
ENHANCING VEGETABLE CONSUMPTION IN THE NSLP: TOOLS FOR SCHOOL NUTRITION PROFESSIONALS



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A project by Jewel Hochstedler and Verena Vancil,
FDACS Dietetic Interns

When faced with the challenge of increasing vegetable acceptance among students, school nutrition programs have a variety of tools and strategies at hand. These include correct handling of vegetables, applying appropriate cooking techniques, enhancing flavor through seasoning blends, strategic use of language, and engaging kitchen staff, students, and other members of the school community to change the culture around school meals.

Handling of Produce

Proper storage, cleaning, and cooking of vegetables ensures optimal appearance and peak flavor, prevents increased costs due to premature spoilage of foods, and curbs plate waste.

Storage¹

Store in the refrigerator

FRUIT	Berries	VEGETABLES	Belgian Endive	Cauliflower	Leafy Vegetables	Radishes
Apples (more than 7 days)	Cherries	Artichokes	Broccoli	Celery	Leeks	Spinach
Apricots	Cut Fruit	Asparagus	Brussel Sprouts	Cut Vegetables	Lettuce	Sprouts
Asian pears	Figs	Green Beans	Cabbage	Green Onions	Mushrooms	Summer Squashes
	Grapes	Beets	Carrots	Herbs (not basil)	Peas	Sweet Corn

1. Place fruits and vegetables in separate, perforated plastic bags.
2. Use within 1-3 days for maximum flavor and freshness.

3. Store each group in different produce drawers in the refrigerator to minimize the detrimental effects of ethylene produced by the fruits on the vegetables.

Store only at room temperature

FRUIT	Citrus fruits	Persimmons	VEGETABLES	Garlic*	Peppers†	Tomatoes
Apples (fewer than 7 days)	Mangoes	Pineapple	Basil (in water)	Ginger	Potatoes*	Winter Squashes
Bananas	Melons	Plantain	Cucumber†	Jicama	Pumpkins	
	Papayas	Pomegranates	Eggplant†	Onions*	Sweet Potatoes*	

1. Many fruits and vegetables should only be stored at room temperatures. Refrigeration can cause cold damage or prevent them from ripening to good flavor and texture. For example, pink tomatoes ripen to a better taste and red color if they are left at room temperature. In the refrigerator, they do not turn red, and even red tomatoes kept in the refrigerator lose their flavor.

2. Keep away from direct sunlight.

*Store garlic, onions, potatoes, and sweet potatoes in a well-ventilated area in the pantry.

†Cucumbers, eggplant, and peppers can be refrigerated for 1-3 days if they are used soon after removing from the refrigerator.

¹ Health and Wellness Resource Guide for Fruits and Vegetables, Produce for Better Health

Cleaning

(from PBH's Health and Wellness Resource Guide for Fruit & Vegetables)

Always keep produce separate from raw meat, poultry, and seafood.

Never use detergent or bleach to wash produce. Instead, rinse produce under running tap water immediately prior to use, including those with skins and rinds that are not eaten. A produce brush

should be used to remove dirt from produce with thick outer skin like melons, potatoes and winter squash.

Washing too far in advance removes some of nature's natural preservatives. However, head lettuce or leafy greens remain crisper when washed right away and then refrigerated. Packaged fruits and vegetables labeled "ready-to-eat," "washed," or "triple washed" need not be washed again. By rewashing, you risk adding more pathogens.

Refrigerate all cut, peeled, or cooked fruits and vegetables within 2 hours.

Florida Specific Produce Handling Guide

By Chef Paula Kendrick

Bell Pepper

- Keep stored in bags or boxes that they are delivered in – 1-2 weeks.
- Wash under running water when ready to use.
- Cut can be properly stored for 2-3 days.
- Green peppers usually last longer than red or orange.
- Can be frozen by cutting, laying flat on sheet pan with parchment in single layer, freezing then storing in plastic bags; best served within 10-12 months.
- Spoiling when become soft and discolored.

Blueberry

- When received, immediately check for mold or rot and discard any that appear moldy or rotten.
- Fresh can be stored for up to a week.
- Don't rinse until ready to serve.
- Once rinsed, make sure to dry by laying on paper towel in container that allows for airflow to deter mold.
- Can be frozen by laying flat on sheet pan with parchment in single layer, freezing, then storing in plastic bags, best served within 6 months.

Citrus

- Ripe citrus will have bright vibrant colors.
- Some green is o.k. but too much can indicate under ripeness.
- Should be heavy for their size.
- Most can be stored in refrigerator for up to one month depending freshness when received.
- Need ventilation so store in mesh bag or bags with holes to allow for airflow.
- Make sure to dry if received damp so that molding is inhibited.

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- Grapefruit can be stored at room temperature for up to a week but be sure to allow for air flow.
 - Oranges and Lemons are best stored in the refrigerator.
 - Squeeze juice and freeze for longer shelf life. Allow refrigerated citrus to come to room temperature before juicing.
 - All citrus juice can be frozen.

Cucumber

- Make sure to check all cucumbers when receiving.
- Cut out any spots and use cut cucumbers first.
- Be sure to store dry in plastic bags with ventilation which helps to protect it from ethylene gas.
- Store away from ethylene gas producers.
- Store in warmer part of the refrigerator.
- Can be stored for up to a week.
- Cannot be frozen.

Lettuce

- Lettuce received in bags that say triple washed, or prewashed, **do not** need to be washed again.
By rewashing, you risk adding more pathogens.
- Lettuce received as whole heads should be stored as whole heads until ready to use. Remove any outer leaves that have wilted and look damaged.
- Once ready to use, remove whole leaves from stem and wash thoroughly under running water in a colander.
- Allow water to drain then use a salad spinner to remove excess moisture.
- Store washed lettuce in plastic containers or plastic bags with paper towel used to soak up moisture. Change paper towels every one or two days as needed.
- Loose leaves should be used within 7-10 days. Bagged should be consumed within 3-4.
- Garden lettuce that comes in with lots of dirt should be washed as soon as it is received:
Small lettuce like Arugula
- Romaine and Iceberg lettuce last the longest.
- Lettuce bruises easily so be sure to handle delicately.
- Arugula has a very short shelf life but can be used to make pesto and added to pasta and pizza for flavor.

Potato

- When received, be sure to remove any rotten, moldy, shriveled, or damaged potatoes.
- Potatoes are best stored in a dark, humid, cool place at around 50°F if possible. If not, potatoes should be stored in dry storage.
- Never store them in the refrigerator as the cold air turns the starch into sugar.
- Store in brown bags, boxes or mesh containers. Never store in plastic bags as they need airflow.

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- Potatoes that start to sprout are fine to eat if they are still firm. Make sure to cut out sprout spot.
 - Potatoes should be stored away from other produce to prevent the transfer of flavors. Especially onions as they are both ethylene producers and will cause one another to over ripen quickly.

Snap Beans / Green Beans

- Do not snap and wash until ready to use.
- When ready to prepare wash and snap off stem end, tips do not need to be removed.
- Should be stored in perforated bags to allow for air flow.
- Can be stored for up to 5 days.
- Best if prepared uncut to maximize sweetness.

Strawberry

- Choose strawberries that are plump, fragrant and firm, with no signs of bruising, leaking or mold on the bottom of the container.
- Do not wash until ready to serve.
- Do not hull until after they have been washed or they will absorb too much water and become soggy.
- Be sure to rinse quickly and dry to avoid losing flavor.
- When received, be sure to inspect thoroughly, removing any moldy fruit immediately to avoid cross contamination and prevent the other fruit from deteriorating quickly.

Sweet Corn

- Look for corn that is firm to the touch with green husks.
- Sweet corn should be refrigerated as soon as received, in the husk if that is an option as removing the husk accelerates the ripening process.
- If corn is received without the husk, try to use within 48 hours before the sugars turn to starch.
- It is best served as soon as possible for maximum flavor.
- Ears of corn can be blanched in boiling water for 6 minutes, shocked in an ice-water bath to stop cooking, then frozen in plastic bags for up to a year.
- Use ripest ears first.
- Store sweet corn away from ethylene producers which speed up the ripening process.

Tomato

- Tomatoes should be received plump and shiny and give slightly when applied with pressure.
- Store tomatoes at room temperature, out of their packaging and never in the refrigerator.
- Storing tomatoes in the cold temperatures will destroy the flavor components.
- Unripe tomatoes will continue to ripen if kept at room temperature.
- Best temperature for holding tomatoes is 55°F.
- Tomatoes that are ripe can be stored in the refrigerator to increase shelf-life, but it is not recommended for flavor.
- Whole tomatoes can be frozen to use for soups, stews, sauces etc.
 - To use, thaw then rinse under running water and skin will come off.

Summer Squash / Zucchini

- Select glossy, deep green, slim and cylindrical-shaped squash /zucchini with no soft spots.
- Select bright yellow, bottle or cylindrical-shaped yellow squash that are heavy for their size.
- Thoroughly scrub each squash under running water before use. It is not necessary to peel summer squash unless the skin is unusually tough, or the surface feels especially gritty after washing.
- Summer squash can be stored in the refrigerator crisper for three to five days and should be kept free from moisture.
- Summer squash can be frozen by cutting and blanching in boiling water for 3-6 minutes (depending on the size of the pieces), then shocked in an ice water bath to stop cooking.
- Once cooked, drain thoroughly then place in a single layer on a sheet pan to freeze.
- Once frozen, place squash in plastic bags and store in the freezer for up to a year.

Proper Cooking Techniques²

Mishandling of vegetables by cooking too much or too little has a noticeable effect on the product's appearance and taste. The ICN developed an easy-to-use timetable to ensure vegetables are cooked properly for maximum flavor and visual appeal.

Preparing Vegetables



Vegetable Steamer Chart

Timetable for Cooking or Steaming Fresh or Frozen Vegetables

For 100 Servings, 1/4 Cup Each

Vegetables Fresh or (As Purchased)	Amount to Purchase Frozen	Ready to Cook (Pounds)	Amount of Water (Pounds)	BOILING		STEAMING
				Cooking Time After Water Boils (Quarts)	Time at 5 Pounds Pressure (Minutes)	(Minutes)
Asparagus: spears cuts and tips	Fresh 12.3	20.7 12.3	11.0 1 1/4	3 1/4 7 to 10	10 to 25 5 to 10	7 to 10
Beans or peas, blackeye	Fresh Frozen	19 8.9	9.7 8.9	2 1/2 1 3/4	30 to 45 15 to 30	20 to 40 20 to 30
Beans, green, cut	Fresh Frozen	9 8.7	7.9 8.7	1 3/4 1	15 to 30 10 to 20	20 to 30 10 to 15
Beans, lima: Baby Fordhook	Fresh Frozen Frozen	21.1 9.2 9.0	9.3 9.2 9.0	2 1/2 1 1/2 1 1/2	15 to 25 12 to 15 6 to 12	15 to 20 10 to 15 12 to 20
Beet greens	Fresh	28.6	13.7	water on leaves	15 to 25	15 to 25
Beets, whole for slicing	Fresh	13.0	9.5	to cover	45 to 60	60 to 75
Broccoli: spears cut or chopped	Fresh Frozen Frozen	10.6 10.4 10.4	8.6 10.4 10.4	2 1/4 1 1/2 1 1/2	10 to 25 10 to 15 6 to 20	7 to 10 5 to 10 10 to 20
Brussel sprouts	Fresh Frozen	11.7 9.6	8.9 9.6	6 1 1/2	10 to 20 10 to 15	5 to 12 5 to 10
Cabbages (green and red): shredded wedges	Fresh Frozen	7.3 11.6	6.5 10.5	1 1/2 1 3/4	10 to 15 15 to 20	5 to 12 12 to 20

Carrots: whole (for slicing) cuts and tips	Fresh Frozen	11.9 9.5	8.3 9.5	2 1/2 1	20 to 30 8 to 10	15 to 30 3 to 5
Cauliflower, flowerets	Fresh Frozen	11.3 10.9	7.0 10.9	4 1/2 1 1/2	15 to 20 10 to 12	8 to 12 4 to 5
Celery, 1" pieces	Fresh	12.4	10.6	3 1/2	15 to 20	10 to 15
Chard	Fresh	15.8	14.5	water on leaves	15 to 25	15 to 25
Collard greens	Fresh Frozen	9.6 10.8	7.1 10.8	3 1/2 1 3/4	20 to 40 30 to 40	15 to 30 20 to 40
Corn: on cob (1/2 medium ear) whole kernel	Fresh Frozen	27 9.1	17.6 9.1	6 or to cover 1 1/2	5 to 15 5 to 10	8 to 10 5 to 10
Eggplant, pieces or slices	Fresh	14.8	12.0	3 1/2	15 to 20	10 to 15
Kale	Fresh Frozen	8.5 10.6	5.7 10.6	2 1 3/4	25 to 45 20 to 30	15 to 35 15 to 30
Mustard greens chopped	Fresh Frozen	7.6 8.6	7.1 8.6	water on leaves 1 3/4	15 to 25 20 to 30	15 to 25 15 to 20
Okra, whole	Fresh Frozen	10.3 8.5	9.0 8.5	2 1 1/4	10 to 15 3 to 5	8 to 15 3 to 5
Onions: Mature, quartered if large	Fresh	14.1	12.4	7	20 to 35	20 to 35

Continued

Timetable for Cooking or Steaming Fresh or Frozen Vegetables

For 100 Servings, 1/4 Cup Each

Vegetables Fresh or (As Purchased)	Amount to Purchase Frozen	Ready to Cook (Pounds)	Amount of Water (Pounds)	BOILING		STEAMING
				Cooking Time After Water Boils (Quarts)	Time at 5 Pounds Pressure (Minutes)	(Minutes)
Parsnips, 3" pieces	Fresh	12.3	10.2	4 3/4	20 to 30	15 to 20
Peas and carrots	Frozen	9.2	9.2	1	8 to 10	3 to 5
Peas, green shelled	Fresh Frozen	24.7 9.9	9.4 9.9	2 1	10 to 20 5 to 10	10 to 20 3 to 5
Potatoes, whole	Fresh	11.3	9.2	5	30 to 45	30 to 45
Rutabagas, 1" cubes	Fresh	12	10.2	2 1/2	20 to 30	15 to 30
Soybeans, green	Fresh	14.5	9.4	1 3/4	10 to 20	
Spinach, leaf	Fresh Frozen	13.1 15.3	11.5 15.3	water on leaves 1 1/4	10 to 20 5 to 10	4 to 5 5 to 10
Squash, winter: Butternut, pieces mashed	Fresh Frozen	13.3 14.3	11.2 14.3	5 1/4	15 to 30	15 to 20 20 to 25 (covered)
Succotash	Frozen	10.6	10.6	2	6 to 15	12 to 20
Sweet potatoes, whole	Fresh	11.0	8.6	5	30 to 45	20 to 40
Turnip green chopped	Fresh Frozen	15.4 10.5	10.8 10.5	water on leaves 1 3/4	15 to 25 20 to 30	15 to 25 15 to 20
Vegetables, mixed	Frozen	12.3	12.3	1	12 to 20	12 to 20

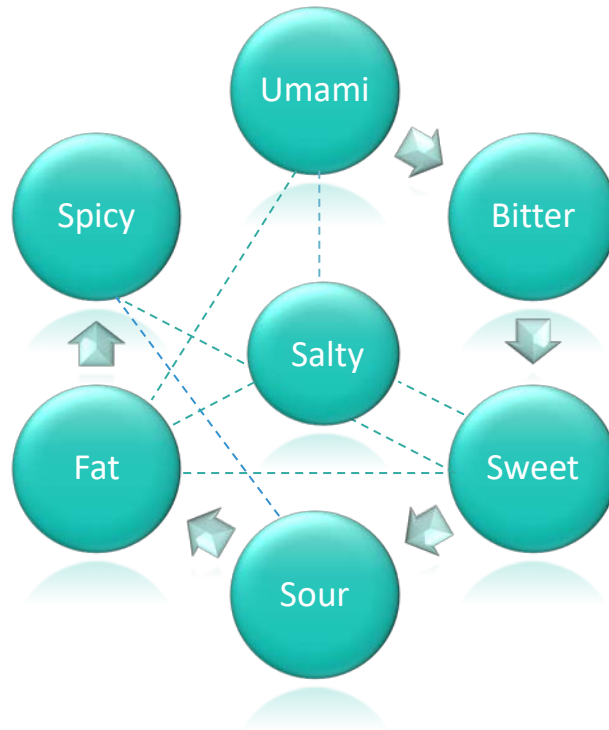
NOTE: Cooking times for fresh vegetables are approximate; they can differ with variety, maturity, quality, and size of vegetables.

²Culinary Techniques for Flavorful School Meals Participant's Workbook, formerly the National Food Service Management Institute (NFSMI), now The ICN.

Flavor Combinations³

Find healthy tasty combinations that work “flavor wheel” (e.g., sweet-sour-fat, umami-bitter-sweet, sour-fat-spicy, etc.)

➡ Balances
----- Complements



³ Breaking Bread, Not the Bank. FNCE 2019. Adapted from Briscione & Parkhurst, Flavor Matrix, 2018.

Specific Flavor Combinations with Vegetables⁴

Leafy Greens: cabbage, brussel sprouts, kohlrabi, kale, collard greens

Best Pairings: toasted nuts, mushrooms, whole grains, anchovies

Surprise Pairings: cilantro, eggplant

KALE (bitter, sweet, sulfur, green)			
How it likes to be treated...	Chef says it goes great with...	But it also goes with...	Here's an idea or two!
Blanch, boil, braise, sauté, steam, stir-fry	Garlic, olive oil, grapeseed oil, onions, red pepper flakes, chicken stock, thyme	Red bell peppers, roasted chicken, ginger, lemon, nutmeg, oregano, sweet potatoes, tomatoes, and red wine vinegar	Kale + garlic + olive oil + red wine vinegar Kale + faro + mushrooms + butternut squash + dried figs + almonds + cilantro

Beans: Black, garbanzo, kidney, lima, pinto, red, white

Best Pairings: lemon, parsley, savory

Surprise Pairings: basil, fish, vinegar

Black Beans (earthy)			
How it likes to be treated...	Chef says it goes great with...	But it also goes with...	Here's an idea or two!
Simmer, sauté, smash	Avocado, carrots, celery, chile peppers, cilantro, cumin, garlic, lime juice, olive oil, onions, flat-leaf parsley, black pepper, scallions, thyme, tomatoes, vinegar	Allspice, apples, bell peppers, cayenne, chives, hard-boiled eggs, fennel seeds, ginger, lemon, orange, oregano, red pepper flakes, rice, rosemary, salsa, shrimp, soups, spinach, tabasco, yogurt	Black beans + cumin + oregano + ground turkey + green bell pepper Black beans + lemon + sherry Black beans + corn + tomatoes + garlic + onion + avocado + cilantro

Carrots: Orange, yellow, purple

Best Pairings: citrus, vinegar, radish, olive, cilantro and coriander seed, cardamom, star anise, coffee, mint, tarragon

Surprise Pairings: balsamic, basil, coffee, eucalyptus

CARROT (sweet, pine, fruit, herb)			
How it likes to be treated...	Chef says it goes great with...	But it also goes with...	Here's an idea or two!
Boil, braise, grill, raw, roast, sauté, simmer, steam, stir-fry	Chile peppers, cinnamon, coriander, cumin, dill, ginger, lemon juice, lime, mint, olive oil, orange juice, flat-leaf parsley, parsnips, tarragon, thyme	Allspice, almonds, basil, celery, chicken, cilantro, cloves, cod, curry, fennel, fish, garlic, leeks, mustard, nutmeg, green onions, peas, pecans, pistachios, raisins, rosemary, sage, spinach, tamarind, turnips, root vegetables, vinaigrette, walnuts, white wine, yogurt	Carrots + celery + onion (mirepoix) Carrots + cumin + orange Carrots + pistachios + tarragon Carrots + mint + peas + vinaigrette

⁴ 2019 FNCE session “Breaking Bread, Not the Bank”. Adapted from Briscione & Parkhurst, Flavor Matrix, 2018 and Page & Dornenburg, The Flavor Bible, 2008

Seasoning Chart⁵

Spice Mixture Chart										50 1/4 cup Proportions				
Mixture	Salt	Pepper	Garlic Powder	Onion Powder	Ginger Powder	Curry Powder	Chili Powder	Cumin	Dry Mustard	Paprika	Oregano	Tarragon	Basil	Parsley
American	1 tsp	1 tsp	2 tsp	2 tsp										1 Tbsp
Asian	1 tsp		1 Tbsp	3 Tbsp	2 tsp				2 tsp					2 tsp
Cajun	3/4 tsp	1 tsp	2 tsp	2 tsp						1/4 tsp				
Curry	1 tsp	1/2 tsp	1 Tbsp	1 1/2 Tbsp	1 tsp	1 tsp						1 tsp		
Indian	1 tsp		2 tsp	1 tsp		2 tsp								
Italian	1 tsp	1/2 tsp	2 1/2 Tbsp	2 Tbsp							1 tsp		2 tsp	
Mexican	1 tsp		2 tsp	1 tsp			2 tsp							
Tex Mex	1 tsp	1/2 tsp	1 Tbsp	1 1/2 Tbsp			4 tsp	1/2 tsp		1/2 tsp	1 tsp			

Spice Mixture Chart										500 Servings				
Mixture	Salt	Pepper	Garlic Powder	Onion Powder	Ginger Powder	Curry Powder	Chili Powder	Cumin	Dry Mustard	Paprika	Oregano	Tarragon	Basil	Parsley
American	3 Tbsp + 1 tsp	3 Tbsp + 1 tsp	6 Tbsp + 2 tsp	6 Tbsp + 2 tsp										1/2 c + 2 Tbsp
Asian	3 Tbsp + 1 tsp		1/2 c + 2 Tbsp	1 3/4 c + 2 Tbsp	6 Tbsp + 2 tsp				6 Tbsp + 2 tsp					6 Tbsp + 2 tsp
Cajun	2 Tbsp + 1 1/2 tsp	3 Tbsp + 1 tsp	6 Tbsp + 2 tsp	6 Tbsp + 2 tsp						2 1/2 tsp				
Curry	3 Tbsp + 1 tsp	1 Tbsp + 2 tsp	1/2 c + 2 Tbsp	3/4 c + 3 Tbsp	3 Tbsp + 1 tsp	3 Tbsp + 1 tsp						3 Tbsp + 1 tsp		
Indian	3 Tbsp + 1 tsp		6 Tbsp + 2 tsp	3 Tbsp + 1 tsp		6 Tbsp + 2 tsp								
Italian	3 Tbsp + 1 tsp	1 Tbsp + 2 tsp	1 1/2 c + 1 tsp	1 1/4 c							3 Tbsp + 1 tsp		6 Tbsp + 2 tsp	
Mexican	3 Tbsp + 1 tsp		6 Tbsp + 2 tsp	3 Tbsp + 1 tsp			6 Tbsp + 2 tsp							
Tex Mex	3 Tbsp + 1 tsp	1 Tbsp + 2 tsp	1/2 c + 2 Tbsp	3/4 c + 3 Tbsp			3/4 c + 4 tsp	1 Tbsp + 2 tsp		1 Tbsp + 2 tsp	2 Tbsp + 1 tsp			

⁵ Culinary Techniques for Flavorful School Meals Participant's Workbook, formerly NFSMI, now The ICN.

Flavor Stations and Salad Bars

The use of flavor or seasoning “stations” is a growing trend in school food service. Consisting of an area or cart where students can add low or no-sodium seasonings, spices, or sauces to boost flavor, flavoring stations allow students to feel more empowered by having control to season their own meals. The 2017 School Nutrition Trend Report found that 46% of 515 districts surveyed offered some kind of “self-service options that allow students to add seasoning, spices or sauces to their meals”. The 2016 SMART study explored salad bar effect on participation, noting that over 60% of directors who increased the use of salad bars said that kids ate more produce as a result.

Use of Descriptive Language

Often restaurants will use catchy, taste-focused, descriptions on their menus and marketing as a way of making an item more desirable. This same strategy is used in school cafeterias to highlight vegetables instead of the common health-focused approach. Children rarely make decisions based on health benefits; the main reason a food gets chosen is initially because it *looks* good; if it *tastes* good, it will be chosen again and again. Highlighting specific flavors of the ingredients or preparation methods, along with words that suggest a positive experience through excitement, tradition, or

geographic location, brings appeal to a dish and encourages children to try something new. This can be taken a step further by involving students in the creation of food labels or allowing them to vote for a food and description they will get to see served in their cafeteria soon.

Combinations for Success

More is more when it comes to implementing strategies to encourage healthy meals among school children, including vegetables. The SMART study underscores the importance of **using a combination of strategies to encourage consumption of vegetables**. Out of 489 school nutrition directors surveyed, 87% said they employ at least one strategy; however, the report says, **active approaches are more effective** than the traditional passive approaches (i.e., cafeteria signs, posters, or nutrition education messages on menus) more commonly used by programs.

Some active strategies to encourage consumption of vegetables include

- Engaging students – Taste tests with children, school-wide events to promote nutrition education, and community events, are regarded as highly effective ways of encouraging students to select and consume more vegetables and other healthy options. Involving students in the creation of posters and signs that promote healthy eating is also recommended.
- Engaging school nutrition professionals – School nutrition staff can be turned into stewards of best practices and advocates of healthy eating, by taking advantage of training opportunities available from ICN, SNA, and USDA’s Team Nutrition, to name a few. If possible, incorporate cooking demonstrations with staff in their training.
- Engaging school faculty, staff, and administrators – Provide teachers with nutrition education and promotional materials, and work with administrators to increase length of meal periods, change lunch or recess schedules, or change the cafeteria environment. Educate administrators on the role of school meals in student wellness and academic performance.

More Resources

The Flavor Bible by Karen Page

The Vegetarian Flavor Bible by Karen Page

The Flavor Matrix by James Briscione

The ICN Website: School Nutrition Programs

Chef Ann’s Website: The Lunch Box

cansgetyoucooking.com

North Carolina Public Schools Child Nutrition Recipes Website