

**APPENDIX C: ECOLOGY, LIFE CYCLE AND DEVELOPMENT OF MODERN FAUNA FROM
NORTHERN LIMPOPO PROVINCE AND NORTHEASTERN BOTSWANA**

C.1 **Wild Fauna**

Ecological and life cycle information for the present-day wild faunal species analysed in this thesis are from Harris (1840 reprinted 1986); Delany and Happold (1979); Ruatenbach (1982); Smithers (1986); Skinner and Smithers (1990); Smithers (1992); Estes (1993); Haltenorth and Diller (1996) and Kingdon (1997), and pertain to criteria for southern Africa herbivores, in particular northern South Africa and northeastern Botswana. Studies by Gagnon and Chew (2000) and Sponheimer *et al.* (2003a) provide a reference for the expected percentage of graze versus browse in diet of southern African herbivores. Gagnon and Chew (2000) derived their $\%C_3/C_4$ intake through an extensive review of documented diets of African bovids. Sponheimer *et al.* (2003a) obtained $\%C_3/C_4$ intake based on $\delta^{13}C$ values from bovids collected from southern African countries of Botswana, Malawi, Namibia, South Africa and Zimbabwe.

Connochaetes taurinus

Ecology: Preference for open woodlands or plains in areas of short grasslands such as floodplains and those regenerated after burning. Seldom graze on grasses more than 15-20cm high (McNaughton 1976; Skinner and Smithers 1990). In the wet season feeds off of short grasses in open plains or lightly wooded areas. In the dry season moves to acacia bush or more well watered areas such as riverbeds. Migration between wet and dry season location may be several 100kms. Described as an exclusive grazer. Reported $\%C_3/C_4$ intake is ~10/90 (Gagnon and Chew 2000), and is supported by stable isotope values (Sponheimer *et al.* 2003a). Needs to drink at least every 1 to 3 days. Active during early morning and late afternoon, resting midday under shade. Territory is within ~15 to 25km of water sources, but herds may range several 100kms. Joost-Vandewalle (2000:15) found that in the southern Kalahari there were two distinct populations. A small sedentary group occupied riverbeds where water supply was permanent, and a highly migratory population that appears to be independent of a water source and relies on water storing plants.

Life Cycle: Gestation is usually 8 to 8.5 months, with calving taking place between November and December. Nearly 90% of all births occur within the first 3 weeks falling the start of the first rains. Breeding takes place at near the end of the rainy season, when animals are well fed and strong. If rains are abnormally low, breeding may be postponed until the start of rains the following year, resulting in fall births. Calves begin to eat grass ~10 to 12 days, weaned at 4 months. Females mature between 1.5 to 2.5 years, and males between 3 to 4 years.

Equus quagga (burchelli)

Ecology: Normally found in association with *C. taurinus*, in similar habitats and following a similar migration. However, less selective on grass height, but tends to prefer stands that are 10-15cm above ground level (Smuts 1972). Higher grasses are depleted first, and *Equus quagga* usually leaves an area before *C. taurinus* (Joost-Vandewalle 2000:45). Described as being almost exclusively a grazer, but limited browse has been noted. Nearby permanent water source is essential, as it has to drink at least 1 to 3 days. Most active during the day, and spends nights on open short grasslands. Not territorial and herds may range ~20km daily.

Life Cycle: Gestation is usually 12 to 13 months, with 85% of all breeding and foaling occur during the rainy season between October and March. Rainfall and grass growth effect the initiation of mating activities, and periods when either or both are diminished may delay breeding. Foals begin to eat grass within a couple of days, weaned at 6 months. Females and males mature between 3 to 3.5 years.

Oryx gazella

Ecology: Adapted to open, and often waterless, grasslands, woodlands and acacia bush. Described as a grazer or mixed-feeder. In absence of grass, will supplement with browse, herbs, melons, roots, bulbs and tubers. Reported %C₃/C₄ intake is ~25/75 (Gagnon and Chew 2000), and is supported by stable isotope values (Sponheimer *et al.* 2003a). Drinks regularly when water is available, but can survive on water storing vegetation. Active in early morning and late

afternoon, and in moonlight. Adapted to endure high temperatures by being able to cool blood to the brain, as well as raising body temperature to $\sim 45^{\circ}\text{C}$ and conserving water. Depending on water availability herd range may extend from a couple of kilometers to several hundred.

Life Cycle: Gestation is 8.5-10 months. Calving is not seasonal, but generally occurs between July and December. When young start to eat is not stated, weaned at 3 to 4 months. Females mature at 2 years, and males at 5 years.

Alcelaphus buselaphus

Ecology: Found in open grasslands of wooded areas, floodplains and arid acacia bush, but avoid thick woodlands. Described by most as an exclusive grazer, feeding specially on medium height grasses. Reported $\%C_3/C_4$ intake is 25/75 (Gangon and Chew 2000), suggesting that they are variable grazers. Stable isotope values reflect more dominant grazing intake of 90% C_4 grasses. Can go several days or months without drinking, relying on water storing vegetation. Active in morning and evening, resting in shade midday. Herds are usually sedentary, usually able to find suitable grasses within the limited territory, except in the Kalahari where they will migrate, similar to *C. taurinus*, to find green pastures.

Life Cycle: Gestation is 8 month. There is a distinctive calving peak in October and November, just prior to the start of the main rains, but they calve year round. When young started to eat is not stated, weaned at 4 months. Female and male mature at ~ 2.5 years.

Giraffe camelopardalis

Ecology: Preference for acacia woodlands, and do not appear to feed on pure *C. mopane* grassland. Described as a exclusive browser. Feeds on terminal growth shoots and leaves of trees and shrubs, preferring board-leaf deciduous foliage in the wet season and evergreen species at other times. Have been known to feed on domestic crops such as maize. Active and feeds mainly during the early to middle morning, and middle to late afternoon. Drinks once a

week when leaves are green, otherwise they need water every 2 to 3 days. Territory may be up to ~80km, but herds may range during the year from 5km to over 500km.

Life Cycle: Gestation is from 13 to 15 months, with no distinct breeding or birthing season. In Mpumalanga Province, South Africa, 60% of births occur between December and March (Haltenorth and Diller 1996). When young start to eat foliage is not stated, weaned between 6 to 12 months. Individuals continue to grow for 10 years, but females mature at 2.5 to 3 years and males at 3 to 3.5 years.

Tragelaphus strepsiceros

Ecology: Marked preference for dense acacia bush, but will inhabit light to thickly wooded hills and plains. Described as being predominately a browser, largely consuming acacia leave, pod-bearing legumes, herbs, fruits, tubers and succulents. Some grasses are eaten, mainly fresh grass shoots, and the reported %C₃/C₄ intake is 15/85 (Gangon and Chew 2000). Stable isotope values indicate a slightly less C₄ intake of 7% (Sponheimer *et al.* 2003a). Water does not appear to be vital, and is able to obtain what is necessary from available water or from water containing vegetation. Active before and after the midday heat, rest in dense bush the remaining time. Herds occupy a territory of ~400ha, dispersing during the wet season and coming together in the dry season where cover, food and water is still present, mainly along river courses.

Life Cycle: Gestation is ~7 months. Calving has been recorded at various times in the year, but the peak season is between February and March. Calves begin to eat foliage with the first months, weaned at 6 months. Females mature at ~1.5 years and males at ~1.5 to 2 years.

Sylvicapra grimmia

Ecology: Found predominantly in woodlands, as it requires protective cover. Described as being an exclusive browser, feeding on tender leaves, shoots, fruits, tubers and bulbs. Reported %C₃/C₄ intake suggests that as much as 12% C₄ grasses are consumed (Gagon and Chew

2000), reflecting local environmental variability. Stable isotope values indicate only a 2% intake of C₄ grasses, however, two individuals from xeric environments had values reflecting a 10% intake (Sponheimer *et al.* 2003a). Not dependent on surface water, but will drink when available. Obtain water from food sources. Under the protection of dense foliage they are active in the morning and evening or in moonlight, rest during midday heat. Herds are sedentary with a limited range. Actual range has not been determined.

Life Cycle: Gestation is 7 to 7.5 months. Main calving season is middle of summer, November to March, but frequently occur in other seasons as well. Feed on foliage after a few days, when young are weaned is not stated. Females mature at 8 to 10 months and males at 12 months.

Aepyceros melampus

Ecology: Found mainly in open woodlands with short to medium grasses. Described as being a mixed-feeder, grazes on grasses in the wet season and browses on foliage, herbs, roots and seedpods when grasses are dry or diminished during the dry season. References differ as to whether graze or browse is preferred. Reported %C₃/C₄ intake is 55/45 (Gagnon and Chew 2000), with stable isotope values indicating an equal intake of graze and browse (Sponheimer *et al.* 2003a). Normally drinks daily, but demands can often be met from dew on grasses and leaves. Active more during the day than night, feeding in the morning and resting at midday. Herds are sedentary with a limited range of ~2.5 to 6km, but during the dry season may wander up to ~20km.

Life Cycle: Gestation is 6.5 to 7. Birth period is at the start of the rainy season between October and December, with the peak in November. When young start to eat grass or foliage is not stated, weaned between 4 to 6 months. Female and males mature at ~12 months.

C.2 Domestic Fauna

The following section outlines the general characteristics and parameters for breeds of *Bos taurus*, *Ovis aries* and *Capra hircus* that are, or historically would have been, in the SLRB and greater region. Unless otherwise stated, the information presented below is from the Campher *et al.* (1998), with contributions from the following websites:

- <http://www.ansi.okstate.edu/breeds>
- <http://arc.agric.za>
- <http://www.embryoplus.com>
- <http://www.studbook.co.za/society>

Bos taurus

Ecology: From the north African Sanga breed, four breeds have evolved that are, or have been, prominent in the greater region. These consist of the Nguni, Tswana, Africander and Bonsmara. Of these the Nguni (also known as Zulu, Swazi and Pedi breeds), is considered to be the least altered from the original Sanga. The other three have similar characteristics to that of the Nguni, but are larger and have been improved for higher beef production. The majority of the modern cattle analyzed in this study are Bonsmara. They are the most popular breed in the Limpopo Province and several individuals were obtained from the Mara Agricultural Research Centre where the breed was developed.

Varieties of Nguni cattle are still herded by most traditional agropastoralists in the region. This breed has numerous attributes that makes it sustainable and highly productive in environments that may be otherwise considered marginal for cattle rearing:

- thick skin makes it tolerant to intense solar radiation and resistant to ticks
- apparently immune to many parasite and tick borne diseases
- small and sturdy stature
- able to traverse steep slopes and dense bush
- good for manual labour

- good walking abilities for long distant herding
- good grazers and browsers, but requires less than larger breeds, however browse does not exceed graze in take
- fattens well on natural graze
- good milk producers
- exceptional fertility even in harsh conditions ease of calving good mothering abilities
- able to maintain lower body temperature than exotic breeds.

Life Cycle: Females mature late and give birth to their first calf at ~ 4 year, but can continue to produce calves until ~15 years. Male mature at ~3 years. Breeding can take place throughout the year, but preference seems to be given to the middle to end of the wet season. At this time grasses are still available and cows are strong. After a gestation period of 9 to 10 months, the main calving period takes place at the end of the dry season/beginning of wet season. This allows the calf to feed off on new graze and gain strength prior to the build up of pests and diseases that come with the height of the wet season, and are strong enough to survive the following dry season when graze is lacking. People interviewed in the northeastern Botswana indicated that most of cows calved in October or November. In Venda, where rainfall is higher at the start of the wet season, the calving peak is from June to August and a smaller peak from December to February (Mansvelt and Skinner 1962).

Ovis aries and Capra hircus

Ecology: Several different breeds of *Ovis aries* and *Capra hircus* have been developed in South Africa from what are considered indigenous stocks. Of the *O. aries* breeds, characteristics found in the Pedi, which is herded around the Soutpansberg, and the Damara, found mainly in southwestern Africa and has had the least amount of interbreeding, are probably most similar to those of the breed in the SLRB archaeological sequence. Most indigenous breeds contain large pockets of fat in their tails. The most abundant breed of *C. hircus* is the Africander goat, which originates from indigenous stock mixed with imported goats. Other indigenous breeds of southern

Africa e.g. Loskop, Speckled, Delftzijs and Damara, are less interbred, but they are few in numbers. All these breeds of *O. aries* and *C. hircus* have similar characteristics that make them suited to the SRLB environment:

- survives well under extreme temperatures, both heat and cold, and limited water
- effectively repels disease carrying insects and ticks
- good foragers and thrives on a mixed diet of graze and browse; in some instances over 50% of the diet is browse
- able to exist on poor quality foilage
- able to traverse long distances and varied terrain, e.g. bush/scrub, rocky, grasslands
- good meat and milk producing capabilities
- good reproduction and high survival rate under harsh conditions
- good mothering abilities and herd protection instincts.

Life Cycle: Both species mature early and begin to reproduce within 1 to 1.5 year. There is no specific season in which lambing or kidding takes place, but in most instances, the birthing periods coincide with sufficient vegetation growth. In interviews with agropastoralists in northeastern Botswana and Venda, lambing and kidding can take place twice a year, approximately May or December. As discussed previously, there are advantages and disadvantages for each birthing period. *O. aries* has a lambing interval of 7 to 9 months, while *C. hircus* is able to have three births every 2 years.