Effects of immune challenge and supernormal clutch production on egg quality in the red-legged partridge

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ABSTRACT

Background: Because maintenance of the immune system is thought to be resource-limited, trade-offs between immune function, body condition, and reproductive allocation are expected.

Questions: Do females confronted with the simultaneous challenges of immune stimulation and supernormal egg production face a trade-off in terms of self-maintenance (body mass and blood parameters) and/or egg quality?

Organism: Red-legged partridge, Alectoris rufa, a precocial bird species with a huge investment in eggs.

Methods: We challenged the immune systems of females, before egg laying, with a novel antigen (Newcastle Disease virus vaccine, NDV). We also removed eggs as they were laid, so as to induce supernormal egg production.

Conclusion: Compared with the other eggs, the last-laid eggs of hens with supernormal production were smaller, contained less yolk, had a lighter shell, and contained albumen with less lysozyme. However, the immune challenge had no effect on female condition or egg quality. Thus we found no evidence of a trade-off between immune function, body condition, and reproductive allocation.

Keywords: Alectoris rufa, egg quality, laying order, maternal investment, NDV vaccine challenge, supernormal clutch.

INTRODUCTION

Life-history theory provides a theoretical evolutionary framework in which to analyse how organisms allocate their resources in relation to different priorities for survival and reproduction (Stearns, 1992). All animals have evolved optimal allocation strategies to counteract the aggression of parasites, organisms able to reduce the fitness of their hosts (Price, 1980). Adaptive defence against parasites is mainly down to the immune apparatus ( Boughton et al., 2011), a complex and heterogeneous system whose maintenance can be
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