

INSIDE JEB

Lifestyle difference gives female yellow-billed hornbills the edge



Being waited on hand and foot is my idea of heaven and this is exactly what happens when female yellow-billed hornbills (*Tockus leucomelas*) seal themselves in crevices in trees in the Kalahari Desert until their clutches of eggs hatch and their youngsters become more independent. During her incarceration, the female takes the opportunity to ditch her tail and flight feathers, while her mate scurries around providing food. ‘The very different environments males and females experience during the breeding attempt raised the intriguing possibility that their abilities to cope with hot conditions have evolved differently’, says Andrew McKechnie from the University of Pretoria, South Africa. The females often experience uncomfortably high temperatures and possibly dehydration when sealed within their stifling chambers. The males, by contrast, are free to roam even on the hottest days. Wondering how both sexes cope with their dramatically different situations, Barry van Jaarsveld and Andrew

McKechnie from the University of Pretoria, South Africa, decided to find out how much the physiology of male and female yellow-billed hornbills differs as the temperature climbs.

‘We travelled to a remote region of South Africa, the arid savanna of the southern Kalahari Desert’, says Barry van Jaarsveld, who trapped 19 birds, males and females, during October in spring 2018. ‘First, we carefully observed the hornbills to make sure we didn’t catch individuals involved in a breeding attempt’, van Jaarsveld adds. Then the team measured the amount of CO₂ produced and water lost by the birds as the researchers gradually increased the temperature from 30 to 52°C, the highest temperature the birds encounter under the direct heat of the sun.

Comparing how the males and females fared, the team found that both coped well at temperatures up to ~40°C. But as the temperature began to rocket, the females

seemed to deal better with the sizzling conditions than the males. The females used 17% less water than the males and 13% less energy as they panted to keep cool. It seems that the females are better prepared for the muggy conditions inside their nests than the males that are never imprisoned. The team suspects that the females are somehow more efficient at regulating their temperature by evaporating water from their bodies or using their impressive beaks as radiators. Either way, female yellow-billed hornbills will get the opportunity to show off their superior thermal tolerance again next austral spring, when they wall themselves back inside more crevices and wait out the heat.

10.1242/jeb.242286

van Jaarsveld, B., Bennett, N. C., Czenze, Z. J., Kemp, R., van de Ven, T. M. F. N., Cunningham, S. J. and McKechnie, A. E. (2021). How hornbills handle heat: sex-specific thermoregulation in the southern yellow-billed hornbill. *J. Exp. Biol.* **224**, jeb232777. doi:10.1242/jeb.232777

Kathryn Knight
kathryn.knight@biologists.com