

Correlates of diet and reproduction in the black-backed jackal

The black-backed jackal (*Canis mesomelas*) is a medium-sized carnivore (about 7 kg) that occurs throughout southern Africa, with a separate population in East Africa.¹ It is an opportunistic omnivore that feeds on a variety of small mammals, insects and plant material, and regularly scavenges from the carcasses of domestic and wild ungulates.²⁻⁶ Reproduction is seasonal and first births occur during winter⁷⁻⁹ and not, as one might expect, during the warm wet season when other canids such as the bat-eared fox, Cape fox and side-striped jackal give birth.^{3,4,7-12} If one accepts that seasonal reproduction in mammals is timed so that births occur at a time of food abundance,¹³ then an explanation for the differences in the timing of parturition in the canids may be found in their diet. Here we present original data on the timing of reproduction of the black-backed jackal from the Cape Province and propose that winter births are timed to coincide with peak abundance of ungulate carcasses in the veld.

The assessment of reproductive condition of the black-backed jackal is based on a histological examination of reproductive material from specimens that had been caught in the Cape Province of South Africa and on observations of pregnant and lactating females, and cubs (Fig. 1) that were made as part of a previous study.⁴

Spermatogenesis, as indicated by division of spermatogonia and the presence of primary spermatocytes in the seminiferous epithelium, began in May, at which time there was a significant increase in testicular mass and diameter of the seminiferous tubules (Fig. 1; $P < 0.05$). Spermiogenesis, as indicated by the presence of developing spermatids in the seminiferous epithelium, began in late May and spermatozoa were present in the cauda epididymes from June to September. After September, the seminiferous epithelium regressed and the testes were spermatogenically inactive until the following April (Fig. 1).

Follicular development began in March and by April both ovaries contained more than 10 Graafian follicles (Fig. 1). Two specimens from May were in oestrus (the vaginal epithelium had a superficial cornified layer and the ovaries contained many large Graafian follicles). Corpora lutea were first noted in the ovaries of June specimens, and were present until October. From June to October, reproduction was asynchronous: some females were pregnant while others were in oestrus

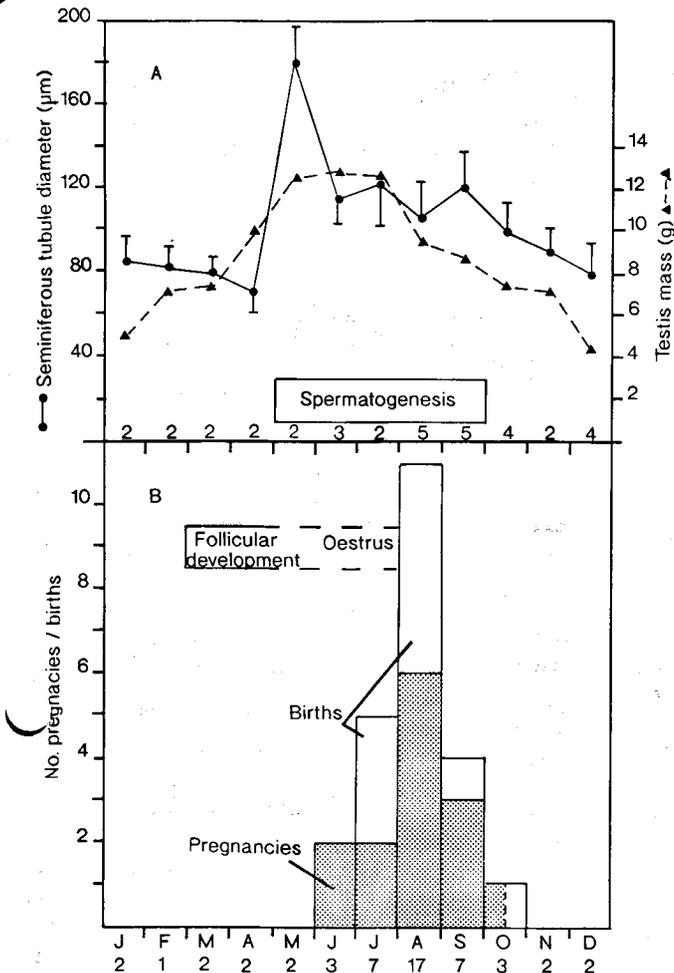


Fig. 1. Summary of the reproductive activity of male (A) and female (B) black-backed jackals from the Cape Province. Monthly sample sizes are given on the x-axis. In A, seminiferous tubule diameter is the mean \pm 1 standard deviation of 20 tubules per testis; testis mass is the mean wet weight of a single testis. In B, the number of pregnant animals per month is a combination of field and histological observations; the number of births per month clearly shows the peak in August. Bars representing births and pregnancies are independent and not cumulative.

or lactating. In November and December, the ovaries of all specimens contained corpora atretica, and the lumen of the uterus contained macrophages, indicating that the period of reproductive activity had ended. None of the ovaries that contained corpora atretica (indicating a previous pregnancy) contained large Graafian follicles, and none of the lactating females were pregnant; it is therefore unlikely that the black-backed jackal experiences a post-partum oestrus.

Taking into account the 60-day gestation of the black-backed jackal,¹⁰ the histological data complement the field observations of pregnant females in August and September (Fig. 1), and of lactating specimens from August to October. A comparison of body parameters of wild killed cubs with cubs of known age in captivity, and the use of growth curves,^{14,15} indicated that backdated births occurred from July to October, with a peak in August (Fig. 1).

In summary, reproduction in the black-backed jackal from the Cape Province is seasonal, with copulation from late May to August and parturition, after a 60-day gestation, from July to October. Males are reproductively inactive from September to April, and females from December to March. This pattern of reproduction is similar to that previously described for black-backed jackals,^{4,7} although first births occur in June in the Drakensberg of Natal.⁹ The occurrence of births in black-

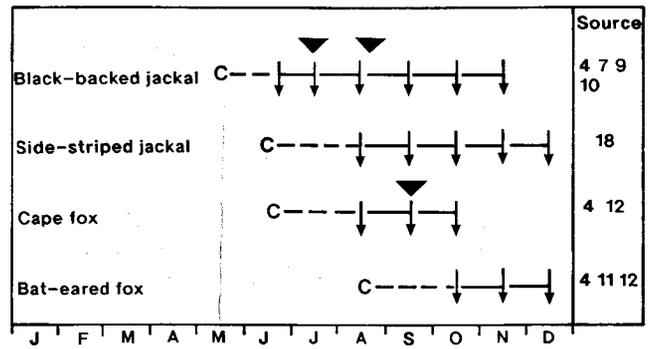


Fig. 2. Timing of reproduction in South African canids. C = first copulation, arrows = births, inverted triangles = peak period of births. Note that first copulations and first births in the black-backed jackal occur earlier than in the other small canids. Sources from which these data were synthesized are given in the reference list.

backed jackals during winter is in stark contrast with the other small canids, for which births occur throughout the summer wet season (Fig. 2).

Information regarding the diet of the small African canids is limited but several trends are apparent. All species are opportunistic omnivores and the degree of opportunism varies. The bat-eared fox, the least opportunistic, specializes in ants and termites during summer,^{4,12,16} and births are relatively synchronized between October and December^{4,11,12} (Fig. 2). The Cape fox^{4,17} and side-striped jackal¹⁸ are more reliant on small vertebrates and give birth over a longer period than the bat-eared fox, with the first births at the onset of the warm, wet season (Fig. 2).^{4,12,18} The black-backed jackal is slightly smaller than the side-striped jackal but is more predacious,¹⁰ and has been widely reported to scavenge from ungulate carcasses.²⁻⁶ Significantly, the carnassial teeth, which are characteristic of flesh-eating mammals and would facilitate scavenging, are larger in the black-backed jackal,¹ and the skull is altogether more robust than that of the side-striped jackal (personal observation).

In the Natal Drakensberg ungulate carcasses are most abundant at the end of the winter dry season and the relative abundance of such remains in jackal scats increases by an order of magnitude at this time.² Limited data for the Andries Vosloo Kudu Reserve (Cape Province) indicate a similar increase in ungulate mortality during winter. We therefore suggest that winter births in the black-backed jackal are timed to coincide with this abundant food resource, whereas births during summer coincide with the reproductive season^{18,19} of important prey species such as *Rhodomys pumilio* and *Otomys irroratus*.²⁻⁶

It is clear that female black-backed jackals come in to oestrus at different times during the year (May–August) and it is likely that the timing of oestrus in any one female may be controlled by factors such as age, body condition and local environmental conditions.¹³

It is well known that social behaviour can modify the timing of reproduction¹³ and the black-backed jackal is the only small canid in which offspring may assist in the feeding of subsequent litters.^{20,21} It is possible that such helpers enable the black-backed jackal to utilize a food resource such as ungulate carcasses and thus to time early parturition to coincide with the peak in carcass abundance at the end of winter.

In conclusion, we suggest that the large carnassial teeth of the black-backed jackal, and possibly the presence of helpers, facilitate the use of a food resource (ungulate carcasses) that is abundant in winter but unavailable to the other small African canids, and consequently allow first births to occur in winter.

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