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Nutrition and behavioural plasticity in the solitary spider Agelena labyrinthica

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The role of nutrition on the physiology, behaviour and fitness of individuals is increasingly recognized as a major factor regulating interactions within social groups. Understanding the impact of the nutritional status is of particular importance for species showing transient gregariousness. Variations in diet experienced by group members can impact their decision to initiate dispersal and, thereby, the maintenance of cohesion. Spiders are relevant models to address this issue as all species show a transient gregarious phase. The duration of this phase is a highly plastic trait under the dependence of food availability. Several studies have investigated the feeding habits of spiders (e.g. foraging behaviour) but only recently attention has been paid to their nutritional ecology (nutrients required for optimal growth, survival and reproduction). For the most part however, the influence of the nutritional state on the regulation of social behaviours and their physiological determinants has been largely overlooked. The important role of food availability on the duration of gregariousness in solitary spiderlings nevertheless suggests a major influence of nutritional status on the initiation of dispersal. In this context, our study aimed to examine the interplay between food supply, energetic stores and short range communication on the maintenance of social cohesion during the gregarious phase of the spider *Agelena labyrinthica* (Araneae, Agelenidae). In our experiments, spiderlings were reared under different diets differing in prey quantities. At different developmental stages following hatching, spiderlings were introduced in circular arenas to quantify their degrees of mutual tolerance and interattraction. After the completion of behavioral assays, we characterized the profiles of cuticular lipids and we quantified energetic stores (triglycerides and cholesterol). Our results suggest a decoupling between the nutritional status and the maintenance of tolerant social interactions in spiderlings. This study provides valuable insight for understanding the proximal causes of social transitions in spiders.