

Discrepancy between the Atwater factor predicted and empirically measured energy values of almonds in human diets.

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Abstract:

Background: The energy content of foods is primarily determined by the Atwater factors, which may not be accurate for certain food groups. Nuts are a food group for which substantial evidence suggests that the Atwater factors may be poorly predictive.

Objective: A study was conducted to determine the energy value of almonds in the human diet and to compare the measured energy value with the value calculated from the Atwater factors.

Design: Eighteen healthy adults consumed a controlled diet or an almond-containing diet for 18 d. Three treatments were administered to subjects in a crossover design, and diets contained 1 of 3 almond doses: 0, 42, or 84 g/d. During the final 9 d of the treatment period, volunteers collected all urine and feces, and samples of diets, feces, and urine were analyzed for macronutrient and energy contents. The metabolizable energy content of the almonds was determined.

Results: The energy content of almonds in the human diet was found to be 4.6 +/- 0.8 kcal/g, which is equivalent to 129 kcal/28-g serving. This is significantly less than the energy density of 6.0-6.1 kcal/g as determined by the Atwater factors, which is equivalent to an energy content of 168-170 kcal/serving. The Atwater factors, when applied to almonds, resulted in a 32% overestimation of their measured energy content.

Conclusion: This study provides evidence for the inaccuracies of the Atwater factors for certain applications and provides a rigorous method for determining empirically the energy value of individual foods within the context of a mixed diet.