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Note and record

Seasonal consumption of browse by the African buffalo (*Syncerus caffer*) in the Thicket Biome of South Africa

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Introduction

The African buffalo (*Syncerus caffer* Sparrman) is both morphologically and physiologically adapted for grazing (Prins, 1996). However, buffalo populations of the Eastern Cape, South Africa, are confined to reserves dominated by thicket vegetation where grass is sparse (Landman & Kerley, 2001; Tshabalala, Dube & Lent, 2009). Given that the nutritional value of grass deteriorates more rapidly than browse in nonproductive periods (Shipley, 1993), it has been hypothesized that buffalo increase their intake of browse during the dry season (Tshabalala, Dube & Lent, 2009). However, past studies contradict one another (de Graaf, Schulz & van der Walt, 1973; Landman & Kerley, 2001; Tshabalala, Dube & Lent, 2009). de Graaf, Schulz & van der Walt (1973) analysed the rumen contents of buffalo in the Addo Elephant National Park and suggested that buffalo should be considered browsers because of the high proportion of browse in rumen samples. However, their study was restricted to one site during a drought. Landman & Kerley (2001) later found the opposite (grass comprised ~72% of buffalo dung) and criticized the findings of de Graaf, Schulz & van der Walt (1973). However, their study was conducted after a period of exceptionally high rainfall. More recently, Tshabalala, Dube & Lent (2009) recorded significantly more browse in the diet of buffalo during the dry season (33%) than the wet season (28%) at the Great Fish River Nature Reserve.

We test the assertion that buffalo increase their intake of browse during dry periods, at another site dominated by thicket. We describe the extent to which grass and browse were consumed by buffalo and whether the proportional occurrence changed monthly.

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Materials and methods

Kwandwe Private Game Reserve (Kwandwe) (~20,000 ha; 33° 15′ S, 26° 25′ E) is ~35 km north of Grahamstown, Eastern Cape, South Africa (Parker & Bernard, 2005). Kwandwe is dominated by Great Fish Thicket vegetation (Hoare *et al.*, 2006) which consists mainly of woody trees, spinescent shrubs and succulents (Hoare *et al.*, 2006), and where dominant grasses such as *Themeda triandra* (Forssk.) and *Panicum* (Jacq.) spp. are less prevalent (Hoare *et al.*, 2006). The climate is semi-arid (mean annual rainfall ~400 mm) and rainfall bimodal, with peaks in August–October and February–April (Parker & Bernard, 2005; Hoare *et al.*, 2006). Annual rainfall in the study year was 371 mm, and the buffalo population was ~100 individuals.

Fresh faecal samples (n = 15/month) were collected opportunistically between October 2011 and September 2012 (n_{total} = 180) from a mixed herd of ~70 buffalo and any solitary individuals. Fifty grams of dung was collected from individual pats (Scotcher, 1979). Samples were oven dried at 60–65°C for 5–6 days and ground into a homogenous powder before microhistological faecal analysis (Scotcher, 1979; MacLeod, Kerley & Gaylard, 1996; Parker & Bernard, 2005). The frequency of occurrence (see MacLeod, Kerley & Gaylard, 1996) of monocotyledonous (monocot) and dicotyledonous (dicot) vegetation was recorded based on the arrangement of the epidermal cells (Scotcher, 1979).

We determined the minimum faecal dry weight required for an accurate reflection of monocot and dicot proportions. Three random samples were selected, and six weight classes established (0.5, 1, 1.5, 2, 2.5 and 3 g) and analysed using the aforementioned procedure. The proportion of monocot and dicot fragments was not significantly affected by the dry mass of the samples (Friedman's ANOVA; $\chi^2_{(18,\ 4)} = 6.43$; $P = 0.17$).

Results and discussion

The dung of buffalo at Kwandwe was dominated (93.06 ± 3.61%) by grass but also had some (6.94 ± 3.91%) browse in all months (Fig. 1). Significant peaks in the proportion of dicot fragments were evident in October, March and June (One-way ANOVA, $F_{(11, 168)} = 23.83$, $P < 0.0001$; Fig. 1). The highest proportion of dicot fragments was recorded in October (14.83%). Rainfall during the study period (October 2011–September 2012) was broadly similar to the 8-year (2003–2010) monthly mean (Fig. 2). However, unlike previous years, there was an uncharacteristic peak in rainfall during June/July (Fig. 2) and no rain fell in September 2011.

Buffalo at Kwandwe consumed a relatively low proportion (~7%) of browse throughout the year, but included more browse in some months. This supports previous work in the Eastern Cape and elsewhere in Africa (Stark, 1986; Owen-Smith, 1997; Landman & Kerley, 2001; Venter & Watson, 2008; Tshabalala, Dube & Lent, 2009). The inclusion of significantly more browse in October and March is likely related to the distinct, bimodal pattern of rainfall in the Eastern Cape which corresponds to periods of active plant growth (Pierce & Cowling, 1984; T. Dold pers. comm.). In addition, the unusual rainfall peak in June/July may have caused several thicket tree species to produce an uncharacteristic flush of palatable shoots (Katjiua & Ward, 2006).

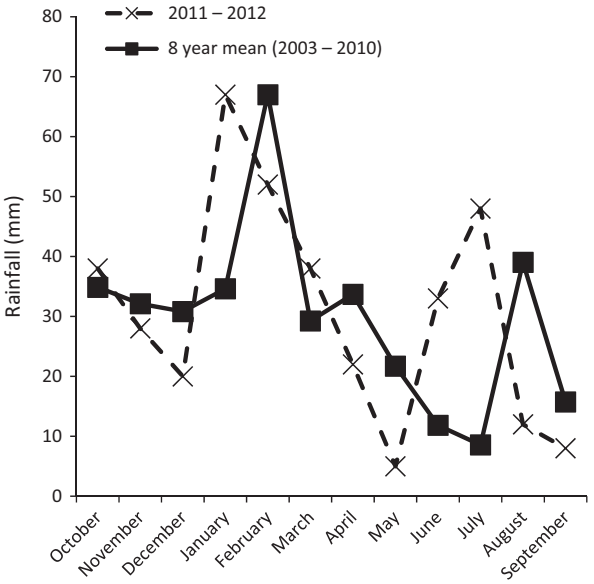

Fig 2 The monthly rainfall during the study period (dashed line) and the mean monthly rainfall for the 8 years preceding the study (2003–2010) at Kwandwe Private Game Reserve, Eastern Cape Province, South Africa

Our work, however, is different to research conducted elsewhere in South Africa where buffalo did not browse at all during drier periods (Perrin & Brereton-Stiles, 1999).

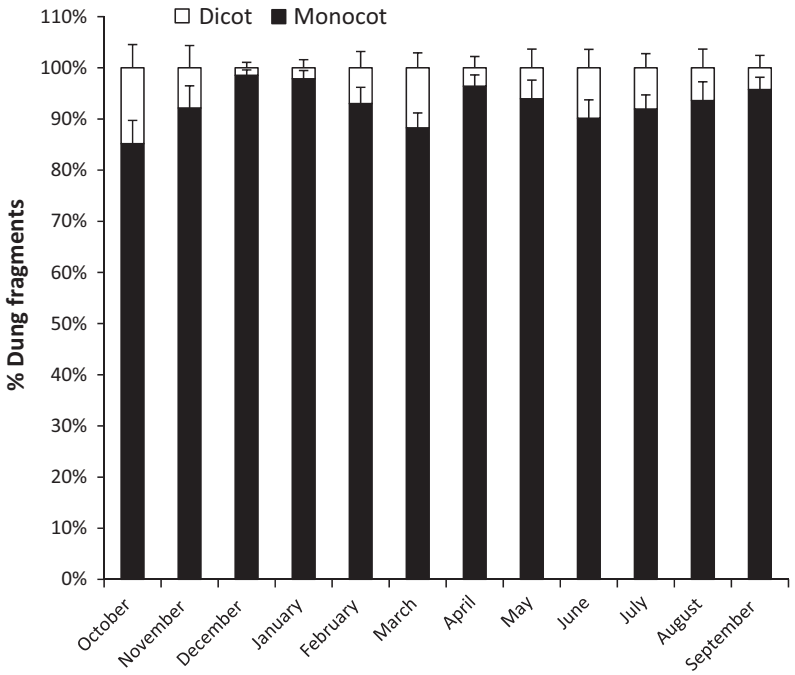

Fig 1 The proportion of monocotyledonous (monocot) and dicotyledonous (dicot) fragments in the dung of buffalo at Kwandwe Private Game Reserve, Eastern Cape Province, South Africa. Values are means + SD

The average monthly rainfall during that study exceeded the average of past dry seasons, indicating that the available graze probably retained a sufficient level of nutrients to sustain the animals (Perrin & Brereton-Stiles, 1999).

Buffalo in the Eastern Cape increase the percentage of browse in their diets at various times of the year. This could be to sustain themselves during temporarily unfavourable conditions (Tshabalala, Dube & Lent, 2009), or it could be a consequence of incidental browsing after a vegetation growth flush. However, excessive browse consumption could result in severe nutritional stress and mortality (de Graaf, Schulz & van der Walt, 1973; Venter & Watson, 2008; Tshabalala, Dube & Lent, 2009). The Eastern Cape buffalo are considered disease free (Smith & Parker, 2010), and any loss of such commercially valuable animals is undesirable (Venter & Watson, 2008). We therefore recommend that the diet (including the identification of the browse species consumed) and nutritional status of buffalo in the Eastern Cape be monitored regularly, especially during periods of low rainfall.

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