

Microhistological analysis of cows' diet during a severe drought in the semi arid region of North Patagonia (Argentina)

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Introduction

The continuous use of the livestock fields of the Middle Valley of Río Negro, North Patagonia, Argentina, combined with adverse weather conditions that occur periodically, have contributed to the degradation of rangelands. The historical annual average rainfall regime in the Valle Medio of Río Negro is 303 mm but between 2002 and 2011, the average deficit was 33%. According to the Rural Society of Choele Choel, due to the decreased forage on offer, the existence of cattle in 2011 dropped to 85,000 animals, representing 50% of the normal amount for the area. During these critical times of drought, when grasslands decrease in quantity and quality, shrubs are supposed to contribute to the diet of cattle in this area.

Knowledge of the diet of grazing animals is important in developing management standards that allow the proper use of natural grasslands. The utilization of epidermal characteristics to identify plant components in esophageal, ruminal, or fecal samples is a widespread technique used to study diet composition of free-ranging herbivores (Holechek *et al.* 1982, Bóo *et al.* 1993, Lindström *et al.* 1998).

Our study was designed to evaluate cow's diet from spring (September 2011) to early summer (January 2012), a particularly difficult period for breeders, in a plot of a field in this area of north Patagonia, Argentina.

Methods

Vegetation and Landscape

The study was conducted in a 200 ha pasture, grazed by 110 breeding cows from September 2011 to January 2012. The pasture was characterised by 110 ha of xerophytic shrublands with herbaceous species in the underlying stratum, 40 ha saline alluvial soils with salt resistant shrubs and 50 ha of a wide river paleochannel with herbaceous plants and tall shrubs.

To describe the floristic composition, in the spring of 2011 (62 mm of local cumulative rain until September and 90 mm more up to the end of the year) and early summer 2012 (January, 22 mm of monthly rain), the identification and frequency of plant species were evaluated on intercepting lines 50 meters long, in a valley field used for cattle breeding (39°28 'S - 65° 2' W). Vegetation species were grouped as herbaceous plants, xerophyte and halophyte shrubs and large (>4 m high) shrubs.

Microhistological study

For the analysis of cow' feces 10 slides were made for each composite (of 10 different cow' feces) sample and 40 microscope fields per slide were systematically observed with 100X magnification (Holechek *et al.* 1982)

Reference slides of leaf, stem and fruit samples of the species present in the area were used for the subsequent identification of epidermal fragments in fecal samples. Reference slides were prepared with diaphanized material (Dizeo de Stritmatter 1973), epidermis fragment removed by scraping (Metcalf 1960) according to the method described by Hansen *et al.* (1977), which uses ground material to prepare the samples.

Results

Xerophyte shrubs were represented mainly by *Larrea divaricata* Cav., *Larrea cuneiforme* Cav., *Prosopis alpacato* Phil., *Schinus molle* L., *Condalia microphylla* Cav. *Geoffraea decorticans* (Gill. ex Hook et Am) Burk., *Acantholippia seriphoides* (A. Gray) Mold., *Lycium chilense* Miers. and *Lycium tenuispinosum* Miers.. Halophyte shrubs were mostly *Atriplex lampa* L. and *Suaeda divaricata* Moq. Large shrubs (> 4m high) were represented by the foreign species *Elaeagnus angustifolia* L. Herbaceous plants were mostly *Poaceae*, as *Poa ligularis* Nees., *Piptochetium napostaense* (Speg.) Hack., *Nasella tenuis* (Phil.) Barkworth, *Stipa papposa* Nees., *Nasella tenuissima* (Trin.) Barkworth, *Nassella longiglumis* (Phil.) Barkworth, *Nasella trichotoma* (Nees) Hack. ex Arechav., *Distichlis spicata* (L.) Greene, *Trichloris crinita* (Lag.) Parodi., and *Hordeum euclaston* Steud., and *Medicago minima* (L.) Bartal (*Fabaceae*).

The mean percentage of herbaceous cover for the complete grazed area of the plot ranged from 12% in September 2011 to 40% in December 2012 and January 2012.

In September 2011, *Poaceae* consumption accounted for 56% of the diet with predominance of *T. crinita* and *D. spicata* (19%) and shrubs accounted for 44% with predominance of the halophyte *A. lampa* (42%). *E. angustifolia* contributed with 2%.

In October 2011, the *Poaceae* (58%) were the main component of cow diet while the shrubs represented 41% (*A. lampa*, 24% and *E. angustifolia*, 10%).

In November 2011, the cows consumed 47% of

Poaceae, 39% of shrubs, to which *A. lampa* and *L. divaricata* contributed about 10% each and the consumption of *E. angustifolia* reached 16%.

During December, the cows ate mainly *Poaceae* (82%), 14.71 % of shrubs represented mostly by *Lycium* sp. (13%) and less than 2% of *E. angustifolia*.

Nearly the same results were obtained in January 2012 with 82 % of *Poaceae* and 11.38 % of shrubs (only 2% of *E. angustifolia*) as determined in the cow's faeces.

Conclusion

Even when the coverage of herbaceous species was very low, the cattle preferentially choose the *Poaceae*. However, during this severe drought the shrubs contributed to the diet of cows, preferably the halophyte *A. lampa*. This plant species is considered by local farmers as alternative forage primarily when animals have access to fresh water, as in this case. *E. angustifolia* increased its contribution to the diet during spring regrowth but in the last evaluated months suffered leaf fall due to drought.

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