

# Which endocrine factors influence reproductive decisions in the multiennially breeding viviparous lizard, *Tiliqua nigrolutea*?

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## The decision

An animal's energy intake must be partitioned between the requirements for growth and maintenance and the requirements of reproduction. For females in particular, a successful reproductive episode may result in an energy debt such that those animals are not able to reproduce again until energy stores are restored.

## Timing

Male blue-tongued lizards (*Tiliqua nigrolutea*) do become reproductively active every year; however females reproduce only at intervals of two, three, or even four years (Edwards et al 2002). Vitellogenesis occurs rapidly after spring emergence: thus reproduction depends on resources accumulated before hibernation.

This implies that in females there is some physiological mechanism that signals to the reproductive system when sufficient fat reserves are available to fuel reproduction.

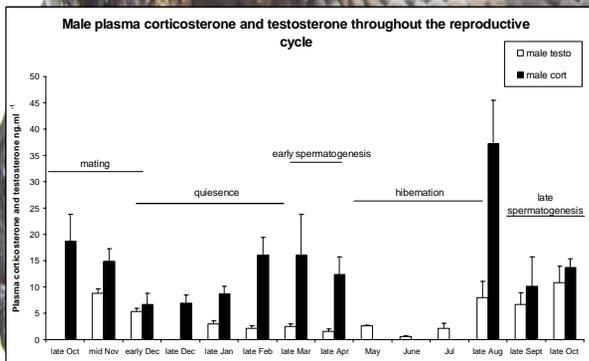
## The factor

The adrenal steroid corticosterone is a major metabolic hormone in reptiles, and appears to be important for regulating lipid cycling. **In this study we compared the annual cycle of plasma corticosterone in male and female blue-tongued lizards.**

## The results

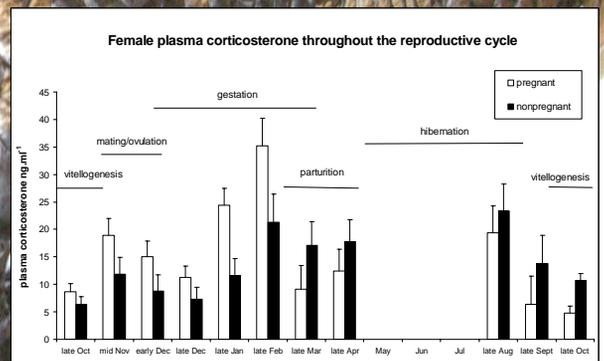
**In pregnant females corticosterone:**

- peaks during late gestation;
- falls sharply around the time of birth; and
- differs from non-pregnant females in this pattern.



**In males, plasma corticosterone is:**

- highest immediately prior to emergence from hibernation;
- elevated during the spring mating period; and
- lowest during summer quiescence.
- The relationship with plasma testosterone is an inverse one (Edwards and Jones 2001).



**Both reproductive and non-reproductive females** showed a peak on plasma corticosterone concentrations during late hibernation, but this was not as marked as that seen in males.

**Plasma corticosterone** concentrations in males ( $P = 0.000$ ), pregnant ( $P = 0.000$ ) and nonreproductive ( $P = 0.016$ ) females all differ significantly throughout the reproductive cycle.

## The conclusion

Higher levels of plasma corticosterone correspond to periods of peak energy demand during the reproductive cycle: mating in males and gestation in reproductive females. However in both sexes plasma corticosterone is also significantly elevated immediately prior to emergence and is moderately high during late summer/autumn in males, but in non-reproductive females only, as the animals prepare for hibernation.

We suggest that these patterns primarily reflect the role of corticosterone in the regulation of metabolic reserves, and that the differences observed between reproductive and non-reproductive females reflect the overlaying of a non-annual reproductive cycle onto an annual cycle of activity. We are exploring the potential role of leptin in mediating between the reproductive and metabolic systems in female blue-tongued lizards.

References  
Edwards, A. and Jones S.M. (2001). Changes in plasma testosterone, estrogen and progesterone concentrations throughout the annual reproductive cycle in male viviparous blue-tongued lizards, *Tiliqua nigrolutea*. *General and Comparative Endocrinology*, 123: 282-289.  
Edwards, A., Jones, S. M. and Pugh, E. (2002). Maternal reproduction in females of a viviparous, temperate-zone skink, *Tiliqua nigrolutea*. *Herpetologica*, 58: 407-414.