

Variation in energy intake of female chimpanzees: comparing estimates based on feeding time versus energy ingestion rates

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Abstract

Different food items can provide calories at different rates, yet nutritional studies of primates are generally based on the proportion of time spent eating different foods. Accordingly, estimates of energy intake are potentially wrong. To assess the importance of this problem we observed 15 female chimpanzees from the Kanyawara chimpanzee community in Kibale National Park, Uganda for 15 months. Feeding rates were recorded and nutritional analyses assembled for 90 food types. Across all foods the mean estimated rate of energy ingestion was 8.8 ± 7.6 Kcals/min. Energy ingestion rates varied among food types ($F_{8,82} = 2.24$, $p < 0.05$), being higher for ripe fruits (12.2 ± 8.7 Kcals/min) than for young leaves (7.8 ± 7.9 Kcals/min), piths (6.0 ± 5.2 Kcals/min) or seeds (2.8 ± 1.9 Kcals/min). Energy ingestion rates estimated assuming high %NDF fermentation (54.3%) were significantly higher than the rates at zero (0%) fermentation ($t = 6.14$, $p < 0.01$). At 54.3% NDF fermentation, estimated energy ingestion rate rose by 20.5% for ripe fruits (9.7 to 12.2 Kcals/min), and by 39.7% for young leaves (4.7 to 7.8 Kcals/min). Chimpanzees spent a mean of 304 ± 80 minutes feeding daily, indicating that daily energy intake averaged to 3029 ± 1198 Kcal. When chimpanzees spent $>60\%$ of feeding time on ripe fruits ($N = 79$ days), the average energy intake (3367 Kcal) was significantly higher than when they spent $>60\%$ of feeding time on herbaceous vegetation (2409 Kcal, $N = 37$ days) ($F_{1,114} = 12.68$, $p < 0.01$). Our results highlight the value of using feeding rates to understand chimpanzee nutrition, and suggest that seasonal fluctuation in nutrient intake is more pronounced than indicated by variation in feeding time.

Key words: feeding rates, feeding time, food quality, energy intake