WATER CONTENT OF PREY OF NESTLING BLUE TITS IN A CORSICAN HABITAT

by

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ABSTRACT

Caterpillars are important prey for tits (Parus spp.), including Corsican blue tits. It is hypothesized that the low abundance of water-rich caterpillars in combination with high temperatures, especially at the end of the breeding season, cause problems of water balance for the nestlings in the Corsican population. Tits were expected to prefer feeding their young with water-rich prey. The three most important groups of prey (caterpillars [82.8% water], grasshoppers [78.9%] and spiders [69.1%]) differ significantly in water content. The water content of grasshoppers was much higher than expected from the literature. From previous studies it was known that, apart from caterpillars (20-60% of the prey items), tits prefer feeding their nestlings with spiders (26-40%) rather than with grasshoppers (5-17%). This unexpected result is discussed within the framework of a cost-benefit analysis of prey choice, mainly with respect to prey availability.

KEY WORDS: diet, Araneae, Lepidoptera, Orthoptera, Parus.

INTRODUCTION

In birds, including tits (Parus spp.), the timing of breeding is assumed to be such that food is abundant when energy requirements of the young are maximal (LACK, 1954, 1966; PERRINS, 1970; DRENT & DAAN, 1980). In the great tit (P. major) and the blue tit (P. caeruleus) a large amount of caterpillars, a favoured food source, allows parents to raise a maximum number of high quality nestlings and therefore to maximise their fitness. In the deciduous forests of North-western Europe, where caterpillars are abundant, up to 95% of the prey biomass fed to the nestlings, are caterpillars (VAN BALEN, 1973). Both among populations and within populations among years, tits were observed to synchronise the breeding season with the period of peak caterpillar availability: the nestlings’ food demand is highest when the caterpillars are maximally abundant (PERRINS, 1965; VAN

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BALEN, 1973; ZANDT et al., 1990; BLONDEL et al., 1993). A high abundance of caterpillars was observed to be related to high nestling growth rates and high nestling weights at fledging (KELLER & VAN NOORDWIJK, 1994), resulting in high post-fledging survival and subsequent recruitment (TINBERGEN & BOERLIJST, 1990).

Yet food is not always abundant or the available food may be low in nutritional quality (e.g., MARTIN, 1987), especially in habitats where caterpillars are not abundant. In such circumstances the diet composition no longer consists of one or a few prey species, but becomes variable as the parents can no longer afford to be selective. Variable nestling diets with low proportions of caterpillars were reported from coniferous forests (VAN BALEN, 1973), from suburban gardens (COWIE & HINSLEY, 1988), from orange groves (BARBA & GIL-DELGADO, 1990) and from Mediterranean sclerophyllous forests (BLONDEL et al., 1991; BANBURA et al., 1994). In these habitats tits produced fewer fledglings per breeding attempt than tits in deciduous forests.

Blondel and co-workers studied the ecology of a blue tit population on Corsica (e.g., BLONDEL et al., 1994). The breeding biology of this population is characterised by a three-week delay in the start of egg laying and a 30% reduction in clutch size, compared to Mediterranean continental populations (BLONDEL, 1985). Caterpillars are not very abundant and occur late at this study site (BANBURA et al., 1994). The proportion of caterpillars in the nestlings' diet was low, ranging from 20% (BLONDEL et al., 1991) to 60% of the items fed, and decreasing during the season (BANBURA et al., 1994). Despite low caterpillar abundance, the Corsican blue tit breeding season is well synchronised with the caterpillar peak (ZANDT et al., 1990), and the small clutch sizes (6.3 eggs on average) are thought to be an adaptation to the food-limited conditions (BLONDEL et al., 1991).

In this Corsican population not only food abundance but also food quality seems to be important. BLONDEL et al. (1991) suggested that nestling blue tits suffer from shortage of water, because of a combination of (1) high temperatures during the nestling period, (2) a low abundance of water-rich caterpillars and (3) a low water content of spiders and grasshoppers (BLONDEL et al., 1991; BANBURA et al., 1994). However, the reported water content values were means calculated from data on arthropods at different developmental stages (from young, growing specimens to hibernating adults; EDNEY, 1977). Thus, these water contents may differ from the actual values at the Corsican study site. In this paper data are presented on the water content of three important groups of prey (caterpillars, spiders and grasshoppers) from the Corsican study site and related to the proportions of these preys in the diet of nestling blue tits.