What are children eating at school lunch?

Bethany Yon, PhD

Nutrition and Food Sciences
University of Vermont
Burlington, VT

The University of Vermont

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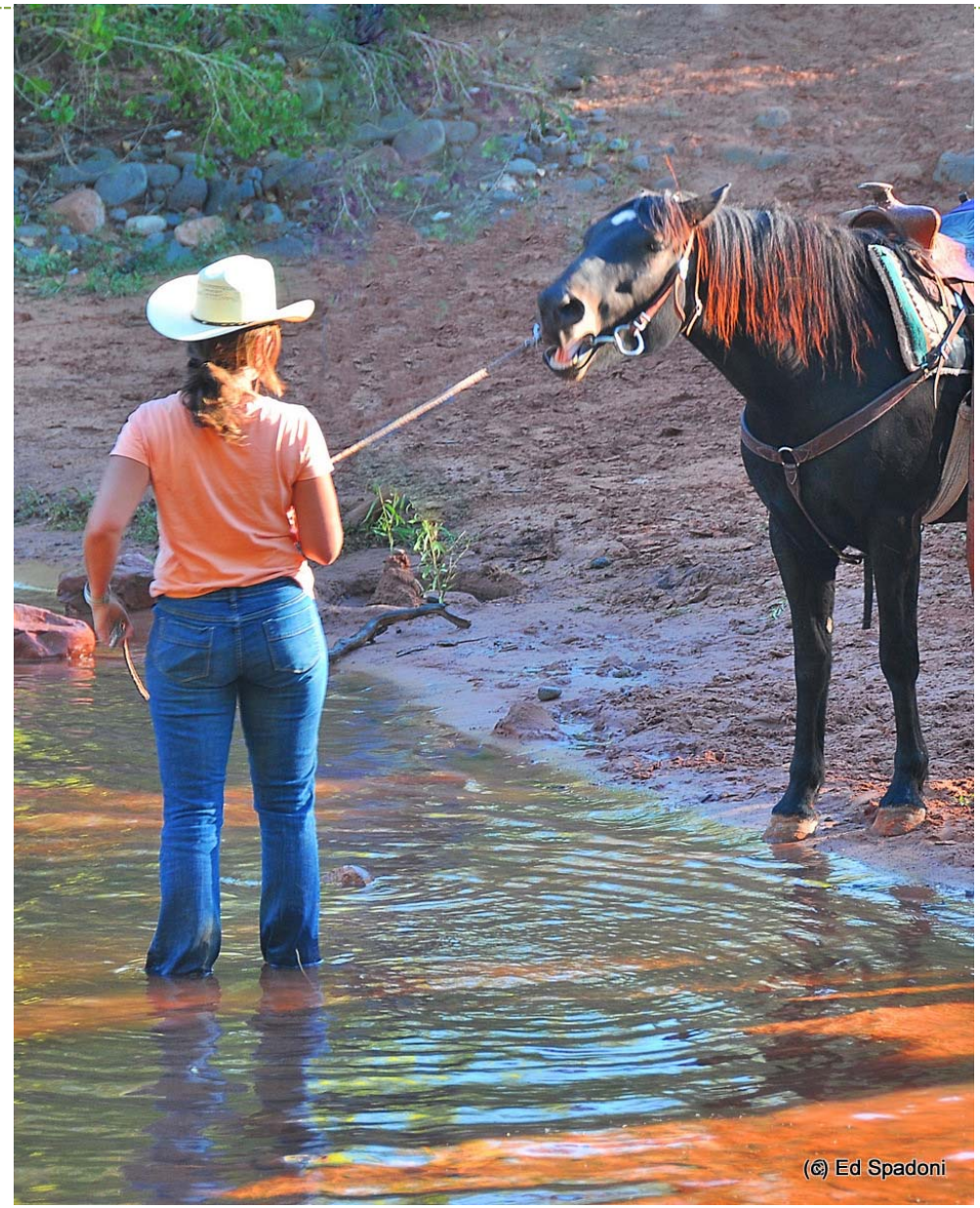
Have the new school meal regulations resulted in increased food waste?

Popular Media: Yes

Research: Yes and No



How do we know what children eat at school?

Objective Meal Observations:

- Weighed Plate Waste
- Direct Observation
- Digital Imaging






Weighed Plate Waste Methods

Individual

Salad Bar evaluation (Adams, JADA 2005)

- Label Student Trays
- Establish baseline weights (5-10 random samples)
- Observe/count/weigh student selections
- Collect trays and weigh remaining food

S-W = Consumption

S=weight of selected food(s)
W=weight of student waste

Aggregate

Gamification increases fruit & vegetable consumption (Jones, Prev Med 2014).

P-U-W / N = Consumption

P=weight of prepared food(s)*
U=weight of unserved food(s)*
W=weight of student waste
N=number of students

*Relies on *Production records*

Direct Observation & Digital Imaging

- Determination of average serving weights

- Selection image
- Plate waste image
  - Percentage consumed estimated using a five or six-point scale

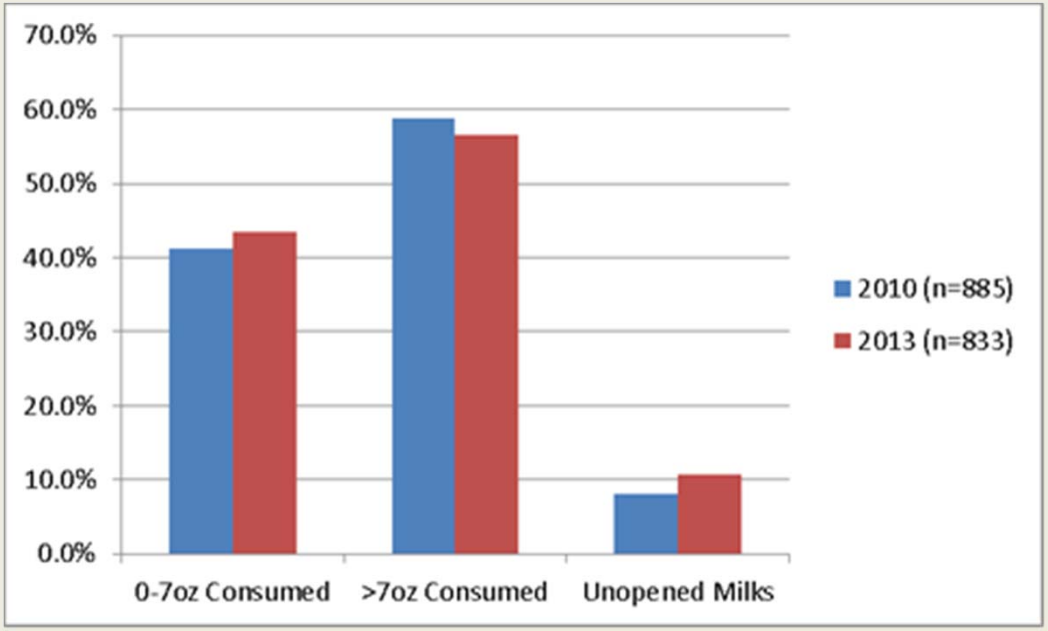
- Farm to School Program & New School Meals evaluation (Yoder, JNEB 2014 & Public Health Nutr 2015)
- Foods brought from home (Hubbard, J Acad Nutr Diet 2014)
- New School Meal Regulations (Schwartz, Childhood Obes 2015)

J Acad Nutr Diet, Sept 2014

Children's Milk Consumption (grades 3-5)

- 10 elementary schools
  (7 northeast, 3 south)
- Individual WPW
- Overall, no change in milk consumption
  (~6.0 oz at lunch)
- Differences between and within schools

(SES, grade, sex, milk packaging)

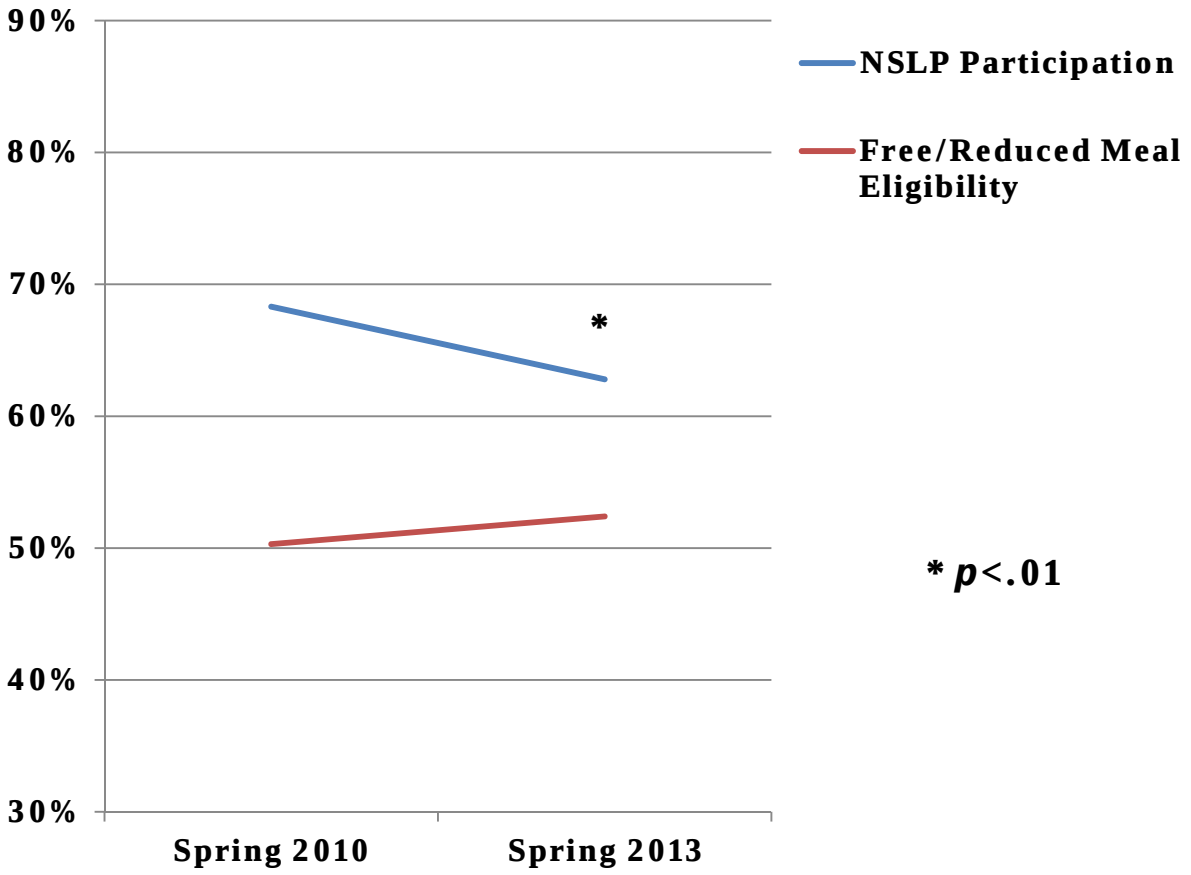


2010: 150-170 calories, 0-1% fat, 22-27gm total sugars
2013: 110-130 calories, 0% fat, 18-22 gm total sugars

In Press: *Preventing Chronic Disease*

- Mixed Models Analyses
- Student eligibility for Free/Reduced Priced Meals increased ($p<.01$)
- NSLP Participation decreased 5.5 points (adjusting for increases in Free/Reduced eligibility)

NSLP Participation and Student eligibility for free/reduced meals



- Overall milk shipment increased.
- 74% of milk shipments were flavored milk.

Milk Shipment before/after USDA updated regulations

	Spring 2010	Spring 2013
White milk shipment [a]	124 ±10	151 ±10*
Flavored milk shipment [a]	303 ±24	388 ±24*
Total milk shipment [a]	421 ±30	537 ±30*
Milk shipment/student [a,b]	0.90 ±.03	1.1 ±.01*

a. Average daily units ± SE shipped based on two months shipment data, adjusted for declines in NSLP participation.

b. Estimated based on average daily student attendance.

* $p<0.01$

What is the impact of the new FV requirements?

Two Northeast elementary schools enrolled 2011-2013

- Spring 2012 (Pre-Rule)
- 10 school visits (498 tray observations)
- Methods:
  - Digital Imaging
  - Direct Observation
  - Weighed Plate Waste

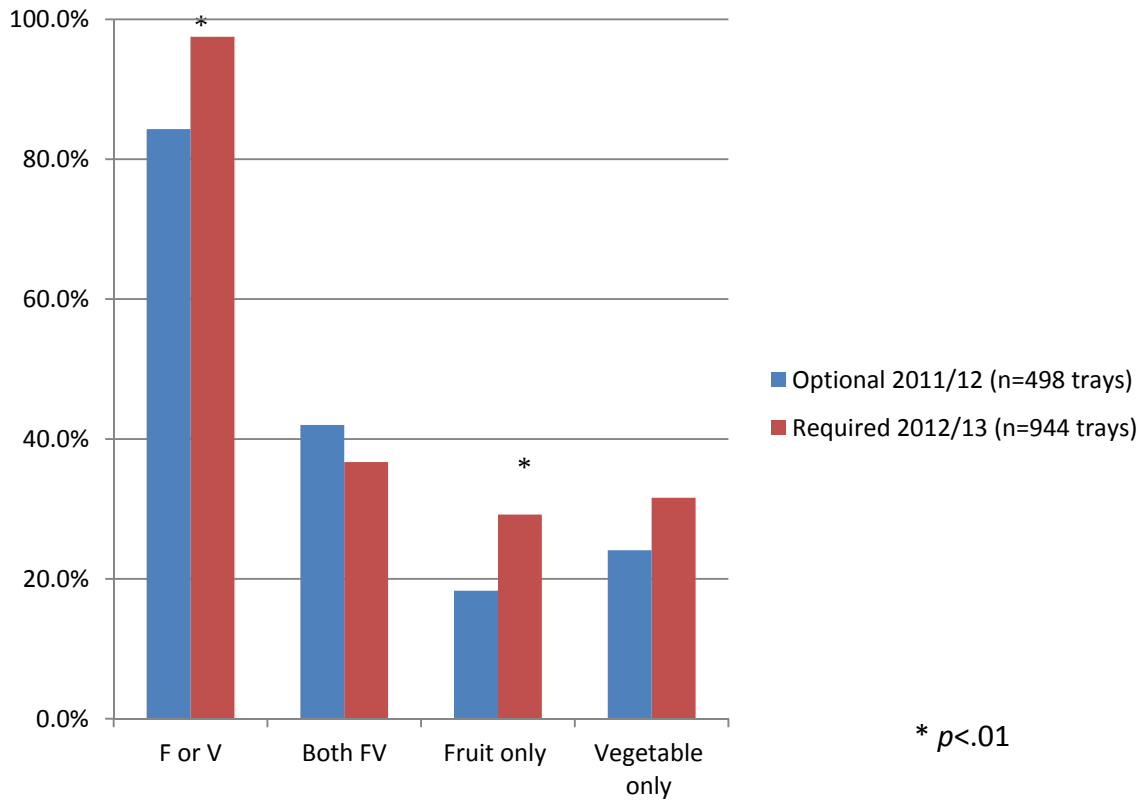
- Spring 2013 (Post-Rule)
- 11 school visits (944 tray observations)
- Methods:
  - Digital Imaging

The University of Vermont's Review Board approved the study, waiving written consent. Parents, teachers, staff and administrators were notified of the study.

Consumption

- FV consumption decreased ~1 TBSP (12%)
- FV waste increased ~2 TBSP (56%) (mostly fruit)
- Vegetable consumption was stable

Percent of elementary student lunch trays with fruit and/or vegetables when optional versus required



Public Health Reports, Sept/Oct 2015

Farm to School/Non-Farm to School

Farm to School

- FTS children selected more whole/unprocessed FV than non-FTS (p=.05)
- Fruit selection increased slightly more on FTS trays (p=.08)
- FTS children consumed more vegetables than non-FTS (1/3 cup vs ¼ cup, p<.0001)

Non-Farm to School

- Compared to 2011/12, non-FTS students selected larger amounts of vegetables & consumed slightly more when FV were required (p=.08)

Nudging: Preschoolers' Fruit and Vegetable Snack Consumption

30 consecutive days of data collection Spring 2015:
10 days Baseline, 10 days Intervention: "FV Mentors" + Teacher Verbal Cues,
10 days Follow-up: can behavior change be sustained?

	Class A (n=15, 33.3% WIC)			*P*	Class B (n=16, 0% WIC)			*P*
	Baseline cups (95% CI)	Intervention cups (95% CI)	Follow-up cups (95% CI)		Baseline cups (95% CI)	Intervention cups (95% CI)	Follow-up cups (95% CI)	
Mean amount of FV consumed by pre-school children (cups)	**0.16** (0.10,0.22)	**0.27** (0.17,0.37)	**0.33** (0.28,0.38)	<0.01	0.34 (0.24,0.44)	0.41 (0.30,0.52)	0.38 (0.31,0.44)	0.37
Mean amount of FV consumed by FV Mentors (cups)		0.61 (0.39,0.82)				0.68 (0.30, 1.06)		

Opportunities – Universal Recycling/Composting

- Aggregate Waste Method simplified
- Food scrap weights can be compared to:
  - Menu/Entrée selection
  - Pre/Post Intervention

Next Steps & Recommendations

- Digital Imaging methods continue to evolve as an evaluation tool.
- Strategies/resources needed to ensure children choose foods they will eat & eat what they choose.
  - Farm to School
  - Staff training
- What is the role of the Cafeteria Environment?
  - Time in service line/at table
  - Recess before Lunch
  - Smarter Lunchrooms

Conclusions

- **Healthy Hunger-Free Kids Act Successes**:
  - Children are drinking lower fat milk, including fat-free flavored milk with less added sugars.
  - More children are selecting FV with school lunch, and in larger amounts.
  - Children eat more vegetables with Farm to School exposure.

  - A new generation of children exposed to healthier foods in WIC, CACFP, School Meals and Smarter Snacks.

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