New Almond Calorie Research: What Does It Mean for the Almond Industry?

December 7, 2016
New Almond Calorie Research: What Does It Mean for the Almond Industry?

Karen Lapsley, Almond Board of California (Moderator)

Dr. David Baer, USDA

Bill Layden, Food Minds
New Almond Calorie Research: The Clash Between Data and Food Label Policy

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Research Leader
Food Components and Health Laboratory
Beltsville Human Nutrition Research Center

USDA
## Disclosures for: David J. Baer

<table>
<thead>
<tr>
<th>AFFILIATION/FINANCIAL INTERESTS</th>
<th>ORGANIZATION</th>
</tr>
</thead>
</table>
| Current Grants/Research Support or Previous Funding of Relevant Research: | California Walnut Commission  
Almond Board of California  
International Tree Nut Council  
Paramount Farms  
Kellogg's  
Hass Avocado Board  
Qualisoy  
National Cattleman’s Beef Association  
USDA  
NIH |
| Scientific Advisory Board/Consultant (No financial relationship)    | Whey Protein Advisory Panel (Dairy Research Institute)  
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Avocado Nutrition Science Advisory Group  
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“That’s because nuts are extra calorie-dense, meaning they have more energy per ounce than most other foods.”


Yes, there’s a ton of research showing that nuts can help you lose weight. But there’s a big caveat to all the studies on nuts and weight loss: The results apply if and only if you eat a moderate amount. Eat more than the recommended daily handful, and you’ll quickly accomplish the exact opposite effect by gaining weight—and much more rapidly than you might by overeating other foods. That’s because nuts are extra calorie-dense, meaning they have more energy per ounce than most other foods. For example, one ounce of almonds has 163 calories, while the same weight in cooked pasta has a mere 37 calories.
New Food Labels!
Gross Energy

Fecal Energy

Urinary Energy

Metabolizable Energy

\[ ME = GE_{\text{Food}} - GE_{\text{Feces}} - GE_{\text{Urine}} \]
THE AVAILABILITY AND FUEL VALUE OF FOOD MATERIALS.

BY W. O. ATWATER AND A. P. BRYANT.

INTRODUCTION.

The Storrs Experiment Station has devoted considerable attention to the study of the food and nutrition of man. Not
• Approach
  ▪ Feed mixed diet
  ▪ Collect feces, urine, duplicate foods
  ▪ Determine energy by bomb calorimetry
  ▪ $\text{ME} = \text{GE}_{\text{food}} - \text{GE}_{\text{feces}} - \text{GE}_{\text{urine}}$

• Experimental details
  ▪ $N = 3$ men, ages 32 y, 29 y, 22 y
  ▪ 50 trials with these 3 men
  ▪ Intervention length 3-8 days
The Atwater factors for calculating energy apply to macronutrient content from a mixed diet, such as the ones shown in the table.

### Sample Atwater Diets

<table>
<thead>
<tr>
<th>Sample Diet A</th>
<th>Sample Diet B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>Beef, fried</td>
</tr>
<tr>
<td>Butter</td>
<td>Beef, dried</td>
</tr>
<tr>
<td>Skim milk</td>
<td>Eggs</td>
</tr>
<tr>
<td>Bread</td>
<td>Butter</td>
</tr>
<tr>
<td>Ginger snaps</td>
<td>Milk</td>
</tr>
<tr>
<td>Parched cereal</td>
<td>Rye bread</td>
</tr>
<tr>
<td>Sugar</td>
<td>Wheat breakfast food</td>
</tr>
<tr>
<td></td>
<td>Sugar</td>
</tr>
<tr>
<td></td>
<td>Baked beans</td>
</tr>
<tr>
<td></td>
<td>Canned pears</td>
</tr>
</tbody>
</table>

- The Atwater factors for calculating energy apply to macronutrient content from a **mixed diet**, such as the ones shown in the table.
Calculating the Energy Value of Almonds Using the Atwater Factors

Macronutrient content per serving:
- 14 g fat
- 6 g total CHO
- 3 g fiber
- 6 g protein

Energy content per serving:
14 g fat * 9 kcal/g = 126 kcal
(6-3) g CHO * 4 kcal/g = 12 kcal
+ 6 g protein * 4 kcal/g = 24 kcal
162 kcal
Myer E. Jaffa
Myer E. Jaffa
Tree Nut Studies: Almonds

Summary of Jaffa’s Almond Research: 6 trials with 2 men

<table>
<thead>
<tr>
<th></th>
<th>“CPH” a 60+ year old vegetarian</th>
<th>“AV” a young male</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Almonds</td>
<td>Almonds</td>
</tr>
<tr>
<td>2</td>
<td>Almonds</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Almonds</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Almonds</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Almonds</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Almonds</td>
<td></td>
</tr>
</tbody>
</table>

- Similar trials were conducted with other tree nuts
  - Brazil nuts: 3 trials with 2 men
  - Pecans: 5 trials with 2 men
  - Walnuts: 11 trials with 3 men
Nut Consumption and Fat Absorption

Comparison of daily fecal excretion of fat during three dietary regimens (% of total dietary fat ±SEM)
Background Summary

- Metabolizable energy (accounts for energy loss in feces and urine) is what we use for our food systems
- Atwater factors...mixed diets

- Eating nuts...increases fecal fat
- Body weight of nut consumers is usually lower than nonconsumers

- ....what is the energy value of nuts?
- ....do the Atwater factors work for nuts?
To measure the metabolizable energy value of nuts (almonds, pistachios, walnuts, cashews) when consumed as part of a mixed diet, and to compare the measured ME value to the calculated ME value.
Summary of Studies

<table>
<thead>
<tr>
<th></th>
<th>Almonds</th>
<th>Pistachios</th>
<th>Walnuts</th>
<th>Cashews</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>42 and 84 g/d</td>
<td>42 and 84 g/d</td>
<td>42 g/d</td>
<td>42 g/d</td>
</tr>
<tr>
<td></td>
<td>2 studies</td>
<td>Whole, lightly roasted and</td>
<td>Whole, roasted, unsalted</td>
<td>Whole, roasted, unsalted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>salted</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Whole, roasted, chopped,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>butterfly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unsalted</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Design

- **Paired Diet**
  - BASE diet without nuts
  - BASE+NUTS
- **Design**
  - Treatment Period 1
    - BASE Diet
    - Adaptation: 9 days
    - Collection: 7 days
  - Treatment Period 2
    - BASE Diet + Nuts
    - Adaptation: 9 days
    - Collection: 7 days
    - Break: 7 days
### Example Menu

- 1 of 7 days
- Paired diet approach
- Gram amounts of food for a 2600 kcal/d menu
  - Base ~2600 kcal/d
  - Base + Almonds ~2600 kcal/d
- Typically consumed foods
- Scaled to caloric need
- Nuts at breakfast and dinner
- Isocaloric across treatments
  - No over- or under-feeding
- Allows determination of energy content of a single food

<table>
<thead>
<tr>
<th>Meal</th>
<th>Food Item</th>
<th>Base</th>
<th>Base + Almonds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Breakfast</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Almonds</td>
<td>0</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Egg Beaters</td>
<td>65</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>Turkey sausage</td>
<td>52</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>English muffins</td>
<td>78</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Margarine</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Peaches, canned</td>
<td>156</td>
<td>127</td>
</tr>
<tr>
<td></td>
<td>2% Milk</td>
<td>260</td>
<td>212</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lunch</strong></td>
<td>Roast beef</td>
<td>65</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>Swiss cheese</td>
<td>36</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Italian bread</td>
<td>72</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>Lettuce</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Mayonnaise</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Mustard</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Carrots</td>
<td>39</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Cranberry juice</td>
<td>234</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>Vanilla wafers</td>
<td>33</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dinner</strong></td>
<td>Almonds</td>
<td>0</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Spaghetti</td>
<td>130</td>
<td>106</td>
</tr>
<tr>
<td></td>
<td>Beef</td>
<td>78</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Pasta sauce</td>
<td>104</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>Lettuce</td>
<td>36</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Shiitake sesame dressing</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Dinner roll</td>
<td>77</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Margarine</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>2% Milk</td>
<td>312</td>
<td>254</td>
</tr>
<tr>
<td></td>
<td>Fruit cocktail</td>
<td>78</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Margarine</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>2% Milk</td>
<td>312</td>
<td>254</td>
</tr>
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<td>78</td>
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</tr>
<tr>
<td></td>
<td>Margarine</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>2% Milk</td>
<td>312</td>
<td>254</td>
</tr>
<tr>
<td></td>
<td>Angel food cake</td>
<td>50</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Calculation of Energy Value

\[ ME = GE_{\text{Food}} - GE_{\text{Feces}} - GE_{\text{Urine}} \]

\[ ME = GE_{(\text{Food1 + Food2 + ...Foodi})} - GE_{\text{Feces (Food1 + Food2 + ...Foodi)}} - GE_{\text{Urine (Food1 + Food2 + ...Foodi)}} \]

\[ ME_{\text{Almond}} = ME_{\text{Base Diet Plus Almonds}} - GE_{\text{Almonds}} \frac{ME_{\text{Base Diet}}}{GE_{\text{Base Diet}}} \]

- Where \( ME \) is the metabolizable energy intake (kcal/d)
- \( GE \) is the gross energy
- Permits determination of the metabolizable energy content of a single food consumed as part of a mixed diet
## Summary of Tree Nut Caloric Value

<table>
<thead>
<tr>
<th></th>
<th>Typical Database and Label Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(kcal/serving)</td>
</tr>
<tr>
<td><strong>Almonds</strong></td>
<td>164 (USDA Data) 170 (Label)</td>
</tr>
<tr>
<td><strong>Walnuts</strong></td>
<td>185 (USDA Data) 190 (Label)</td>
</tr>
<tr>
<td><strong>Pistachios</strong></td>
<td>159 (USDA Data) 170 (Label)</td>
</tr>
</tbody>
</table>
Food Form and Energy Availability

Whole Natural < Roasted (p<0.05)

-25%  -19%  -17%  +6%

Whole (Natural)  Whole (Roasted)  Chopped (Roasted)  Butter (Roasted)

Roasted (Whole = Chopped) < Butter (p<0.05)

Food & Func 2016;7:4231-4238
New Food Labels!

FDA modernizes Nutrition Facts label for packaged foods
Refreshed design and relevant information will help consumers make healthy food choices

For Immediate Release
May 20, 2016
Nutrition Labeling of Foods

(i) Caloric content may be calculated by the following methods...

(A) Using specific Atwater factors (i.e., the Atwater method) given in table 13, USDA Handbook No. 74 (slightly revised, 1973),

(B) Using the general factors of 4, 4, and 9 calories per gram for protein, total carbohydrate, and total fat, respectively, as described in USDA Handbook No. 74 (slightly revised, 1973) p. 9-11;

(C) Using the general factors of 4, 4, and 9 calories per gram for protein, total carbohydrate (less the amount of non-digestible carbohydrates and sugar alcohols), and total fat, respectively, as described in USDA Handbook No. 74 (slightly revised, 1973) p. 9-11. A general factor of 2 calories per gram for soluble non-digestible carbohydrates shall be used. The general factors for caloric value of sugar alcohols provided in paragraph (c)(1)(i)(F) of this section shall be used;

(D) Using data for specific food factors for particular foods or ingredients approved by the Food and Drug Administration (FDA) and provided in parts 172 or 184 of this chapter, or by other means, as appropriate;

(E) Using bomb calorimetry data subtracting 1.25 calories per gram protein to correct for incomplete digestibility, as described in USDA Handbook No. 74 (slightly revised, 1973) p. 10; or

(F) Using the following general factors for caloric value of sugar alcohols: Isomalt--2.0 calories per gram, lactitol--2.0 calories per gram, xylitol--2.4 calories per gram, maltitol--2.1 calories per gram, sorbitol--2.6 calories per gram, hydrogenated starch hydrolysates--3.0 calories per gram, mannitol--1.6 calories per gram, and erythritol--0 calories per gram.
Recent Developments

• USDA Standard Release
  ▪ 12 “almond” entries

• Branded Foods Database
  ▪ 100s of “almond” entries
Sources of Information on Almonds

- USDA Standard Release Database
- USDA Branded Foods Database
- Almond Board of California marketing materials
- Food Label
Summary...

1. Calories on the food label are estimated from macronutrient composition (using Atwater factors) and not measured.

2. Estimations are based on data collected from small studies, not designed as randomized controlled trials, with short feeding periods of simple mixed diets or individual foods (not representative of how people eat).
3. Availability of energy from nuts is lower than what is assumed by Atwater factors.

4. Therefore, measured energy value of nuts is lower than calculated energy (5-25% lower).

5. Lower measured energy content impacts the accuracy of food labeling.

6. Accurate food labels may help reduce barriers to consumption of these nutrient-dense foods.

...Summary
CALORIES COUNT: TIME TO RIGHT-SIZE ALMONDS

Bill Layden, Founder
Executive Vice President

California Almonds
Almond Board of California

FoodMinds
Disclosure

1995

Nutrition and Your Health: Dietary Guidelines for Americans

- Balance the food you eat with physical activity to maintain or improve your weight.
- Choose a diet rich in fruits and vegetables, whole grains, and seafood.
- Choose a diet moderate in sugars, saturated fats, and sodium.
- Eat a variety of foods.
- If you drink alcoholic beverages, do so in moderation.

USDA United States Department of Agriculture
Center for Nutrition Policy and Promotion
Clients Served*

*Includes only clients that have authorized public disclosure.
New Interim FDA Guidelines-Almonds are HEALTHY
FDA Nutrition Labeling Changes Coming Soon

May 5, 2017

July 28, 2018

July 28, 2018
New Nutrition Facts Label
**Calories Will Be Highlighted**

### Nutrition Facts

**Serving Size**: 2/3 cup (55g)
**Servings Per Container**: About 8

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th>Calories 230</th>
<th>Calories from Fat 72</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Fat</strong> 8g</td>
<td>12%</td>
<td><strong>% Daily Value</strong></td>
</tr>
<tr>
<td>Saturated Fat 1g</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Trans Fat 0g</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cholesterol</strong> 0mg</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td><strong>Sodium</strong> 160mg</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td><strong>Total Carbohydrate</strong> 37g</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Dietary Fiber 4g</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>Sugars 1g</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Protein</strong> 3g</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Vitamin A 10%
Vitamin C 8%
Calcium 20%
Iron 45%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.*

### Nutrition Facts

**8 servings per container**

<table>
<thead>
<tr>
<th>Serving size 2/3 cup (55g)</th>
<th>Calories 230</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Fat</strong> 8g</td>
<td>10%</td>
</tr>
<tr>
<td>Saturated Fat 1g</td>
<td>5%</td>
</tr>
<tr>
<td>Trans Fat 0g</td>
<td></td>
</tr>
<tr>
<td><strong>Cholesterol</strong> 0mg</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Sodium</strong> 160mg</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Total Carbohydrate</strong> 37g</td>
<td>13%</td>
</tr>
<tr>
<td>Dietary Fiber 4g</td>
<td>14%</td>
</tr>
<tr>
<td>Total Sugars 12g</td>
<td></td>
</tr>
<tr>
<td>Includes 10g Added Sugars</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Protein</strong> 3g</td>
<td></td>
</tr>
</tbody>
</table>

Vitamin D 2mcg
Calcium 260mg
Iron 8mg
Potassium 235mg

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.*
Food & Beverage Industry Commitments Driving to Reduce Calories

A NEW GOAL TO REDUCE 20% OF BEVERAGE CALORIES CONSUMED PER PERSON BY 2025

15 September 2014

Per excellency,
Dr. Margaret Chan
Director General
World Health Organization
20 Avenue de la Paix
Geneva, Switzerland

Dear Dr. Chan,

Re: The International Food & Beverage Alliance’s Enhanced Commitments on Health and Wellness

In 2008, our companies came together around a commitment to take collective global action in five key areas to support the advancement of the goals of the 2004 WHO Global Strategy on Diet, Physical Activity and Health. We appreciate your leadership in this field to date, as well as your continued openness to engage with our industry.

Over the past six years, we have made substantial progress in each of these areas, specifically in: the reformulation and innovation of products to help address the public health problems of under- and over-nutrition; the provision of clear, fact-based nutrition information to consumers; the adoption of voluntary measures restricting the marketing of foods high in fat, sugar and salt to children; the promotion of balanced diets and healthy, active lifestyles; and the support of public-private partnerships aimed at improving public health.

We are proud of our work, but understand that even greater efforts must be made if the goals of the 2013 UN political declaration of the high-level meeting on the Prevention and Control of Non-communicable Diseases and the WHO Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013-2020 are to be achieved.
Consumers are Paying Attention to Calories

2015: 29%  
2016: 39%

*International Food Information Council-2016 Food and Health Survey
Highlighting Calories on Labels will Attract More Consumer Attention

**TOP INGREDIENTS OF CONCERN**

- Sugar/artificial sweeteners: 55
- Salt/sodium content: 53
- High fructose corn syrup: 51
- Fat content: 47
- Trans fat content: 44
- Chemical additives: 43
- Saturated fat content: 42
- Preservatives: 42
- Number of Calories: 41

67% of shoppers generally read the labels.

*Food Marketing Institute-2016 Shopping for Healthy Survey*
Nutrition Labeling Education Consortium (NLEC)

**Founding Members**

GMA

INTERNATIONAL FOOD INFORMATION COUNCIL FOUNDATION

NATIONAL RESTAURANT ASSOCIATION

FMI

Nutrition Labeling Education Consortium (NLEC)

**Members – January 2016**

AARP FOUNDATION

Academy of Nutrition and Dietetics

AAFCS

American Heart Association

Healthy Weight Commitment Foundation

Feeding America

NHMA

Society for Nutrition Education and Behavior

**Gov’t Liaisons/Additional Participants**

FDA

USDA

United States Department of Agriculture

Fruits and Vegetables for America

National Association of Chronic Disease Directors
Key Takeaways: FDA Report at NLEC

• The agency is highly supportive of the public-private partnership serving as a catalyst for unified consumer and health professional education efforts
• “Calories” has been identified as the first topic area to focus on
• Potential directions to take a calorie-focused campaign include:
  – Know your calorie needs and how to budget them
  – A practical guide to calories and serving sizes and their relationship to Daily Value
• Messaging should be consistent with Dietary Guidelines for Americans and be applicable across grocery, restaurant and vending channels

FDA Liaison to NLEC:
Robin A. McKinnon, PhD MPA
Senior Advisor for Nutrition Policy | Center for Food Safety and Applied Nutrition (CFSAN)
Office of Foods and Veterinary Medicine | FDA
Dietary Guidelines for Americans Encourage Nut Consumption
But the Recommendation Comes with a Qualification on Calories

One-half ounce of nuts or seeds counts as 1 ounce-equivalent of protein foods, and because they are high in calories, they should be eaten in small portions and used to replace other protein foods rather than being added to the diet.
Global Nutrition Profiling Coming

WHO aims to prepare a global nutrient profile model for: the marketing of food to children; school food procurement; fiscal policies; and product labelling (i.e. front-of-pack labelling).
WHO Healthy Diet Recommendations

Yes on Nuts!
Nutrition Educators and Communicating Metabolized Energy

Food & Function

Food processing and structure impact the metabolizable energy of almonds†‡

Sarah K. Gebauer,§ Janet A. Novotny,§ Gail M. Bornhorst§ and David J. Baer**

The American Journal of CLINICAL NUTRITION

Discrepancy between the Atwater factor predicted and empirically measured energy values of almonds in human diets1,2,3,4

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