Target for lipid to carbohydrate intake minimizes cost of growth

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Abstract

Many theoretical treatments of foraging use energy as currency, with carbohydrates and lipids considered interchangeable as energy sources. However, herbivores must often synthesize lipids from carbohydrates since they are in short supply in plants, theoretically increasing the cost of growth. We tested whether a generalist insect herbivore (Locusta migratoria) can improve their growth efficiency by consuming lipids, and whether these locusts have a preferred intake target ratio of carbohydrate (C) to lipid (L). Locusts fed pairs of isocaloric, isoprotein diets differing in C and L consistently selected a 2C:1L target. Locusts reared on isocaloric, isoprotein 3C:0L diets attained similar final body masses and lipid contents as locusts fed the 2C:1L diet but ate more and had a ~12% higher metabolic rate—indicating an energetic cost for lipogenesis. These results demonstrate that some animals can selectively regulate carbohydrate to lipid intake and that consumption of dietary lipid can improve growth efficiency.

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