Chapter 3

Vegetables

Consuming a wide variety of vegetables is an important component of a healthy, well balanced diet. Most Americans do not eat enough vegetables or a wide enough variety of vegetables in their diets. Home gardening is a great way to get more colorful, fresh vegetables into the diet, and it is cost efficient too. As a professional who can guide individuals in making healthier lifestyle choices, it is important for you to role model positive behaviors, like eating a variety of vegetables yourself and maybe even starting your own vegetable garden.

In order to be effective in promoting vegetable intake to others, you will need to be knowledgeable about available vegetable products, nutrient composition of vegetables, and food cost. It is also important for you to know how to grow, select, purchase, prepare, utilize, and incorporate vegetables into a healthy diet your consumers and clients will enjoy.

THINK ABOUT IT

- List a few vegetables that you eat regularly and some details about each vegetable, such as the nutrient composition and how to select/purchase it.

- List 3 things you would like to learn about vegetables or 3 questions you have relating to vegetables.

  1.

  2.

  3.

LAB ASSIGNMENT:

Green Beans, Corn, Broccoli & More

There are so many different types of vegetables that it is impossible to work with every vegetable in one laboratory period. The emphasis of this laboratory is to focus on some principals of vegetable science and preparation using green beans, corn, broccoli, onions, spinach, potatoes, carrots, and red cabbage. Each group will also prepare a vegetable salad or side dish to help familiarize the class with a greater variety of vegetables.

Overview:

Each student group will experiment with a specific vegetable. One group will set up the green bean can cutting. Another group will prepare corn using various cooking methods. Three groups will test four different treatments on their assigned vegetables. The directions for these treatments can be found at the beginning of the recipe list. The remaining group will experiment with cooking potatoes. Five groups will prepare an additional salad or side dish and share their product with the class.

Kitchen 1: Green Bean Can Cutting
Butternut Squash Soup
(Begin cooking the squash while setting up can cutting)

Kitchen 2: Nectarine and Radish Salad
Harvard Beets

Kitchen 3: Cauliflower and Leek Au Gratin
Edamame and Avocado Dip

Kitchen 4: Asparagus Bake
Creamy Turnips

Kitchen 5: Spinach: Treatments A, B, C, and D
Onions: Treatments A, B, C, and D

Kitchen 6: Potatoes: Idaho, Sweet, White, Oven baked, and Microwave baked
Broccoli: Treatments A, B, C, and D

Kitchen 7: Carrots: Treatments A, B, C, and D
Red Cabbage: Treatments A, B, C, and D

Kitchen 8: Corn: Fresh and Frozen
Black-Eyed Pea Salad

Evaluation Tools:

- Observation of Bean Can Cutting
- Evaluation of Corn
- Evaluation of Cooking Treatments for Vegetables
- Evaluation of Baked Potatoes
- Evaluation of Vegetable Recipes

Directions:

1. Always begin by washing your hands and thoroughly cleaning/sanitizing work surfaces.
2. Gather ingredients needed for your assigned vegetable experiments/recipes.
3. Complete all assigned experiments/recipes.
4. Read "Vegetable Science" and "Vegetable Tips for Consumers." Complete the "Vegetable Questions."
5. When your group is finished, observe the can cuttings and experiments. Then taste a sample of each prepared vegetable and each salad or side dish. Complete the evaluation tools.
6. Clean your work station and check out before leaving.

RECIPES:

Broccoli, Onions, Carrots & More

Cooking Treatments For Vegetables

Ingredients:

Assigned Vegetable:

1 bunch broccoli, fresh
10 ounces spinach, fresh
1/2 medium head red cabbage, fresh
1/2 teaspoonBaking soda
8 medium onions, fresh
8 medium carrots, fresh
1/2 teaspoon cream of tartar

Method:

1. Wash your assigned vegetable, cut it into small uniform pieces, and divide pieces into 4 equal portions.
2. Pour 1 quart of cold water into a 2-quart saucepan. Repeat with 3 additional saucepans. Bring the water in each of the four saucepans to a boil.
3. When the water boils, add one portion of your vegetables to each saucepan of boiling water. You may need to add more water if too much water is lost as steam.
4. Assign a "cooking treatment" to each saucepan and follow the treatment directions on the next page. *Note: You will need to save a portion of the cooking liquid for observation.*
5. At the end of the cooking period for each treatment, remove the saucepan from the heat and drain the liquid. For each treatment place a glass container in the sink while draining to collect part of the cooking liquid. Place the cooked vegetables on a white plate for evaluation. Label each plate and glass container with the cooking treatment used.
6. When you complete the "Evaluation of Cooking Treatment for Vegetables," you will consider both the vegetable and the cooking liquid.

Cooking Treatments:

Acid: Cream of Tartar
Base: Baking Soda

START COUNTING TIME AFTER THE WATER RETURNS TO A BOIL FOR EACH EXPERIMENT.

Experiment A	Experiment B	Experiment C	Experiment D
Boil for 15 minutes.	Boil for 30 minutes.	1. Add 1/2 teaspoon cream of tartar to the water. 2. Boil for 15 minutes.	1. Add 1/2 teaspoon baking soda to the water. 2. Boil for 15 minutes.

Green Bean Can Cutting

Ingredients:

1 can green beans brand A, whole
1 can green beans brand B, whole
1 can green beans brand C, whole
1 can green beans brand D, whole

Method:

1. Open one can of whole green beans.
2. Pour the liquid into a small measuring cup.
3. Place the beans on a plate and weigh. Be sure to subtract the weight of the plate or **tare** the scale to zero.
4. Sort the beans with defects away from the uniform beans. Then count the number of uniform beans and the number of beans with defects.
5. Repeat steps 1 through 4 for the remaining 3 brands.

Butternut Squash Soup

Ingredients:

- 1 medium butternut squash
- 1 cup milk, whole or 2%
- 1/4 teaspoon pepper
- 4 cups chicken broth
- 1/4 cup white onion, chopped
- 1 dash salt

Method:

1. Wash the squash. Using a fork, prick through the skin of the squash several times on each half. Microwave for 8 minutes. Turnover and microwave for an additional 4 minutes. Continue turning and microwaving for 4-minute intervals until thoroughly cooked (about 16-20 minutes total).
2. Cool and then peel the squash. Cut in half lengthwise and remove the seeds. Cut the first half into chunks and place the chunks into a blender.
3. Add 1/8 cup of onion, 2 cups of chicken broth, and 1/2 cup of milk. Blend until smooth. Pour into a 4-quart saucepan.
4. Cut the second squash half into chunks and add to the blender. Again add 1/8 cup of onion, 2 cups of chicken broth, and 1/2 cup of milk. Blend until smooth. Add to the saucepan.
5. Heat over medium-high heat until it simmers. Add pepper and salt. Announce to the class when the soup is done.

Nectarine and Radish Salad

Ingredients:

- 2 1/4 cups nectarines
- 1/2 cup cucumber, sliced thinly
- 1/4 cup lime juice
- 1/4 teaspoon salt
- 1 1/2 cups daikon radishes, peeled, sliced thinly
- 1/4 cup red onion, sliced thinly
- 2 teaspoons fresh parsley, chopped
- 1/4 teaspoon pepper

Method:

1. Add all the ingredients to a medium bowl and mix well.
2. Allow flavors to develop for 30 minutes before serving.
3. Consume on the same day as prepared.

Harvard Beets

Ingredients:

1 bunch or 3 beets, fresh beets*
1 tablespoon cornstarch
1/2 teaspoon salt
1/4 cup vinegar, white
1/2 cup sugar
1/2 teaspoon pepper

Method:

1. Wash beets and trim off all but 1-2 inches of the tops. Place the beets in a medium pot. Add enough water to cover them.
2. Bring the water to a simmer and cook 30-45 minutes or until an inserted fork easily moves through the beets.
3. Run the beets under cold water. Remove the skin, remaining stems, and the root end. Slice beets and place in a glass bowl (non-reactive bowl).
4. Combine the remaining ingredients in a medium pot over medium-high heat. Cook until it boils and is thickened. Add the beets and stir to coat. Announce to the class when the beets are done.

Cauliflower & Leek Au Gratin

Ingredients:

2 tablespoons + 1/2 teaspoon olive oil, divided
2 large leeks, white and light green portions
4 cups (1/2 head) cauliflower florets, 1-inch pieces
1 ½ cups, divided skim or nonfat milk
1/4 teaspoon salt
2 tablespoons flour, all purpose
3/4 cup, divided sharp cheddar cheese, low-fat
1 1/2 teaspoons dijon mustard
1/2 teaspoon pepper
1/4 cup bread crumbs, whole wheat

Method:

1. Cut off the stringy roots and the dark leafy green portion of the leeks. Peel off the outer layer. Cut the leaks in half lengthwise and rinse to remove any sand between the layers. Slice the white and light green portions into thin half-moon slices.
2. In a large saucepan, add 2 tablespoons of olive oil and the sliced leeks. Heat over medium heat for about 5 minutes, stirring occasionally.
3. Add the cauliflower, salt, and 1 1/4 cups of milk. Bring to a boil, then reduce heat, cover, and simmer for about 5 minutes or until the cauliflower is tender.
4. In a small bowl, whisk together 1/4 cup of milk and the flour. Add this mixture to the cauliflower. Stir for about 2 minutes or until thickened. Add 1/2 cup of cheese, the mustard, and the pepper. Spoon into a 4-quart baking dish.
5. In a small bowl, mix the bread crumbs, 1/4 cup of the cheese, and 1/2 teaspoon olive oil. Sprinkle over the cauliflower mixture.
6. Broil 1-2 minutes or until the top is crispy. Announce to the class that the dish is ready.

Avocado and Edamame Dip

Ingredients:

16-ounce package edamame, frozen, shelled
2 tablespoons olive oil
2-3 medium garlic cloves, minced
1 teaspoon cumin, or to taste
1 avocado
2 tablespoons lime juice
1/2 teaspoon salt, or to taste

Method:

1. Pour 1 quart of cold water into a 2-quart saucepan and bring to a boil.
2. While waiting for the water to boil, peel the avocado and remove the pit. Then, cut the avocado into small chunks.
3. When the water boils, add the edamame. Bring the water back to a boil. Reduce the heat and simmer for 5 minutes. Strain the water by pouring it into a colander. Rinse edamame with cold water.
4. Pour the edamame, avocado, olive oil, lime juice, garlic, salt, and cumin into a blender or food processor. Puree until smooth.
5. Chill for 30 minutes. May be served as a dip for chips, as a spread for sandwiches or crackers, or as a salad topping.

Asparagus Bake

Ingredients:

8-ounce package cream cheese, low-fat
1/4 cup parmesan cheese, divided
8-ounce package sugar snap peas, frozen
1 medium red pepper, chopped
1/4 cup onion, chopped
1/2 teaspoon parsley flakes
1/3 cup milk, skim
4 tablespoons olive oil
4 cups fresh asparagus, 1-inch pieces
1 medium yellow pepper, chopped
1/4 cup oatmeal

Method:

1. Preheat oven to 350° Fahrenheit. Grease a 4-quart baking dish.
2. Prepare asparagus by washing and removing the woody ends. Cut into 1-inch pieces.
3. Place the asparagus on a baking sheet. Drizzle with 2 tablespoons of olive oil. Cook until slightly tender, yet still crisp, for about 10-15 minutes. When ready, remove from the oven and set aside until needed.
4. While the asparagus is cooking, heat the olive oil in a small stove pan. Add the frozen sugar snap peas, red pepper, yellow pepper, and onion to the pan. Cook until slightly tender. Remove from heat. Drain excess liquid from the pan using a colander.
5. When vegetables are done cooking, add the asparagus pieces and transfer them to the greased baking dish.
6. In a small microwave safe bowl, combine the cream cheese and milk. Microwave for 1 minute.
7. Add the milk and cream cheese mixture and 1/8 cup of parmesan cheese to the baking dish with the vegetables. Mix.
8. In another small bowl, mix 1/8 cup of parmesan cheese, oatmeal, and parsley. Sprinkle mixture on top of the vegetables.
9. Bake for 30 minutes. Announce to the class when the dish is ready.

Creamy Turnips

Ingredients:

1 cup vegetable broth
1/3 cup onion, finely chopped
1 1/2 tablespoons sour cream, reduced fat
1/4 teaspoon pepper
1/4 cup fresh parsley, chopped (optional)
3 cups turnips, peeled, chopped into cubes
2 garlic cloves, minced
Dash salt
1/2 cup mozzarella cheese, shredded, divided

Method:

1. Add broth to a 2-quart saucepan and bring to a boil.
2. Add the turnips, onion, and garlic. Bring back to a boil and cook for 10 minutes.
3. Reduce the heat. Simmer for about 15 minutes or until most of the liquid evaporates.
4. Add the sour cream, salt, and pepper and gently stir.
5. Stir in 1/4 cup of cheese. Sprinkle the remaining cheese on top. Top with fresh parsley, if desired. Announce to the class when the turnips are done.

Oven Baked Potatoes

Ingredients:

4 Idaho potatoes
4 white potatoes
4 sweet potatoes

Method:

1. Preheat oven to 400° Fahrenheit.
2. Thoroughly wash and dry the potatoes.
3. Place the potatoes (all 3 kinds) on a baking sheet. Do not crowd potatoes on the baking sheet. Prick through the skin of the potatoes 4 or 5 times with a fork.
4. Bake until the potatoes can be pierced readily with a fork. About 1 hour.
5. As soon as the potatoes are removed from the oven, carefully quarter them and announce to the class that they are ready.

Microwave Baked Potatoes

Ingredients:

4 Idaho potatoes
4 white potatoes
4 sweet potatoes

Method:

1. Thoroughly wash the potatoes. Prick through the skin of the potatoes 4 or 5 times with a fork.
2. Arrange the 4 Idaho potatoes in a circular pattern on a microwave tray or on a paper towel. Repeat for sweet potatoes and white potatoes.
3. Microwave the Idaho potatoes on high power for 3 minutes. Rearrange potatoes on the tray and turn them over so the side that had been on top becomes the underside. Microwave on high power for 3 minutes. Rearrange potatoes on the tray. Microwave on high power for 3 more minutes. Check for degree of tenderness. If potatoes are still not tender, continue microwaving for 30-second to 1-minute intervals. Repeat for sweet potatoes and white potatoes.
4. As soon as the potatoes are removed from the microwave, carefully cut into quarters and announce to the class that they are ready.

Fresh & Frozen Corn

Ingredients:

16, 1-2 inch pieces corn, frozen cobs
16, 1-2 inch pieces corn, fresh cobs, shucked, silks removed

Method:

1. Boil 3-4 quarts of water.
2. Place the frozen corn in the pot of boiling water. Cover and return to a boil.
3. Boil for 3 minutes. Remove the corn from the water.
4. Announce to the class that the corn is ready.
5. Repeat the process for the fresh corn.

Black-Eyed Pea Salad

Ingredients:

- 4, 15-ounce cans black-eyed peas, canned, drained
- 1 medium green bell pepper, diced
- 3 stalks celery, chopped
- 1 bunch green onions, chopped
- 1/3 cup olive oil
- 1/4 cup sugar
- 1 medium red bell pepper, diced
- 1 medium yellow bell pepper, diced
- 2 carrots, diced
- 1/2 bunch parsley, chopped
- 2/3 cup vinegar, red wine
- 2 garlic cloves, minced

Method:

1. Combine the black-eyed peas, bell peppers, celery, carrots, green onions, and parsley in a large bowl.
2. In a small bowl, mix the oil, vinegar, sugar, and garlic. Drizzle over the black-eyed pea mixture and stir to combine.

OBSERVATION OF BEAN CAN CUTTING

1. Taste each variation and place the numerical score for each characteristic in the upper left hand corner of each box. (Score System: 1=very poor; 2=poor; 3=fair; 4=medium; 5=good; 6=very good; 7=excellent)
2. Provide comments/descriptions to justify the numerical score.

VARIETY	COLOR/ APPEARANCE	VOLUME OF LIQUID	WEIGHT OF BEANS	FLAVOR	NUMBER OF UNIFORM BEANS	NUMBER OF BEANS WITH DEFECTS	PRICE
BRAND A: _____							
BRAND B: _____							
BRAND C: _____							
BRAND D: _____							

EVALUATION OF CORN

1. Taste each variation and place the numerical score for each characteristic in the upper left hand corner of each box. (Score System: 1=very poor; 2=poor; 3=fair; 4=medium; 5=good; 6=very good; 7=excellent)
2. Provide comments/descriptions to justify the numerical score.

VARIETY	COLOR/ APPEARANCE	TEXTURE/ TENDERNESS	FLAVOR	OVERALL QUALITY
FROZEN CORN				
FRESH CORN				

EVALUATION OF COOKING TREATMENTS FOR VEGETABLES

1. Taste each variation and place the numerical score for each characteristic in the upper left hand corner of each box. (Score System: 1=very poor; 2=poor; 3=fair; 4=medium; 5=good; 6=very good; 7=excellent)
2. Provide comments/descriptions to justify each numerical score.

VARIETY	LIQUID COLOR	VEGETABLE COLOR	TEXTURE	FLAVOR	OVERALL QUALITY
BROCCOLI TREATMENT A					
BROCCOLI TREATMENT B					
BROCCOLI TREATMENT C					
BROCCOLI TREATMENT D					
ONIONS TREATMENT A					
ONIONS TREATMENT B					
ONIONS TREATMENT C					
ONIONS TREATMENT D					

EVALUATION OF COOKING TREATMENTS FOR VEGETABLES (CONTINUED)

1. Taste each variation and place the numerical score for each characteristic in the upper left hand corner of each box. (Score System: 1=very poor; 2=poor; 3=fair; 4=medium; 5=good; 6=very good; 7=excellent)
2. Provide comments/descriptions to justify each numerical score.

VARIETY	LIQUID COLOR	VEGETABLE COLOR	TEXTURE	FLAVOR	OVERALL QUALITY
SPINACH TREATMENT A					
SPINACH TREATMENT B					
SPINACH TREATMENT C					
SPINACH TREATMENT D					
CARROTS TREATMENT A					
CARROTS TREATMENT B					
CARROTS TREATMENT C					
CARROTS TREATMENT D					

EVALUATION OF COOKING TREATMENTS FOR VEGETABLES (CONTINUED)

1. Taste each variation and place the numerical score for each characteristic in the upper left hand corner of each box. (Score System: 1=very poor; 2=poor; 3=fair; 4=medium; 5=good; 6=very good; 7=excellent)
2. Provide comments/descriptions to justify each numerical score.

VARIETY	LIQUID COLOR	VEGETABLE COLOR	TEXTURE	FLAVOR	OVERALL QUALITY
RED CABBAGE TREATMENT A					
RED CABBAGE TREATMENT B					
RED CABBAGE TREATMENT C					
RED CABBAGE TREATMENT D					

EVALUATION OF BAKED POTATOES

1. Taste each variation and place the numerical score for each characteristic in the upper left hand corner of each box. (Score System: 1=very poor; 2=poor; 3=fair; 4=medium; 5=good; 6=very good; 7=excellent)
2. Provide comments/descriptions to justify the numerical score.

VARIETY	COLOR/ APPEARANCE	TEXTURE/ TENDERNESS	FLAVOR	OVERALL QUALITY
OVEN BAKED IDAHO				
MICROWAVE BAKED IDAHO				
OVEN BAKED SWEET POTATO				
MICROWAVE BAKED SWEET POTATO				
OVEN BAKED WHITE POTATO				
MICROWAVE BAKED WHITE POTATO				

EVALUATION OF VEGETABLE RECIPES

1. Taste each variation and place the numerical score for each characteristic in the upper left hand corner of each box. (Score System: 1=very poor; 2=poor; 3=fair; 4=medium; 5=good; 6=very good; 7=excellent)
2. Provide comments/descriptions to justify the numerical score.

VARIETY	APPEARANCE	CONSISTENCY/ TEXTURE	TENDERNESS	FLAVOR	OVERALL QUALITY
BUTTERNUT SQUASH SOUP					
HARVARD BEETS					
EDAMAME AND AVOCADO					
CAULIFLOWER AND LEEK AU GRATIN					
ASPARAGUS BAKE					
BLACK-EYED PEA SALAD					
CREAMY TURNIPS					
NECTARINE AND RADISH SALAD					

LEARN MORE:

Vegetable Science

- Vegetables are classified into groups based on the part of the plant from which they come. Roots, bulbs, stems, leaves, fruits, flowers, and seeds are all groups of vegetables.

- **Root** vegetables store energy for the plant and are higher in calories and starches than other vegetables. Roots can be divided into tap roots, tuberous roots, and tubers. Tap roots, such as carrots, turnips, radishes, and beets, are large main tapered roots. Tuberous roots, such as sweet potatoes and yams, are enlarged portions of roots. Tubers, such as potatoes and Jerusalem artichokes, are actually thickened underground stems that have buds (eyes).

- **Bulbs,** such as onions and garlic, are underground stems with overlapping leaves and are a source of stored energy for the plant. Bulbs are full of flavoring and are often added to other foods as a seasoning.

- **Stems** transport nutrients to various parts of the plant. For example, stems transport nutrients from the roots to the leaves. Asparagus and celery are commonly eaten stems.

- **Leaves** are the site of photosynthesis; in which carbon dioxide, water, and energy from the sun are used to produce carbohydrates. The carbohydrates are transported away from the leaves by the stems. Some common leaf vegetables include lettuce, spinach, kale, and cabbage. Leaves are low in calories and carbohydrates as well as a good source of vitamin A, vitamin C, riboflavin, calcium, and iron.

- Vegetables that are botanically **fruits** of a plant contain seeds. Tomatoes, cucumbers, eggplants, peppers, olives, and zucchinis are all vegetables that are the fruit of the plant. Fruits contain carbohydrates in the form of starches and sugars.

- Vegetable **flowers** include broccoli, cauliflower, and sweet corn. Flowers store carbohydrates such as starches or sugars.

- **Seeds,** such as black beans, kidney beans, lentils, lima beans, peas, and soybeans, all grow in a pod and are called legumes. In the case of green beans and snow peas, both the pod and seed are eaten. The pod is removed before eating many other legumes.

Vegetable Tips for Consumers

- Eat 2½ - 3 cups of vegetables every day (based on a 2,000 kilocalorie diet).
- Try to vary veggies by eating dark-green veggies, orange veggies, dried beans, and more! Dark green veggies are a good source of folate, vitamin C, and vitamin A. Orange vegetables are an excellent source of vitamin A. Many legumes are a good source of potassium and fiber.
- Try to consume fresh or frozen vegetables when possible. Canned vegetables lose nutrients and can be high in sodium.
- Buy plain frozen vegetables more often than vegetables with added sauces or seasonings. The sauces and seasonings are often packed with calories, fat, and sodium.
- When buying canned vegetables, choose no or low sodium. If canned vegetables have added sodium, rinse the vegetables with water before eating.
- Wash fresh vegetables thoroughly before eating.
- Avoid overcooking vegetables! To preserve nutrients, try steaming vegetables or cooking in the microwave with just a small amount of water. Cooked vegetables should be slightly crisp or just tender.
- Boiling vegetables for long periods of time is not recommended due to **leaching.** Leaching is the loss of the vegetables vitamins and minerals into the cooking liquid. To add back some of the vegetables nutrient content, include some of the cooking liquid in soups and casseroles.

Vegetable Questions

1. Pregnant women need to consume increased amounts of folate. What vegetables would you recommend to a pregnant client to help her reach this goal?

2. Which brand of green beans would you order for an upcoming wedding that you are catering? (Choose from the four used in today's lab.)

3. Which brand of green beans would you recommend to a cardiac patient who receives SNAP (Supplemental Nutrition Assistance Program)? What other recommendations for selecting/preparing canned vegetables would you make to this patient?

4. An employee complains that the cooked broccoli on the tray line never looks bright. He suggests adding baking soda to the cooking water. Is this a good idea? Why or why not?

5. Which color pigments are most changed by acids and bases?

6. Which color pigments are least changed by acids and bases?

Vegetables Teacher Tips

Overview

This lab experience will take a full class period of 2 ¼ hours to complete and should be scheduled early in the course.

- The "can cutting" is done to show variation in quality of different brands of canned vegetables. This can also be done by using different brands of frozen vegetables. Be sure to include a store brand in the comparisons.
- The students will study the effect of different cooking treatments including pH, time for vegetables.
- The students will study ways to make vegetables, including strong flavored vegetables, more appealing to children and adults who say they "hate vegetables."
- The students may be introduced to equipment they have not used previously such as blenders, microwave (for something other than popcorn or warming frozen food), food processors, mandolin, and juicer (optional).

Lab Management

Demonstrations

- This is a good opportunity to demonstrate and review knife selection, care, storage, and safety.
- If available, demonstrate the use of a mandolin to slice vegetables.
- If available, demonstrate the use of food processor blades to slice or grate vegetables. For the nectarine and radish salad, discuss the way the vegetable is sliced (e.g. using a mandolin; slicing blade in a food processor; or by hand) impacts the appearance and mouthfeel of the final product.

Time Management

- As available, have the students slice the vegetables using a knife, the slicing blade of a food processor, and/or a mandolin.

- **Kitchen 1:** Should begin preparing the butternut squash soup first. As the soup is heating, they can continue onto their can cutting experiment. Neither the green beans nor the cans they came in should be thrown away. The class will need to analyze the four bean varieties. The class can observe one of the group member's evaluation of bean can cutting page to determine the weight of the liquid, amount the beans weighed, number of uniform beans, number of beans with defects, and price. Students will analyze the appearance and flavor of the beans individually.

- **Kitchen 2:** Should begin preparing the Harvard beets first. As the beets boil they can make the nectarine and radish salad. Canned beets (1 lb) may be substituted for the fresh beets. If fresh beets are used, golden beets are preferred.

- **Kitchen 3:** Should bring water to a boil for the edamame. While the water is coming to a boil and the pods are cooking, they can begin to prepare the cauliflower and leek au gratin. When the cauliflower and leek au gratin is baking, they can finish the edamame dip recipe.

- **Kitchen 4:** This group can prep for both recipes at the same time, beginning with chopping vegetables. When finished, they can put the creamy turnip prep work aside and complete the asparagus bake. When the asparagus is baking, they can complete the creamy turnip recipe.

- **Kitchen 5:** Should do treatments to one vegetable, place it out for everyone, wash the pots that were used, and use those same pots to continue to the second round of treatments for the second vegetable.

- **Kitchen 6:** Should begin by preheating the oven and getting the potatoes into the oven as soon as possible. They can then bring the pots of water to a boil and prep the broccoli for the treatments. While the broccoli is cooking, they can start to microwave the potatoes.

- **Kitchen 7:** Same as kitchen 5.

- **Kitchen 8:** Should begin by bringing water to a boil for the fresh and frozen corn. They can cut the whole ears of fresh corn into thirds after cooking. While the corn is cooking, they can start preparing the black-eyed pea salad.

- If possible, add a microwave and/or steaming treatment to the broccoli and spinach vegetables. Discuss the impact of time and amount of cooking fluid on texture, taste, and nutrient quality.

- This lab requires many pots. To free needed equipment, remind students to clean as they empty them and wash pots as soon as they are emptied.

Sensory Evaluation

- Instruct the students on how to display and evaluate the products. As time allows, a student from each kitchen should comment about the preparation of the dish and the final product.
- Serve the frozen and fresh corn at the same time for the best comparison.
- Evaluate at the same time, side by side: all bean samples; baked and microwaved potatoes; frozen and fresh corn; all broccoli treatments; all onion treatments; all spinach treatments; all carrot treatments; and all red cabbage treatments.

Nutrition Points for Discussion:

- The Dietary Guidelines for Americans recommend that all Americans eat more vegetables because they contain nutrients that are typically under consumed including folate, magnesium, potassium, dietary fiber, and vitamins A, C, and K.
- People who consume more vegetables have lower risks for chronic conditions including some cancers, heart disease, and obesity.
- Beans and peas are unique foods in that they are excellent sources of protein and also provide nutrients similar to those found in meat, poultry, and seafood such as iron and zinc.
- Eating approaches like the Mediterranean Diet and the DASH (Dietary Approaches to Stop Hypertension) Diet include a plate that is half vegetables.
- Discuss the function of fat used in each of the recipes.
    - How would using full fat milk change the butternut squash soup?
    - What role does olive oil play in the cauliflower and leek au gratin? How would the product be different if full fat cheese was used? How would the product be different if full fat milk was used?
    - What is the role of olive oil in the avocado and edamame dip? Can it be eliminated? What characteristics of the product would change if different oil was used (e.g. canola oil)?
    - What is the function of olive oil in the asparagus bake? Can it be eliminated? How would the final product vary if a cooking spray was used?
    - How would the creamy turnips be different if full fat sour cream and full fat mozzarella cheese were used?
    - What is the function of olive oil in the black-eyed pea salad? Can it be eliminated?

- Salt has either been eliminated from the traditional recipe or listed as optional. Discuss with the students the function of salt in these recipes. What other spices could be used if the students find them lacking in flavor?

- Discuss ways to enhance the enjoyment of eating vegetables without adding fat, salt, or sugar.

- Select a nutrition tip for each of the recipes. For example:

  - For the butternut squash soup recipe, discuss the use of a vegetable as the main ingredient in a recipe. Discuss the difference in the nutritional value, flavor, and texture when using whole, 2%, or skim milk.
  - For the nectarine and radish salad recipe: How do the nutrients from vegetables and fruits complement each other?
  - For the Harvard Beets recipe, discuss the role of sugar in this recipe. Can the sugar be reduced? Compare the nutrient value of this recipe using fresh versus canned beets.
  - For the cauliflower and leek au gratin, discuss how the nutrient composition varies using a thin or thick white sauce.
  - For the avocado and edamame dip, discuss the amount of fat as well as the amount of saturated fat in the product. Is this a healthy snack?
  - For the asparagus, a top-of-the-stove method would be to put just a small amount of water in a frying pan, bring to boil, and evaporate the water. When the fork can pierce the stalks, spray with a flavored cooking spray and "grill" for 1-2 minutes. What method preserves the most nutrients? Is there a difference in the nutrient value of thin versus thick asparagus?
  - For the creamy turnips, what role do root vegetables play in a healthy diet?
  - For the baked and microwaved potatoes, compare the texture of the skin and the pulp of the potatoes. Is the skin edible? What nutrients would be lost if the skin was discarded? Compare and contrast the nutrient profile of white and sweet potatoes.
  - For the fresh and frozen corn, discuss the year round source and availability of fresh corn for your area; how does travel and storage impact its quality, including its nutrient value?
  - For the black-eyed pea salad, discuss the nutrients provided by the various vegetables. What other vegetables could be used in this salad?

SHOPPING LIST: (8 SECTIONS)

Item	Utilized Unit/Lab Section	Purchased Unit
Fresh corn cobs	24	8 cobs (1/3s)
Broccoli, Fresh	1 bunch	1 bunch
Cauliflower, Fresh	½ head	1 head
Onions	10 medium	10 medium
White Onion	¼ cup	1 large
Red Onion	¼ cup	1 large
Green Onions	1 bunch	1 bunch
Fresh Spinach	10 oz.	1 bag
Carrots, Fresh	10 large	1 bag
Red Cabbage	½ head	1 head
Idaho Potatoes	8	8
Sweet Potatoes	8	8
White Potatoes	8	8
Butternut Squash	1 medium	1 medium
Avocado	1	1
Leeks	2 large	2 large
Asparagus	4 cups	1 bunch
Red Bell Pepper	2 medium	2 medium
Yellow Bell Pepper	2 medium	2 medium
Green Bell Pepper	1 medium	1 medium
Fresh Parsley	½ bunch + ¼ cup	1 bunch
Turnips	3 cups	1 large
Nectarines	2 ¼ cups	2 large
Daikon Radishes	1 ½ cups	1 bunch
Cucumber	½ cup	1 medium
Celery	3 stalks	1 head
Garlic Cloves	7 cloves	1 head
Fresh Beets ***canned beets (1 lb) substitute**	3 beets	1 bunch
Canned Black-eyed peas	(4) 15 oz cans	(4) 15 oz cans
Canned Whole Green Beans ***each can should be a dif. brand**	(4) 15 oz cans	(4) 15 oz cans

SHOPPING LIST: (8 SECTIONS) CONTINUED

Item	Utilized Unit/Lab Section	Purchased Unit
White Vinegar	¼ cup	1 sml. bottle
Red Wine Vinegar	2/3 cup	1 sml. bottle
Olive Oil	7 ½ oz + ½ tsp.	1 bottle
Lime Juice	3 oz	1 bottle
Dijon Mustard	1 ½ tsp.	1 bottle
Chicken Broth	4 cups	32 oz cont.
Vegetable Broth	1 cup	1 can
Bread Crumbs (Whole Wheat)	½ cup	1 sml. cont.
Oatmeal	½ cup	1 sml. cont.
Parsley Flakes	½ tsp.	1 sml. cont.
Cream of Tartar	2 ½ tsp.	1 sml. cont.
Cornstarch	1 TBSP	1 box
Cumin (opt)	½ tsp.	1 sml. cont.
Pepper	1 ¾ tsp.	1 cont.
Baking Soda	2 ½ tsp.	1 box
Salt	1 ¾ tsp.	1 cont.
Sugar	¾ cup	1 sml. bag
Flour, all purpose	½ cup	1 medium
Frozen corn cobs	3 stalks	1 head
Frozen edamame, shelled	7 cloves	1 head
Frozen sugar snap peas	2/3 cup	1 sml. bottle
Milk, whole or 2%	7 ½ oz + ½ tsp.	1 bottle
Skim or nonfat milk	3 oz	1 bottle
Sharp cheddar cheese, low fat	1 ½ tsp.	1 bottle
Cream cheese, low fat	4 cups	32 oz cont.
Sour Cream, low fat	1 cup	1 can
Parmesan Cheese	½ cup	1 sml. cont.
Mozzarella Cheese, shredded	½ cup	1 sml. cont.