Are Agricultural Policies Making Us Fat? Likely Links Between Agricultural Policies and Human Nutrition and Obesity, and their Implications

Julian Alston
Daniel Sumner
Stephen Vosti

Agricultural Issues Center
USDA
Department of Agricultural and Resource Economics

IAAE Meetings, Queensland, Australia, August 2006
(*BMI ≥30, or about 30 lbs overweight for 5’4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Adolescent Population Is of Particular Concern

Obesity has risen rapidly since the mid-1970s

- Percent of adults who are obese
- Percent of adolescents who are overweight
Economic Costs

• **Direct**
  – *Increased health care costs*
    • $78.5 billion in the U.S. in 1998
    • $7.8 billion in California alone, 1998-2000
      – 28% of total CA outlays for HHS in 2003-04

• **Indirect**
  – *Morbidity costs*
    • Lost productivity
    • Absenteeism
  – *Mortality costs*
    • Over 300,000 death per year attributable to obesity
    • Obese individuals have a 50 to 100% increased risk of premature death from all causes
Key Issues

• Why Is Obesity on the Rise?
  – Long-Term and Worsening Energy Imbalance
    • Energy Intake > Energy Expenditure

• Mechanisms Affecting of This Imbalance
  – Types and sources of food consumed
  – Food portions
  – Energy expenditure patterns

• Drivers of Behavioral Changes
  – Opportunities
    • Increases in incomes and choices
  – Food preferences
  – Incentives
    • Changes in relative prices, especially for foods

• What Role of Agriculture and Agricultural Policy?
  – Getting us to this point?
    • Prices, quality, availability
  – Course correction?
Is Agricultural Policy (Partially) Responsible?

• “[Our] cheap-food farm policy comes at a high price: . . . farmers in the United States have managed to produce 500 additional calories per person every day; each of us is, heroically, managing to pack away 200 of those extra calories per day.” (Pollan 2003)

• “Commodity prices . . . are so low that restaurants have been able to double serving sizes without doubling prices.” (Davis 2003)

• “Why healthier foods are slipping out of reach of large segments of the US population is a question with many policy and political implications.” (Drewnowski and Barratt-Fornell, 2004)
One ‘Smoking Gun’

Trends in Consumption of Corn Sweeteners

http://www.ers.usda.gov/data/foodconsumption/FoodGuideIndex.htm#calories
The More Complete Story

Trends in Consumption of Selected Sweeteners

Avg. Kcalories/person/day

Year


Refined cane and beet sugar
Corn sweeteners
All Added sugars

http://www.ers.usda.gov/data/foodconsumption/FoodGuideIndex.htm#calories

Alston, Sumner, Vosti UCD/AIC/ARE
White Sugar Policy – What Role?

Sugar Prices in the USA -- 1986-2004

Support to Sugar Producers -- Absolute
The Much More Complete Story

Calories from Different Food Groups

http://www.ers.usda.gov/data/foodconsumption/FoodGuideIndex.htm#calories

Alston, Sumner, Vosti UCD/AIC/ARE
## Types and Magnitudes of Agricultural Outlays

<table>
<thead>
<tr>
<th>USDA Program</th>
<th>Expenditure in 2004</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>billions of dollars</td>
<td>percent</td>
</tr>
<tr>
<td>Food, Nutrition, and Consumer Services</td>
<td>45.4</td>
<td>40.2</td>
</tr>
<tr>
<td>Farm Service Agency (<em>mainly farm commodity programs</em>)</td>
<td>27.4</td>
<td>24.3</td>
</tr>
<tr>
<td>Rural Development</td>
<td>15.5</td>
<td>13.7</td>
</tr>
<tr>
<td>Natural Resources and Environment</td>
<td>8.4</td>
<td>7.4</td>
</tr>
<tr>
<td>Foreign Agricultural Service</td>
<td>6.4</td>
<td>5.7</td>
</tr>
<tr>
<td>Risk Management (<em>mainly crop insurance</em>)</td>
<td>4.1</td>
<td>3.6</td>
</tr>
<tr>
<td>Research, Education and Economics (<em>mainly ag. R&amp;D</em>)</td>
<td>2.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Marketing and Regulatory Programs</td>
<td>1.8</td>
<td>1.6</td>
</tr>
<tr>
<td>Other</td>
<td>1.4</td>
<td>1.2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>112.9</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Alston, Sumner, Vosti UCD/AIC/ARE
Trends in Agricultural R&D Spending

**Total Federal and State Spending on Ag. R&D**
(1925-1997)

**Total Private Sector Spending on Ag R&D**
(1960-1992)
Trends in Crop/Product Productivity

Average Yield of Corn 1900-1997

<table>
<thead>
<tr>
<th>Year</th>
<th>Avg. Corn Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>20 bush./acre</td>
</tr>
<tr>
<td>1906</td>
<td>22 bush./acre</td>
</tr>
<tr>
<td>1912</td>
<td>24 bush./acre</td>
</tr>
<tr>
<td>1918</td>
<td>26 bush./acre</td>
</tr>
<tr>
<td>1924</td>
<td>28 bush./acre</td>
</tr>
<tr>
<td>1930</td>
<td>30 bush./acre</td>
</tr>
<tr>
<td>1936</td>
<td>32 bush./acre</td>
</tr>
<tr>
<td>1942</td>
<td>34 bush./acre</td>
</tr>
<tr>
<td>1948</td>
<td>36 bush./acre</td>
</tr>
<tr>
<td>1954</td>
<td>38 bush./acre</td>
</tr>
<tr>
<td>1960</td>
<td>40 bush./acre</td>
</tr>
<tr>
<td>1966</td>
<td>42 bush./acre</td>
</tr>
<tr>
<td>1972</td>
<td>44 bush./acre</td>
</tr>
<tr>
<td>1978</td>
<td>46 bush./acre</td>
</tr>
<tr>
<td>1984</td>
<td>48 bush./acre</td>
</tr>
<tr>
<td>1990</td>
<td>50 bush./acre</td>
</tr>
<tr>
<td>1996</td>
<td>52 bush./acre</td>
</tr>
</tbody>
</table>

Milk Production per Cow 1929-1996

<table>
<thead>
<tr>
<th>Year</th>
<th>Milk per Cow</th>
</tr>
</thead>
<tbody>
<tr>
<td>1929</td>
<td>2000 lbs./cow</td>
</tr>
<tr>
<td>1933</td>
<td>2200 lbs./cow</td>
</tr>
<tr>
<td>1937</td>
<td>2400 lbs./cow</td>
</tr>
<tr>
<td>1941</td>
<td>2600 lbs./cow</td>
</tr>
<tr>
<td>1945</td>
<td>2800 lbs./cow</td>
</tr>
<tr>
<td>1949</td>
<td>3000 lbs./cow</td>
</tr>
<tr>
<td>1953</td>
<td>3200 lbs./cow</td>
</tr>
<tr>
<td>1957</td>
<td>3400 lbs./cow</td>
</tr>
<tr>
<td>1961</td>
<td>3600 lbs./cow</td>
</tr>
<tr>
<td>1965</td>
<td>3800 lbs./cow</td>
</tr>
<tr>
<td>1969</td>
<td>4000 lbs./cow</td>
</tr>
<tr>
<td>1973</td>
<td>4200 lbs./cow</td>
</tr>
<tr>
<td>1977</td>
<td>4400 lbs./cow</td>
</tr>
<tr>
<td>1981</td>
<td>4600 lbs./cow</td>
</tr>
<tr>
<td>1985</td>
<td>4800 lbs./cow</td>
</tr>
<tr>
<td>1989</td>
<td>5000 lbs./cow</td>
</tr>
<tr>
<td>1993</td>
<td>5200 lbs./cow</td>
</tr>
<tr>
<td>1996</td>
<td>5400 lbs./cow</td>
</tr>
</tbody>
</table>

Alston, Sumner, Vosti UCD/AIC/ARE
Trends in Prices Received By Farmers

Prices received Deflated with prices paid (Commodities, services, interest, taxes, wages) (1977=100)

Deflated Prices Received for Selected Grains
(1977=100)

Deflated Prices Received for Selected Fruits
(1977=100)
Prices Paid By Consumers – Basic Stuff

Consumer Prices for Eggs Deflated by CPI (food at home)

- $/doz.
- Line: Eggs, Grade A Large

Consumer Prices for Ground Beef Deflated by CPI (food at home)

- $/lb.
- Line: Ground Chuck, USDA Choice Cons.Food_Prices/$N$/7, 100% Beef

Consumer Prices for Chicken deflated by CPI (food at home)

- $/lb.
- Line: Chicken, whole, fresh

Consumer Prices for White Sugar Deflated by CPI (food at home)

- $/lb.
- Line: Sugar, white, all sizes

Alston, Sumner, Vosti UCD/AIC/ARE
Prices Paid By Consumers – Fresh Fruits and Vegetables

Consumer Prices for Strawberries Deflated by CPI (food at home)

Consumer Prices for Oranges Deflated by CPI (food at home)
## Getting the Price Story Right: Strawberries

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>0.653</td>
<td>0.608</td>
<td>0.66</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>0.866</td>
<td>0.69</td>
<td>0.637</td>
<td>0.696</td>
<td>0.77</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>1.016</td>
<td>0.914</td>
<td>0.73</td>
<td>0.778</td>
<td>0.775</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>0.728</td>
<td>0.708</td>
<td>0.752</td>
<td>0.863</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>0.912</td>
<td>0.663</td>
<td>0.648</td>
<td>0.78</td>
<td>0.827</td>
<td>0.943</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>1.016</td>
<td>0.809</td>
<td>0.646</td>
<td>0.774</td>
<td>0.913</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>0.637</td>
<td>0.797</td>
<td>0.718</td>
<td>0.84</td>
<td>0.899</td>
<td>1.081</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>0.937</td>
<td>0.824</td>
<td>0.955</td>
<td>1.071</td>
<td>1.029</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>1.181</td>
<td>0.693</td>
<td>0.919</td>
<td>0.937</td>
<td>1.059</td>
<td>0.971</td>
<td>1.216</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>1.218</td>
<td>0.966</td>
<td>0.831</td>
<td>1.055</td>
<td>1.117</td>
<td>0.986</td>
<td>1.087</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>1.638</td>
<td>1.338</td>
<td>1.109</td>
<td>0.781</td>
<td>0.987</td>
<td>0.965</td>
<td>1.081</td>
<td>1.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>1.467</td>
<td>1.268</td>
<td>1.112</td>
<td>0.976</td>
<td>0.924</td>
<td>0.948</td>
<td>0.961</td>
<td>1.014</td>
<td>1.035</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>1.43</td>
<td>1.173</td>
<td>0.96</td>
<td>0.831</td>
<td>1.048</td>
<td>0.988</td>
<td>1.185</td>
<td>1.473</td>
<td>1.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>1.467</td>
<td>1.26</td>
<td>0.908</td>
<td>0.874</td>
<td>1.066</td>
<td>1.013</td>
<td>1.069</td>
<td>1.151</td>
<td>1.261</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>1.318</td>
<td>1.262</td>
<td>0.91</td>
<td>0.983</td>
<td>1.047</td>
<td>1.085</td>
<td>1.108</td>
<td>1.209</td>
<td>1.286</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>1.926</td>
<td>1.34</td>
<td>1.001</td>
<td>1.14</td>
<td>1.18</td>
<td>1.209</td>
<td>1.398</td>
<td>1.355</td>
<td>1.316</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>1.692</td>
<td>1.505</td>
<td>1.236</td>
<td>1.082</td>
<td>0.957</td>
<td>1.226</td>
<td>1.247</td>
<td>1.164</td>
<td>1.42</td>
<td>1.409</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>2.135</td>
<td>2.08</td>
<td>1.751</td>
<td>1.613</td>
<td>1.386</td>
<td>1.413</td>
<td>1.346</td>
<td>1.454</td>
<td>1.469</td>
<td>1.779</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>2.102</td>
<td>1.96</td>
<td>1.751</td>
<td>1.419</td>
<td>1.49</td>
<td>1.375</td>
<td>1.557</td>
<td>1.679</td>
<td>1.664</td>
<td>1.948</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>2.167</td>
<td>1.935</td>
<td>1.825</td>
<td>1.45</td>
<td>1.218</td>
<td>1.187</td>
<td>1.246</td>
<td>1.263</td>
<td>1.416</td>
<td>1.619</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>2.14</td>
<td>2.01</td>
<td>1.737</td>
<td>1.482</td>
<td>1.465</td>
<td>1.486</td>
<td>1.628</td>
<td>1.916</td>
<td>1.996</td>
<td>2.137</td>
<td>2.526</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>2.498</td>
<td>2.137</td>
<td>1.941</td>
<td>1.551</td>
<td>1.527</td>
<td>1.552</td>
<td>1.545</td>
<td>1.695</td>
<td>1.873</td>
<td>1.884</td>
<td>2.224</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>2.153</td>
<td>1.871</td>
<td>1.762</td>
<td>1.678</td>
<td>1.568</td>
<td>1.776</td>
<td>1.84</td>
<td>1.986</td>
<td>2.246</td>
<td>2.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>2.481</td>
<td>2.332</td>
<td>2.124</td>
<td>1.661</td>
<td>1.672</td>
<td>1.847</td>
<td>1.629</td>
<td>1.817</td>
<td>1.843</td>
<td>2.6</td>
<td>3.185</td>
<td>3.602</td>
</tr>
</tbody>
</table>

Alston, Sumner, Vosti UCD/AIC/ARE
A Closer Look at Strawberry Prices

June Strawberry Prices
(BLS data)

\[ y = -0.0089x + 18.289 \]
\[ R^2 = 0.5356 \]

Feb Strawberry Prices
(BLS data)

\[ y = -0.0003x + 1.4305 \]
\[ R^2 = 0.0003 \]
Alston, Sumner, Vosti UCD/AIC/ARE

Consumer Prices for Foods

Statistics report proportional changes in real prices over 1980-2003

White Sugar: -.024
Butter: -.013
Milk: -.011
Cheese: -.033
Lettuce: -.009
Tomatoes: +.004
Carrots: -.009
Potatoes: 0.0

Turkey: -.026
Chicken: -.012
Eggs: -.019
Beef: -.021

White Bread: 0.0
Rice: -.029
Pasta: -.020

Bananas: -.013
Apples: -.009
Oranges: 0.0
Grapefruit: -.004

Milk: -.011
Cheese: -.033
Butter: -.013
Food Prices in Terms of the Wages

- **12-Item Food Basket (60% of the historical price today)**
  - 1955: 3 hours
  - 1997: 1.75 hours

- **3-Pound Chicken (40% of the historical price today)**
  - 1958: 35 minutes
  - 1997: 14 minutes

- **Soft Drink (53% of the historical price today)**
  - 1950: 2.8 minutes
  - 1997: 1.5 minutes

- **Pizza (88% of the historical price today)**
  - 1958: 57 minutes
  - 1997: 50 minutes

Source: Dallas Fed
Preliminary Conclusions for USA and Policy Implications

- **Agricultural Policy → Commodity Prices**
  - Commodity Support Programs
    - Effects on farmer income are large; Effects on commodity prices are small, varied and difficult to predict
  - Publicly Sponsored Agricultural Research
    - Chiefly responsible for past yield increases and price declines

- **Commodity Prices → Food Prices**
  - Increasing ‘disconnect’ between commodity prices and food prices
  - Role of food industry needs to be better understood and exploited
    - Entry points for regulating in food preparation technologies and portion sizes

- **Food Prices → Caloric Intake**
  - Price responses are generally low
  - Micro-management of food prices might not be wise

- **Agricultural Policy for Dealing with Obesity**
  - Increased yields, and improved quality/availability of fresh fruits/vegetables
    - Fragmented markets and social benefits call for public policy action

- **Changes in Prices of Fruits/Vegetables Are Hard to Identify**
  - Difficult to Defend the ‘Increasingly Out of Reach’ Hypothesis
Lessons for Developing Countries

• Too Early for USA ‘Blueprint’ for Controlling Obesity
  – Costs of Obesity Can Be Very Large
  – Improve Health Monitoring Now

• Decreases in Food Costs Are Necessary to Combat Hunger
  – Productivity growth in agriculture is essential
  – But ‘over-consumption’ of food may occur
  – Regulation of the food industry may be needed

• Commodity Prices Fall More Quickly than Food Prices
  – Structure of food industry and changes in all input costs matter greatly
  – Commodity price policies are poor tool for managing food prices

• Changes in Food Prices Are Not Easy to Track
  – Changes in food quality and availability complicate the issue

• “Healthy Diet” Is Still Mysterious
  – Identifying and clarifying site-specific objectives is important

• Food Preferences Matter Greatly
  – Policy based solely on food costs will likely fail
Next Steps in Research and Outreach

• **Review Trends**
  – Food consumption, food prices, commodity prices, and food and agricultural policies

• **Analyze the Effects of Alternative Subsidy and R&D Policies on Commodity Prices**
  – Retrospectively – Delphi method
  – Prospectively – FAPRI model

• **Analyze the Effects of Prices on Consumption and Nutrition**
  – Complete demand system
  – Food composition tables
Next Steps in Research and Outreach (cont.)

• Case Study of the Sweeteners Industry  
  – Multi-market model

• Case Study of Proposed Changes to the WIC Program  
  – On WIC participants’ consumption of fresh fruits and vegetables (FFV)  
    • California Latino family experiment  
      – On demand for FFV  
      – On prices FFV in the short and long term  
      – On farmers – FFV supply response

• Curriculum Development

• Policy Guidance to WIC