# Purchasing Power

*How Institutional "Good Food" Procurement Policies Can Shape a Food System That's Better for People and Our Planet*
*www.ucsusa.org/PurchasingPower*

Appendix I: Procurement Policies and Standards

Appendix II: Data, Methods, and Calculations



Union of Concerned Scientists

# Appendix I: Procurement Policies and Standards

TABLE A1-1: **Review of Literature on "Good Food" Procurement and Impact on Local Economies, Labor Issues, Sustainability, Health, and Animal Welfare**

| Focus | Institution | Location | Author | Study Title | Findings |
|---|---|---|---|---|---|
| **Animal Welfare** | Healthcare | Multiple | Lagasse and Neff (2010) | Balanced Menus: A Pilot Evaluation of Implementation in Four San Francisco Bay Area Hospitals | At the time of study, 40% of beef and 2.5% of poultry purchased by Oregon Health and Science University in Portland, OR, were produced without antibiotics, opening up market channels for locally owned Carman Ranch to increase wholesale sales from $27,000 to $238,000. One-quarter of all chicken purchased by John Muir Medical Center in San Francisco, CA, was being raised without routine use of antibiotics, and between 93% and 100% of all beef and chicken purchased by Fletcher Allen Health Care in Burlington, VT, was being raised without routine use of antibiotics. |
| **Economic** | Healthcare | Vermont | Becot, Imrie, and Ettman (2016) | Assessing the Impacts of Local Hospital Food Procurement: Results from Vermont | A one-dollar increase in local purchasing generates an additional $0.78 cents to $1.27 in the local economy. |
| **Economic** | Multiple | Sacramento, CA | Hardesty et al. (2016) | Economic Impact of Local Food Producers in the Sacramento Region | For every $1 million of output produced by farmers and sold through direct marketing, 31.8 jobs are created in the Sacramento Region, while for every $1 million of output produced by farmers and sold through indirect marketing, 10.5 jobs are created. Every dollar in sales generated by producers and sold through direct marketing channels creates an additional $0.86 of output produced in the Sacramento region. For producers selling through indirect marketing channels, every dollar in sales creates an additional $0.42 of output produced in the Sacramento region. |
| **Economic** | Schools | Minneapolis and Georgia | Christensen et al. (2017) | Economic Impacts of Farm to School Case Studies and Assessment Tools | A one-dollar increase in local purchasing generates an additional $0.60 to $2.12 in the local economy. |
| **Economic** | Schools and Healthcare | Minnesota | Pesch (2014) | Assessing the Potential Farm-to-Institution Market in Central and Northeast Minnesota: An Analysis of the Market Potential for Locally Raised Foods by Educational and Healthcare Institutions in 12 Minnesota Counties | If educational and healthcare institutions in Central and Northeast Minnesota sourced 20% of foods locally, regional farmers would net between $480,000 to $590,000 each year, and an additional $250,000 to $360,000 would be injected into the economy. |
| **Economic** | Schools | Colorado | Gunter and Thilmany (2012) | Economic Implications of Farm to School for a Rural Colorado | Local produce purchases of $39,000 by a Colorado school district could result in a net benefit of nearly $8,000 to the regional economy. The net impact is |

| | | | | | |
|---|---|---|---|---|---|
| | | | | Community | lower than the total purchase amount due to the countervailing effect of demand shifting from the wholesaler to the producer. |
| **Economic** | Schools | Oregon | Upstream Public Health (2011) | Health Impact Assessment of Oregon Farm to School and School Garden Policy | A Health Impact Assessment of the Oregon House Bill (HB) 2800, which would guarantee school districts could purchase Oregon produced, processed, packed and packaged foods with an additional 15 cents for lunch and seven cents for breakfast in reimbursement funds, found that for every job created by school districts purchasing local foods, additional economic activity would generate another 1.67 jobs. |
| **Economic** | Schools | Oregon | Kane et al. (2010) | The Impact of Seven Cents: Examining the Effects of a $.07 per Meal Investment on Local Economic Development, Lunch Participation Rates, and Student Preferences for Fruits and Vegetables in Two Oregon School Districts | For each dollar spent initially by school districts, successive rounds of spending led to another $1.82 of spending, for an overall increase of $2.82 to the Oregon economy. For each job created by school districts purchasing local foods, successive rounds of economic activity would generate another 1.43 jobs, for an overall increase of 2.43 jobs in Oregon. |
| **Economic** | Schools | Minnesota | Tuck et al. (2010) | Impact of Farm-to-School Lunch Programs: A Central Minnesota Example | The potential annual economic impact of farm-to-school programs in Central Minnesota ranges from $20,000 for a monthly special meal to $427,000 for sourcing a large number of easily adapted products. |
| **Economic** | Schools | Vermont | Roche et al. (2016) | Economic Contribution and Potential Impact of Local Food Purchases Made by Vermont Schools | For each dollar spent by school districts on local foods, successive rounds of spending lead to another $1.10 to $1.40 of spending, for an overall increase of $2.10 to $2.40 to the economy. |
| **Environment** | Healthcare | San Francisco, CA | Lagasse and Neff (2010) | Balanced Menus: A Pilot Evaluation of Implementation in Four San Francisco Bay Area Hospitals | Four hospitals participating in a Balanced Menus program reduced meat purchases by 28%, saved an aggregate $33,514 per month from meat budgets, and reduced meat-related greenhouse gas emissions by 26 percent per hospital for a total of more than 1,000 tons $CO_2$-equivalent greenhouse gas emissions saved across all four hospitals annually. |
| **Environment** | Multiple | National | Leidig (2012) | Sodexo Meatless Monday Survey Results | Food service company Sodexo surveyed the general managers of all of institutions, organizations and companies (client sites) for which it provides food services. Out of 74% of survey respondents who offer meatless Mondays at their client sites, 65% said they would continue to promote it. More than 40% of client sites saw an overall increase in vegetable sales, and 24% noted a decrease in consumer selection of meat options as a result of meatless Monday promotion. |
| **Environment** | Schools | Oakland, CA | Hamerschlag and Kraus-Polk (2017) | Shrinking the Carbon and Water Footprint of School Food: A Recipe for Combating Climate Change. A Pilot Analysis of Oakland Unified | The Oakland Unified School District reduced its meat purchases by 30%, reduced its carbon footprint by 14%, decreased its emissions by 600,000 kg $CO_2$ per year, reduced embedded water use by 6%, and saved seven gallons of water per meal (42 million gallons per year). |

| | | | | | |
|---|---|---|---|---|---|
| | | | | School District's Food Programs | |
| **Health** | County facilities | Los Angeles County, CA | Gase et al. (2011) | Estimating the Potential Health Impact and Costs of Implementing a Local Policy for Food Procurement to Reduce the Consumption of Sodium in the County of Los Angeles | Institution-specific sodium reduction strategies in select LA County facilities were projected to reduce sodium intake by 233 mg each day among 15,113 adults eating regular meals at facilities, resulting in 388 fewer cases of uncontrolled hypertension and an annual decrease of $629,724 in health care costs. |
| **Health** | Multiple | Multiple | Niebylski et al. (2014) | Healthy Food Procurement Policies and their Impact | A comprehensive review of healthy food procurement policies identified 34 studies demonstrating increases in the availability and purchase of healthful food and decreases in the purchase of less healthful food. The review concluded that the implementation of such policies in schools, work sites, hospitals, care facilities, correctional facilities, government institutions, and remote communities increase markers of healthy eating. Ongoing research and evaluation of these programs is required. |
| **Health** | Schools | National | Berezowitz, Bontrager Yoder, and Schoeller (2015) | School Gardens Enhance Academic Performance and Dietary Outcomes in Children | Among 12 studies of school garden programs with dietary measures, all showed increases or improvements in predictors of fruit and vegetable consumption. Of four studies that included academic outcomes, two showed improvements in science achievement and one measured and showed improvement in math scores. |
| **Labor** | Multiple | National | Fair Food Program (n.d.) | The Fair Food Program: Results | From the program's inception in 2011 through 2017, $25 million in fair food premiums have been paid; 12,000 workers were interviewed; 150,000 workers received "know your rights" materials; 45,000 workers were educated by Coalition of Immokalee Workers in person; and 1,800 worker complaints were resolved. |

# Appendix II: Data, Methods, and Calculations

Sources and calculations for all data table figures are listed as notes. Due to rounding, numbers presented in the appendices may not add up precisely to the figures reported in the main text.

TABLE A2-1: **Total School Enrollment**

| Enrollment | LAUSD | LA County schools |
|---|---|---|
| **Total number of schools** | 1,302[1] | 2,223[2] |
| **Total K-12 enrollment** | 664,774[2] | 1,529,895[2] |

NOTES:

1. LAUSD 2016.
2. Public School Review 2017.

TABLE A2-2: **Annual Food Budget and Number of Meals Served Daily**

| | LAUSD | LA County Schools | LA County facilities |
|---|---|---|---|
| **Total number of students** | 664,774[1] | 1,529,895[2] | N/A |
| **Meals served daily** | 739,200[1] | 1,701,000[3] | 100,000[4] |
| **Annual total food budget (in millions)** | $150[5] | $345[6] | $21[7] |

NOTES:

1. LAUSD 2016.
2. Public School Review 2017.
3. Estimated as: total number of students * (meals served daily LAUSD / total number of students LAUSD). We assume that the number of meals served per student in LA County is comparable to the number of meals served per student at LAUSD.
4. The total number of meals served annually by LA County facilities was estimated at 37 million (LACDPH 2014). Meals served daily are estimated as: 37,000,000 / 365 = 101,370.
5. LAUSD personal communication.
6. Estimated as: (annual total food budget LAUSD / number of meals served daily LAUSD) * meals served daily LA County schools.
7. Estimated as: (annual total food budget LAUSD / number of meals served daily LAUSD) * meals served daily at LA County facilities.

## Estimated Benefits to the Local Economy if a Larger Share of the Total Food Budget of LAUSD, LA County Schools, and LA County Facilities Were Sourced Locally

**Assumptions:**

1. Calculations assume comparable costs per meal across LAUSD, LA County schools, and LA County facilities. In reality, LA County facilities likely incur higher costs per meal, due to factors such as larger portion sizes, meaning actual benefits to the economy resulting from local food purchases by LA County facilities will be underreported.
2. Benefits to the local economy are estimated from several studies that estimate multipliers for farm-to-school programs. We focused only on the studies that reported value-added multipliers, as they are a more accurate measure of economic activity. The value-added multiplier includes wages paid to employees, profit accrued by the business owner, dividends paid to investors, interest payments, rents, indirect excise taxes, and sales and excise tax paid by individuals to the government.
3. Multiplier estimates vary across different studies and different regions. Ideally, an estimation of the multiplier effects for LA County using the Impact Analysis for Planning (IMPLAN) software model would be more accurate than using a varied range of estimates from different regions and studies. Adopting an IMPLAN model specific to LA County was outside the scope of this study.
4. Estimates of jobs created assumed that all local sales by farmers are indirect, that is, through a wholesale distributor. This is based on our communication with LAUSD that indicated that local food purchases are made primarily through wholesale distributor Gold Star Foods. Our estimates are based on one study only; an IMPLAN model specific to LA County would give a more accurate estimate of jobs generated as a result of increased local food purchases.

TABLE A2-3: **Annual Benefits to the Local Economy from Increased Local Food Purchases by LAUSD**

| | | | | |
|---|---|---|---|---|
| **LAUSD annual food budget (in millions $)[1]** | $150 | $150 | $150 | $150 |
| | | | | |
| **Percentage of food sourced locally[2]** | 20% | 50% | 75% | 100% |
| **Amount of food sourced locally (in millions $)[3]** | $30 | $75 | $113 | $150 |
| | | | | |
| **Benefit to local economy (in millions $) (1.60 multiplier)[4]** | $48.0 | $120 | $180 | $240 |
| **Benefit to local economy (in millions $) (2.1 multiplier)[5]** | $63.0 | $158 | $236 | $315 |
| **Benefit to local economy (in millions $) (2.82 multiplier) [6]** | $84.6 | $212 | $317 | $423 |
| **Benefit to local economy (in millions $) (3.12 multiplier) [7]** | $93.6 | $234 | $351 | $468 |
| | | | | |
| **Jobs generated [8]** | 262 | 654 | 980 | 1310 |

NOTES:

1. LAUSD personal communication.
2. LAUSD personal communication: approximately 20% of annual LAUSD food budget is currently directed toward local food purchases. The rest (50%, 75%, and 100%) are projections.
3. Estimated as: annual food budget * percentage sourced locally.
4. Estimated as: amount sourced locally * 1.60 (Christensen et al. 2017).
5. Estimated as: amount sourced locally * 2.1 (Roche et al. 2016).
6. Estimated as: amount sourced locally * 2.82 (Kane et al. 2010).
7. Estimated as: amount sourced locally * 3.12 (Christensen et al. 2017).
8. Based on the estimate that for every $1 million of output produced by farmers and sold through indirect marketing, 10.5 jobs are generated (Hardesty et al. 2016). Farmers' output is estimated as follows: dollar value of foods sourced locally by LAUSD - (dollar value of foods sourced locally by LAUSD * wholesale trade sector margin). The wholesale trade sector margin (which includes food intermediaries) is assumed to be 17% based on default data in IMPLAN (Christensen et al. 2017).

### TABLE A2-4: **Annual Benefits to the Local Economy if LA County Schools Adopted GFPP Standards and Sourced a Percentage of their Food Locally**

| | | | | |
|---|---|---|---|---|
| **LA County schools' annual food budget (in millions $)[1]** | $345 | $345 | $345 | $345 |
| | | | | |
| **Percentage of food sourced locally[2]** | 20% | 50% | 75% | 100% |
| **Amount of food sourced locally (in millions $)[3]** | $69.0 | $173 | $259 | $345 |
| | | | | |
| **Benefit to local economy (in millions $) (1.60 multiplier)[4]** | $110 | $276 | $414 | $552 |
| **Benefit to local economy (in millions $) (2.1 multiplier)[5]** | $145 | $362 | $544 | $725 |
| **Benefit to local economy (in millions $) (2.82 multiplier)[6]** | $195 | $487 | $730 | $973 |
| **Benefit to local economy (in millions $) (3.12 multiplier)[7]** | $215 | $539 | $808 | $1,080 |
| | | | | |
| **Jobs generated[8]** | 602 | 1,500 | 2,260 | 3,010 |

NOTES:

1. Estimated as: meals served daily in LA County schools (LAUSD 2016) * (annual food budget LAUSD (LAUSD personal communication) / meals served daily LAUSD).
2. The current percentage of food sourced locally by LA County schools is unknown. All figures (20%, 50%, 75%, and 100%) are projections.
3. Estimated as: annual food budget * percentage sourced locally.
4. Estimated as: amount sourced locally * 1.60 (Christensen et al. 2017).
5. Estimated as: amount sourced locally *2.1 (Roche et al. 2016).
6. Estimated as: amount sourced locally * 2.82 (Kane et al. 2010).

7. Estimated as: amount sourced locally * 3.12 (Christensen et al. 2017).
8. Based on the estimate that for every $1 million of output produced by farmers and sold through indirect marketing, 10.5 jobs are generated (Hardesty et al. 2016). Farmers' output is estimated as follows: dollar value of foods sourced locally by LA County schools - (dollar value of foods sourced locally by LA County schools * wholesale trade sector margin). The wholesale trade sector margin (which includes food intermediaries) is assumed to be 17% based on default data in IMPLAN (Christensen et al. 2017).

## TABLE A2-5: **Annual Benefits to the Local Economy if All LA County Facilities (Not Including Schools) Adopted GFPP Standards and Sourced a Percentage of their Food Locally**

| | | | | |
|---|---|---|---|---|
| **LA County facilities' annual food budget (in millions $)[1]** | $21 | $21 | $21 | $21 |
| | | | | |
| **Percentage of food sourced locally[2]** | 20% | 50% | 75% | 100% |
| **Amount of food sourced locally (in millions $)[3]** | $4.1 | $10 | $15 | $21 |
| | | | | |
| **Benefit to local economy (in millions $) (1.60 multiplier)[4]** | $6.6 | $16 | $25 | $33 |
| **Benefit to local economy (in millions $) (2.1 multiplier)[5]** | $8.6 | $22 | $32 | $43 |
| **Benefit to local economy (in millions $) (2.82 multiplier)[6]** | $12 | $29 | $44 | $58 |
| **Benefit to local economy (in millions $) (3.12 multiplier)[7]** | $13 | $32 | $48 | $64 |
| | | | | |
| **Jobs generated[8]** | 36 | 90 | 135 | 179 |

NOTES:

1. Estimated as: (annual total food budget LAUSD / number of meals served daily LAUSD) * meals served daily at LA County facilities.
2. The current percentage of food sourced locally by LA County facilities is unknown. All figures (20%, 50%, 75%, and 100%) are projections.
3. Estimated as: annual food budget * percentage sourced locally.
4. Estimated as: amount sourced locally * 1.60 (Christensen et al. 2017).
5. Estimated as: amount sourced locally * 2.1 (Roche et al. 2016).
6. Estimated as: amount sourced locally * 2.82 (Kane et al. 2010).
7. Estimated as: amount sourced locally * 3.12 (Christensen et al. 2017).
8. Based on the estimate that for every $1 million of output produced by farmers and sold through indirect marketing, 10.5 jobs are generated (Hardesty et al. 2016). Farmers' output is estimated as follows: amount of foods sourced locally by LA County (amount of foods sourced locally by LA County * wholesale trade sector margin). The wholesale trade sector margin (which includes food intermediaries) is assumed to be 17% based on default data in IMPLAN (Christensen et al. 2017).

## Estimates of Carbon Footprint and Water Use for LAUSD, LA County Schools, and LA County Facilities

We used emissions data reported by Heller and Keoleian (2015) and water use data reported by Mekonnen and Hoeskstra (2012) to estimate the carbon footprint and water use of LAUSD food purchases. We used the data pertaining to the industrial farming system for all products since this is the major production system used in the United States. We used these data both for simplicity and in order to be consistent with data used in a recent study that estimated the potential impact of the GFPP (Hamerschlag and Kraus-Polk 2017). A number of peer-reviewed studies report estimates of carbon footprints and the estimates for different food products can vary greatly across different studies. Therefore, our results could be lower or higher if based on different estimates. LAUSD provided data on meat, poultry, and produce purchases (quantity and dollar amount by vendor) for the years 2013, 2014, and 2015. However, data were not provided for the complete school year. The only consistent data that allowed comparison between two time periods were for protein purchases (beef, pork, turkey, chicken, eggs, cheese, yogurt, and beans) from April to June 2013 and April to June 2015. All product weights were first calculated in pounds and then converted to kilograms.

**Assumptions regarding protein purchases:**

1. When estimating the number of pounds of eggs purchased, if there was no specification on the size of eggs, we assumed them to be large eggs.
2. For prepared products where no information was provided on the number of units per case or the individual serving size of each product, we obtained the information from vendor purchasing forms online.
3. If the amount of protein foods in the product (characterized as those foods qualifying as a meat/meat alternate in the National School Lunch Program meal patterns) was available from the vendor product list, it was used.
4. If the amount of protein foods in the product was not available from the vendor product list, the amount of protein foods was assumed to be equal to 2 oz. equivalents, per the National School Lunch Program meal pattern requirements.
5. For prepared products containing multiple protein foods in unspecified quantities, it was assumed that the product contained equal proportions of protein foods.

**General assumptions:**

1. Due to a lack of consistent data for the entire school year, we used emissions per meal and water use per meal for the period April through June 2013 and April through June 2015 to estimate the total annual emissions for the entire school years 2012-2013 and 2014-2015.
2. Carbon footprints and water use for LA County schools and LA County facilities were estimated assuming all schools and facilities in LA County adopted GFPP and followed similar meat reduction strategies as LAUSD.
3. Due to lack of data, savings in emissions per meal and water use per meal for LA County schools and LA County facilities were assumed to be the same as those for LAUSD.
4. Los Angeles Unified School District and Los Angeles County public schools serve a comparable number of meals relative to student enrollment.

TABLE A2-6: **Emissions by Food Category**

| Category | Kg $CO_2$ per kg of food |
|---|---|
| **Beef** | 26.45 |
| **Pork** | 6.87 |
| **Poultry** | 5.05 |
| **Legumes** | 0.78 |
| **Cheese** | 9.78 |
| **Yogurt** | 2.02 |
| **Eggs** | 3.54 |

SOURCE: Heller and Keoleian 2014.

TABLE A2-7: **Annual Reduction in Carbon Footprint Calculated for LAUSD**

| | 2012-2013 | 2014-2015 |
|---|---|---|
| **Total number of meals served annually LAUSD (in millions)** | 114[1] | 129[2] |
| **Emissions (kg $CO_2$/meal)[3]** | 0.352 | 0.242 |
| **Total emissions (kg/$CO_2$) (in millions)[4]** | 40.1 | 31.1 |
| **Savings (kg $CO_2$) between 2012-2013 and 2014-2015 (in millions)[5]** | 8.99 | |
| **Percent annual savings between 2012-2013 and 2014-2015[6]** | 22% | |

NOTES:

1. Food Day n.d.
2. Estimated as: number of daily meals served (Los Angeles Times 2015) * number of instructional days in school (LAUSD 2014).
3. Estimated as: (kg of food purchased by category * emissions $CO_2$ per kg food by food category) / total number of meals served.
4. Estimated as: emissions (kg $CO_2$/meal) * total number of meals served annually.
5. Estimated as: total emissions (2012-2013) - total emissions (2014-2015).
6. Estimated as: (total emissions (2012-2013) - total emissions (2014-2015)) / (total emissions (2012-2013) * 100).

TABLE A2-8: **Projected Annual Reduction in Carbon Footprint if LA County Schools Were to Adopt the Same Meat-reduction Measures as LAUSD**

| | |
|---|---|
| **Total number of meals served daily LA County schools (in millions)[1]** | 1.70 |
| **Number of instructional school days[2]** | 180 |
| **Total number of meals served annually (in millions)[3]** | 306 |
| **Savings in emissions (kg $CO_2$/meal)[4]** | 0.11 |
| **Total savings kg $CO_2$ (in millions)[5]** | 33.8 |

NOTES:

1. Estimated as: total students in LA County schools (Public School Review 2017) * (meals served daily by LAUSD (LAUSD 2016) / total students in LAUSD (LAUSD 2016)). We assume that the number of meals served per student in LA County is comparable to the number of meals served per student at LAUSD.
2. California Department of Education n.d.
3. Estimated as: total number of meals served daily * number of instructional school days.
4. Estimated as: total emissions LAUSD (2012-2013) - total emissions LAUSD (2014-2015).
5. Estimated as: total number of meals served annually * savings in emissions LAUSD (kg $CO_2$/meal).

TABLE A2-9: **Projected Annual Reduction in Carbon Footprint if LA County Facilities Were to Adopt the Same Meat-reduction Measures as LAUSD**

| | |
|---|---|
| **Total number of meals served annually LA County facilities (in millions)[1]** | 37 |
| **Savings in emissions LAUSD (kg $CO_2$/meal)[2]** | 0.11 |
| **Total savings kg $CO_2$ (in millions)[3]** | 4.1 |

NOTES:

1. LACDPH 2014.
2. Estimated as: total emissions LAUSD (2012-2013) - total emissions LAUSD (2014-2015).
3. Estimated as: total number of meals served annually * savings in emissions LAUSD (kg $CO_2$/meal).

TABLE A2-10: **Water Use Type by Category (Gallons/Lb.)**

| Category | Green Water[1] | Blue Water[1] | Grey Water[1] |
|---|---|---|---|
| **Beef** | 389.52 | 47.02 | 72.78 |
| **Pork** | 449.62 | 74.36 | 83.74 |
| **Poultry** | 228.64 | 24.70 | 40.02 |
| **Legumes[2]** | 206.05 | 12.15 | 1.32 |
| **Cheese** | 290.06 | 41.61 | 65.12 |
| **Yogurt** | 68.16 | 9.25 | 15.32 |
| **Egg product** | 160.88 | 17.44 | 30.64 |

NOTES:

1. Mekonnen and Hoekstra 2012.
2. Soybeans were used as a proxy for legumes, as soybean water use per pound falls at the approximate center of the range of values within the category of legumes.

TABLE A2-11: **Annual Water Savings Calculated for LAUSD**

| | 2012-2013 | 2014-2015 |
|---|---|---|
| **Total number of meals served annually (in millions)** | 114[1] | 129[2] |
| **Water use per meal (green + blue + grey) (gallons/meal)[3]** | 44.5 | 30.3 |
| **Annual water use between 2012-2013 and 2014-2015 (in billions of gallons)[4]** | 5.07 | 3.91 |
| **Annual savings (in billions of gallons)[5]** | 1.16 | |
| **Percent annual savings between 2012-2013 and 2014-2015[6]** | 22.88% | |

NOTES:

1. Food Day n.d.
2. Estimated as: number of daily meals served (Los Angeles Times 2015) * number of instructional days in school (LAUSD 2014).
3. Estimated as: [(lbs. of food purchased by category * green water use per pound by food category) + (lbs. of food purchased by category * blue water use per pound by food category) + (lbs. of food purchased by category * grey water use per pound by food category)] / total number of meals served.
4. Estimated as: water use per meal (gallons/meal) * total number of meals served annually.
5. Estimated as: total water use (2012-2013) - total water use (2014-2015).
6. Estimated as: [total water use (2012-2013) - total water use (2014-2015)] / total water use (2012-2013) * 100.

TABLE A2-12: **Projected Annual Water Savings if LA County Schools Were to Adopt the Same Meat-reduction Measures as LAUSD**

| | |
|---|---|
| **Total number of meals served daily LA County schools (in millions)[1]** | 1.70 |
| **Number of instructional school days[2]** | 180 |
| **Total number of meals served annually (in millions)[3]** | 306 |
| **Water savings (gallons/meal)[4]** | 14.1 |
| **Total annual water savings (in billions of gallons)[5]** | 4.32 |

NOTES:

1. Estimated as: total students in LA County schools (Public School Review 2017) * meals served daily by LAUSD (LAUSD 2016) / total students in LAUSD (LAUSD 2016).
2. California Department of Education n.d.
3. Estimated as: total number of meals served daily * number of instructional school days.
4. Estimated as: total water use per meal LAUSD (2012-2013) - total water use per meal LAUSD (2014-2015).
5. Estimated as: water savings LAUSD (gallon/meal) * total annual meals served.

TABLE A2-13: **Projected Annual Water Savings if LA County Facilities Were to Adopt the Same Meat-reduction Measures as LAUSD**

| | |
|---|---|
| **Total number of meals served annually LA County facilities (in millions)[1]** | 37 |
| **Water savings LAUSD (gallons/meal)[2]** | 14 |
| **Total annual water savings (in millions of gallons)[3]** | 520 |

NOTES:

1. LACDPH 2014.
2. Estimated as: total water use per meal LAUSD (2012-2013) - total water use per meal LAUSD (2014-2015).
3. Water savings LAUSD (gallons/meal) * total number of meals served annually LA County facilities.

## Estimated Reduction in Sodium Intake Among LAUSD and LA County Students from Adopting HHFKA Target 2 Sodium Limits

Using data on sodium intake among adolescents from the 2011-2012 National Health and Examination Survey and reported daily counts of breakfasts and lunches served in LAUSD schools, we calculated the expected percentage decrease in sodium intake among K-12 students resulting from schools adhering to the Healthy, Hunger-Free Kids Act's Target 2 sodium limits, and estimated the number of students eating both breakfast and lunch at school who would be affected. We then extrapolated results to LA County schools based on the size of the student population. Relying on research that has found strong associations between sodium reduction and blood pressure reduction in youth, we assume that this percentage reduction will result in blood pressure reduction among this population of students and may be protective against cardiovascular risk factors through adulthood.

**Assumptions:**

1. A relatively consistent population of students eats school meals.
2. Students are generally consuming meals in their entirety. Data on food waste or percentage of food typically consumed by students in LAUSD was unavailable.
3. About half of all the students who eat lunch prepared by LAUSD (or LA County schools) are also eating breakfast prepared by LAUSD (or LA County schools). This is likely a conservative estimate, as LAUSD has been recognized for its high participation rates in school breakfast and lunch programs.
4. Students who eat school meals and those who do not eat school meals have comparable sodium intakes outside of school.
5. LAUSD student populations are comparable to LA County schools' populations in measures of health and demographics.
6. The relationship between the reported number of daily meals (breakfast, lunch) served at LAUSD and the total LAUSD student population is comparable to and can be used to estimate the (unknown) number of daily meals served in LA County schools based on the total LA County schools' student population.
7. The average sodium intake in LAUSD and LA County schools' student populations reflects average sodium intake of K-12 students nationally.

TABLE A2-14: **Number of Students Eating Breakfast and Lunch at LAUSD and LA County Schools**

| | Total number of students | Estimated number of students eating school breakfast | Estimated number of students eating school lunch | Estimated number of students eating school breakfast and lunch |
|---|---|---|---|---|
| **LAUSD** | 664,774[1] | 345,000[1] | 320,000[1] | 160,000[2] |
| **LA County public schools** | 1,529,895[3] | 794,000[4] | 736,000[4] | 368,000[2] |

NOTES:

1. LAUSD 2016.
2. Assumption: half of all students who consistently eat school lunch are also eating school breakfast.
3. Public School Review 2017.
4. Calculations based on LAUSD data: (students eating school breakfast LAUSD / total number of students LAUSD) = (students eating school breakfast LA County / total number of students LA County). Repeat for students eating school lunch.

TABLE A2-15: **Percentage Reduction in Average Sodium Intake among Students Eating School Breakfast and Lunch**

| | Average daily sodium intake[1] | Change in sodium at breakfast[2]: (T2) - (T1) | Change in sodium at lunch[2]: (T2) - (T1) | Change in daily sodium intake | Percent reduction sodium intake[3] |
|---|---|---|---|---|---|
| **Grades K-5** | 3051 mg | -55 mg | -295 mg | -350 mg | 11.5% |
| **Grades 6-8** | 3117 mg | -65 mg | -325 mg | -390 mg | 12.5% |
| **Grades 9-12** | 3565 mg | -180 mg | -340 mg | -520 mg | 14.6% |

NOTES:

1. CDC 2016. Based on average daily sodium intake for youth aged 6-10 years, 11-13 years, and 14-18 years old.
2. The change in sodium is equal to the Target 2 sodium reduction goal minus the Target 1 sodium reduction goal for breakfast and lunch, respectively, for each grade group (Appel et al. 2015).
3. Percentage reduction in sodium intake, grades K-5: 350 / 3051 = 0.115 = 11.5%.

   Percentage reduction in sodium intake, grades 6-8: 390 / 3117 = 0.125 = 12.5%.

   Percentage reduction in sodium intake, grades 9-12: 520 / 3565 = 0.146 = 14.6%.

## Estimated Reductions in Lifetime Cases of Colorectal Cancer among Students in Schools Offering No Lunchtime Option of Processed Meat

Using research that determines an 18 percent increase in lifetime colorectal cancer risk for every additional daily serving (50 g) of processed meat, data on overall lifetime risk of colorectal cancer, and reported daily counts of lunches served in LAUSD schools, we calculated the reduction in risk and expected cases of colorectal cancer per grade or graduating class of students among schools offering processed meat as one of two daily lunch options, versus schools offering no processed meat at lunch. We then extrapolated results to LA County public schools based on the size of the student population. It is important to note that LAUSD has only committed to reducing processed meats in school meals, and has not yet eliminated them. However, even modest reductions in processed meat (e.g., serving processed meat two to three days per week rather than five days per week) may help to reduce lifetime risk of colorectal cancer, given that the 18 percent increase in lifetime colorectal cancer risk applies to every additional **daily** serving (50 g) of processed meat. It is important to interpret the results as the maximum reduction in cases of colorectal cancer that would be expected in a scenario in which lunchrooms offering processed meat as one of two daily options eliminate processed meat from lunches, with the understanding that incremental reductions from varying baselines may offer lesser benefits.

**Assumptions:**

1. If processed meat is offered as one of two daily lunch options, it will be selected by approximately half of all students eating lunch.
2. A relatively consistent population of students eats school meals, and a relatively consistent population of students chooses processed meat when it is available.
3. Students who routinely choose processed meat options, and students who do not routinely choose processed meat options, will continue to demonstrate these dietary preferences over time. Assuming some degree of consistency in processed meat intake over time is necessary in predicting lifetime risk of colorectal cancer.
4. LAUSD student populations are comparable to LA County schools' populations in measures of health and demographics.
5. The relationship between the reported number of daily lunches served at LAUSD and the total LAUSD student population is comparable to and can be used to estimate the (unknown) number of daily lunches served in LA County schools based on the total LA County schools' student population.
6. LAUSD and LA County schools' enrollment is distributed relatively evenly across all grades K-12.

TABLE A2-16A: **Lifetime Risk and Expected Cases of Colorectal Cancer <u>with</u> Daily Option of Processed Meat, per Graduating Class across All Schools**

| | Estimated students per grade eating school lunch, not choosing processed meat option[1] | Expected lifetime colorectal cancer cases, based on average population risk[2] | Estimated students per grade eating school lunch, choosing processed meat option[1] | Expected lifetime colorectal cancer cases, based on increased risk[3] | Expected total lifetime colorectal cancer cases among students per grade eating school lunch, with daily option of processed meat[4] |
|---|---|---|---|---|---|
| **LAUSD** | 12,310 | 529 | 12,310 | 624 | 1,153 |
| **LA County schools** | 28,310 | 1,217 | 28,310 | 1,435 | 2,652 |

NOTES:

1. Total lunches served at LAUSD: 320,000 (LAUSD n.d.). Lunches per day per grade = 320,000 / 13 = 24,615. Assumption: of all LAUSD students eating lunch, half choose the processed meat option and half do not. LAUSD students per grade eating school lunch / number of lunch choices = 24,615 / 2 = 12,308. Total lunches served at LA County schools: 736,000 (Table A2-14). Lunches per day per grade = 736,000 / 13 = 56,615. Assumption: of all LA County students eating the school lunch, half choose the processed meat option and half do not. LA County students per grade eating school lunch / number of lunch choices = 56,615 / 2 = 28,308.
2. Lifetime risk of colorectal cancer is 4.3% or .043 (SEER 2017). Among LAUSD students not choosing the processed meat option at lunch, expected lifetime cancer cases are: 12,308 * .043 = 529. Among all LA County students, expected lifetime cancer cases are: 28,308 * .043 = 1,217.
3. Lifetime risk for colorectal cancer increases by 18% per every serving (50 g) of processed meat consumed daily (Bouvard et al. 2015). Among LAUSD students choosing the processed meat option at lunch daily, lifetime risk of colorectal cancer increases 18%, from 4.3% to 5.07%. Calculation: .043 * 1.18 = .0507. Among LAUSD students choosing the processed meat option at lunch daily, expected lifetime cancer cases are: 12,308 * .0507 = 624. Among LA County students: 28,308 * .0507 = 1,435.
4. Expected total lifetime colorectal cancer cases among LAUSD students, per grade, eating school lunch: 529 + 624 = 1,153. Among LA County students: 1,217 + 1,435 = 2,652.

### TABLE A2-16B: **Lifetime Risk and Expected Cases of Colorectal Cancer without Daily Option of Processed Meat, per Graduating Class across All Schools, and Total Reduction in Lifetime Colorectal Cancer Cases**

| | Estimated students per grade eating school lunch[1] | Expected lifetime colorectal cancer cases, based on average population risk, without daily option of processed meat[2] | Expected total lifetime colorectal cancer cases among students per grade eating school lunch, with daily option of processed meat[3] | Reductions in lifetime cases of colorectal cancer per grade in the absence of processed meat option in lunchrooms[4] |
|---|---|---|---|---|
| **LAUSD** | 24,620 | 1,058 | 1,153 | 95 |
| **LA County schools** | 56,620 | 2,435 | 2,652 | 217 |

NOTES:

1. Total lunches served at LAUSD: 320,000 (LAUSD n.d.). Lunches per day per grade = 320,000 / 13 = 24,615. No students consume processed meat at lunch. Total lunches served at LA County schools: 736,000 (Table A2-14). Lunches per day per grade = 736,000 / 13 = 56,615.
2. Lifetime risk of colorectal cancer is 4.3% or .043 (SEER 2017). Among LAUSD students eating school lunch without processed meat option, expected lifetime cancer cases are: 24,615 * .043 = 1058. Among LA County students: 56,620 * .043 = 2,435.
3. Table A2-16A
4. LAUSD: 1,153 - 1,058 = 95

   LA County: 2,652 - 2,435 = 217

## Estimated Reductions in Blood Pressure and Hypertension Resulting from Sodium Reduction Strategies LA County Facilities

A 2011 mathematical simulation drawing on health impact assessment methods determined the impact of a range of targeted sodium reduction strategies across LA County facilities with consistent populations of adults consuming lunch. The study authors selected facilities in LA County serving meals to the same venue-based population at least once per day, at least five days per week, for eight consecutive weeks. Facilities included one or more senior centers, cafeteria buffets, mobile trucks, hospital cafeterias, and county government cafeterias, serving a total of 15,113 adults. Study assumptions include relative stability in the set of day-to-day consumers; sodium consumption by adults in LA County is comparable to national averages; and a linear relationship exists between sodium consumption and systolic blood pressure (Gase et al. 2011).

It should be noted that the role of dietary sodium in elevating blood pressure, which has long been accepted in literature and espoused by health professionals, has been complicated by recent research. A growing number of studies suggest that minerals such as potassium, magnesium, and calcium—abundant in many minimally processed foods—may play an equally or more important role in determining blood pressure, with some studies finding that high sodium and potassium intakes together are associated with lower blood pressure (Moore, Singer and Bradlee 2017). However, the *Scientific Report of the 2015 Dietary Guidelines Advisory Committee* supports the dose-dependent relationship between sodium intake and blood pressure in adults, and the 2015-2020 Dietary Guidelines for Americans recommends that adults consume no more than 2,300 mg per day (DHHS and USDA 2015). A 2013 Institute of Medicine review of the evidence supporting dietary sodium intake and health outcomes also concludes that the literature generally supports a positive relationship between higher levels of sodium intake and cardiovascular disease, but does not support reducing daily sodium intake to levels lower than 2,300 mg, as lower sodium intake may be associated with adverse health outcomes in some populations (IOM 2013).

Despite these tensions, nutritional science broadly supports the underpinnings of general recommendations reflected in the Dietary Guidelines and GFPP nutrition standards: consuming more nutrient-dense foods such as fruits, vegetables, legumes, and whole grains that contain important vitamins and minerals—while limiting processed foods that may offer high levels of sodium with little additional nutritional benefit—is likely to promote health. While a direct relationship between sodium intake and blood pressure has been assumed for the purposes of this report, practical applications of the results should take into consideration the context provided by complete dietary patterns.

## Estimated Reductions in New Cases of Type 2 Diabetes and Health-Care Savings over a 10-year Period Due to Increased Daily Whole Grain Intake in LA County Facilities

Using data on average whole grain intake and incidence of type 2 diabetes among US adults, we applied the results of a prospective study on 10-year risk of type 2 diabetes to determine the potential impact of substituting whole grains for enriched or refined grains in LA County facilities food service settings. In the absence of data on the average number of servings of whole grains in LA County facility meals, we conducted an analysis in which we assumed that average whole grain intake among LA County adults mirrors that of the general population and that substituting all or some enriched or refined grains with whole grains would result in an increase of ½ to 1 serving of whole grains per day among the 15,113 adults consistently eating meals at LA County facilities (see Gase et al. 2011).

**Assumptions:**

1. One serving of whole grain bread = 1 oz. of whole grain bread containing 16 grams of whole grains. One half serving = ½ oz. of whole grain bread containing 8 grams of whole grains (FDA 2014; Maras et al. 2009).
2. Substitution of whole grains for some or all refined and enriched grains will result in increased whole grain consumption among adults of between ½ and 1 serving.
3. Substitution of whole grains for some or all refined and enriched grains will not affect adults' likelihood of purchasing or consuming grain products and will not otherwise impact or influence dietary choices.
4. Approximately 15,113 adults are consistently eating meals at LA County facilities, as estimated by Gase et al. 2011.
5. Adults who have not been diagnosed with type 2 diabetes do not yet have type 2 diabetes. While it is known that nearly one-quarter of people with diabetes are undiagnosed, our calculations aim to identify the *difference* in number of new cases given increases in whole grain intake, and a similar number of undiagnosed cases will be present under both conditions.
6. All new cases of diabetes diagnosed in adulthood will be classified as type 2 diabetes. While it is possible for adults to be diagnosed with type 1 diabetes, it is much less likely.

TABLE A2-17: **Estimated Reductions in Type 2 Diabetes (T2D) Risk and Lifetime Cases among Adults Eating Regular Meals at LA County Facilities and Consuming an Additional ½ to 1 Serving of Whole Grains Daily**

| Number of adults eating daily in LA County facilities[1] | Estimated number of adults without diabetes[2] | Expected T2D cases over 10-year period[3] | Overall risk of T2D over 10-year period[4] | Overall risk of T2D over 10-year period plus ½ to 1 serving whole grains[5] | Expected T2D cases over 10-year period plus ½ to 1 serving whole grains[6] | Estimated reduction in T2D cases attributed to ½ to 1 serving whole grains[7] | Estimated health care savings[8] |
|---|---|---|---|---|---|---|---|
| 15,113 | 13,700 | 891 | 6.50% | 6.02% - 6.26% | 825 - 858 | 33 - 66 | $2,810,000 - $5,620,000 |

NOTES:

1. Gase et al. 2011.
2. The prevalence of diabetes (type 1 and type 2) among all adults in 2015 was 9.3% (CDC 2017). Out of 15,113 adults in the LA County subpopulation, 15,113 * (1.00 - 0.093) = 13,707 were estimated to have no diagnosis of diabetes.
3. Incidence of type 2 diabetes in the US adult population (defined as the number of new cases each year, among those without diabetes) is 6.7 cases per 1,000 persons. Because incidence is calculated by dividing all new cases by individuals in the subpopulation who do not yet have the disease, those who are expected to acquire new cases of type 2 diabetes in the LA County adult subpopulation over the course of each year must be removed from the denominator.

   Year 1: (6.7 / 1000) * 13,700 = 91.79 = 92

   Year 2: (6.7 / 1000) * (13,700 - 91.8) = 91.17 = 91

   Year 3: (6.7 / 1000) * (13,700 - 92 - 91) = 90.56 = 91

   Year 4: (6.7 / 1000) * (13,700 - 92 - 91 - 91) = 89.95 = 90

   Year 5: (6.7 / 1000) * (13,700 - 92 - 91 - 91 - 90) = 89.35 = 89

   Year 6: (6.7 / 1000) * (13,700 - 92 - 91 - 91 - 90 - 89) = 88.75 = 89

   Year 7: (6.7 / 1000) * (13,700 - 92 - 91 - 91 - 90 - 89 - 89) = 88.16 = 88

   Year 8: (6.7 / 1000) * (13,700 - 92 - 91 - 91 - 90 - 89 - 89 - 88) = 87.57 = 88

   Year 9: (6.7 / 1000) * (13,700 - 92 - 91 - 91 - 90 - 89 - 89 - 88 - 88) = 86.97 = 87

   Year 10: (6.7 / 1000) * (13,700 - 92 - 91 - 91 - 90 - 89 - 89 - 88 - 88 - 87) = 86.40 = 86

   Total new cases of diabetes over 10 years = 92 + 91 + 91 + 90 + 89 + 89 + 88 + 88 + 87 + 86 = 891.
4. Estimated risk of developing type 2 diabetes over 10-year period = 891 / 13,700 = .0650 = 6.50%.
5. For every additional 10 g of whole grains consumed, there is an overall absolute reduction of 0.3% in the T2D rate. The relationship is linear (Chanson-Rolle et al. 2015).

   For every 8 g (½ serving) increase in whole grains, there is an estimated absolute reduction of (0.3% * (8 / 10)) = 0.24%. The new risk of T2D over a 10-year period with additional ½ serving of whole grains becomes (6.50% - 0.24%) = 6.26%.

   For every 16 g (1 serving) increase in whole grains, there is an estimated absolute reduction of (0.3% * (16 / 10)) = 0.48%. The new risk of T2D over a 10-year period with one additional serving of whole grains becomes (6.50% - 0.48%) = 6.02%.
6. New cases over 10 years with additional ½ serving of whole grains = (13,700 * .0626) = 857.62 = 858.

   New cases over 10 years with one additional serving of whole grains = (13,700 * .0602) = 824.74 = 825.
7. Reduction in cases with additional ½ serving of whole grains = (891 - 858) = 33.

   Reduction in cases with 1 additional serving of whole grains = (891 - 825) = 66.
8. The average total direct medical costs of treating type 2 diabetes and diabetic complications over the lifetime of each case is $85,200 (Zuo, Zhang, and Hoerger 2013). Medical costs savings of 33 fewer T2D cases = $85,200 * 33 = $2,811,600. Medical costs savings of 66 fewer T2D cases = $85,200 * 66 = $5,623,200.

## Estimated Reductions in Cardiovascular Mortality Resulting from LA County Facility Interventions Increasing Fruit and Vegetable Intake by One Serving Daily

Using data on population rates of cardiovascular mortality and a meta-analysis of prospective cohort studies targeting the relationship between fruit and vegetable consumption and cardiovascular mortality, we calculated the reductions in cardiovascular deaths that would be expected over a 10-year period among adults consistently consuming meals at LA County facilities, given an additional daily serving of fruits and vegetables.

Note: There are a number of evidence-based strategies to increase fruit and vegetable intake in food service settings, whose effectiveness will vary by institution. These strategies include increasing the variety of fruits, vegetables, and/or salad bar ingredients; providing price incentives or promotions; using food labeling systems, such as "traffic light" light labeling for foods ranging from healthiest (green) to least healthy (red); changing food placement at point of sale, including replacing snacks or sweets with produce in checkout lanes; information and signage about healthy diets; and altered portion sizes or recipe modifications that incorporate more fruits and vegetables in meals (Roy et al. 2015; Wolfenden et al. 2015; Levy et al. 2012; Jeffrey et al. 1994).

**Assumptions:**

1. LA County facilities are able to achieve an increase in consumers' fruit and vegetable intake of approximately one serving per day.
2. Deaths from cardiovascular disease and other causes accruing during each of the 10 years would have a negligible impact on the number of cardiovascular deaths expected each year thereafter.
3. The population of adults regularly consuming meals at LA County facilities do not differ significantly from the general population or study population(s).

TABLE A2-18: **Estimated Reductions in Cardiovascular Mortality (CVM) among Adults Eating Regular Meals at LA County Facilities Attributable to Increased Fruit and Vegetable (F/V) Intake**

| Number of adults eating daily in LA County facilities[1] | Conversion to standard population[2] | Expected CV deaths over 10-year period in standard population[2] | Estimated CVM risk among LA County adults[4] | Estimated CVM risk among LA County adults plus 1 serving F/V[5] | Expected CV deaths over 10-year period among LA County adults plus 1 serving F/V[6] | Percentage reduction in CVM attributed to 1 serving F/V[7] | Estimated reduction in CV deaths attributed to 1 serving F/V[8] |
|---|---|---|---|---|---|---|---|
| 15,113 | 20,360 | 420 | 2.78% | 2.67% | 404 | 4% | 16 |

NOTES:

1. Gase et al. 2011.
2. Because age-adjusted mortality rates are based on a "standard population" representing a typical distribution of the US population, and the LA County subset consists exclusively of adults, the subset must be assumed to be part of a standard population. In a standard population, 25.77% of the total population is aged 0 to 17 years (SEER n.d.). This means that we must assume the 15,113 adults in the LA County subset make up approximately 74.23% of a standard population distribution. By these estimates, the total "standard population" represented by the LA County adult subset is equal to (15,113 / 0.7423) = 20,359.7.
3. The age-adjusted mortality rates for diseases of heart and stroke are 169.8 per 100,000 and 36.2 per 100,000, respectively. Together, age-adjusted rates for CVD mortality can be estimated as 206 deaths per 100,000 (Xu et al. 2016). Annual deaths from cardiovascular disease among the LA County subset, converted to a standard population distribution, are estimated as 20,360 * (206 / 100,000) = 41.94 = 42. Over 10 years, the number of expected deaths is equal to (42 * 10) = 420.
4. Estimated risk of cardiovascular mortality over a 10-year period among adults in LA County facilities = (420 / 15,113) = 0.0278 = 2.78%.

5. The hazard ratio (reduction in risk) for cardiovascular mortality for each additional serving a day of fruit and vegetables is 0.96 (Wang et al. 2014). Estimated CVM risk with one additional daily serving of fruits and vegetables = (2.78% * 0.96) = 2.67%.
6. Expected CV deaths among LA County adult subset over 10-year period = (15,113 * 0.0267) = 403.5 = 404.
7. Because the hazard ratio for each additional serving a day of fruit and vegetables is 0.96, the percent reduction in CVM risk attributed to one additional daily serving of fruits and vegetables = 4%.
8. Estimated reduction in CV deaths attributed to one additional daily serving of fruits and vegetables = (420 - 404) = 16.

## The Increasing Availability of Antibiotic-free Poultry in the Supply Chain

Using market data on US ready-to-cook chicken production and "no antibiotics ever" (NAE) chicken production by the top five US chicken producers from 2015 through 2017, we estimated the percentage of all US ready-to-cook chicken that is produced by the top five US chicken producers and treated with no antibiotics ever. (Note that Koch Foods and Sanderson Farms, both among the top five ready-to-cook chicken producers in the US, have not publicly reported any NAE chicken production.)

TABLE A2-19: **Total Market Share and Market Contributions of "No Antibiotics Ever" (NAE) Chicken by Producers Tyson, Pilgrim's Pride, and Perdue between 2015 and 2017**

| Rank | | 2015 market share (percentage of all US chicken production)[1] | Percentage of company's chickens treated with "no antibiotics ever" (NAE) | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| 1 | **Tyson** | 23.3% | **Tyson (estimated)[2]** | N/A | N/A | 33% |
| 2 | **Pilgrim's Pride** | 18.8% | **Pilgrim's Pride[3]** | 5% | 13% | 24% |
| 4 | **Perdue** | 8.2% | **Perdue[4]** | 50% | 95% | 95% |
| | **Total** | 50.3% | Percentage of all US produced chickens that are NAE and processed by Tyson, Pilgrim's Pride, or Perdue[5] | 5% | 10% | 20% |

NOTES:

1. WATT Global Media 2015.
2. Tyson has confirmed that transition of Tyson retail to brand to NAE is now complete, and the company is now the world's largest producer of NAE chicken. Tyson declined to provide estimates for NAE chicken produced in 2015 or 2016, and declined to identify the percent of total chicken production that is sold under the Tyson retail brand (personal communication, October 2017). Tyson's 2017 NAE production has been estimated by assuming that its market share contribution of NAE chicken is, at minimum, equal to that of Perdue, the US company contributing the second-greatest percentage of NAE chicken to the US market:

   (Tyson total market share) * (Tyson % NAE 2017) > (Perdue total market share) * (Perdue % NAE 2017)

   Tyson % NAE 2017 > 33.4%
3. Pilgrim's Pride 2016; Polansek 2016; Szal 2015.
4. Perdue 2016; Charles 2015.
5. The % NAE 2015 total market share was calculated as: [(Tyson % NAE 2015) * (Tyson market share)] + [(Pilgrim's Pride % NAE 2015) * (Pilgrim's Pride market share)] + [(Perdue % NAE 2015) * (Perdue market share)]. Repeat for 2016 and 2017.

## The Magnitude of the Medical Costs Associated with Antibiotic-resistant Infections

Using estimates of the annual medical costs of treating antibiotic-resistant infections and estimates of potential cost increases associated with purchasing antibiotic-free chicken for school food service, we demonstrated the large difference in the magnitude of these two types of costs. These calculations are not intended not to provide precise values for any cost increases associated with antibiotic-free chicken production, and they are in no way intended to suggest that purchases of antibiotic-free chicken are directly related to the medical costs of treating antibiotic-resistant infections. Rather, they are intended to demonstrate the magnitude of the costs of treating antibiotic-resistant infections as compared to the potential cost increases associated with antibiotic-free meat, and to communicate the severity of the risk posed by antibiotic-resistant infections and the urgency of investing in a number of solutions.

TABLE A2-20A: **Estimated Medical Costs of Antibiotic-resistant Infections in the United States and Projected Medical Cost Savings Resulting from a 1% Decrease in these Infections**

| Annual direct medical costs of antibiotic-resistant infections [1] | Hypothetical reduction in antibiotic-resistant infections (%) | Direct medical costs savings from reduction in antibiotic-resistant infections[2] |
|---|---|---|
| $20,000,000,000 | 1.0% | **$200,000,000** |

NOTES:

1. CDC 2013.
2. The direct medical costs savings resulting from a theoretical 1% decrease in antibiotic-resistant infections represent 1% of the annual medical costs of antibiotic-resistant infections.

TABLE A2-20B: **Estimated Costs of Substituting Conventional Chicken for Antibiotic-free Chicken (ABF) in the Top 10 Largest US School Districts**

| 2013-2014 LAUSD enrollment[1] | 2013-2014 LAUSD chicken budget[2] | Estimated percent increase in cost of ABF chicken[3] | Estimated annual additional cost of ABF chicken in LAUSD[4] | Estimated annual additional cost of ABF chicken, per student, in LAUSD[5] |
|---|---|---|---|---|
| 651,322 | $5,365,681 | 33% | $1,770,000 | $2.72 |
| **Total number of students in top 10 school districts[6]** | **Estimated annual cost of substituting ABF for conventional chicken in top 10 school districts[7]** | | **Estimated total cost of substituting ABF for conventional chicken in top 10 school districts through the year 2035[8]** | |
| 4,080,636 | $11,100,000 | | **$200,000,000** | |

NOTES:

1. LAUSD 2014.
2. LAUSD 2013-2014 purchasing data.
3. There is wide variability in reported cost increases of replacing conventional chicken with antibiotic-free chicken in institutional settings. Reported costs of switching to antibiotic-free chicken range from negligible (increasing the cost of chicken by less than a penny per pound) to substantial (increasing the cost of chicken by 67%) (Consumer Reports 2012; Szymanski 2016). Based on the available reported estimates and diminishing price premiums anticipated with increasing availability of antibiotic-free chicken, this calculation assumes that substituting antibiotic-free chicken for conventional chicken would increase the cost of chicken procured by institutions by one-third (33%). **These are not actual cost increases reported by LAUSD and should not be interpreted as such.**

4. Estimated cost increase of substituting antibiotic-free chicken for conventional chicken, based on 2013-2014 chicken spending by LAUSD = ($5,365,681 * 0.33) = $1,770,675.
5. Estimated cost increase of substituting antibiotic-free chicken for conventional chicken, per student per year, based on 2013-2014 student population of LAUSD = ($1,770,675 / 651,332) = $2.72.
6. NCES 2011.
7. Estimated cost of substituting antibiotic-free chicken for conventional chicken in the top 10 largest US school districts, based on estimated cost increases of antibiotic-free chicken per student per year = ($2.72 * 4,080,636) = $11,099,330.
8. Estimated total cost of substituting antibiotic-free chicken for conventional chicken in the top 10 largest US school districts through the year 2035 = ($11,099,330) * (2035 - 2017) = $199,787,940.

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