CONCLUSION

REFERENCES
Lab 12

Egg Replacement in Bakery Items

OBJECTIVE
• To evaluate the use of egg replacers in recipes and understand their properties, substitution amounts, and affect on bakery items

LAB INFORMATION
In bakery items, eggs impart their unique ability to foam, emulsify, and coagulate when exposed to heat. Because of these properties, eggs play an enormous role in producing the flavor and texture of the final product. It can be a challenge to find a comparable alternative/substitute.

MATERIALS AND METHODS

Ingredients for Each Batch
- 1/8 cup butter
- 1/4 cup egg substitute
- 2 eggs
- 1/6 cup milk
- 1 cup sugar
- 1/2 tsp. vanilla
- 1/2 cup cake flour
- 1/2 tsp. baking powder

Equipment
- Muffin tins
- Muffin/cupcake papers

Methods
1. Preheat the oven to 350°F (177°C).
2. Each student group will make both the experimental recipe (with egg replacers) and the control recipe (with eggs).
3. Sift together the flour, salt, and baking powder and set the mixture aside.
4. Use an electric mixer to combine the shortening, sugar, and vanilla
5. Add either the egg replacer or the eggs to the wet mixture (shortening, sugar, vanilla) and
beat for 1 minute after each addition.

6. Add half the flour mixture and half the milk and beat at medium speed for 1 minute. The last portion of the flour and liquid is added and blended together for 30 seconds at medium speed and then for 3 more minutes at high speed.

7. Pour equal portions of the batter into the paper cupcake holders. Make sure each cupcake holder is labeled as either “control” or “experiment.”

8. Repeat the above steps to make the other batter (egg or egg replacer).

9. Bake for 25 minutes at 350°F (177°C). After baking, cool for 5 minutes before removing from the cake pan. Compare the samples and record your observations in Table 1.

RESULTS
Score each product using a 9-point hedonic scale:
1 = like extremely
2 = like very much
3 = like moderately
4 = like slightly
5 = neither like nor dislike
6 = dislike slightly
7 = dislike moderately
8 = dislike very much
9 = dislike extremely

<table>
<thead>
<tr>
<th></th>
<th>Appearance</th>
<th>Texture</th>
<th>Volume</th>
<th>Tenderness</th>
<th>Flavor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baked good with egg replacer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baked good with eggs</td>
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</tbody>
</table>
Lab 13

Egg Quality and Storage

OBJECTIVE
• To assess the physical condition of a raw egg based on storage conditions and age

LAB INFORMATION
The grade assigned to an egg is based on the quality of the egg’s interior, overall appearance, and the condition of the shell. Eggs of any quality grade may differ in weight or size:
• U.S. Grade AA eggs have thick and firm whites when cracked. The yolks are high, round, and practically free from defects. They have clean, unbroken shells. Choose Grade AA and Grade A eggs for frying and poaching, where appearance is important.
• U.S. Grade A eggs have the same characteristics as Grade AA eggs except that the whites are “reasonably” firm. This is the quality most often sold in stores.
• U.S. Grade B eggs have thinner whites. When cracked, the yolks will appear wider and flatter than those of eggs of higher grades. The shells must be unbroken, but they may show slight stains. This quality is seldom found in retail stores; they are usually used to make liquid, frozen, and dried egg products.

METHODS AND MATERIALS
1. Take a dozen eggs. Divide the eggs into three groups of four eggs each. Store them as follows for 1 week:
   • Group 1: Room temperature, 68–72°F (20–22°C)
   • Group 2: Between 38–42°F (3–6°C)
   • Group 3: Between 50–54°F (10–12°C)
2. At the end of the week, test each egg as follows:
   a. Test the eggs in their shell for quality by placing them in a bowl of water. Create a table to record the number of eggs from each group that float or sink. For those that sink, measure how far the egg sinks into the bowl.
   b. Crack the eggs and measure the diameter of the albumin of each egg. Average the diameter for each egg group. Create a chart that compares the average diameter of the eggs stored at different temperatures.
   c. Use the test results to validate which temperature maintained the quality of the eggs.
3. Test the quality of a cake based on the storage temperature used for the eggs. Use the cake recipe from Lab 12 and make it three ways with a new half-dozen of eggs:
   a. Batch 1: Use the group 1 eggs.
   b. Batch 2: Use the group 2 eggs.
   c. Batch 3: Use the group 3 eggs.
   d. Assess the crumb texture, lightness, and overall quality of each cake. Record your observations in Table 1.

**RESULTS**

Score each product using a 9-point hedonic scale:

1 = like extremely  
2 = like very much  
3 = like moderately  
4 = like slightly  
5 = neither like nor dislike  
6 = dislike slightly  
7 = dislike moderately  
8 = dislike very much  
9 = dislike extremely

<table>
<thead>
<tr>
<th></th>
<th>Appearance</th>
<th>Texture</th>
<th>Volume</th>
<th>Tenderness</th>
<th>Flavor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
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<tr>
<td>Group 2</td>
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<tr>
<td>Group 3</td>
<td></td>
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</tbody>
</table>
CONCLUSION

REFERENCES
Fruit and Vegetable Labs
Lab 14

Vegetable Pigments, Browning, and Nutrient Loss

OBJECTIVE
• To determine the effect of cooking techniques, the addition of acids and bases, and variable cooking times on pigment changes and nutrient loss

LAB INFORMATION
Pigments that occur naturally in fruits and vegetables include chlorophylls, carotenoids, betalains, and the flavonoids, which consist of anthocyanins and anthoxanthins. The chlorophylls are green pigments. The carotenoids are yellow and orange pigments (sometimes pink or red). The betalains are purplish-red and sometimes yellow pigments. The anthocyanins are red, purple, and blue pigments, and the anthoxanthins are creamy white or colorless.

MATERIALS AND METHODS

Ingredients
1 lb. fresh green vegetable of your choice and a small frozen package of the same vegetable
1 lb. fresh red vegetable of your choice and a small frozen package of the same vegetable
1 lb. fresh orange vegetable of your choice and a small frozen package of the same vegetable
1 lb. fresh white vegetable of your choice and a small frozen package of the same vegetable
1 oz. cream of tartar powder per preparation
1 oz. baking soda per preparation

Equipment
2 qt. pans
Vegetable steamer

Methods
1. Trim vegetables into bite sized pieces.
2. You will prepare each vegetable—green, red, orange, and white—in six different ways:
   a. Boil the fresh vegetable for 15 minutes with 1 oz. of cream of tartar. (For each boiling treatment, use 1 qt. of water.)
b. Boil the fresh vegetable for 15 minutes with 1 oz. of baking soda.
c. Boil the fresh vegetable for 15 minutes in just water.
d. Boil the fresh vegetable for 30 minutes. Use two pots; cover one and keep the other uncovered.
e. Microwave the frozen vegetable on high for 3 minutes.
f. Steam the fresh vegetable for 6 to 7 minutes.

3. Record your observations in the corresponding tables in the Results section.

RESULTS

<table>
<thead>
<tr>
<th>Green Vegetable/Pigment</th>
<th>Treatment</th>
<th>Color, Texture, and Flavor</th>
</tr>
</thead>
<tbody>
<tr>
<td>________ with cream of tartar</td>
<td>15 min. boil</td>
<td></td>
</tr>
<tr>
<td>________ with baking soda</td>
<td>15 min. boil</td>
<td></td>
</tr>
<tr>
<td>________ with plain water</td>
<td>15 min. boil</td>
<td></td>
</tr>
<tr>
<td>________ with plain water</td>
<td>30 min. boil uncovered</td>
<td></td>
</tr>
<tr>
<td>________ with plain water</td>
<td>30 min. boil covered</td>
<td></td>
</tr>
<tr>
<td>________ steamed</td>
<td>6–7 min.</td>
<td></td>
</tr>
<tr>
<td>________ microwaved</td>
<td>3 min. high</td>
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</table>

<table>
<thead>
<tr>
<th>Red Vegetable/Pigment</th>
<th>Treatment</th>
<th>Color, Texture, and Flavor</th>
</tr>
</thead>
<tbody>
<tr>
<td>________ with cream of tartar</td>
<td>15 min. boil</td>
<td></td>
</tr>
<tr>
<td>________ with baking soda</td>
<td>15 min. boil</td>
<td></td>
</tr>
<tr>
<td>________ with plain water</td>
<td>15 min. boil</td>
<td></td>
</tr>
<tr>
<td>________ with plain water</td>
<td>30 min. boil uncovered</td>
<td></td>
</tr>
<tr>
<td>________ with plain water</td>
<td>30 min. boil covered</td>
<td></td>
</tr>
<tr>
<td>Orange Vegetable/Pigment</td>
<td>Treatment</td>
<td>Color, Texture, and Flavor</td>
</tr>
<tr>
<td>--------------------------</td>
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<td>-----------------------------</td>
</tr>
<tr>
<td>_______ with cream of tartar</td>
<td>15 min. boil</td>
<td></td>
</tr>
<tr>
<td>_______ with baking soda</td>
<td>15 min. boil</td>
<td></td>
</tr>
<tr>
<td>_______ with plain water</td>
<td>15 min. boil</td>
<td></td>
</tr>
<tr>
<td>_______ with plain water</td>
<td>30 min. boil uncovered</td>
<td></td>
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<tr>
<td>_______ steamed</td>
<td>6–7 min.</td>
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<tr>
<td>_______ microwaved</td>
<td>3 min. high</td>
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</table>

<table>
<thead>
<tr>
<th>White Vegetable/Pigment</th>
<th>Treatment</th>
<th>Color, Texture, and Flavor</th>
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<td>15 min. boil</td>
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<tr>
<td>_______ with baking soda</td>
<td>15 min. boil</td>
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<tr>
<td>_______ with plain water</td>
<td>15 min. boil</td>
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<tr>
<td>_______ with plain water</td>
<td>30 min. boil uncovered</td>
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<tr>
<td>_______ steamed</td>
<td>6–7 min.</td>
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<tr>
<td>_______ microwaved</td>
<td>3 min. high</td>
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<tr>
<td>Method</td>
<td>Time</td>
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<td>---------------</td>
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</tr>
<tr>
<td>Steamed</td>
<td>6–7 min.</td>
<td></td>
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<tr>
<td>Microwaved</td>
<td>3 min. high</td>
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</tbody>
</table>

REVIEW OF LITERATURE AND DISCUSSION
CONCLUSIONS

REFERENCES
Lab 15

Organic Versus Conventional Fruits and Vegetables

OBJECTIVE
- To determine differences between organic and conventional fruits and vegetables

LAB INFORMATION
Organic foods were defined by the 1990 Farm Bill. This law states that organic farmers may not use most conventional pesticides. The only substances that can be used on organic crops are those specified by the National Organic Standards Board, which reviews all chemicals and pesticides. Only foods that have been certified as 95% organic or more are allowed to boast the USDA Organic Seal. Foods containing 70–95% organic ingredients can claim that they have been made with organic ingredients.

Organic foods are one of the fastest growing trends in the United States today. Despite the higher prices for organically grown foods, consumers have been quick to follow this nutritional trend. Organic farming originally came to the United States from Europe in the early 1900s.

MATERIALS AND METHODS

Ingredients
3 lbs. organic carrots
3 lbs. conventional carrots
6 organic apples
6 conventional apples

Equipment
Paper plates
Knives
Vegetable peeler
Pot with cover
Plastic gloves
**Methods**

1. Peel and slice a conventional carrot and an organic carrot. Conduct a taste test comparing the raw organic and the raw conventional carrot. Judge each on a scale from 1 to 7 (7 being the best) on its appearance, consistency/texture, tenderness, flavor, and overall eating quality. Record your results in Table 1.

2. Boil water on the stove and cook part of both carrots. Conduct a taste test comparing the cooked organic and the cooked conventional carrot. Judge each food on a scale from 1 to 7 (7 being the best) on its appearance, consistency/texture, tenderness, flavor, and overall eating quality. Record your results in Table 1.

3. Slice an organic apple and a conventional apple. Conduct a taste test comparing the raw organic and the raw conventional apple. Judge each on a scale from 1 to 7 (7 being the best) on its appearance, consistency/texture, tenderness, flavor, and overall eating quality. Record your results in Table 1.

**RESULTS**

<table>
<thead>
<tr>
<th>Food</th>
<th>Appearance</th>
<th>Consistency/Texture</th>
<th>Tenderness</th>
<th>Flavor</th>
<th>Overall Quality</th>
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</thead>
<tbody>
<tr>
<td>Organic raw carrot</td>
<td></td>
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<tr>
<td>Conventional raw carrot</td>
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<td></td>
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<tr>
<td>Organic cooked carrot</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional cooked carrot</td>
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<tr>
<td>Organic apple</td>
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<tr>
<td>Conventional apple</td>
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</table>
REVIEW OF LITERATURE AND DISCUSSION
Lab 16

Osmosis and Enzymatic Browning

OBJECTIVES

• To study the characteristics of different types cooked apples
• To see how sugar affects the cell structure of fruits
• To observe enzymatic browning and determine if acid limits browning in fruit

LAB INFORMATION

Although all apples are the same type of fruit, each apple tastes, looks, and feels completely different from another. Some are bitter, whereas others are sweet. Some apples are better for cooking than others. Many fruits tend to turn brown immediately after peeling when they are in the presence of oxygen due to enzymatic activity. In this lab, you’ll sample different varieties of apple and determine if the addition of acids can inhibit enzymatic browning.

MATERIALS AND METHODS

Ingredients

6 different types of apples (e.g., Gala, McIntosh, Fuji, Red Delicious, Granny Smith, Braeburn, etc.)
1/2 cup lemon juice
1/2 cup pineapple juice
1/2 cup papaya juice
Ascorbic acid (crushed vitamin C pills)
1 oz. cream of tartar
1 1/3 cup and 2 2/3 cups sugar

Methods

1. Slice the apples, keeping them separated by variety.
2. Taste each type of apple. Observe its texture, flavor, color, and appearance. Record your findings in Table 1.
3. Pour or sprinkle 1 tsp. each of lemon juice, papaya juice, and cream of tartar on one slice of each apple type and let it sit for 20 minutes.
4. Compare the apple slices with and without lemon juice, papaya juice, and cream of tartar.
5. Make cobbled apples.  
a. Get two saucepans. Boil 2 cups of water in each. Dissolve 1 1/3 cups of sugar into one pan and 2 2/3 cups of sugar into the other. Once the sugar has dissolved, add a few unused apple slices of each apple type and heat for 30 minutes.  
b. Taste the apples and record your observations in Table 3.

RESULTS  
Score each apple sample on a 5-point scale where 1 = least preferred and 5 = most preferred.

Table 1. Apple Taste Test

<table>
<thead>
<tr>
<th>Variety</th>
<th>Color and Appearance</th>
<th>Texture and Tenderness</th>
<th>Flavor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gala</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McIntosh</td>
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<td></td>
</tr>
<tr>
<td>Fuji</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red Delicious</td>
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<td></td>
</tr>
<tr>
<td>Granny Smith</td>
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<td></td>
<td></td>
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<tr>
<td>Braeburn</td>
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</tbody>
</table>

Table 2. Enzymatic Browning and Various Acid Treatments

<table>
<thead>
<tr>
<th>Variety</th>
<th>Control</th>
<th>Lemon Juice</th>
<th>Papaya Juice</th>
<th>Cream of Tartar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gala</td>
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<tr>
<td>McIntosh</td>
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<td>Fuji</td>
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<tr>
<td>Red Delicious</td>
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<td>Granny Smith</td>
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</table>
Table 3. Cobbled Apples: Comparison of Sugar Solutions

<table>
<thead>
<tr>
<th>Variety</th>
<th>1 1/3 Cup Sugar Solution</th>
<th>2 2/3 Cup Sugar Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gala</td>
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<td>McIntosh</td>
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<td>Fuji</td>
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<tr>
<td>Red Delicious</td>
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<td>Granny Smith</td>
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<tr>
<td>Braeburn</td>
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</table>

REVIEW OF LITERATURE AND DISCUSSION
CONCLUSION

REFERENCES
Grains, Flour, Cereals, and Pasta Labs
Lab 17

Pasta with Flour Variations

OBJECTIVE
• To assess the quality of pastas made from different types of flour

LAB INFORMATION
The most important factor for producing high-quality pasta is the use of durum wheat, which is higher in protein than other varieties of wheat. Durum wheat is milled into coarse particles known as semolina or semolina flour. It is possible to make pasta with other types of milled wheat, but they are considered lower in quality. Durum wheat contains carotenoid pigments, which gives it the characteristic yellow or amber color. In commercial pasta production, the alimentary paste is mixed with about 100 parts semolina to 30 parts water.

Hundreds of different types of pastas are available in a vast array of shapes and sizes, including long-cut, short-cut, solid, hollow, large, small, and numerous specialty pastas. Pasta should be added to boiling water and stirred to separate the pieces of pasta. It should be cooked in boiling water for several minutes until al dente, tender yet firm and resistant when bitten into. Fresh pasta cooks very fast and reaches the al dente stage in less than 1 minute.

MATERIALS AND METHODS

Ingredients
2 lbs. semolina flour
1 lb. all-purpose flour
1 lb. whole wheat flour
1 lb. rye flour
1 lb. potato flour
1 lb. rice flour
5 extra large eggs for each pasta recipe
1 Tbsp. olive oil for each pasta recipe

Equipment
Mixer with dough hook attachment (or you may knead by hand)
Pasta maker (or you may cut pasta shapes by hand)

Methods

Basic Pasta Dough (makes 1 pound)

Ingredients
1/2 cup of semolina flour
3 1/2 cups of any other flour of choice from the ingredient list
5 extra large eggs
1 Tbsp. olive or vegetable oil
3–4 Tbsp. water, as needed

Mixing Instructions
1. Mound 3 1/2 cups of the flour of your choice and 1/2 cup of semolina flour (or 4 cups total of semolina flour if you are only using semolina in the recipe) in the center of a mixing bowl.
2. Make a well in the middle of the flour and add the eggs and olive oil.
3. Using a fork, beat together the eggs and oil and begin to incorporate the flour, starting with the inner portion of the well.
4. When the flour is mixed about half way, attach the dough hook to the mixer and mix on the lowest speed until the flour is mostly mixed in and the dough looks formed. If you prefer, you can also keep mixing the dough mound by hand until the dough looks formed.
5. Add water as needed to make the dough come together.
6. Transfer the dough onto a lightly floured countertop or cutting board and knead for 6 more minutes. The dough should be elastic and a little sticky.
7. Wrap the dough in plastic, and allow it to rest for 30 minutes at room temperature.

Rolling Instructions
Roll out sections of the dough on a floured countertop or cutting board until the dough is 1/8 to 1/4 inch thick. Cut pasta shapes as desired (bowties, noodles, etc.).

Pasta Machine Instructions
1. Use the instructions that came with the machine or follow the steps provided here.
2. Set the flat roller to #1 and roll a small piece of dough through the flat rollers. After each rolling, fold the pasta in half, flouring the middle when necessary. Repeat five to six times until the dough takes a regular shape.
3. Pass the dough only once more through the flat rollers as per the pasta machine instruction booklet.
4. Flour your dough and pass through the finer cutters (for angel hair).

Cooking Instructions
1. Drop the fresh pasta into salted, oiled water at a rolling boil and cook for 3 to 4 minutes.
Remove carefully with a slotted spoon.

2. After the pasta as cooled slightly, taste the pasta and record your observations in Table 1. Record your observations for each type of pasta that you make.

Variations
Spinach pasta: Drain frozen spinach and squeeze the leaves as dry as possible. Puree the spinach with a food processor. With a fork, combine the spinach with the pasta ingredients. Knead and roll out the dough.
Tomato pasta: Stir about 1/4 cup tomato puree into the pasta dough. Knead and roll out the dough.

RESULTS

Table 1. Pastas Using Different Types of Flour

<table>
<thead>
<tr>
<th>Flour Type</th>
<th>Texture</th>
<th>Taste</th>
<th>Mouthfeel</th>
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<tbody>
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</table>
CONCLUSION

REFERENCES
Lab 18

Gluten-Free Pasta

OBJECTIVE

• To evaluate the effects of removing gluten from a typically glutinous pasta product

LAB INFORMATION

In making fresh pasta, proper gluten development is needed in order to create smooth and elastic dough that will yield a snappy, yet soft, chew in the finished product. The Italians call this *al dente*, meaning “to the tooth,” which describes the perfect texture and mouthfeel of pasta. Proper gluten development is the focus in properly executed fresh pastas, because it provides structure and textural integrity.

Gluten is formed when water interacts with a wheat product, such as semolina flour, activating glutenin and gliadin. These two molecules are responsible for the elastic nature of flour-based doughs, building a matrix of strands with strong bonds. The more the dough is manipulated, the more gluten that is developed, providing more elasticity. The higher the concentration of the protein in the wheat-based dough, the more gluten that can be developed.

A person with gluten intolerance will often forgo consumption of breads and pastas, because both rely on gluten for structural and textural integrity. Wheat flour can be replaced by a number of other starches, such as flours made from tapioca, sweet rice, quinoa, taro root, and potato. With the right combination of ingredients, gluten-free products can be made that have a similar taste and mouthfeel as those made from traditional wheat flour. The only problem is that adding water to these flours does not change anything other the strength and saturation of the resulting paste. No gluten will be formed in the absence of wheat flour.

To provide the structure and snap akin to traditional wheat pasta, gluten-free products often use vegetable gums to provide stability. Fermented simple sugars, such as those from corn, are vegetable gums, and these can be powdered and added to foods. One particular vegetable gum, xanthan gum, is added to foods to help emulsify and thicken mixtures that would ordinarily rely on glutinous ingredients to achieve their final consistency. Xanthan gum used in conjunction with a blend of nonwheat flours allows for the consistency of the mixture to be manipulated and eaten just like fresh wheat pasta. Egg serves the same purpose in gluten-free dough, imparting texture, flavor, and richness to the dough. Oil is often added to provide a smooth texture to the...
gluten-free dough and help it stay together.

MATERIALS AND METHODS

Ingredients
1/2 cup tapioca or sweet rice flour
1/3 cup potato starch
1/2 cup cornstarch
1/3 cup brown rice flour
1/2 tsp. salt
2 Tbsp. xanthan gum
2 Tbsp. canola oil
4 eggs

Variations: Select one of the following to add to the above flour mixture.
2 Tbsp. cranberry flour
2 Tbsp. mesquite flour
1/2 cup pumpkin puree to replace 2 of the eggs

Methods
1. Put the dry ingredients into the larger bowl, adding variations if you want. Whisk to blend well.
2. Make a well in the middle.
3. Crack the eggs into the smaller bowl. Lightly beat the eggs and oil together.
4. Pour the liquids into the well. Using a fork, begin incorporating the dry ingredients into the wet ingredients.
5. As soon as the dough comes together, begin kneading for 2 minutes to form a smooth ball.
6. Lightly dust a counter with cornstarch. Cut the dough into eight pieces and roll the pasta out.
7. Use a pasta machine to flatten the dough. Start by flattening the piece of pasta dough in your hands and then feed it through the machine. Begin on the widest opening of the machine.
8. Fold the dough up in thirds. Lightly dust with cornstarch if the dough is tacky. Flatten with the rolling pin or by using your fingertips to press and flatten the dough and roll through the same width.
9. Fold the dough into thirds and repeat the process another six times. Now decrease the thickness and roll through each thickness twice until the desired thickness is achieved.

Rolling Instructions
Roll out sections of the dough on a floured countertop or cutting board until the dough is 1/8- to 1/4-inch thick. Cut pasta shapes as desired (bowties, noodles, etc.).

Pasta Machine Instructions (Use the instructions that came with the machine or follow the directions listed below.)
1. Set the flat roller to #1 and roll a small piece of dough through the flat rollers. After each rolling, fold the dough in half, flouiring the middle when necessary. Repeat five to six
times until dough takes a regular shape.

2. Pass the dough only once more through the flat rollers as per the pasta machine instruction booklet.

3. Flour your dough and pass through the finer cutters (for angel hair).

_Cooking Instructions_

Bring a large pot of water to a boil. Add salt. Drop the pasta into the boiling water and cook until _al dente_. Fresh pasta cooks quickly, depending upon its thickness. When the pasta is done, drain it and then rinse under hot water. Toss the pasta with a little extra-virgin olive oil. Use immediately or cool and refrigerate for later use.

**RESULTS**

Fill in the sensory evaluation information in Table 1 with descriptive words.

<table>
<thead>
<tr>
<th>Pasta Type</th>
<th>Consistency</th>
<th>Mouthfeel</th>
<th>Aftertaste</th>
<th>Appearance</th>
<th>Smell</th>
<th>Taste</th>
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</table>
REVIEW OF LITERATURE AND DISCUSSION
Lab 19

Starch Thickeners

OBJECTIVES
- To evaluate a commercially available thickener for use in dysphasia and/or pureed diets
- To prepare a complete meal of modified foods and make it appealing

LAB INFORMATION
Dysphasia is a disorder manifested through difficulty swallowing. The strategy for feeding individuals with dysphasia has been to create thickened juices and foods with modified texture. Undernutrition is common among institutionalized individuals who are served unappealing pureed meals. With the appropriate use of commercial thickeners, improved food consumption may occur. In addition, the use of food molds and various other tools to shape modified foods can add to their visual appeal.

MATERIALS AND METHODS

Equipment
- Blender
- Pastry bags and tips
- Thick n’ Easy by Hormel or Thick It by Milani (or other commercial starch thickener)

Ingredients (for each student group)
- 1 qt. apple juice
- 8 oz. canned green beans, drained
- 1/2 lb. ground turkey, cooked and drained
- 1 cup mashed potatoes
- 1 can peaches, drained
- Ice cream or sherbet

Methods
1. To make thickened apple juice, follow the package directions on the thickener product
used. If no directions are found, add 1 to 2 Tbsp. of thickener to 4 oz. of apple juice for a nectar consistency. For a honey consistency, add 2 to 3 Tbsp. of thickener to 4 oz. apple juice. For a pudding consistency, add 3 to 4 Tbsp. of thickener to 4 oz. apple juice.

2. For solid foods, blend the food in a blender until it has a pureed consistency. Strain out any cellulose, lignin, or other nonpureed substances. Use the package directions on the thickener to achieve the desired consistency. If no directions exist for the specific foods used, add 1 to 2 Tbsp. of thickener until a pudding-like consistency is achieved.

3. Spoon the thickened food into molds (gelatin molds work well), or cut out shapes with cookie cutters. In addition, spoon thickened food into a pastry bag and decorate the plate and molded food (mashed potatoes work well). Spoon thickened peaches over ice cream or sherbet.

4. Rate the food items and record your scores in Table 1.

RESULTS
Rate the food items using a 5-point scale:
1 = dislike extremely
2 = dislike somewhat
3 = neither like nor dislike
4 = like somewhat
5 = like extremely

<table>
<thead>
<tr>
<th>Food</th>
<th>Mixing Ability</th>
<th>Consistency (Texture)</th>
<th>Stability</th>
<th>Aftertaste</th>
<th>Appearance</th>
<th>Smell</th>
<th>Taste</th>
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</table>
REVIEW OF LITERATURE AND DISCUSSION
Lab 20

Cooked Cereals: Gelatinization

OBJECTIVES
- To study starch gelatinization and dextrinization
- To observe the differences between types of hot cereals

LAB INFORMATION
Starch is insoluble in cold water. When starch granules are mixed with water, a suspension is formed whereby the starch granules are suspended in the liquid. If left undisturbed, the starch will fall out of the suspension and settle at the bottom of the container. When heat is applied to the starch and water suspension, the granules swell with water at a temperature range characteristic of the particular starch. Cornstarch granules swell at 144–162°F (62–72°C), wheat starch granules swell at 136–147°F (58–64°C), and potato starch granules swell at 138–154°F (59–68°C). As heating continues, the suspension becomes thicker, the viscosity of the mixture increases, and the mixture becomes more translucent. The process of heating starch in water or any water-based liquid to swell the starch granules in order to thicken and increase the viscosity of the mixture is called gelatinization.

MATERIALS AND METHODS

Ingredients and Materials
Oatmeal, grits, cream of wheat, and cream of rice (both varieties of each: slow-cooking and instant)
Microwave oven (optional)
Scale

Methods
1. Add water to each hot cereal and cook and/or microwave as directed on the package. Describe the appearance of each item in Table 1.
2. Overcook each type of hot cereal by doubling the recommended cooking time. Describe the appearance of each item in Table 1.

RESULTS

Table 1. Appearance and Texture of Hot Cereals

<table>
<thead>
<tr>
<th>Cereal</th>
<th>Appearance</th>
<th>Texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow-cooked cereal</td>
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<td></td>
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<tr>
<td>Instant cereal</td>
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<td></td>
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<tr>
<td>Overcooked slow-cooked cereal</td>
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<tr>
<td>Overcooked instant cereal</td>
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</tbody>
</table>
REVIEW OF LITERATURE AND DISCUSSION
CONCLUSIONS

REFERENCES
Yeast and Quick Breads/Cakes Labs
Lab 21

Pie Pastry

OBJECTIVES
• To assess the impact of different types of fats on pastry crust
• To assess the impact of different amounts of fat, flour, or liquid on pastry crust
• To evaluate pie crust on a sensory scale for overall eating quality and acceptability

LAB INFORMATION
Pie crusts serve as the base for a wide variety of both sweet and savory food products. The making of a successful pie crust depends on the use of a specific proportion of ingredients. It also requires proper mixing and baking methods. Even the smallest variations can greatly affect the final baked pie crust.

MATERIALS AND METHODS

Ingredients
The type of fat and the amount, the mixing method, the amount of liquid and flour, and the extent to which the dough is mixed or manipulated will differ for each pastry product. See Table 1 for the ingredients and methods for each type of pastry dough.

Table 1. Ingredients for Each Pastry Product

<table>
<thead>
<tr>
<th>Recipe</th>
<th>Control Group</th>
<th>Fat Change Group</th>
<th>Liquid Change Group</th>
<th>Mixing Change Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flour (all purpose)</td>
<td>1 1/2 cups</td>
<td>1 1/2 cups</td>
<td>1 1/2 cups</td>
<td>1 1/2 cups</td>
</tr>
<tr>
<td>Sugar</td>
<td>2 tsp.</td>
<td>2 tsp.</td>
<td>2 tsp.</td>
<td>2 tsp.</td>
</tr>
<tr>
<td>Salt</td>
<td>1 tsp.</td>
<td>1 tsp.</td>
<td>1 tsp.</td>
<td>1 tsp.</td>
</tr>
<tr>
<td>Fat</td>
<td>1/2 cup vegetable oil</td>
<td>1/2 cup solid butter</td>
<td>1/2 cup vegetable oil</td>
<td>1/2 cup vegetable oil</td>
</tr>
<tr>
<td>Whole milk</td>
<td>2 Tbsp.</td>
<td>2 Tbsp.</td>
<td>1/2 cup</td>
<td>2 Tbsp.</td>
</tr>
</tbody>
</table>
Mixing directions

Gently stir with a wooden spoon until the ingredients are combined (1 minute).

Gently stir with a wooden spoon until the ingredients are combined (1 minute).

Gently stir with a wooden spoon until the ingredients are combined (1 minute).

Whisk harshly for 4 minutes.

Methods

1. Preheat the oven to 400°F (204°C).
2. Place all the ingredients into a bowl and stir based on the instructions provided in Table 1.
3. Dump the mixture into a pie plate and spread with a fork, piercing holes in the bottom of the dough.
4. Bake for 15 minutes or until lightly browned.

RESULTS

Score for tenderness, flavor, aftertaste, and overall acceptability using a 9-point hedonic scale:

1 = like extremely
2 = like very much
3 = like moderately
4 = like slightly
5 = neither like nor dislike
6 = dislike slightly
7 = dislike moderately
8 = dislike very much
9 = dislike extremely

Table 2. Comparison of Pie Crusts

<table>
<thead>
<tr>
<th>Pie Crust Variety</th>
<th>Tenderness</th>
<th>Aftertaste</th>
<th>Flavor</th>
<th>Overall Acceptability</th>
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<tbody>
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Lab 22

The Role of Acid in Angel Food Cake

OBJECTIVE

• To evaluate the role of cream of tartar in angel food cake

LAB INFORMATION

The role of an acid (cream of tartar in this case) in a baked good is to stabilize the egg whites, allowing them to form high, stiff peaks. Without cream of tartar, the volume and texture of the cake is affected, as well other attributes.

MATERIALS AND METHODS

Ingredients for Each Batch

1 cup cake flour
3/4 cup sugar
2 Tbsp. sugar
12 large egg whites
1 1/2 tsp. cream of tartar
1/4 tsp. salt
3/4 cup sugar
1 1/2 tsp. vanilla
1/2 tsp. almond extract

Methods

1. You will make two cakes. One with cream of tartar and one without.
2. Do not grease the pan. Line the pan with wax or parchment paper by cutting out the shape of the pan.
3. Preheat the oven to 375°F (190°C).
4. Sift the cake flour and 3/4 cup + 2 Tbsp. sugar and set aside.
5. Combine the extracts in a small bowl and set aside.
6. Beat the egg whites, cream of tartar, and salt until it forms peaks. When making the variation without the acid, leave out the cream of tartar.
7. Add the other 3/4 cup of sugar slowly, beat on high until stiff peaks form.
8. Beating on low, add the flour mixture and extracts slowly.
9. Spoon the batter into an angel food cake pan.
10. Move a knife through batter to remove air pockets.
11. Bake 30 to 35 minutes or until the top springs back when touched lightly.
12. Invert the pan onto a plate and turn over when cool.

RESULTS
1. When cool, cut a slice from each cake. Measure the standing height (in mm or cm) of each slice. Record this measurement in Table 1.
2. Observe the crust color of each cake. Use the following crust color scale to evaluate the crust of each cake. Record this value in Table 1.

   1  2  3  4  5
   Light Brown   Medium Brown  Dark Brown

3. Evaluate the tenderness, flavor, and overall acceptability of each cake. Record your answers in Table 1.

Table 1. Angel Food Cake Comparison

<table>
<thead>
<tr>
<th>Angel Food Cake</th>
<th>Height</th>
<th>Crust Brownness (use scale)</th>
<th>Tenderness</th>
<th>Flavor</th>
<th>Overall Acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>With cream of tartar</td>
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<tr>
<td>Without cream of tartar</td>
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</table>
REVIEW OF LITERATURE AND DISCUSSION
CONCLUSIONS

REFERENCES
Lab 23

Manipulation of Ingredients in Baked Goods

OBJECTIVE

• To assess the function of each ingredient in a baked good

LAB INFORMATION

Table 1. Functions of Ingredients in Baked Goods

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Purpose</th>
<th>Too Much</th>
<th>Too Little</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yeast</td>
<td>Rise.</td>
<td>Low rise; CO₂ escapes, gluten becomes weak.</td>
<td>Low rise; little CO₂ production.</td>
</tr>
<tr>
<td>Flour</td>
<td>Dry ingredient with protein content; gluten becomes available with proper hydration.</td>
<td>Low rise; gluten network too tight.</td>
<td>Low rise; not enough protein for gluten development.</td>
</tr>
<tr>
<td>Mixing, kneading</td>
<td>Incorporation of air, development of gluten, and distribution of ingredients.</td>
<td>Low rise; breaks gluten linkages.</td>
<td>Low rise; less air incorporated, more open gluten; uneven.</td>
</tr>
<tr>
<td>Liquid</td>
<td>Hydration. Also aids in gelatinization and gluten development.</td>
<td>Low rise; dilutes/tenderizes gluten.</td>
<td>Low rise; poor gluten development because flour not hydrated.</td>
</tr>
<tr>
<td>Milk</td>
<td>Hydration. Source of fat, sugar, and protein. Sometimes scalded and cooked to destroy enzymes for tender, richer bread.</td>
<td>Low rise; if not scalded, nontender product results.</td>
<td>Nontender bread due to lack of liquid, fat, and protein.</td>
</tr>
<tr>
<td>Sugar</td>
<td>Attracts and holds water. Acts as food source for yeast. Enables browning.</td>
<td>Low rise; overproduction of yeast due to too much food.</td>
<td>Low rise; too tight due to lack of food source for yeast.</td>
</tr>
<tr>
<td>Fat</td>
<td>Tenderizes because air gets between fat globules.</td>
<td>Low rise; oversoftens gluten network (rubbery), weakens gluten structure.</td>
<td>Low rise; tough, no tenderizing.</td>
</tr>
<tr>
<td>Salt</td>
<td>Firming effect</td>
<td>Low rise; overcontrol of yeast.</td>
<td>Open, coarse texture; negative impact on yeast.</td>
</tr>
</tbody>
</table>

MATERIALS AND METHODS

Each group will make a control for one or both of the recipes below and one to six variations by
cutting either the fat, sugar, yeast, liquid, salt, egg, or rising time in half.

Cake Recipe

Ingredients
1/8 cup butter
1/3 cup sugar
1/4 tsp. vanilla
1 egg
1/2 cup cake flour
1/2 tsp. baking powder
1/8 tsp. salt
1/6 cup milk

Methods
1. Preheat oven to 350°F (177°C).
2. Grease only the bottom of the cupcake pan and insert waxed paper to fit the bottom of each cup.
3. Stir together the flour, salt, sugar, and baking powder.
4. Place the butter and vanilla in a bowl. Set the electric mixer at medium speed. Cream until the mass is light and fluffy. The total creaming time may be as long as 5 to 7 minutes.
5. Add the beaten egg in two portions. Beat for 1 minute after each addition.
6. Add half the flour mixture and half the milk. Beat at medium speed for 1 minute. Add the last portion of flour and liquid. Blend for 30 seconds at medium speed. Beat for 3 more minutes at high speed.
7. Beat and push each batter into its designated spot in the cupcake pan.
8. Bake at 350°F (177°C) for approximately 25 minutes.
9. Cool for at least 5 minutes before removing the cake from the pan.

Yeast Bread Recipe

Ingredients
2 1/4 cup all-purpose flour
1 pkg. (.25 oz.) active dry yeast
1 tsp. salt
2 Tbsp. sugar
2 Tbsp. butter
1 beaten egg
1 cup hot water
Methods
1. Preheat the oven to 425°F (218°C).
2. Grease a muffin tin.
3. Mix together butter, sugar, and hot water. Allow to cool.
4. Add yeast, salt, egg, and flour. Mix.
5. Set aside until dough doubles in size.
6. Push the dough into the muffin tin and allow dough to double again.
7. Bake for 10 minutes.

RESULTS
Score for tenderness, rise, texture, and overall acceptability:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most unlike control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Most like control</td>
</tr>
</tbody>
</table>

Table 1. Comparison of Baked Goods After Recipe Change

<table>
<thead>
<tr>
<th>Ingredient Change or Control</th>
<th>Tenderness</th>
<th>Rise</th>
<th>Texture</th>
<th>Overall Acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
CONCLUSIONS

REFERENCES
Lab 24

Smoke Points of Edible Fats

OBJECTIVES
• To determine the smoke point of different fats

LAB INFORMATION
Fats are used in prepared foods to give textural quality (e.g., body, mouthfeel). They also are used as a medium for transferring heat when frying foods. In baked goods they are used for shortening, tenderizing, and leavening. They also are used in making emulsions.

MATERIALS AND METHODS

Ingredients
1 cup butter
1 cup shortening
1 cup lard
1 cup olive oil
1 cup peanut oil
1 cup canola oil

Equipment
Graduated cylinders
Thermometers
Metal measuring cups
Frying pans
Ring stands with clamps
Stopwatch

Methods
1. Place measured quantities of each fat (1 cup) into a clean, dry metal can from which the label has been removed.
2. Securely position the cans with clamps on the electric burners of a range. For each can, a ring stand and clamp can be used to position a thermometer so that the bulb is immersed in the fat but above the bottom of the can.
3. Heat the fat until it begins to smoke.
4. Record the temperature when the smoke is rising in a steady fashion.
5. Turn off the heat and allow the fat to cool undisturbed.
## RESULTS

<table>
<thead>
<tr>
<th>Fat/Oil</th>
<th>Smoke Point (°C or °F)</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butter</td>
<td></td>
<td></td>
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<tr>
<td>Canola oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olive oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peanut oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shortening</td>
<td></td>
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</tr>
</tbody>
</table>
REVIEW OF LITERATURE AND DISCUSSION
CONCLUSION

REFERENCES
Lab 25

Salad Dressings: Permanent and Temporary Emulsions

OBJECTIVE

• To prepare different kinds of salad dressings to understand emulsions

LAB INFORMATION

An emulsion is a mixture of two immiscible (unblendable) substances. One substance (the dispersed phase) is dispersed in the other (the continuous phase). Examples of emulsions include butter, margarine, and mayonnaise. In butter and margarine, a continuous lipid phase surrounds droplets of water (water-in-oil emulsion). Emulsions are part of a more general class of two-phase systems of matter called colloids. Although the terms *colloid* and *emulsion* are sometimes used interchangeably, the word *emulsion* tends to imply that both the dispersed and the continuous phases are liquids.

MATERIALS AND METHODS

Honey and Oil Dressing

*Ingredients and Methods*

1/4 cup lemon juice
1/4 cup honey
1/4 cup olive oil

Mix all ingredients in a container with a tight-fitting lid. Shake the contents together until thoroughly combined. Chill and serve over salad.

Vinegar and Oil Dressing

*Ingredients and Methods*

1/4 cup olive oil
1/4 cup red wine vinegar

Mix all ingredients in a container with a tight-fitting lid. Shake the contents together until thoroughly combined. Chill and serve over salad.
**Homemade French Dressing**  
*Ingredients and Methods*  
1/4 cup olive oil  
1/4 cup red wine vinegar  
1/4 cup tomato sauce  
1/4 cup sugar  
Mix all ingredients in a bowl with a hand beater until thoroughly combined. Chill and serve over salad.

**Homemade Mayonnaise**  
*Ingredients and Methods*  
2 eggs  
1 cup olive oil  
2 Tbsp. salt  
1/4 cup lemon juice  
Mix all ingredients in a bowl except the oil with a hand beater until thoroughly combined. Slowly add the oil and continue to beat until the product has whipped peaks. Chill and serve over salad.

**Store-Bought Mayonnaise**  
*Ingredients and Methods*  
Chill the mayonnaise and serve over salad.

**RESULTS**  
Evaluate each of the products using a 7-point scale:  
1 = very poor  
2 = poor  
3 = fair  
4 = medium  
5 = good  
6 = very good  
7 = excellent

<table>
<thead>
<tr>
<th>Table 1. Evaluation of Dressings</th>
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</thead>
<tbody>
<tr>
<td><strong>Quality Characteristic</strong></td>
</tr>
<tr>
<td>Appearance</td>
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<tr>
<td>Consistency or texture</td>
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<tr>
<td>Flavor</td>
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<tr>
<td>Overall eating quality</td>
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<tr>
<td>Type of emulsion? (permanent or temporary)</td>
</tr>
<tr>
<td>Honey and Lemon Oil</td>
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<tr>
<td>Appearance</td>
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<tr>
<td>Consistency or texture</td>
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<tr>
<td>Flavor</td>
</tr>
<tr>
<td>Overall eating quality</td>
</tr>
<tr>
<td>Type of emulsion? (permanent or temporary)</td>
</tr>
</tbody>
</table>
CONCLUSION

REFERENCES
Lab 26

Fat Replacement in Bakery Items

OBJECTIVE

- To evaluate the use of different types of fat and/or oil in recipes

LAB INFORMATION

In bakery items, fat tenderizes the product to produce a soft, moist crumb. When the tenderizing factor is manipulated, baked goods can be too soft or too tough. Both situations result in a low rise.

MATERIALS AND METHODS

Ingredients

1/8 cup butter (control group)
1/8 cup lard (group 1)
1/8 cup vegetable oil (group 2)
1/8 cup shortening (i.e., Crisco) (group 3)
1/4 cup Lighter Bake (by Sunsweet) (group 4)

Ingredients for Each Batch

2 eggs
1/6 cup milk
1 cup sugar
1/2 tsp. vanilla
1/2 cup flour, cake
1/2 tsp. baking powder

Equipment

Muffin tins
Muffin/cupcake papers

Methods

1. Preheat the oven to 350°F (177°C).
2. Each group will make a control cupcake and one variation, as follows.
   Control: 1/8 cup butter
   Group 1: 1/8 cup lard
Group 2: 1/8 cup vegetable oil
Group 3: 1/8 cup shortening (i.e., Crisco)
Group 4: 1/4 cup Lighter Bake (by Sunsweet) (group 4)
Group 5: No fat.

3. Sift together the flour, salt, and baking powder. Set the dry mix aside.
4. Use an electric mixer to combine the designated fat, sugar, and vanilla.
5. Add the eggs to the fat and vanilla and beat for 1 minute after each addition.
6. Add half the flour mixture and half the milk. Beat at medium speed for 1 minute.
7. Add the last portion of the flour and liquid. Blend for 30 seconds at medium speed and then beat for 3 more minutes at high speed.
8. Divide the batter into equal portions and pour into the paper cupcake holder. Make sure to label the cupcake holder with the group number or as the control.
9. Bake for 25 minutes at 350°F (177°C). After baking, cool for 5 minutes before removing from the cupcake pan. Compare the samples and record the results in Table 1.

RESULTS

Table 1. Comparison of Baked Products with Different Fats
Evaluate each of the following using a 9-point hedonic scale:
1 = like extremely
2 = like very much
3 = like moderately
4 = like slightly
5 = neither like nor dislike
6 = dislike slightly
7 = dislike moderately
8 = dislike very much
9 = dislike extremely

<table>
<thead>
<tr>
<th></th>
<th>Appearance</th>
<th>Texture</th>
<th>Volume</th>
<th>Tenderness</th>
<th>Flavor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control: Butter</td>
<td></td>
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<tr>
<td>Group 1: Lard</td>
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<td>Group 2: Vegetable oil</td>
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<tr>
<td>Group 3: Shortening</td>
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<tr>
<td>Group 4: Lighter bake</td>
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<td>Group 5: No added fat</td>
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</table>
Sugar and Sugar Substitutes Labs
Lab 27

Sugar Content of Soft Drinks

OBJECTIVES
- To determine the amount of sugar in various popular soft drinks
- To test the accuracy of the Nutrition Facts panel with regard to the sugar content of soft drinks

LAB INFORMATION
Soft drinks are often sweetened with high fructose corn syrup, which is 55% fructose and 45% glucose. Obesity is often blamed on excessive sugar consumption. One theory is that the added calories that are responsible for weight gain are associated with high sugar intake. Others suggest that high fructose corn syrup disturbs the process of cellular metabolism.

MATERIALS AND METHODS

Materials
- 5 different varieties of regular soft drinks (do not use diet or sugar-free soda)
- 5 small or medium saucepans
- Spoons for stirring
- Small kitchen scale (able to measure in grams)

Methods
1. Pour a can of soda into the saucepan.
2. Heat the soda to a boil.
3. Continue boiling until all the liquid has evaporated.
4. Once the liquid has evaporated completely, a sticky syrup should remain.
5. Transfer the syrup to a scale. Measure its weight in grams. Record this weight in Table 1.
6. Find the grams of sugar on the soda’s Nutrition Facts panel. Record this weight in Table 1.
7. Repeat this procedure for each soft drink variety.

RESULTS

<table>
<thead>
<tr>
<th>Soda Variety</th>
<th>Weight (g) of Syrup</th>
<th>Weight (g) of Sugar on Nutrition Facts Panel</th>
</tr>
</thead>
<tbody>
<tr>
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</table>
Lab 28

Sugar Substitutes in Sponge Cake

OBJECTIVES

- To create a high-quality baked product (a sponge cake muffin) using a sugar substitute
- To reduce the calorie content of a baked product through the use of sugar substitutes

LAB INFORMATION

Sugar substitutes can be part of an overall strategy to reduce the calories consumed in the American diet. Polyols, a type of monosaccharide, are a common sugar substitute. They are commonly used in chewing gums and other products for added sweetness. Polyols vary in sweetness compared to sugar, but yield less energy than sugar because they are not fully absorbed in the intestine.

MATERIALS AND METHODS

Ingredients for Each Batch
1/4 tsp. vanilla
1/2 egg
1/2 cup cake flour
1/2 tsp. baking powder
1/8 tsp. salt
1/6 cup milk

Read the substitution equivalent for sugar on each sugar-substitute package. Determine how much you should use if you needed to replace 1/2 cup of sugar.

Recipe 1: Use 100% sweetener substitute of your choice: Splenda (sucralose), Equal (aspartame), or Sweet N Low (saccharin). This will replace the 1/2 cup of sugar in the recipe.

Recipe 2: Use 50% of the sweetener substitute of your choice and 1/4 cup sugar.

Recipe 3: Use 75% of the sweetener substitute of your choice and 1/8 cup sugar.

Recipe 4: Use 0% of the sweetener substitute of your choice and 1/2 cup of sugar.

Methods
1. Preheat the oven to 350°F (177°C).
2. Measure out the polyol and sugar needed for each variation for a total of four cupcakes per polyol type.
3. Line the cupcake pan with cupcake liners. Label each liner based on the polyol type: “All
Polyol,” “1/2 Polyol,” “1/3 Polyol,” and “1/4 Polyol.”

4. Sift together the flour, baking powder, and salt. Set the dry mix aside.
5. Place the shortening and vanilla into a bowl. Mix at medium speed until well blended.
6. Add the beaten egg in two portions. Beat for 1 minute after each addition.
7. Add half the flour mixture and half the milk. Beat at medium speed for 1 minute.
8. Add the remaining flour and milk. Blend for 30 seconds at medium speed, and then for 3 more minutes at high speed.
10. Split the batter into four separate bowls. Add the polyol and sugar in the quantities listed in the recipe for the four variations.
11. Place each batter into its respective cupcake liner in the pan.
12. Bake at 350°F (177°C) for 25 minutes.
13. Cool for at least 5 minutes prior to removing the cakes from the cupcake pan.
14. Cut each cupcake in half. Measure its height. Record the appearance, crumb, and other observations for each polyol variation in Table 1.
15. Determine the number of calories in each polyol variation. Record the calories in Table 1.

RESULTS
Score each sensory characteristic using a 7-point scale:

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>excellent</td>
</tr>
<tr>
<td>6</td>
<td>very good</td>
</tr>
<tr>
<td>5</td>
<td>good</td>
</tr>
<tr>
<td>4</td>
<td>medium</td>
</tr>
<tr>
<td>3</td>
<td>fair</td>
</tr>
<tr>
<td>2</td>
<td>poor</td>
</tr>
<tr>
<td>1</td>
<td>very good</td>
</tr>
</tbody>
</table>

Table 1. Evaluation of Polyol Baked Goods

<table>
<thead>
<tr>
<th>Sensory Characteristic</th>
<th>100% Polyol</th>
<th>50% Polyol</th>
<th>33.3% Polyol</th>
<th>25% Polyol</th>
<th>Control (all sugar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consistency/texture</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Tenderness</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flavor</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Overall quality</td>
<td></td>
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<td></td>
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<tr>
<td>Rise (height in cm)</td>
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<td></td>
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<tr>
<td>Energy (calories)</td>
<td></td>
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</tr>
</tbody>
</table>
REVIEW OF LITERATURE AND DISCUSSION
CONCLUSION

REFERENCES
Lab 29

Caramel Candy

OBJECTIVE

• To explore differences between types of candy
• To describe the texture and browning of caramel

LAB INFORMATION

Candies produced from the manipulation of boiled sugar solutions are classified as either crystalline or amorphous. Crystalline candies are soft, smooth, and creamy. Their sugar crystals are so tiny that they cannot be felt by the tongue. Fudge, panache, divinity, and creams are all types of crystalline candies. In contrast, noncrystalline (amorphous) candies are, as their name implies, without form. Amorphous candies have a higher concentration of sugar than crystalline candies. Their syrups are so viscous that sugar crystals cannot form. They come in a variety of forms, such as chewy caramels or hard brittles.

MATERIALS AND METHODS

Ingredients

1 cup heavy cream
1 cup sugar
1/2 cup corn syrup
1/4 tsp. salt
4 Tbsp. butter
1/2 tsp. vanilla

Variations: Add nuts or chocolate.

Equipment

Candy thermometer

Methods

1. Grease a 10-inch square pan or line one with waxed paper.
2. Put all ingredients except the butter and vanilla into a saucepan.
3. Stir with a wooden spoon over a medium heat until the sugar melts.
4. Add the butter and stir until it melts.
5. Place the candy thermometer into the saucepan and bring the heat up until it reads 250°F (121°C) without stirring.
6. Add the vanilla. When the mixture firms up, remove it from the heat and pour it into the 10-inch pan.
7. Allow the mixture to cool and harden.
8. Cut the caramel into squares (1 inch is the standard size for caramel).

RESULTS

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does the corn syrup prevent the crystallization of the candy?</td>
<td></td>
</tr>
<tr>
<td>Based on the use of cream and sugar, what type of browning occurs in this candy?</td>
<td></td>
</tr>
<tr>
<td>How does stirring prevent the formation of a grainy texture?</td>
<td></td>
</tr>
<tr>
<td>Is this type of candy amorphous or crystalline? Explain.</td>
<td></td>
</tr>
</tbody>
</table>
CONCLUSIONS

REFERENCES
Beverage Labs
Lab 30

Make Your Own Sports Drink

OBJECTIVE
- To make a homemade sports drink
- To evaluate the nutritional content of sports drinks

LAB INFORMATION

Sports drinks have been used for the last several decades as a means to restore glycogen stores and replace fluid, sodium, and potassium lost in sweat during prolonged, intense exercise. Consumption of carbohydrates, fluids, and electrolytes may help delay the onset of fatigue by providing the body with an alternate glucose supply, which spares muscle glycogen.

METHODS AND MATERIALS

Ingredients
- 5 lbs. sugar
- 2 shakers of potassium (salt substitute)
- 1 cup salt
- Water
- Food coloring kit
- Milligram scale
- Several commercial sport drinks (e.g., Gatorade and PowerAde)

Methods
1. Select one of the commercial sports drinks. Mix sugar, sodium, and potassium with 12 oz. water according to your conversion calculations, which are based on the amounts of sugar, sodium, potassium, and water listed on the label of the commercial sports drink. Record these values in Table 1.
2. Add 2 drops of any color food coloring.
3. Sample the homemade sports drink and rank its taste on scale of 1 to 5 where 1 = like and 5 = dislike.
4. Select another commercial sports drink and repeat.
RESULTS

Table 1. Comparison of Homemade Sports Drinks

<table>
<thead>
<tr>
<th>Sports Drink Replicated</th>
<th>Sugar</th>
<th>Sodium</th>
<th>Potassium</th>
<th>Water</th>
<th>Taste (on a scale of 1 to 5)</th>
</tr>
</thead>
<tbody>
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Lab 31

Coffee and Tea: Sensory Evaluation

OBJECTIVES

- To perform a sensory evaluation of different coffees and teas
- To describe the nutritional composition of coffee and tea

LAB INFORMATION

Coffee and tea are enjoyed around the world. Each contains compounds that are associated with potential health benefits. Coffee contains more than 1,000 different compounds. One class of phytonutrients of interest in coffee is phenolic acids. Chlorogenic acids, caffeine, and diterpenes are other important bioactive compounds in coffee. Chlorogenic acids are a family of esters that are formed between quinic acid and trans-cinnamic acids (both of which are dietary phenols).

Tea also is composed of a wide variety of compounds, including phytonutrients called polyphenols. Polyphenols, specifically catechins, are thought to be responsible for the beneficial health effects of tea. White and green tea have high concentrations of the phytonutrients epicatechin (EC), epigallocatechin (EGC), epicatechin gallate (ECG), and epigallocatechin gallate (EGCG). Oolong and black teas are good sources of theaflavins and thearubigins, which are complex polyphenols.

MATERIALS AND METHODS

Ingredients

Several brands of caffeinated tea
Several brands of decaffeinated tea
Several brands of caffeinated coffee, brew and instant
Several brands of decaffeinated coffee, brew and instant

Equipment

Coffee maker

Methods

1. In Table 1, record the beverage, the caffeine content, any phytonutrients that may be present, any possible health benefits, and any potential health warnings. This information
may be found on the packaging or in outside resources.

2. Perform a sensory evaluation. Record your scores in Table 2.

RESULTS

Table 1. Caffeine Content, Phytonutrient Content, and Health Effects of Teas and Coffees

<table>
<thead>
<tr>
<th>Beverage</th>
<th>Caffeine (mg)</th>
<th>Phytonutrients</th>
<th>Health Benefits</th>
<th>Health Warnings</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

Table 2. Tea and Coffee Sensory Sheet

Evaluate each of the following based on a 5-point scale:

1 = unacceptable
2 = marginal
3 = fair, 4 = good
5 = excellent

<table>
<thead>
<tr>
<th>Product</th>
<th>Dry Fragrance</th>
<th>Wet Aroma</th>
<th>Acidity</th>
<th>Flavor/Depth</th>
<th>Aftertaste</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

149
REVIEW OF LITERATURE AND DISCUSSION
CONCLUSIONS

REFERENCES
Lab 32

Effect of Caffeine on Blood Pressure, Heart Rate, and Reaction Time

OBJECTIVE
- To observe the effect of caffeine on blood pressure, heart rate, and reaction time

LAB INFORMATION
Caffeine is a natural stimulant that elicits a number of physiological and psychological effects in the body. Its stimulating properties result from interactions with the nervous, respiratory, and circulatory systems. Approximately 90% of adults in North America consume a caffeinated product each day (average intake = 168 mg/day), and 80% of the world population consumes caffeine on a daily basis. Caffeine is a complex molecule containing more than 1,000 different compounds, including carbohydrates, lipids, nitrogenous compounds, vitamins, minerals, alkaloids, and phenolic compounds. It can be found in many common foods and beverages, including coffee, tea, soft drinks, chocolate, medications, and dietary supplements. Table 1 provides a list of common caffeine-containing items and the doses they deliver. For example, an 8 oz. cup of coffee contains approximately 133 mg of caffeine, but may contain anywhere from 102 to 200 mg.

After caffeine is consumed, it is absorbed rapidly and distributed throughout the body, reaching its highest concentration within 30 to 40 minutes. Caffeine is eliminated from the body within 6 to 12 hours; however, elimination time is longer for pregnant women and shorter for smokers. Caffeine has been shown to have beneficial effects on sports performance, particularly in endurance-related activities. Caffeine may enhance endurance by stimulating fatty acid release. Performance benefits attributed to caffeine include physical endurance, reduction of fatigue, and enhanced mental alertness and concentration. Despite the potential benefits, habitual caffeine consumption is also known to cause dependency and adverse reactions, even at low doses.

Symptoms may include tachycardia, palpitations, insomnia, restlessness, nervousness, tremor, headache, abdominal pain, nausea, vomiting, diarrhea, and diuresis. The ingestion of 15–30 mg of caffeine per kg of body weight has resulted in significant toxicity; however, moderate consumption equivalent to 3 to 4 cups of coffee per day may be good for health.

Hypertension due to caffeine consumption is a controversial topic. It has been established that
short-term consumption of high doses of caffeine raises blood pressure in both normotensive and hypertensive individuals. A 200–250 mg dose of caffeine (equivalent to 2 to 3 cups of coffee) has been found to increase systolic blood pressure by 3–14 mm Hg and to increase diastolic blood pressure by 4–13 mg Hg in normotensive individuals. Although coffee intake slightly increases blood pressure, studies have found that there is no association between the incidence of hypertension in the general population and that sensitivity to caffeine varies among individuals.

Table 1. Caffeine Content of Beverages, Foods, and Over-the-Counter Drugs

<table>
<thead>
<tr>
<th>Caffeine Source</th>
<th>Average Caffeine Content (mg)</th>
<th>Range (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beverages</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Coffee</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brewed, drip method (8 oz.)</td>
<td>133</td>
<td>90–200</td>
</tr>
<tr>
<td>Instant (8 oz.)</td>
<td>93</td>
<td>27–173</td>
</tr>
<tr>
<td>Decaffeinated, brewed or instant (8 oz.)</td>
<td>5</td>
<td>3–12</td>
</tr>
<tr>
<td>Espresso (single 1 oz. shot)</td>
<td>40</td>
<td>30–90</td>
</tr>
<tr>
<td>Decaf espresso (single 1 oz. shot)</td>
<td>4</td>
<td>—</td>
</tr>
<tr>
<td>Latte (16 oz.)</td>
<td>150</td>
<td>—</td>
</tr>
<tr>
<td>Cappuccino (12 oz.)</td>
<td>75</td>
<td>—</td>
</tr>
<tr>
<td>Starbucks Grande Reg Coffee (16 oz.)</td>
<td>320</td>
<td>—</td>
</tr>
<tr>
<td>Starbucks Caramel Frappuccino (16 oz.)</td>
<td>100</td>
<td>—</td>
</tr>
<tr>
<td>Starbucks Mocha Frappuccino Chilled Coffee Drink (9.5 oz. bottle)</td>
<td>75</td>
<td>—</td>
</tr>
<tr>
<td>Dunkin Donuts Reg Coffee (16 oz.)</td>
<td>206</td>
<td>—</td>
</tr>
<tr>
<td>Dunkin Donuts Iced Coffee (16 oz.)</td>
<td>70</td>
<td>—</td>
</tr>
<tr>
<td>Dunkin Donuts Coffee Coolatta (16 oz.)</td>
<td>16</td>
<td>—</td>
</tr>
<tr>
<td><strong>Tea (8 oz.)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>86</td>
<td>23–110</td>
</tr>
<tr>
<td>Oolong</td>
<td>37</td>
<td>12–55</td>
</tr>
<tr>
<td>Green</td>
<td>30</td>
<td>8–60</td>
</tr>
<tr>
<td>White</td>
<td>10</td>
<td>6–25</td>
</tr>
<tr>
<td>Iced, brewed</td>
<td>35</td>
<td>9–50</td>
</tr>
<tr>
<td>Iced, Snapple, flavored (16 oz.)</td>
<td>42</td>
<td>—</td>
</tr>
<tr>
<td>Iced, Arizona, black (16 oz.)</td>
<td>32</td>
<td>—</td>
</tr>
<tr>
<td>Iced, Nestea (12 oz.)</td>
<td>26</td>
<td>—</td>
</tr>
<tr>
<td><strong>Colas and Soft Drinks (12 oz.)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular Coca-Cola</td>
<td>45</td>
<td>30–46</td>
</tr>
<tr>
<td>Regular Pepsi</td>
<td>37</td>
<td>30–46</td>
</tr>
<tr>
<td>Diet Cola</td>
<td>47</td>
<td>2–58</td>
</tr>
<tr>
<td>Dr. Pepper</td>
<td>41</td>
<td>—</td>
</tr>
<tr>
<td>Mountain Dew</td>
<td>55</td>
<td>—</td>
</tr>
<tr>
<td>Sprite, 7-up, Fresca, Sunkist, Root Beer</td>
<td>0</td>
<td>—</td>
</tr>
<tr>
<td>Jolt</td>
<td>72</td>
<td>—</td>
</tr>
<tr>
<td><strong>Energy Drinks</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red Bull (8.3 oz.)</td>
<td>80</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------</td>
<td>-----</td>
</tr>
<tr>
<td>Monster (16 oz.)</td>
<td>160</td>
<td>—</td>
</tr>
<tr>
<td>Rockstar (8 oz.)</td>
<td>80</td>
<td>—</td>
</tr>
<tr>
<td>5 Hour Energy (2 oz.)</td>
<td>138</td>
<td>—</td>
</tr>
<tr>
<td>NOS (16 oz.)</td>
<td>260</td>
<td>—</td>
</tr>
<tr>
<td>Amp (8.4 oz.)</td>
<td>74</td>
<td>—</td>
</tr>
<tr>
<td>Full Throttle (16 oz.)</td>
<td>144</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Foods</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chocolate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot cocoa (5 oz.)</td>
<td>5</td>
<td>2–20</td>
</tr>
<tr>
<td>Chocolate milk (8 oz.)</td>
<td>8</td>
<td>—</td>
</tr>
<tr>
<td>Milk chocolate (1 oz.)</td>
<td>6</td>
<td>1–15</td>
</tr>
<tr>
<td>Dark chocolate (1 oz.)</td>
<td>20</td>
<td>5–35</td>
</tr>
<tr>
<td>Chocolate syrup (2 T.)</td>
<td>5.4</td>
<td>—</td>
</tr>
<tr>
<td>Haagen-Dazs Coffee Ice-Cream (1 cup)</td>
<td>58</td>
<td>—</td>
</tr>
<tr>
<td>Dannon Coffee Yogurt</td>
<td>45</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Over-the-Counter Drugs</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold Remedies (Standard Dose)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dristan</td>
<td>0</td>
<td>—</td>
</tr>
<tr>
<td>Triaminicin, Coryban-D</td>
<td>30</td>
<td>—</td>
</tr>
</tbody>
</table>

| Pain Relievers (Standard Dose) |       |     |
| Excedrin                       | 130   | —   |
| Midol, Anacin                  | 64    | —   |
| Aspirin, plain (any brand)     | 0     | —   |

| Stimulants                     |       |     |
| NoDoz, Vivarin, Caffedrin      | 200   | 100–200|

| Weight-Control Aids (daily dose) |       |     |
| Prolamine                       | 280   | —   |
| Dexatrim, Dietac                | 200   | —   |

**MATERIALS AND METHODS**

**Equipment**
- Instant coffee (calibrate dry amount to provide 200 mg caffeine per 6 oz. liquid coffee)
- Blood pressure cuff
- Reaction timer

**Methods**
1. Sit quietly in your seat for a few minutes. Take a resting heart rate after you relax and quiet yourself by placing two fingers either on the inside of wrist or on the side of the neck just under the bend of the jawbone. Move your fingers until you feel a pulse. Once you have located your pulse, use a watch to count off 15 seconds. Count how many times you feel your pulse during that 15-second interval and multiply that by four to calculate beats per minute. Record your resting heart rate in the Results section. **Alternative:** some automated blood pressure measuring devices will also record heart rate.
2. Have a resting blood pressure measurement taken while sitting. Use an automated blood
3. Measure your reaction time using the reaction timer. Have a partner press on the small pad of the reaction timer to trigger the light signal. As soon as you observe the light signal, hit the large pad in response and record the time indicated on the machine. Follow this procedure two or three times until you feel comfortable with it. Repeat this procedure three more times and record each time using the 1/100 of a second setting. Record these values and calculate the mean of the three trials in the Results section.

4. Repeat step 3 but use the sound signal setting.

5. Drink two 6-ounce cups of coffee (200 mg of caffeine) within a 10-minute period. Record the amount of coffee you consumed in Results section. Determine the amount of caffeine consumed.

Alternative: Other oral delivery forms of caffeinate may be substituted for coffee, including over-the-counter caffeine tablets, which are generally available in 200 mg doses. Other caffeinated drinks, including some soft drinks, contain high doses of caffeine. If caffeinated candy products and gums are used, they may need to be special ordered in advance.

6. Forty-five minutes after consuming the caffeine, measure your reaction time again using the procedure in steps 3 and 4.

7. Determine your heart rate and blood pressure as you did in steps 1 and 2. Record these measurements in Results section.

8. Once everyone has completed the lab, fill in the group data table (see Table 2).

### RESULTS

1. Precaffeine heart rate: __________ beats per minute
2. Precaffeine blood pressure: __________ mm Hg
3. Reaction time before caffeine (to the closest hundredth of a second):

<table>
<thead>
<tr>
<th>Light Signal</th>
<th>Sound Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial 1:</td>
<td>Trial 1:</td>
</tr>
<tr>
<td>Trial 2:</td>
<td>Trial 2:</td>
</tr>
<tr>
<td>Trial 3:</td>
<td>Trial 3:</td>
</tr>
<tr>
<td>Mean:</td>
<td>Mean:</td>
</tr>
</tbody>
</table>

4. Caffeine delivery system used (coffee, tablet, candy/gum, soft drink, energy drink):

5. Dose of caffeine consumed: ______________

6. Reaction time after caffeine consumption (to the closest hundredth of a second):

<table>
<thead>
<tr>
<th>Light Signal</th>
<th>Sound Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial 1:</td>
<td>Trial 1:</td>
</tr>
<tr>
<td>Trial 2:</td>
<td>Trial 2:</td>
</tr>
<tr>
<td>Trial 3:</td>
<td>Trial 3:</td>
</tr>
<tr>
<td>Mean:</td>
<td>Mean:</td>
</tr>
</tbody>
</table>

7. Postcaffeine heart rate: __________ beats per minute
8. Postcaffeine blood pressure: __________ mm/Hg
Table 2. Group Data Table

<table>
<thead>
<tr>
<th>Student</th>
<th>Usual Caffeine Intake: Light, Moderate, or Heavy*</th>
<th>BP Before Caffeine</th>
<th>BP After Caffeine</th>
<th>HR Before Caffeine</th>
<th>HR After Caffeine</th>
<th>Light Signal Reaction Before Caffeine</th>
<th>Light Signal Reaction After Caffeine</th>
<th>Sound Signal Reaction Before Caffeine</th>
<th>Sound Signal Reaction After Caffeine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td></td>
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</tbody>
</table>

*Heavy = 3–4 cups or more/day; Moderate = 1–2 cups/day; Light = some, but not daily.
DISCUSSION AND REVIEW OF LITERATURE QUESTIONS

1. How did you classify your usual level of caffeine consumption, heavy, moderate, or light? Do you think your regular daily caffeine intake affected your reaction time in today’s lab? Did students within the class appear to have different reactions to caffeine based on their usual intake?

2. What was the effect of caffeine consumption on your heart rate and blood pressure? Is this what you expected?

3. What was the effect of caffeine on heart rate and blood pressure on the class as a whole? Is this what you expected?

4. Discuss how caffeine affected your reaction to sound and light. Is this what you expected?

5. What was the effect of caffeine on light and sound reaction times on the class as a whole? Is this what you expected?

6. Find out more about caffeine by doing an online search. Explain how caffeine causes its effects in the body, including mention of its effect on adenosine receptors in the brain and body.
7. List the pros and cons of caffeine ingestion, including mention of the side effects of excessive caffeine intake.

8. Does caffeine affect one’s fluid status? If so, how does fluid status (how hydrated you are) affect blood pressure and heart rate, especially during exercise/physical activity?

9. In general, do you think the dosage of caffeine makes a difference on reaction time? If so, please describe how so and in what direction.

10. What were the strengths of this experiment’s design and execution?

11. What were the limitations of this experiment’s design and execution?
Lab 33

Comparison of Macronutrients and Micronutrients in Oral Supplements

OBJECTIVE

• To compare the taste of different oral formulary supplements
• To evaluate the nutrient content of oral formulary supplements

LAB INFORMATION

As future dietetic professionals, you may be in a position to offer a client a formulary supplement beverage. These beverages are meant to fortify the diet.

MATERIALS AND METHODS

Ingredients

Oral supplements of your choice: Ensure, Ensure Plus, Carnation Instant Breakfast, Jevity, Glucerna, Boost, Boost Glucose Control and flavor variations of these (vanilla, chocolate and strawberry)

Methods

1. Prepare samples of each supplement.
2. Taste each supplement, making sure to clean the palate with a sip of water between tastings.
3. Complete the sensory evaluation chart in Table 1. Use descriptive words to describe each sensory component.
4. Fill in Table 2 to compare the nutrient composition of the supplements.

RESULTS

Table 1. Sensory Evaluation Chart

<table>
<thead>
<tr>
<th>Product</th>
<th>Consistency</th>
<th>Smell</th>
<th>Aftertaste</th>
<th>Appearance</th>
<th>Taste</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

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Table 2. Oral Supplement Nutrient Composition Comparison Chart

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Oral Supplement Nutrient Composition (compare only those nutrients on the label)</th>
<th>Oral Supplement Nutrient Composition (compare only those nutrients on the label)</th>
<th>20 year old male DRI</th>
<th>Difference + or -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td></td>
<td>2,400–3,000 (sedentary-active)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calories from fat</td>
<td></td>
<td>20–30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total fat</td>
<td></td>
<td>&lt; 80 g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturated fat</td>
<td></td>
<td>&lt; 20 g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trans fats</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyunsaturated fat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monounsaturated fat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cholesterol</td>
<td></td>
<td>&lt; 300 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium</td>
<td></td>
<td>1,500 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium</td>
<td></td>
<td>4,700 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total carbohydrates</td>
<td></td>
<td>270–390 g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dietary fiber</td>
<td></td>
<td>38 g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugars</td>
<td></td>
<td>56 g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proteins</td>
<td></td>
<td>900 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td></td>
<td>90 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin C</td>
<td></td>
<td>1,000 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td></td>
<td>8 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin D</td>
<td></td>
<td>5 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin E</td>
<td></td>
<td>15 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin K</td>
<td></td>
<td>120 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thiamin</td>
<td></td>
<td>1.2 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riboflavin</td>
<td></td>
<td>1.3 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Niacin</td>
<td></td>
<td>16 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin B₆</td>
<td></td>
<td>1.3 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Folate</td>
<td></td>
<td>400 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin B₁₂</td>
<td></td>
<td>2.4 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pantothenic Acid</td>
<td></td>
<td>5 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phosphorous</td>
<td></td>
<td>700 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iodine</td>
<td></td>
<td>150 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnesium</td>
<td></td>
<td>400 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td></td>
<td>11 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selenium</td>
<td></td>
<td>55 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td>900 µg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manganese</td>
<td></td>
<td>2.3 mg</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromium</td>
<td>35 µg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molybdenum</td>
<td>45 µg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloride</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Choline</td>
<td>550 mg</td>
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REVIEW OF LITERATURE AND DISCUSSION
Culturally Competent Recipes
**America, Southeastern**
Courtesy of Lynn Thomas, DrPH, RD, CNSD

**Cornbread**

*Ingredients*
- 1 1/2 cups cornmeal (white or yellow)
- 3/4 cup flour
- 1 1/2 tsp. baking powder
- 1 1/2 tsp. salt
- 2 or 3 Tbsp. sugar
- 1 3/4 cups buttermilk
- 1 egg (beaten)
- 2 Tbsp. oil

*Cooking Instructions*
Mix together. Bake at 425°F (218°C) for 20 to 25 minutes in a greased skillet.

**Chinese**
Courtesy of Gary S. Chong, PhD, and Katherine L. Fernald, MS, RD, LDN

**Chinese Chicken Soup**

*Ingredients*
- 1 package wood ears (mok yee) 1 oz.
- 10 to 12 pieces Chinese dried mushrooms
- 3 to 4 lbs. young skinless chicken
- 8 oz. ginger (peeled and sliced in 1/4" pieces)
- 3 Tbsp. liquor (whiskey)
- 8 to 10 pieces red dried dates
- 2 1/2 qt. water
- 1 Tbsp. Hawaiian or rock salt

*Cooking Instructions*
Soak wood ears until soft. Rinse, dry, and discard hard parts, and then cut into bite-size pieces and set aside. Cut chicken into 2-inch chunks and set aside. Soak dried mushrooms until soft. Rinse, dry, cut off, and discard stems. Cut mushrooms into bite-sized pieces and set aside. In a large pot, stir fry the ginger and chicken in 1 tsp. of oil on high heat for 5 to 10 minutes, or until lightly brown. Add water to cover chicken and bring to boil. Add dried dates, wood ears, mushrooms, liquor, and Hawaiian salt (to taste, about 1 Tbsp.). Bring back to boil, then reduce heat to medium and cook for 10 minutes. Reduce heat and simmer for 45 minutes. or more until chicken is tender. Serve hot.
Serves 8–10 adults.
Cajun Creole
Courtesy of Colette G. Leistner, PhD, RD, and Simone Camel, MS, RD

Catfish Sauce Piquant (Cajun Creole)

*Ingredients*
2 lb. catfish fillets  
1/4 cup canola oil  
2 cups chopped celery  
2 cups chopped onion  
1 cup chopped green pepper  
Salt and pepper to taste  
1 bay leaf  
2 cloves minced garlic  
1 can (14.5 oz.) diced tomatoes  
2 cups water  
4 thin slices lemon  
1/2 cup chopped parsley  
1/2 cup chopped green onion

*Cooking Instructions*
Cut fillets into eight pieces. Sauté celery, onion, green pepper, and garlic in oil until vegetables are tender. Add diced and crushed tomatoes, salt, pepper, bay leaf, and water. Simmer 20 to 30 minutes over low heat. Add catfish and cook 10 minutes. Add lemon, parsley, and green onion, and cook until fish flakes easily with a fork. Remove bay leaf and lemon slices. Serve over rice.

Vegetarian
Courtesy of Carolyn King, RD

Special K Roast

*Ingredients*
6 cups Special K cereal, coarsely crushed  
2 lbs. firm tofu, drained  
1 1/2 tsp. garlic salt  
2 tsp. onion powder  
3/4 cup chopped walnuts  
1/2 tsp. garlic powder  
3/4 cup soy mayonnaise  
1 Tbsp. vegetarian beef- or chicken-style seasoning  
1 large onion, chopped and sautéed

*Cooking Instructions*
Combine in blender 1 lb. tofu, mayonnaise, garlic salt, onion powder, and garlic powder; blend smooth. In a large bowl, mash remaining 1 lb. tofu with beef/chicken-style seasoning. Add sautéed onion and walnuts and blended mixture and crushed cereal. Mix thoroughly. Bake
uncovered in a 13 × 9 inch pan (prepared with cooking spray) at 350°F (177°C) until golden brown, about 1 hour. Serve roast warm with gravy or cold in a sandwich.

**Lentil Stew**

*Ingredients*
- 1 lb. brown lentils
- 1 cup pearl barley
- 3 large carrots, diced
- 3 large ribs of celery, diced
- 1 can (6 oz.) tomato paste
- 5–6 cups vegetable broth
- 1 tsp. oregano
- Fresh chopped cilantro for garnish
- 1 large bell pepper, diced
- 1 large onion, diced
- 3 cloves garlic, minced
- 1 can (28-oz.) fire-roasted tomatoes
- 1/4 cup soy sauce
- 1 tsp. cumin
- 2 bay leaves
- 1/4 cup nutritional yeast flakes (optional)

*Cooking Instructions*
Sauté onions and garlic. Add remaining vegetables, oregano, cumin, lentils, barley, and broth/
Bring to a boil and simmer covered until barley and lentils are tender (about 45 to 60 minutes). Then add canned tomatoes, tomato paste, nutritional yeast flakes, and soy sauce; simmer another 15 to 30 min. Add more or less liquid depending on desired thickness. Add salt to taste.

**Garbanzo–Oat Burger Patties**

*Ingredients*
- 3 cups quick oats
- 1 1/2 cups water
- 2 onions, quartered
- 1 tsp. sage
- 1 can (15-oz.) garbanzo beans, rinsed and drained
- 3 cups walnuts
- 3/4 cup soy milk
- 3 Tbsp. soy sauce
- 2 tsp. salt

*Cooking Instructions*
Blend all ingredients (except oats) in a blender until smooth. Pour mixture over oats and mix well. Let set 30 minutes or overnight, covered. Using the back of a spatula and butter knife, form patties onto a cookie sheet prepared with cooking spray. Bake at 350° (177°C) on the lowest rack
in the oven for 20 minutes, then flip and bake another 15 to 20 minutes. Serve as a burger or
topped with creamy mushroom sauce/gravy. Patties can be frozen to be used as needed. Recipe
makes 24 large patties.

**Creamy Fettuccini**

*Ingredients*
- 8 oz. whole wheat fettuccini noodles
- 4 cloves garlic, minced
- 1 tsp. dried basil
- 1 box (12.5 oz.) silken tofu
- 1 large bunch of kale or spinach
- 1 tsp. salt
- 1 tsp. onion powder
- 2 Tbsp. flour
- 2 cups plain soy or rice milk
- 1/3 cup fresh parsley, chopped

*Cooking Instructions*
Cook noodles in salted water until tender, then drain. Sauté chopped kale/spinach and garlic in a
little olive oil or water for about 2 minutes. Add salt, basil, onion powder, and parsley. Blend
tofu, milk, and flour in blender and pour into spinach/kale mixture. Cook 2 minutes more. Toss
with noodles and garnish with diced pimentos, if desired. This dish is also good cold.

**Tofu–Spinach Lasagna**

*Ingredients*
- 1 box whole wheat lasagna noodles
- 1 lb. firm tofu, drained and pressed between paper towel to remove excess moisture
- 10 oz. frozen chopped spinach, thawed and squeezed to remove excess moisture
- 3/4 tsp. garlic salt
- 2 tsp. onion powder
- 2 cups spaghetti sauce
- 1/2 tsp. garlic powder
- 3/4 cup cashew–pimento sauce
- 1/3 cup TVP (optional)

*Cooking Instructions*
Cook lasagna noodles according to package directions and set aside. Combine spaghetti sauce
and TVP, set aside. Add garlic salt, garlic powder, and onion powder to tofu in a large bowl and
mash well using a potato masher. Add spinach and 1/2 to 3/4 cups cashew–pimento sauce; mix
well. Layer in a 13 × 9 inch pan: 1 cup spaghetti sauce mixture, lasagna noodles, tofu–spinach
mixture, lasagna noodles, tofu–spinach mixture, lasagna noodles, then remaining spaghetti sauce
mixture. Bake at 350° (177°C) for 45 minutes. Drizzle the top with more cashew–pimento sauce
and sprinkle with dried basil. Bake another 10 minutes. Delicious reheated the next day.
Matzo Balls

*Ingredients*
6 eggs  
1 1/2 tsp. baking powder  
1 1/2 cups Matzo meal

*Cooking Instructions*
Combine all ingredients. Form into walnut-size balls. Place in boiling water. Boil for 30 to 40 minutes. Yields 20 balls.

Blinetz Soufflé

*Ingredients*
12 blintzes  
1/4 lb. margarine  
1 1/2 cups sour cream  
4 eggs (beaten)  
1 tsp. salt  
1/2 cup sugar  
1/2 cup orange juice (optional)  
1 tsp. vanilla extract

*Cooking Instructions*
1. Melt margarine in a glass dish.  
2. Mix sour cream, eggs, salt, sugar, vanilla extract and orange juice.  
3. Add margarine and mix well.  
4. Pour mixture over blintzes in glass baking dish.  
5. Bake for 45 to 55 minutes until brown at 350°F (177°C).

Breakfast Blintzes Casserole

*Ingredients*
2 Tbsp. unsalted butter  
1 package (6) frozen blintzes  
3 eggs  
1 cup sour cream (divided use)  
1/3 cup sugar  
1/4 cup orange juice  
1/2 teaspoon vanilla extract  
1/4 tsp. salt  
1 Tbsp. sugar mixed with 2 tsp. cinnamon  
2 cups fresh blueberries, strawberries, raspberries (one type or a mixture)
**Cooking Instructions**

1. Preheat oven to 350°F (177°C).
2. Place butter in a small baking dish (one that will hold blintzes snugly) and set in the oven until melted.
3. Roll the frozen blintzes in the butter, then arrange in a single layer in the baking dish.
4. In a mixing bowl, beat the eggs well. Add 1/2 cup sour cream, sugar, orange juice, vanilla and salt, and whisk until smooth.
5. Pour the mixture over the blintzes.
6. Sprinkle with cinnamon-sugar and bake until set, about 40 minutes.
7. To serve, cut into squares. Sprinkle each portion with berries and a spoonful of the remaining sour cream.

Yields 4 servings.

**Potato Latkes**

**Ingredients**

- 2 cups raw potatoes (peeled and coarsely grated or shredded)
- 2 eggs
- 1/8 tsp. baking powder
- 1 1/2 tsp. salt
- 1 Tbsp. flour, bread crumbs, or matzo meal
- Pepper to taste (optional)
- Grated onion to taste (optional)
- Oil or chicken fat for frying

**Cooking Instructions**

1. Soak potatoes several hours in enough water to cover (this keeps them from turning dark).
2. Drain water. Grate or shred, then drain well, pressing the water out of the potatoes.
3. Add other ingredients and the eggs; beat well. A little pepper and grated onion are optional.

**Apple Matza Kugel**

**Ingredients**

- 3 matza (regular)
- 2 eggs (separated)
- 1/2 cups sugar
- 1/4 tsp. salt
- 1/4 tsp. cinnamon
- 1/4 cup raisins
- 3 Tbsp. shortening (oil)
- 3 tart apples (Granny Smith; sliced thin)
- Grated rind lemon or orange
- 1/4 cup chopped nuts
Cooking Instructions
1. Soak matza and drain.
2. Beat yolks (lightly).
3. Add salt, sugar, cinnamon.
4. Break matza and combine with above.
5. Fold in stiffly beaten egg whites.
6. Add raisins.
7. Grease pan. Place half of the mixture in first.
8. Layer apples on top. Sprinkle nuts and rind.
9. Cover with remaining mixture.
10. Bake for 45 minutes at 350°F (177°C).
Yields 6 portions.

Knishes

Ingredients
Potatoes (boiled)
Onions (sliced, peeled, and browned)
2 1/2 cups flour (sifted)
1 tsp. baking powder
1/2 tsp. salt
2 eggs
1/2 cup oil
4 Tbsp. cold water

Cooking Instructions
1. Mix flour, baking powder, and salt in a bowl. Make a well in the middle.
2. Stir in eggs, oil, and water.
3. Work well with hand into the dough.
4. Knead on a lightly floured board until dough is smooth.
5. Divide dough into two parts. Roll out as thin as possible. Brush lightly with oil.
6. Spread filling across one end and roll up like a jelly roll.
7. Cut into half-inch slices. Place on greased baking sheets, cut side down.
8. Dress tops with one beaten egg for glaze. Knishes may be frozen and baked later.
9. Bake for 45 minutes until golden at 375°F (190°C).

Sweden
Courtesy of Sharon Palmer, RD

Köttbullar (Swedish Meatballs)

Ingredients
For meatballs:
1 lb. lean ground beef
1/2 cup fine breadcrumbs
1/3 cup milk
1 small onion, diced finely
1 egg
1/2 tsp. salt
1/2 tsp. black pepper
Nonstick cooking spray

For sauce:
2 Tbsp. margarine or butter
2 Tbsp. flour
1 cup half and half
1 cup milk
1 cube beef bullion
1/2 tsp. salt
1/2 tsp. black pepper
1 tsp. soy sauce
1 tsp. jelly
Lingonberry preserves

**Cooking Instructions**

1. In large mixing bowl, add ground beef, breadcrumbs, milk, diced onion, egg, salt, and pepper. Combine mixture well with wooden spoon.
2. Knead mixture an additional few minutes with hands to thoroughly mix ingredients. Shape into small meatballs (1–1.5 inches in diameter).
3. Heat a large skillet over medium heat and spray with nonstick cooking spray. Place meatballs on skillet, covering the entire surface. Monitor the cooking process closely, turning the meatballs when one side is cooked and browned.
4. When the meatballs are cooked and browned evenly on all sides, remove to a serving pan and repeat the process to cook all meatballs.
5. To prepare sauce, in a clean skillet melt 2 Tbsp. margarine or butter.
6. Stir in flour to make a roux. Gradually add the half and half and heat over medium-low heat.
7. Stir in milk and beef bouillon cube, stirring until beef bouillon is dissolved. Mix in salt, pepper, soy sauce, and jelly. Stir with a whisk until all ingredients are dissolved and sauce is thick and bubbly.
8. Serve meatballs immediately with sauce and lingonberry preserves as desired.

Yields 6 servings

**Jordgubbtårta (Swedish Strawberry Cake)**

**Ingredients**

4 Tbsp. butter
1 1/4 cups sifted cake flour
1 1/2 tsp. baking powder
2 large eggs
3/4 cup sugar
1/2 cup milk
1 tsp. vanilla extract
8 oz. heavy whipping cream
2 cups fresh strawberries, cleaned
1/3 cups strawberry jam

Cooking Instructions
1. Preheat oven to 350°F (177°C). Grease and flour a 9-inch springform pan and set aside.
2. Melt the butter and cool slightly.
3. Mix the cake flour and baking powder together and set aside.
4. Beat the eggs and sugar together for several minutes until light and foamy.
5. Add milk, vanilla, and cooled, melted butter. Beat for an additional minute. Add the dry ingredients and beat for an additional minute. Pour the batter into the prepared pan.
6. Bake for about 30 minutes until a toothpick inserted in center comes out smoothly. Cool for 5 minutes, remove from pan, and continue to cool completely on a rack.
7. Whip the heavy cream until soft peaks form.
8. Clean, drain, and slice half of the strawberries, reserving half of the cleaned berries for decoration.
9. With a bread knife, slice the cake in half horizontally to form two thin equal layers. Place the first half on a cake plate. Spread strawberry jam over the top of the bottom half. Cover with a layer of whipped cream and sliced strawberries. Place the top cake layer. Frost the top and sides of the cake with an ample amount of whipped cream. Decorate the top with whole strawberries. Chill until serving time.

Yields 12 servings

Cod with Mashed Potatoes

Ingredients
4 cod fillets (4 oz. each)
1 clove garlic, minced
1/4 tsp. black pepper
1 bunch fresh dill, chopped
1/2 cup nonfat milk
1 Tbsp. margarine spread
1/4 tsp. black pepper
1 Tbsp. margarine spread
1 cup milk
1/8 tsp. black pepper
1 tsp. lemon juice
1 Tbsp. flour

Cooking Instructions
1. Preheat oven to 375°F (190°C). Place cod fillets in the bottom of a small casserole dish.
2. Sprinkle with minced garlic, 1/4 tsp. black pepper, and 3/4 of the fresh dill (reserve the remaining dill for later).
3. Place casserole in oven at 375°F (190°C) and cook about 10 to 15 minutes until cod fillets are tender.
4. Mash cooked cubed potatoes with 1 Tbsp. margarine spread, 1/2 cup nonfat milk, and 1/4
tsp. black pepper until smooth and creamy.
5. Prepare lemon white sauce by melting 1 Tbsp. margarine spread in a saucepan and stirring in pepper and lemon juice.
6. Whisk flour in 1 cup milk and add to saucepan, cooking over medium and stirring until blended and thickened.
7. When cod fillets are tender, remove casserole dish from oven and cover with mashed potatoes, covering entire surface with potatoes.
8. Make a shallow indentation running vertically along the mashed potatoes, to create a channel. Pour lemon sauce in this channel so that it fills it and pour slightly over the mashed potatoes.
9. Sprinkle over remaining fresh dill and return to oven for an additional 15 minutes until mashed potatoes are slightly golden on top.

Yields 4 servings: 1 cod fillet, 1/2 cup mashed potatoes, and 1/4 cup lemon white sauce each.

Swedish Rye Bread

Ingredients
1 cup rye flour
1 1/2 cup bread flour
1 1/2 tsp. yeast
1/2 tsp. grated orange peel
2 tsp. caraway seeds
1 Tbsp. margarine
1/4 cup honey
7/8 cup lukewarm water

Cooking Instructions
1. If using a bread machine, place all the ingredients in the container and set the cycle for a normal loaf of bread. If using the traditional method of bread making, stir flours, yeast, orange peel, caraway seeds, and salt in a large mixing bowl.
2. Add margarine, honey, and lukewarm water, and stir until well combined. Cover and let rise for 2 hours.
3. Punch down and knead for 10 minutes on a floured surface.
4. Transfer to loaf pan and let rise for 45 minutes before baking at 350°F (177°C) for approximately 45 to 55 minutes until done.

Yields 1 loaf (20 slices)

Hungary

Courtesy of Mary Louise Kranyak, PhD, MBA, RD

Cherry Soup (Meggy Leves [medge le-vesh])

Ingredients
2 cups water
1 lb. sweetened frozen sour cherries
1/8 tsp. salt
1/4 cup cold water
2 Tbsp. flour
1 to 2 egg yolks, slightly beaten
1/2 cup sour cream

Cooking Instructions
1. In a 2-qt. saucepan with a tight-fitting lid, bring water to a boil.
2. Add salt and cherries; break frozen blocks apart with fork. Bring to a boil again.
3. Cover saucepan and simmer 10 minutes.
4. Put cold water into an 8-oz. container with a tight-fitting lid and sprinkle in flour; cover tightly and shake until mixture is well blended.
5. Slowly pour flour–water mixture into cherry mixture, stirring constantly. Bring to a boil and cook for 4 minutes.
6. Remove from heat. Vigorously stir about 1/3 cup hot soup gradually into egg yolk. Immediately blend into hot soup. Stir constantly and cook over low heat for 3 minutes. (Do not overcook or allow soup to boil.)
7. Remove from heat immediately. Stirring vigorously, gradually add about 1 cup of hot soup to sour cream. Immediately blend into remaining soup.
8. Cover the soup and cool slightly; chill in refrigerator.
Yields 3–4 servings.

Goulash (Gulyás [gū-yahsh])

Ingredients
1 1/2 lbs. boneless pot roast beef
3 cups prepared beef broth
4 slices bacon, diced
1 large onion, chopped
1 Tbsp. paprika
1/4 tsp. freshly ground pepper
1 small green pepper, chopped
1/2 cup cold water*
1/4 cup water*

Cooking Instructions
1. Cut beef into 1.5-inch pieces and set aside.
2. Place bacon into 3-qt. sauce pot; cook slowly, stirring frequently until bacon is lightly browned.
3. With a slotted spoon, remove bacon from sauce pot to a small bowl and set aside.
4. Add chopped onion to the bacon fat in the sauce pot and cook over medium heat until onion is transparent, stirring occasionally.
5. With a slotted spoon, remove onion from sauce pot and place in the bowl containing bacon; set aside.
6. Add meat to bacon fat; stir occasionally to slowly brown on all sides.
7. Sprinkle evenly over meat a mixture of the paprika and pepper. Stir in the bacon–onion
mixture and the green pepper. Slowly pour in the beef broth and bring to a boil.

8. Reduce heat, cover sauce pot, and simmer for 2 hours, or until meat is tender when pierced with a fork.

9. Remove meat with slotted spoon to hot serving dish.

* If desired, thicken cooking liquid as follows: Put cold water into a 1-pt. container with a tight-fitting lid and sprinkle in flour; cover tightly and shake until mixture is well blended. Slowly pour half the mixture into the sauce pot, stirring constantly. Bring to a boil. Gradually add enough of the remaining flour–water mixture for the desired consistency. Bring to a boil after each addition. After the final addition, cook 3 to 5 minutes longer. Serve immediately.

Soft Dumplings (Galuska [gah-lūsh-kah])

Ingredients
3 qt. water
1 tsp. salt
2 1/3 cups sifted flour
1/2 tsp. salt
1 egg slightly beaten
1 cup water
2 Tbsp. melted butter or margarine

Cooking Instructions
1. Bring water and salt to a boil in a 4-qt. saucepan.
2. Sift together flour and salt. In a separate bowl, beat egg and water together. Gradually add flour mixture to egg mixture, and stir until smooth. The batter should be thick (not pourable) and break from a spoon.
3. Begin dropping the batter into the boiling water as follows: Hold the bowl of batter on an angle slightly above the pot of boiling water. Dip a small spoon into the boiling water. Dip the edge of the spoon into the batter at the edge of the bowl and scrape about 0.5–1 tsp. of batter into the water. Repeat, each time dipping the spoon into the boiling water, until there is one layer of dumplings in the pot. Do not crowd the pot.
4. After noodles rise to the surface, boil gently for 5 to 8 minutes, or until soft, depending on the size of the dumplings.
5. Remove dumplings from water using a slotted spoon and place in a bowl. Repeat process until all dough is used.
6. Toss dumplings with butter or margarine.

Cucumber Salad (Uborka Sálata [ū-bor-ka sha-lah-ta])

Ingredients
3 medium-sized cucumbers
1 tsp. salt
1/4 cup white vinegar
1/2 cup water
1 tsp. sugar
Fresh or dried dill (optional)
Sour cream (optional)

**Cooking Instructions**
1. Wash and peel cucumbers. Slice them half-inch thick and place in a bowl. Mix lightly with salt and set cucumbers aside for 1 hour.
2. Mix vinegar, water, and sugar together, adjusting vinegar and sugar to taste, and set aside.
3. With clean hands, squeeze the liquid from cucumber slices, a few at a time, and put into a clean bowl; discard liquid.
4. Pour the vinegar mixture over the cucumbers and toss lightly together. If desired, sprinkle dill on top and mix in.
5. Chill for at least 1 hour. If desired, top each serving with a dollop of sour cream.

**Greece**

**White Bean Soup (Fasolada)**

**Ingredients**
1 lb. dry great northern beans
2 medium dry onions, chopped finely
4 medium carrots, halved and sliced
1 1/2 cups chopped celery
1/2 cup extra virgin olive oil
1/2 cup tomato sauce or 3 Tbsp. tomato paste
Salt and pepper to taste

**Cooking Instructions**
1. Soak the beans overnight in a large pot. Drain the beans and add about 8 cups of water. Bring to boil and simmer for about 30 minutes.
2. Add onions, carrots, and celery. Cook for another 25 minutes, then add olive oil, tomato sauce or paste, and simmer for another 20 minutes or until beans and vegetables are tender.

**Baked Chicken and Potatoes (Kotopoulou Lemonato sto Fournou me Patates)**

**Ingredients**
1 whole chicken, washed
6 medium russet potatoes
4–6 garlic cloves
3/4 cups olive oil
2 tsp. oregano
Juice of 2 lemons

**Cooking Instructions**
1. Wash chicken and put it in a large roasting pan.
2. Mix 1 tsp. oregano, 1/4 cup olive oil, and 2 chopped garlic cloves.
3. Rub chicken inside and out with the mixture, then set aside.
4. Peel potatoes and cut into quarters or eighths (if you prefer smaller potatoes). Mix with remaining oil, oregano, and garlic cloves.
5. Pour entire mixture into roasting pan next to chicken.
6. Bake at 375°F (190°C) for 1.5 hours or until chicken and potatoes are browned.

France
Courtesy of Martine I. Scannavino, DHSc, RD, LDN

Crème Caramel

Ingredients
1/2 cup of sugar (for the caramel)
1/3 cup of sugar
1 cup milk
1 cup heavy cream
3 whole eggs
2 egg yolks
1 Tbsp. cognac

Cooking Instructions
1. Preheat the oven to 325°F (163°C).
2. In a small heavy-bottom sauce pan, melt the 1/2 cup of sugar until it becomes a golden rich caramel color.
3. Pour a thin layer of caramel into the bottom of six ovenproof ramekins and allow to cool completely.
4. In a large bowl stir together the 1/3 cup of sugar, milk, heavy cream, eggs, egg yolks, and cognac. Strain through a fine sieve and fill ramekins to within 0.25 inch of the top.
5. Bake the crème caramels in a water bath for 30 to 40 minutes. Allow to cool completely, then chill for at least 1 hour.
6. To serve, loosen the crème caramel by running a thin knife around the inside of the ramekin, and invert on a dessert plate.

Soupe au Pistou

Cooking Instructions
1. Parboil dry beans for 30 minutes. Cut green beans into 1-inch pieces.
2. Peel and dice the potatoes, onions, carrots, and turnips. Dice the zucchini and the leeks.
3. Heat 1 Tbsp. of olive oil in a large heavy bottom sauté pan.
4. Add the onions and cook over a medium flame for 5 minutes, add the potatoes, leeks, carrots, and a pinch of sage, and sauté for 5 more minutes.
5. Bring a large pot of water to a boil (about 3 qt.). Add the sautéed vegetables and the remaining vegetables and bay leaf. Simmer uncovered for 40 minutes.
6. Check seasoning and continue cooking over low heat for 1 hour.
7. For the pistou, rinse and dry basil and cut into chiffinade. Peel and crush the garlic
clove. Grate the cheese. Place the basil, cheese, and garlic in a food processor, pulse to chop fine. With the machine running pour in the olive oil and continue to blend till smooth.

8. Serve soup garnished with pistou and shredded Romano cheese.

**Netherlands**

*Courtesy of Jeannette van der Velde, MPH, MSc*

**Snert (Pea Soup)**

*Ingredients*

- 6 cups water
- 3 cups dried split green peas, rinsed
- 1 smoked ham hock
- 2 potatoes, peeled and cubed
- 1–2 leeks, thinly sliced
- 1 small onion, thinly sliced
- 3–4 celery stalks, sliced
- 1 tsp. nutmeg
- 1 Tbsp. lemon juice
- Salt and pepper

*Cooking Instructions*

1. Bring the water to a boil in a large heavy pot and add the peas and ham hock.
2. When the water reboils, reduce heat and simmer for 2 hours, stirring occasionally.
3. Add the potatoes, leeks, onion, celery stalks, nutmeg, and lemon juice. Simmer for 30 minutes, stirring occasionally.
4. Remove and cut the ham hock, then return it to the pot. Simmer for 10 minutes.
5. Serve with dark pumpernickel or rye bread.

**Stamppot Rode Kool (Mashed Potatoes, Red Cabbage, and Applesauce)**

*Ingredients*

- 8–10 large potatoes, peeled and diced
- Salt and pepper
- 4 Tbsp. butter
- 4 breakfast sausages
- 1 medium red cabbage, grated or very thinly sliced
- 2 Tbsp. red wine vinegar
- 2 tsp. brown sugar
- 1 bay leaf
- 1 whole clove
- 1 cup applesauce
- Dash of ground cloves
Cooking Instructions
1. Cook potatoes in water with salt until fully cooked (about 20 minutes), then drain.
2. Fry the cabbage in 2 Tbsp. butter, stirring constantly for about 5 minutes.
3. Fry sausages in 2 Tbsp. butter for 5 minutes, add 1/3 cup water, vinegar, sugar, bay leaf, and clove to sausages, and cook for 20 minutes.
4. Mash the potatoes with the applesauce.
5. Stir red cabbage through mashed potatoes, add salt and pepper to taste.
6. Garnish with ground cloves. Slice cooked sausages and arrange around mashed potatoes.

Great Britain
Courtesy of Rachel Hayes, MPH, RD

Welsh Rarebit

Ingredients
4 thick slices of bread, crusts removed
2 Tbsp. butter, melted
2 cups grated cheddar cheese
1 tsp. mustard powder
Few drops Worcestershire sauce
4 Tbsp. brown ale, beer, or milk

Cooking Instructions
1. Preheat the broiler. Toast the bread until golden-brown, then place in a shallow baking dish (in a single layer). Keep warm.
2. Stir the cheese, mustard powder, and Worcestershire sauce into the melted butter, then slowly pour in the ale (or beer or milk) in a steady stream.
3. Stir the cheese mixture until very well blended.
4. Spoon the cheese mixture onto the toast then place under the broiler until bubbly and golden.
5. Serve immediately.
Yields 4 servings

Cottage Pie

Ingredients
2 Tbsp. butter, divided
1 onion, diced
1 carrot, finely chopped
1 clove garlic, crushed
1 lb. lean ground beef
1 1/4 cup water
1 Tbsp. all-purpose flour
1 bay leaf
2 tsp. Worcestershire sauce
1 Tbsp. tomato paste
1 1/2 lb potatoes, peeled and boiled
3 Tbsp. milk
Salt and pepper to taste

Cooking Instructions
1. Heat 1 Tbsp. butter in a skillet.
2. Add the onion, carrot, and garlic; cook on medium heat until lightly browned.
3. Stir the beef into the skillet mixture and cook until browned.
4. Blend a few spoonfuls of the water with the flour; stir this flour–paste mixture into the pan.
5. Stir in the remaining water and simmer for 15 minutes, stirring occasionally.
6. Add the bay leaf, Worcestershire sauce, and tomato paste; cover and cook on low heat for 1 hour, stirring occasionally. (If necessary, uncover the pan during the last few minutes of cooking to allow any excess water to evaporate.)
7. Preheat the oven to 375°F (190°C).
8. Mash the potatoes with the remaining 1 Tbsp. of butter and the milk.
9. Spoon the meat mixture into a nonstick baking dish.
10. Cover the meat with an even layer of the mashed potatoes. Bake for 35 minutes, or until golden brown.
11. Place the dish under the broiler for 3 minutes if an extra-crispy top is desired. Add salt and pepper to taste.

Yields 4 servings

Scones

Ingredients
2 cups all-purpose flour
1 1/2 tsp. cream of tartar
1 tsp. baking soda
1/2 tsp. salt
2 Tbsp. granulated sugar
1/4 cup cold butter
1/4 cup milk
1 large egg

Cooking Instructions
1. Preheat oven to 425°F (218°C).
2. Grease a baking sheet (or line with wax paper).
3. Blend flour, cream of tartar, baking soda, salt, and sugar; cut in butter until the mixture resembles fine breadcrumbs.
4. In a separate bowl, whisk milk and egg together; stir into flour mixture until it forms a soft dough.
5. On a floured surface, roll dough into 0.5- to 0.75-inch thickness. Cut into rounds with a floured 2-inch biscuit/cookie cutter; carefully transfer onto baking sheet with a spatula.
6. Bake scones approximately 10 minutes, or until just golden-brown; transfer to a rack to cool.
7. Serve scones warm or at room temperature with butter and/or jam. 
Yields 10 scones

Korea
Courtesy of Melissa Ip, BS

Seasoned Spinach (Shigumchi Namul)

Ingredients
1 lb. fresh spinach  
1 Tbsp. sesame oil  
1 garlic clove, minced  
Salt  
1 tsp. toasted sesame seeds

Cooking Instructions
1. Wash and trim the spinach. Dunk the spinach quickly in boiling water. Squeeze out all 
water from the spinach.
2. Heat the sesame oil and garlic in a skillet for 1 to 2 minutes. Stir-fry the spinach. Remove 
from heat. Toss spinach and sesame seeds in a bowl. Add salt.

Japan
Courtesy of Joseph M. Carlin, MS, MA, RD, LDN, FADA

Temarizushi (Vinegared Rice and Fish Balls)

Ingredients
3 oz. white meat fish fillet cut crosswise in thin strips  
1 Tbsp. salt or MSG  
1/4 tsp. black sesame seeds  
1 1/2 Tbsp. rice vinegar  
1 tsp. sugar  
1/4 cup sticky rice

Cooking Instructions
1. Cook fish with MSG or salt and marinate for 3 to 6 hours in the refrigerator.  
2. Toast the sesame seeds in a heated pan for 2 to 3 minutes and set aside.  
3. Mix vinegar, sugar, and 3 Tbsp. cold water in a mixing bowl.  
4. Dip sliced fish into vinegar-sugar mixture and lay out on a cheesecloth.  
5. Place 1 tsp. of sticky rice onto the fillet strips and fold the fillet strips over, enclosing the 
rice inside. Wrap each fillet–rice mixture in a piece of cheesecloth and form a ball.  
6. Unwrap the cheesecloth and roll the ball in sesame seeds.
India
Courtesy of Sudha Raj, PhD, RD

Sambar

Ingredients
1/2 cup red gram dal (lentil)
2 cups water
1 small lemon-sized ball of tamarind
1 cup sliced vegetables (e.g., eggplant, radish, okra, red peppers)
Salt to taste
1 tsp. turmeric
3 tsp. sambar powder
1 Tbsp. curry leaves
For tempering:
2 Tbsp. oil
1 tsp. mustard seeds
A pinch of asafoetida
1/2 tsp. fenugreek seeds
1 red chili

Cooking Instructions
1. Wash, drain dal, and cook in a pressure cooker.
2. Soak tamarind in hot water for 15 minutes, then strain pulp.
3. Heat oil in a saucepan. Add mustard seeds, asafoetida, red chilies, fenugreek seeds, and curry leaves.
4. When mustard seeds splutter, add chopped vegetables and sauté for a couple of minutes.
5. Add tamarind pulp, turmeric, water enough to cover the vegetables, and sambar powder. Cover and cook until vegetables are tender.
6. Add cooked dal and cook the gravy for 5 minutes. If sambar needs to be thickened, make a paste with 1 Tbsp. rice flour and 2 Tbsp. water, and add to the mixture.
7. Serve hot with rice or as an accompaniment to idlis, dosa, or vadais.

Far East
Courtesy of Zaheer Ali Kirmani, PhD, RD

Afghaniaash (Soup)

Ingredients
1 package ramen noodles (spicy chicken)
1 medium onion, thinly sliced
1 tsp. salt
1/2 cup vegetable oil
1 Tbsp. tomato paste
2–3 roma tomatoes
1 can red kidney beans
1 can garbanzo beans
16 oz. mung beans (presoaked or half cooked in a pressure cooker for 5 minutes)
1 Tbsp. dry dill weed

**Cooking Instructions**
1. Add oil to stock pot and warm at high heat.
2. Add onions and fry until golden brown.
3. Lower heat to medium-high and add tomatoes, salt, and tomato paste until a thick sauce has formed.
5. Add ramen noodles and cook until noodles are tender. Do not stir frequently.
6. Once noodles are tender, sprinkle with dill weed and serve.

**Bangladeshi Doi Mach**

**Ingredients**
1.5 lbs. carp or similar fish, descaled and cleaned
4 oz. mustard oil or any other cooking oil
4 cloves
4 green cardamoms
2-inch piece cinnamon
2 bay leaves
1-inch piece of ginger root
1 small bulb garlic
2 tsp. turmeric powder
1 tsp. red chili powder
4 oz. yogurt
Salt and sugar to taste
A few green chili peppers
2 tsp. clarified butter (ghee)

**Cooking Instructions**
1. Clean and wash the fish pieces thoroughly, and cut them into squares or rectangles of 4-inch dimension. Wipe them dry.
2. Smear 1 tsp. turmeric and a little salt on the pieces. Put them aside.
3. Grind the onion, garlic, and ginger until it turns into a smooth paste. Put it aside.
4. Beat the sour curds/yogurt with half a cup of water until smooth. Put it aside.
5. Heat oil to lightly smoking. Lightly fry the fish pieces and put aside.
6. In the heated oil add the cloves, cardamom, and cinnamon.
7. Add the ground paste of onion, garlic, and ginger.
8. Fry lightly until the spices are browned.
9. Mix the remaining 1 tsp. of turmeric powder and the red chili powder with 3 tsp. of water and add to the frying paste. Fry again. Stir to prevent the spices from sticking to the pan.
10. Add to this the beaten sour curds. Stir the mixture and add one more cup of water. Add salt to taste and 1 tsp. of sugar (or less, if you prefer).
11. Add the green chilies and cook a while until the excess water begins to dry and the gravy
comes to a boil.
12. Gently add the fried fish pieces and let the mixture cook on high heat until the oil separates and floats on top. Before removing it from the fire, add the clarified butter.

Jamaica
Courtsey of Goulda A. Downer, PhD, RD, LN, CNS, and Denise Bailey, M.Ed

Rice and Peas

Ingredients
14-oz. can red kidney beans (drained)
2 cups rice
1 clove garlic, chopped
1 small onion, chopped
1/2 cup coconut milk
1 tsp. ground pimento seed
1/2 tsp. salt
1 sprig fresh thyme, chopped
1 stalk scallion (green onion)
1 whole Scotch bonnet pepper
1 1/2 cups water

Cooking Instructions
1. Drain the liquid from beans and rinse.
2. Add coconut milk and all seasonings, and let it come to a boil.
3. Add rice and stir. Add enough water so that it covers the rice and beans, and cover tightly for 25 to 30 minutes or until liquid is absorbed and the rice is cooked. (Dry peas can be used; soak overnight.)

Curry Chicken

Ingredients
8 pieces chicken (skinless breast, drumstick)
1/4 cup vinegar
1 medium white potato, diced
1 cup water
2 Tbsp. olive oil
Seasoning mixture:
2 tsp. curry powder
1 tsp. thyme, crushed
1 stalk scallion, chopped
1 tsp. black pepper, ground
1 Tbsp. Scotch bonnet pepper, chopped
1 large onion, chopped
8 cloves garlic, crushed
1 Tbsp. ginger, grated
Cooking Instructions
1. Wash chicken with vinegar and pat dry. Rub chicken with seasoning mixture.
2. Marinate for at least 2 hours in the refrigerator.
3. Heat oil in skillet over medium flame. Add chicken and sauté.
4. Add water and allow chicken to cook over medium flame for 30 minutes, turning occasionally.
5. Add diced potatoes and cook for an additional 20 to 30 minutes or until meat is tender.
6. Serve over a bed of rice and peas (or, for an authentic Jamaican meal, serve with boiled bananas, fried plantains, and a fresh green salad).

Jerk Chicken

Ingredients
8 pieces chicken, skinless (breast, drumstick)
1/2 tsp. cinnamon, ground
2 tsp. allspice, ground
2 tsp. black pepper, ground
1 Tbsp. hot pepper, chopped
1 tsp. hot pepper, crushed, dried
2 tsp. oregano, crushed
1 Tbsp. basil, dried
2 tsp. thyme, crushed
2 tsp. salt
6 cloves garlic, finely chopped
1/4 cup vinegar
1 cup onion, puréed or finely chopped
3 Tbsp. brown sugar
3 Tbsp. soy sauce (low sodium)

Cooking Instructions
1. Wash chicken with vinegar and pat dry.
2. Preheat oven to 350°F (177°C) and add all ingredients.
3. Rub seasoning over chicken. Marinate in the refrigerator for 4 hours or more.
4. Evenly space chicken on nonstick or lightly greased baking pan.
5. Cover with aluminum foil and bake 30 minutes.
6. Remove foil, turn chicken, and continue baking for an additional 30 to 40 minutes or until the meat can be easily pulled away from the bone with a fork. (Breasts may require more cooking time than drumsticks.)
Guatemala
Courtesy of Hugo Melgar-Quinonez, MD, PhD

Enchiladas

*Ingredients*
- 1 lb. beef or pork
- 1/2 cup carrots, cooked, finely chopped
- 1 cup red beets, cooked, finely chopped
- 1/2 cup green beans, cooked, chopped
- 1/2 cup peas, cooked
- 2 onions, finely chopped
- 4 garlic cloves, finely chopped
- 1/4 cup vinegar
- 1/4 tsp. thyme, ground
- 1/4 tsp. oregano, ground
- 3 bay leaves
- 1 can tomato paste/sauce
- 10 leaves lettuce
- 10 tostada shells
- 2 hard-boiled eggs, thinly sliced
- 1/4 cup parsley, finely chopped
- 1/2 cup hard white cheese, grated
- 1/2 tsp. salt
- 1/2 tsp. pepper

*Cooking Instructions*
1. For the curtido salad, 2 to 3 hours before serving mix in a bowl the carrots, red beets, green beans peas, chopped onion, and 2 garlic cloves. Add vinegar, thyme, oregano, and 2 bay leaves. Season with salt and pepper, and put mixture in the refrigerator.
2. Cook the meat with salt. Once cooked, chop the meat and sauté with 1/2 chopped onion and 1 garlic clove.
3. Sauté the tomato sauce with chopped garlic and remaining bay leaf, and season with salt.
4. Put a lettuce leaf on each shell. On top, place 1 Tbsp. meat and 2–3 Tbsp. curtido salad.
5. Garnish with 2 tsp. tomato sauce, 1/4 tsp. finely chopped parsley, 1/2 tsp. grated cheese, and one slice of hard-boiled egg.

Yields 10 servings

Jocón

*Ingredients*
- 3 lbs. chicken, pork, or beef, cut into pieces
- 2 onions, 1 finely chopped
- 4 garlic cloves, 2 finely chopped
- 2 corn tortillas, soaked in water
10 tomatillos
1/2 cup cilantro, finely chopped
1/2 cup scallions, finely chopped
1 green bell pepper, finely chopped
2 Serrano peppers, finely chopped
2 bay leaves
1/2 tsp. salt
1/2 tsp. pepper

Cooking Instructions
1. Cook the meat in water with 1 onion and 2 garlic cloves, then add salt. Once cooked, remove the meat and set aside.
2. Using the broth, cook the remaining onion and garlic gloves, cilantro, scallions, and bell and Serrano peppers. Once cooked, add the soaked tortillas and blend into a smooth sauce.
3. Add the cooked meat to the sauce. Add pepper and bay leaves, and simmer for about 20 minutes on a medium-low flame. Season with salt, if desired.

Yields 6–8 servings

Haiti
Courtesy of Jennifer Miller RD, CNSD

Rice with Black Mushrooms
Creole Name: Diri ak Djon-Djon
French Name: Riz aux Djon-Djon

Ingredients
2 cups djon-djon mushrooms or European dried mushrooms
2 Tbsp. vegetable or olive oil
3 garlic cloves, crushed and minced
1 small onion, chopped
1 shallot, sliced
2 cups long-grain rice, rinsed with cold water
2 tsp. salt
4 cloves
1 (12 oz.) can cooked lima beans
1 Tbsp. tritri (a type of dried fish)
1 or 2 sprigs thyme
1 green Scotch bonnet pepper

Cooking Instructions
1. In a small saucepan, soak mushrooms in 4 cups of water for 10 minutes.
2. Boil mushrooms on low heat for 10 minutes. Strain the mushrooms, reserving the liquid.
3. Add oil to cast-iron pot on medium heat. Stir in garlic, onion, and shallot for 2 minutes. Add rice and stir for 3 minutes.
4. Add mushroom water, salt, cloves, cooked lima beans, and tritri. Bring to a boil until
water evaporates.

5. Lower heat, stir rice, and place the whole Scotch bonnet pepper and thyme on top of the rice.

6. Cover and cook for 20 minutes.

7. Remove hot pepper and thyme. Stir before serving.

**Costa Rica**

Courtesy of Katherine L. Cason, PhD, RD, Marta Eugenia Gamboa-Acuna, BS, and Yenory Hernandez Garbanzo, BS

**Gallo Pinto (Speckled Rooster)**

Gallo pinto is garnished with sour cream, either on top or on the side. You can also eat it with scrambled or over-easy eggs.

**Ingredients**

1 can (approximately 2 cups) black or pinto beans
2 cups cooked white rice
1 small onion, chopped
1/4 cup red bell pepper, chopped
1/4 cup cilantro, chopped
1 tsp. minced garlic
2 Tbsp. *Salsa Lizano* (or Worcestershire sauce)
1/2 Tbsp. canola oil (or olive oil)
Salt to taste

**Cooking Instructions**

1. Sauté the onions and bell pepper in the oil.
2. Once the onions and peppers are cooked, add the garlic.
3. Let the mixture cook until almost soft and then add the beans, and cook for another 2 minutes.
4. Add the rice, cilantro, and sauce, and cook for about 2 minutes more.

Yields 2–3 servings

**Sudan**

Courtesy of Ahlam Badreldin Ibrahim Al Shikieri, PhD

**Chicken Stew (*Damaat Dijaj*)**

**Ingredients**

1 kg chicken (leg, wings, breast)
2 1/3 cups red onion, chopped
0.7 cups oil (peanut or cottonseed)
3 Tbsp. tomato paste
1 1/2 cups tomato juice
Spices, garlic, salt
Cooking Instructions
1. Add oil to an empty saucepan and place over heat.
2. Add onion and stir until golden brown.
3. Add meat and water.
4. When meat is cooked (tender), add tomato paste and the remaining ingredients.

Falafel (Taamya)

Ingredients
1.8 cups chickpeas (soaked in water overnight)
1 cup oil (peanut or cottonseed)
Salt
Baking powder
Garlic
Spices (cumin, coriander, black pepper, and/or others)
Water (small amount)

Cooking Instructions
1. Mash the chickpeas until soft.
2. Add spices, baking powder, and water, then mix. Shape into small balls.
3. Deep fry the balls in oil; turn until both sides are light brown.

Rwanda
Courtesy of Margaret Udahogora, MS, RD, and Colette Janson-Sand, PhD, RD, LD

Igisafuriva [Ee-GEE-Sah-Foo-REE-Vah]

Ingredients
1 chicken, cut into pieces
1 lb. plantains
4 Tbsp. vegetable oil
1 large onion, thinly sliced
4 large tomatoes, diced and mashed
3 Tbsp. tomato paste
4 stalks of celery, cut into thin rounds
1 1/2 tsp. salt
1 hot pepper

Cooking Instructions
1. Fry chicken in oil until browned and cooked through.
2. Remove and add sliced plantains.
3. Cook until slightly golden.
4. Remove and add onion.
5. When golden brown, add remaining ingredients.
6. Return chicken and plantains to the pot. Simmer for 15 to 20 minutes to blend flavors.
**Isombe [Ee-SOHM-Bee]**

*Ingredients*
2–3 bunches cassava leaves, washed and chopped (kale or spinach can be used if cassava leaves are not available)
1 large onion, chopped
3 small eggplants, cut into chunks
1–2 green peppers, sliced
2 Tbsp. oil
3–4 Tbsp. peanut butter

*Cooking Instructions*
1. Boil greens until tender.
2. Add onions, eggplant, and green peppers. Cook for 10 to 12 minutes.
3. Add oil and peanut butter. Simmer for 10 to 15 minutes, stirring occasionally.

**Nigeria**
Courtesy of Titilayo O. Ologhobo, BS, MPH Candidate, and Jeffery I. Harris, DrPH, MPH, RD, LDN

**Jollof Rice**

*Ingredients*
2 cups rice
Tomatoes
Canned tomato paste
Onion
Dry peppers
Beef or chicken broth
Bouillon cubes and water

*Cooking Instructions*
1. Rinse rice and add it to 4 cups of water and place over heat for 10 to 15 minutes.
2. If using fresh tomatoes, peppers, and onions, mix them together, or use canned tomato sauce. Add the tomato mixture or canned sauce, and the tomato paste, to the rice. (If canned tomato sauce is used, add some diced onions before adding the whole mixture to the rice.)
3. Add enough water or beef/chicken broth to allow the rice to be completely cooked.
4. Add salt and spices to taste.

**Fried Rice**

*Ingredients*
Rice
Vegetables (carrots, onions, peas, green pepper, sweet corn)
Diced beef, liver, or shrimp
Bouillon cubes

_Cooking Instructions_
1. Parboil the rice and set it aside.
2. Stir-fry the vegetables with the diced meat or shrimp, and season it to taste.
3. Add stir-fried mixture to parboiled rice and mix.
4. Cook until the rice is fully cooked.

**Turkey**
Courtesy of Hülya Yüksel, PhD

**Lentil Balls**

_Ingredients_
1 cup red lentils
1 cup bulgur
3 cups water
2 large onions
1/2 cup tomato paste
1 lemon
Parsley, chopped
Lettuce
Cumin to taste
Salt and pepper to taste
Red peppers to taste, crushed
Mint leaves

_Cooking Instructions_
1. Cook red lentils in 3 cups of water.
2. Turn off stove and add the bulgur. Mix well and let it sit for an hour.
3. In a separate pan, sauté the chopped onions in olive oil, then add the tomato paste.
4. Add this to the lentil–bulgur mix.
5. Add spices, chopped parsley, and lemon juice. Mix everything well.
6. Make the lentil balls. Serve with lettuce. (Lentil balls can be wrapped in lettuce while eating.)

**Stuffed Grape Leaves (Sarma or Dolma)**

_Ingredients_
1 lb. grape leaves
2 onions
2 puréed tomatoes or tomato paste
1/2 cup parsley
Dill
1 cup rice
1 cup bulgur
1 tsp. cumin
1 lemon juice
1/2 tsp. black pepper
5 Tbsp. olive oil
1 tsp. mint, crushed
1 Tbsp. black currants
1 Tbsp. pine nuts

Cooking Instructions
1. Chop onions, parsley, and dill, and cook onions until golden.
2. Add puréed tomatoes, washed rice, bulgur, and 3 Tbsp. olive oil, and let it cook for 5 minutes.
3. Add the parsley and dill, spices, pine nuts, and black currants.
4. In a separate pan, boil water and soak the grape leaves in the boiled water.
5. When the leaves are soft, drain the water and remove stems.
6. Place leaves shiny side down and have the mixture ready.

Stuffing and Wrapping:
1. Put about 1 tsp. of mixture toward the bottom of the leaf.
2. Fold in sides and roll upward firmly. Do not roll too tightly. (The rice expands during cooking and may tear the leaf.)
3. Repeat with remaining leaves and mixture.

Assyria
Courtesy of Arezoo Rojhani, PhD, RD

Dolma Makhlot (Stuffed Mixed Vegetable Dolma)

Ingredients
Vegetables:
5 tomatoes (firm)
5 bell peppers
2–3 quince or Granny Smith apples (medium size)
5 zucchini (medium size), cut in half
5 Italian eggplants or 2–3 medium-sized eggplants, peeled and cut in half
1 lemon, thinly sliced
2–3 hot banana peppers
Stuffing:
2 bunches parsley, chopped
2 bunches leek, chopped
1/2 Tbsp. basil, crushed and dried
1 1/2 lbs. tender beef cubes
1 cup rice
2 bunches coriander, chopped
1 Tbsp. salt (or to taste)
1/3 to 1/2 cup cooking oil (depending on taste)
2 Tbsp. of Assyrian spice mix (mixture of turmeric, black pepper, nutmeg, and curry powder)
Cooking Instructions
1. Add about 2 cups of water to beef and cook until tender.
2. Shred the cooked beef into small bits and mix with the rest of the stuffing ingredients.
3. Hollow out the inside of the vegetables. Keep the hollowed material and mix with the stuffing ingredients.
4. Place the stuffing ingredients in a large frying pan.
5. Add oil and sauté about 10 minutes or until mixture become tender. Stuff each vegetable with the stuffing.
6. Arrange the stuffed vegetables in a medium-depth pan.
7. Place lemon slices on top of the vegetables. Cook over medium heat for about 30 to 45 minutes ensuring that the vegetables are cooked but not overly done and soggy. Cover the pan with heavy foil (optional).
8. Preheat oven to 350° (177°C) and bake for 45 minutes.
Yields 7–8 servings

Dolma Darpe (Stuffed Grape-Leaf Dolma)

Ingredients
2 jars pickled grape leaves
Stuffing:
2 bunches parsley, chopped
2 bunches leek, chopped
1 bunch dill, chopped
1 1/2 lbs. tender beef cubes
1 cup rice
2 bunches coriander, chopped
1 Tbsp. salt (or to taste)
1/2 cup cooking oil (depending on taste)
1/2 Tbsp. black pepper
2 Tbsp. Assyrian spice mix (mixture of turmeric, black pepper, nutmeg, and curry powder)
2–4 garlic cloves, chopped
Dressing:
2–3 cups yogurt
2–4 garlic cloves (optional), chopped
Additional Optional Dressing Sauce:
6 Tbsp. tomato paste
1 large onion, thinly sliced
2–3 Tbsp. cooking oil
2 Tbsp. water

Cooking Instructions
1. Add about 2 cups of water to beef and cook until tender.
2. Shred the cooked beef into small bits and mix with the rest of the stuffing ingredients.
3. Place stuffing ingredients in a large frying pan, add 1/4 cup of oil, and sauté about 10 minutes or until they become tender.
4. While preparing the stuffing, soak the grape leaves in a large amount of water in a plastic
tub to get rid of excess salt, and then rinse thoroughly with water.

5. Place 1–2 tsp. of stuffing in the center of each grape leaf. Fold toward center point, end first, each side, and then stem end in a square shape, or alternatively, roll the leaves like a cylinder.

6. Place two to three layers of the grape leaves at the bottom of the pan. Layer the stuffed grape leaves neatly in the pot. Pour the remainder of the oil (1/4 cup) over the top.

7. Cook over medium heat for about 30 to 45 minutes ensuring that the stuffed grape leaves are cooked but not overly done and soggy. Cover the pan with heavy foil (optional).

8. Preheat oven to 350°F (177°C) and bake for 45 minutes.

Yields 8–10 servings

To Prepare the Optional Dressing Sauce:
1. Pour 2–3 Tbsp. cooking oil in a small frying pan and add the onion. Sauté the onion until it becomes slightly tender.
2. Add tomato paste and water and mix, and sauté until onions are golden brown.
3. When serving, add the yogurt on top of the stuffed grape leaves.
4. Add the garlic and tomato/onion dressing (optional).

Dolma Kalama (Stuffed Cabbage Dolma)

Ingredients

Vegetables:
1 head cabbage

Stuffing:
2 bunches parsley, chopped
2 bunches leek, chopped
1/2 crushed basil, dried
1 1/2 lbs. tender beef cubes
1 cup rice
2 bunches coriander, chopped
1 Tbsp. salt (or to taste)
1/2 cup cooking oil
2 Tbsp. (or to taste) Assyrian spice mix (mixture of turmeric, black pepper, nutmeg, and curry powder)
Juice of 2 lemons

Sauce:
6 Tbsp. tomato paste
2–4 Tbsp. water
1 cup dried prunes (optional)

Cooking Instructions

1. Add about 2 cups of water to beef and cook until tender.
2. Shred the cooked beef into small bits and mix with the rest of the stuffing ingredients.
3. Place stuffing ingredients in a large frying pan, add 1/4 cup of oil, and sauté about 10 minutes or until it becomes tender.
4. Core the cabbage. Pour boiling water over cabbage leaves and cook for about 5 minutes. Make sure that the cabbage leaves are soft but not overcooked.

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5. Break the leaves apart and cut each in half.
6. Place 1–2 tsp. of stuffing in the center of each cabbage leaf and fold it either into a triangular shape or simply roll it up to cover stuffing.
7. Layer the stuffed cabbage leaves neatly in a large casserole pan or roaster.
8. Add a few dried prunes to each layer (optional).
9. Mix the tomato paste and water and pour on top of each layer of stuffed cabbage leaves.
10. Cook over medium heat for about 30 to 45 minutes, ensuring that the stuffed cabbage leaves are cooked but not overdone and soggy. Cover the pan with heavy foil (optional).
11. Preheat oven to 350°F (177°C) and bake for 45 minutes.
Yields 8–10 servings

**Indonesia**

Courtesy of Marta Sovyanhadi, Dr. PH, RD, LD/N

**Nasi Tumpeng**

*Ingredients*
- 1 cup coconut milk
- 3 cups water
- 4 cups enriched rice, long grain
- 1/4 cup turmeric powder
- 1 small bunch lemon grass
- 6 bay leaves
- Salt to taste

*Cooking Instructions*
1. Boil all ingredients together until the liquid is evaporated.
2. Transfer to steamer and cook until rice is done.
3. Mold it into a cone shape.
4. Garnish with sliced cucumber and tomato, scrambled eggs, sambel tempeh, and perkerdel dipped in sambel.

Yields 8–12 servings

**Sambel**

*Ingredients*
- 1 Tbsp. red fresh chili, ground
- 10 small cloves of garlic, sautéed
- 1 whole fresh onion
- 1 small tomato, chopped
- 1 Tbsp. lemon juice
- 4 g fresh ginger
- 1/4 tsp. pepper, ground
- 1 tsp. palm sugar
- Salt to taste
Cooking Instructions
1. Place all ingredients in a saucer-shaped granite grinding stone and grind with the granite pestle until smooth.
2. Serve the fresh sambel in the granite saucer.
Yields 8–12 servings

Australia
Courtesy of Rebecca J. Scritchfield, MA, RD

Balsamic Bean Salad with Grilled Fish Fillets

Ingredients
1 Tbsp. olive oil
1 tsp. ginger (fresh or ground)
2 cloves garlic, chopped
1/2 tsp. cumin, ground
1/2 tsp. chili powder, ground
5 small fish fillets

Balsamic Bean Salad:
Canned beans (chickpeas, black beans, or black-eyed peas)
1/2 medium English cucumber, seeded, diced
1 large tomato, chopped coarsely
1/2 onion, chopped
2 tsp. balsamic vinegar
2 tsp. olive oil
1 Tbsp. each of mint and parsley, chopped
Pepper

Cooking Instructions
1. In a flat dish combine oil, ginger, garlic, chili powder, and cumin.
2. Add fish and refrigerate. Prepare balsamic bean salad.
3. In a bowl, mix together beans, cucumber, tomato, and onion.
4. Add vinegar, olive oil, herbs, and pepper. Toss to coat well.
5. Chill salad while grilling fish fillets.
6. Preheat chargrill pan, and grill or barbecue until hot.
7. Remove fish from dish and cook each fillet for 4 minutes each side or until cooked through. (When cooked, the fish flakes when tested with a fork.) Serve immediately.
Yields 5 servings

Spinach Salad with Avocado Sautéed, Apples, and Toasted Macadamia Nuts

Ingredients
2 crisp green apples, peeled, halved and cut into quarters
1 tsp. macadamia nut oil
1 large bunch baby spinach leaves, washed and dried
1 avocado, chopped
2 Tbsp. roasted macadamias, chopped coarsely
Shaved parmesan cheese

_Salad Dressing:_
2 Tbsp. macadamia nut oil
4 Tbsp. apple cider vinegar
Sea salt and pepper to taste
1 tsp. chives, chopped (optional)
Pinch of sugar to taste

_Cooking Instructions_
1. Make the dressing by combining all ingredients.
2. Sauté the apple wedges with the macadamia nut oil until golden.
3. Pile the spinach leaves onto serving plates and top with sautéed apple, avocado, macadamias, and parmesan cheese.
4. Drizzle over the dressing and serve immediately.
Yields 2 servings

_Argentina_
Courtesy of Beth Klos, BS

_Tortilla_

_Ingredients_
Oil (any kind)
1 medium-sized potato
2–3 eggs
1/2–1 onion
Salt to taste

_Cooking Instructions_
1. For the finished tortilla to retain its shape and contents, choose a frying pan to which eggs will not stick.
2. Peel and cut the potato into small cubes, and chop the onion into small pieces.
3. In a separate bowl, mix the eggs together. Put enough oil in the pan to coat the bottom, and cook the potato and onion on high heat.
4. When the potatoes and onions are cooked, add the eggs.
5. Lower the temperature and cook 5 minutes more or until the eggs are thoroughly cooked.
6. Turn it over onto a cutting board or another clean surface, and then place it back in the frying pan or another pan for serving.

_Variations:_ Top with cheese or oregano. Add other ingredients such sausage, peas, or any others that would go well with an omelet.
Empanada Dough and Filling

*Ingredients*

**Dough for Empanadas:**
- 2 1/4 lbs. flour
- 14 oz. warm, melted lard
- 1–1 1/2 cups lukewarm water
- 1 tsp. salt
- 1 Tbsp. of paprika

**Empanada Filling:**
- 1 lb. sirloin tips (finely ground)
- 1 lb. scallions (quantity to taste), finely chopped
- 1 red sweet pepper, finely chopped
- 2 tomatoes without the seeds, peeled, chopped
- 1 Tbsp. paprika
- 1 tsp. cumin
- 1 Tbsp. oregano
- Salt to taste
- 1 olive per empanada
- 1 Tbsp. raisins (if desired)
- 2 hard-boiled eggs, thoroughly chilled (if desired)

*Cooking Instructions*

**Empanada Dough:**
1. On a counter or cutting board, place the flour in the shape of a wreath, and put the paprika and lukewarm lard in the middle.
2. In a separate bowl, combine the salt and lukewarm water, then mix everything together, kneading well for 15 minutes until it is very smooth.
3. Leave it covered with a dishcloth for 20 minutes.
4. Roll it out with a rolling pin until it is about a half inch thick.
5. Cut it into medallions, sufficient to hold a few ounces of filling.

*Variation: Use regular bread dough.*

**Empanada Filling:**
1. Put a splash of oil in a saucepan and add the scallions, sweet red pepper, and tomatoes. Cook on low heat until they are tender.
2. Add the meat and stir until it is browned.
3. Remove it from the heat and add the raisins (if desired). Let the resulting mixture cool completely.
4. Add hard-boiled eggs.
5. Place this mixture on one side of a dough medallion and add one olive. Fold over and roll the edges together. Bake in a hot oven (350°F, 177°C) for 10 to 12 minutes or until golden brown. (If both the mixture and the hard-boiled eggs are not thoroughly cooled when combined, the egg will not hold its shape. Note that empanadas can also be deep-fried.)

Yields 24 empanadas
Brazil
Courtesy of Emily J. Burritt MS, RD, CNSC

Pão de Queijo

*Ingredients*
- 1/3 cup vegetable oil
- 1/2 cup water
- 1/3 cup milk
- 1 tsp. salt
- 2 cups cassava flour (tapioca flour)
- 3/4 cup queijo minas (parmesan cheese)
- 2 eggs, beaten

*Cooking Instructions*
1. Preheat oven to 375°F (190°C).
2. Pour oil, water, milk, and salt into a large saucepan, and bring to a boil.
3. Remove from heat immediately upon boiling.
4. Stir in tapioca flour until smooth. Stir the cheese and egg until well combined. Allow the dough to set for 15 to 30 minutes.
5. Make small rounded balls (about 2–3 Tbsp. dough) and place them onto an ungreased baking sheet.
6. Bake balls until puffy and the tops are lightly browned (about 15 to 20 minutes). Serve warm.

Persia
Courtesy of Jeannette van der Velde, MPH, MSc

Shirin Pollo (Chicken, Sweet Rice with Orange, Raisins, and Almonds)

*Ingredients*
- 2 cups basmati or long-grain rice, soaked and rinsed
- 1.5 lbs. boneless chicken, cut into pieces
- 2 large onions, thinly sliced
- 4 Tbsp. olive oil
- 2 Tbsp. butter
- 1/4 cup sliced almonds, soaked in water for 1 hour
- 1/4 cup sliced pistachios, soaked in water for 1 hour
- 1/4 cup raisins
- 1/4 cup orange peel (soak in cold water for 1 hour, drain, and repeat)
- 2 Tbsp. sugar
- 1 tsp. saffron
- Salt and pepper

*Cooking Instructions*
1. Fry onions in 2 Tbsp. of olive oil until golden brown.
2. Add chicken and fry until browned.
3. Add 1 cup of hot water, salt, and pepper, and cook over medium heat for 20 minutes, adding more hot water if necessary. (Some water should remain in the pan after 20 minutes.)
4. Melt sugar in 1 cup of water and bring to a boil.
5. Add remaining 2 Tbsp. of olive oil, add saffron, mix well, and set aside.

Preparing the Rice:
1. Pour 3 cups of water in a large nonstick pan and bring to a boil.
2. Add rice and salt, and continue boiling until rice slightly softens.
3. Pour rice into a colander and wash it with lukewarm water.

Layering the Rice:
1. Add 1/2 cup of hot water in a pot and add a layer of rice (about 1/3 inch).
2. Spread chicken pieces over the rice and cover with a layer of rice.
3. Spread half of almonds, orange peel, and pistachios over rice and cover with remaining rice.
4. Pour sugar and saffron mixture over rice.
5. Cover and cook over low heat for about 30 minutes.
6. Add remaining almonds, orange peel, and pistachios.
7. Mix well and serve.

Adas Pollo (Rice with Dates and Lentils)

Ingredients
3/4 cup lentils, washed and drained
2 cups basmati or long-grain rice, soaked and rinsed
1 lb. ground beef or lamb, cubed
2 large onions, thinly sliced
3/4 cup pitted dates, washed
1/4 cup raisins, washed
1 tsp. saffron, dissolved into 1/3 cup hot water
Salt and pepper

Cooking Instructions
1. Pour 3 cups of water in a large nonstick pan and bring to a boil.
2. Add rice and salt, and continue boiling until rice slightly softens.
3. Pour rice into a colander and wash it with lukewarm water.
4. Bring 2–3 cups of water to a boil, add lentils, and cook for 15 to 20 minutes until tender.
5. Fry onions in olive oil until golden.
6. Add ground beef or lamb, salt and black pepper, and fry over medium heat for about 10 minutes.
7. Add 1 cup of hot water and cook until water is mostly absorbed.

Layering the Rice:
1. Pour 1/2 cup of water and 1 Tbsp. of olive oil into a nonstick pot.
2. Add half of the semicooked rice.
3. Spread meat, lentil, raisins, dates, and raisins over rice.
4. Add remaining rice and cook over low heat for about 20 minutes.
5. Pour saffron water over rice. Mix well and serve.

**Lebanon**  
Courtesy of Susan J. Massad, HSD, RD

**Hommus Bi Tahini**

*Ingredients*
- 1 can (16-oz.) of chickpeas  
- 3 Tbsp. tahini  
- 1 clove fresh garlic, crushed  
- 1 tsp. salt  
- Juice of 1 lemon  
- Paprika  
- 3 sprigs parsley

*Cooking Instructions*
1. Drain half of liquid from can of chickpeas.  
2. Blend chickpeas and remainder of liquid in food processor or blender.  
3. Add tahini, garlic, lemon juice, and salt.  
4. Blend until smooth, pour into serving platter, and garnish with parsley and paprika.  
5. Pour some olive oil on top (if desired). The mixture can be stored up to 1 week in a tightly covered container.

Yields 6–8 servings

**Tabouleh**

*Ingredients*
- 2 bunches parsley, washed, drained, and finely chopped  
- 1 bunch fresh spearmint, washed, drained, and finely chopped  
- 2 tomatoes, seeded and finely chopped  
- 1 bunch scallions, washed and finely chopped  
- 1/2 cup bulgur (fine cracked wheat), soaked in water for at least 30 minutes and squeezed dry  
- 1 tsp. salt  
- Juice of 2 lemons or 4 Tbsp. lemon juice  
- 4 Tbsp. olive oil

*Cooking Instructions*
1. In a deep bowl, combine all ingredients and toss together.  
2. Serve with Syrian bread or leaves of romaine lettuce.

Yields 10–12 servings

**Fish Tarator (Fish Baked with Tahini)**

*Ingredients*
- 2 lbs. white fish
Salt to taste
1 cup water
3 Tbsp. olive oil
Juice of 2 1/2 lemons
1 cup tahini
1 cup walnuts, chopped
2 onions, sliced
2 cloves garlic, crushed

Cooking Instructions
1. Mix water, 2 Tbsp. olive oil, and juice of 1 lemon.
2. Spread over fish in baking dish.
3. Bake covered at 325°F (163°C) for 20 minutes.
4. Sauté the walnuts and onions in the remainder of the olive oil.
5. Blend tahini, remainder of lemon juice, and salt.
6. Spread tahini mixture over the fish, and then spread the onion-and-walnut mixture over it.
Serve either warm or cold.

Chick Peas and Eggplant

Ingredients
1 large onion, diced
1/4 cup oil
1 large eggplant, peeled and cubed
1 can chickpeas, drained
1 can (18 oz.) tomato sauce
Salt and pepper to taste

Cooking Instructions
1. In a large saucepan, fry onions in oil until golden.
2. Add chickpeas, eggplant, and tomato sauce, and stir for about 3 to 4 minutes.
3. Add salt and pepper and cook over low heat for 25 minutes.
Yields 6 servings

Spinach Pies

Ingredients
Basic Dough:
1 pkg. dry yeast or 1 yeast cake
2/3 cups warm water
8 cups flour
1 tsp. salt
1/4 cup olive oil

Cooking Instructions
1. Dissolve yeast in 1/2 cup of warm water.
2. Place flour and salt in large bowl; add yeast, remaining water, and oil.
3. Knead until dough is smooth and pulls away from sides of bowl.
4. Cover with towel and let rise in warm place for 2 hours until doubled in size.

*Filling:*
2 lbs. fresh spinach, chopped
1 bunch green onions (scallions), chopped
1/4 cup olive oil
3/4 cup lemon juice
Salt, pepper, and allspice to taste

*Cooking Instructions*
1. Wash greens and drain well.
2. Combine all ingredients and mix thoroughly.
3. Cut pieces of dough into the size of an egg, cover, and let sit for 35 minutes.
4. Roll out each dough ball into flat circles and place about 2 Tbsp. of the filling in center of circle.
5. Bring sides together to form a triangle and pinch tightly.
6. Place in oiled pan and brush with oil.
7. Bake at 400°F (204°C) for about 20 minutes or until golden brown.
Resources
Sample Sensory Sheets
Linespread Test Sheet
Weights and Measures
Scoops and Can Sizes
Sensory Sheet

Item: ________________   Serving Size: ______________

OVERALL TASTE:
like extremely
like somewhat
neither like nor dislike
somewhat dislike
strongly dislike

DESCRIBE:
sweet
Sour
salty
bitter
other: ___________

ACIDITY:
mild
Average
strong
overwhelming

ASTRINGENCY:
mild
average
strong
overwhelming

SOLIDS TEXTURE:
soft
smooth
creamy
crisp
hard
other: ___________

LIQUID CONSISTENCY:
thin
gelatinous
nectar
thick
other: ___________

PREDOMINANT FLAVOR: ______________________
### Sensory Sheet

Score the number that best reflects the taster’s opinion:

1 = not liked all at  
2 = disliked somewhat  
3 = neutral  
4 = liked somewhat  
5 = much liked

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<th>Appearance</th>
<th>Taste</th>
<th>Texture</th>
<th>Record Other Comments</th>
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### Weights, Measures, Metric Conversions, and Can and Scoop Sizes

#### Weight Conversions

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<tr>
<th>Measurement</th>
<th>Conversion</th>
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<tbody>
<tr>
<td>1 gram</td>
<td>1,000,000 micrograms</td>
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<tr>
<td>1 gram</td>
<td>1,000 milligrams</td>
</tr>
<tr>
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<td>1,000 grams</td>
</tr>
<tr>
<td>1 kilogram</td>
<td>2.2 pounds</td>
</tr>
<tr>
<td>1 microgram</td>
<td>0.001 milligrams</td>
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<tr>
<td>1 milligram</td>
<td>1,000 micrograms</td>
</tr>
<tr>
<td>1 ounce</td>
<td>28.35 grams</td>
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<tr>
<td>1 pound</td>
<td>16 ounces</td>
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<tr>
<td>1 pound</td>
<td>454 grams</td>
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#### Volume Conversions

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<tr>
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<td>16 tablespoons</td>
</tr>
<tr>
<td>1 cup</td>
<td>236.59 milliliters</td>
</tr>
<tr>
<td>1 cup</td>
<td>8 fluid ounces</td>
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<td>1 fluid ounce</td>
<td>1/8 cup</td>
</tr>
<tr>
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<td>2 tablespoons</td>
</tr>
<tr>
<td>1 fluid ounce</td>
<td>29.6 milliliter</td>
</tr>
<tr>
<td>1 gallon</td>
<td>128 fluid ounces</td>
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</tr>
<tr>
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<tr>
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<td>4 quarts</td>
</tr>
<tr>
<td>1 gallon</td>
<td>8 pints</td>
</tr>
<tr>
<td>1 jigger</td>
<td>3 tablespoons</td>
</tr>
<tr>
<td>1 liter</td>
<td>0.85 Imperial gallon</td>
</tr>
<tr>
<td>1 liter</td>
<td>1.06 quart</td>
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<tr>
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<td>1,000 milliliters</td>
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<tr>
<td>1 tablespoon</td>
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<td>1 tablespoon</td>
<td>14.79 milliliters</td>
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<td>1 tablespoon</td>
<td>3 teaspoons</td>
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<tr>
<td>1 teaspoon</td>
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<tr>
<td>1 teaspoon</td>
<td>60 drops</td>
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<tr>
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<td>Approximately 5 grams dry weight</td>
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<tr>
<td>1/3 cup</td>
<td>16 teaspoons</td>
</tr>
<tr>
<td>1/3 cup</td>
<td>5 tablespoon + 1 teaspoons</td>
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**Length Conversions**

| 1 centimeter | 0.01 meter |
| 1 centimeter | 0.394 inches |
| 1 foot | 12 inches |
| 1 inch | 2.54 centimeters |
| 1 meter | 39.37 inches |

**Can Equivalents**

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<th>Can Size</th>
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<td>19–20 ounces</td>
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<td>2.5</td>
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<td>48 ounces</td>
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<td>211</td>
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<td>303</td>
<td>14.5–16 ounces</td>
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<td>Buffet</td>
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**Scoop Equivalents**

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<td>8</td>
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<tr>
<td>10</td>
<td>2/5 cup</td>
</tr>
<tr>
<td>12</td>
<td>1/3 cup</td>
</tr>
<tr>
<td>16</td>
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<tr>
<td>20</td>
<td>3 1/5 tablespoons</td>
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<tr>
<td>24</td>
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<tr>
<td>30</td>
<td>2 1/5 tablespoons</td>
</tr>
<tr>
<td>40</td>
<td>1 3/5 tablespoons</td>
</tr>
</tbody>
</table>

**Note:** The scoop number indicates the number of scoops it takes to make 1 quart.
Contributors

The Effect of Caffeine on Blood Pressure, Heart Rate, and Reaction Time (Contributed by Lisa Brown and Ilisa Palmer)

Gluten-Free Pasta (Contributed by Rebekah Angoff and Rebecca Riley)

Milk Alternatives for Lactose Intolerance (Contributed by Hope Patterson)

Sensory Evaluation (Contributed by Sungeun Choi)

Sugar Content in Various Soft Drinks (Contributed by Joan Hupfer)

Culturally Competent Recipes (Contributed by chapter authors of S. Edelstein, Food, Cuisine, and Cultural Competency. Sudbury, MA: Jones & Bartlett Learning; 2011)

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