

Optimal feeding strategy of the temperate herbivorous fish *Aplodactylus punctatus*: the effects of food availability on digestive and reproductive patterns

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Abstract

In this study we examined differences in feeding behavior of populations of the marine temperate herbivorous fish *Aplodactylus punctatus*, in three different localities off the Chilean coast, which differ qualitatively and quantitatively in food availability. We test whether food selection follows optimal foraging strategies, whether there is any modification of the fishes' digestive tracts in relation to their diets, and whether differences in diet quality affect the allocation of energy into reproduction and maintenance in these populations. Samples of this fish and of the understore algal assemblages were taken seasonally from May 1989 to February 1990. For each population we analyzed dietary composition, weight of the digestive tract and of the food content, the condition factor (K), and the gonadosomatic index (GSI). Our results showed that the diet observed in the three populations closely resembled the differences in macro-algal abundance and composition among the three localities studied. Local differences in diet quality were inversely related to the amount of food consumption and size of the digestive tract, suggesting that under differential conditions of food availability *A. punctatus* is able to compensate for variations in food quality through a flexibility in its digestive strategies. The nutritional status (K) of individuals, and their reproductive pattern (GSI) were directly related to diet quality. These results indicate that although *A. punctatus* is able to adjust its digestive processes to different algal food regimes, the digestive modifications observed in food-poor environments are not sufficient to compensate for the lack of food and allow fish to reach the nutritional status and reproductive output reached in a food-rich environment. This study represents the first natural experiment demonstrating a direct relationship among food availability, feeding patterns, digestive processes, and reproductive effort.

Keywords

Fish herbivory, Optimal digestion, Feeding strategy, Food availability, Reproductive effort .