

The timing of gonadal development and moult in three raptors with different breeding seasons: effects of gender, age and body condition

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Differences between species in breeding seasons are thought to be mediated through differences in their reproductive physiology. Little is known about how the timing and duration of gonadal maturation varies between raptor species, how the timing of moult relates to the gonadal cycle, whether the timing and degree of sexual maturation varies between juveniles and adults or whether body condition has a significant effect. To address these questions, data on gonadal size and moult for adults and juveniles of both sexes of three raptor species were extracted from the Predatory Bird Monitoring Scheme (based on birds found dead by members of the public). The three species, Sparrowhawk *Accipiter nisus*, Kestrel *Falco tinnunculus* and Barn Owl *Tyto alba*, have different ecologies – diurnal bird predator, diurnal mammal predator and nocturnal mammal predator, respectively. All are single-brooded but have different breeding seasons. The duration of gonadal maturation was markedly different between the species. Barn Owls showed the earliest maturation and the latest gonad regression, and Sparrowhawks the latest maturation and earliest gonad regression. Kestrels were intermediate. In males of all species, the testes remained fully mature throughout their respective breeding seasons. In females, the ovaries remained partially mature throughout the breeding season. Moult started slightly earlier in Sparrowhawks than in Kestrels and coincided with gonadal regression in the two species. Although females of the two species started to moult earlier than males, moult duration was similar between the sexes. Barn Owls showed no distinct annual pattern of moult. In juveniles of all three species, the gonads were smaller than in adults throughout spring and started to mature later. Gonad size in birds that had starved tended to be smaller than in birds dying from other causes, but did not influence the difference in gonad mass between adults and juveniles and between seasons. Body condition had no effect on moult. Whilst ecology has led to the evolution of different breeding seasons, differences between species, and between adults and juveniles, are mediated through adaptive differences in their reproductive physiology.

Keywords: breeding seasons, ovary, starvation, testis.

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