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Qualitative evaluation of *Cenchrus ciliaris* cv. Molopo and Gayndah as foggage

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Abstract

The aim of the study was to determine the qualitative value of *Cenchrus ciliaris* cv. Molopo and Gayndah utilized by small ruminants as a foggage (standing hay). Molopo material had crude protein (CP) concentrations that varied from 76 to 101 g/kg DM and Gayndah CP concentrations ranging from 78 to 135 g/kg DM over a five week period. Molopo had *in vitro* digestible organic matter (IVDOM) values that ranged from 556 to 604 g/kg DM and Gayndah IVDOM values that ranged from 532 to 642 g/kg DM. The neutral detergent fibre (NDF) concentration of Molopo varied from 647 to 716 g/kg DM and the acid detergent lignin (ADL) concentration from 56 to 64 g/kg DM. Gayndah had NDF concentrations that ranged from 547 to 711 g/kg DM and ADL concentrations from 60 to 86 g/kg DM. The quality of the selected material was slightly better than values reported for foggages of tropical grasses.

Keywords: *Cenchrus ciliaris*, Molopo, Gayndah, foggage
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Introduction

Major parts of South Africa suffer from a dry autumn and winter. This poses a problem to stock farmers in the management of their fodder flow. A way to overcome this problem is the use of foggage (standing hay) over this dry period until enough plant material is available after the first rains. It is well documented that a decrease in quality and intake will occur with advancing stage of maturity (Relling *et al*., 2001; Van Niekerk *et al*., 2002). The selection of a grass type that maintains its quality as a foggage is therefore important. In the literature there is a paucity of information on qualitative values of *C. ciliaris* cv. Molopo and Gayndah as a foggage. The aim of this study was to evaluate the quality of material selected of two types of *C. ciliaris*, Molopo and Gayndah, utilized as a foggage.

Materials and Methods

The study was conducted at the Hatfield Experimental Farm of the University of Pretoria, South Africa. The site is situated at 028.11 °E, 25.44 °S at an altitude of 1 372 m, with an average annual rainfall of 674 mm and a dry autumn and winter. The soil at the experimental site is classified as a sandy-loam with a $pH_{(H20)}$ of 4.2, P, K, Ca, Mg and Na concentrations of 29, 73, 158, 38 and 11 mg/kg respectively.

Cenchrus ciliaris cv. Molopo and Gayndah pastures were established under dry land conditions and fertilized with 2:3:4 (30) at a rate of 100 kg/ha two years before the trial was conducted. One year after establishment and with the onset of the rainy season, 300 kg of limestone ammonium nitrate (28% N) was applied to both pastures. The pastures were mowed during the second half of February and fertilized with 75 kg N/ha. Twelve oesophageal fistulated wethers were randomly allocated to paddocks of 2.2 ha. The experiment ran over five weeks in mid-winter.

Dry matter and crude protein (CP) concentrations were determined according to AOAC (2000), neutral detergent fibre (NDF) concentration according to the method of Robertson & Van Soest (1981) and acid detergent lignin (ADL) according to Goering & Van Soest (1970). *In vitro* digestible organic matter (IVDOM) was done according to the method of Tilley & Terry (1963) as modified by Engels & Van der Merwe (1967).

An analysis of variance for unbalanced data with Proc GLM (SAS, 1994) was used. Least square means and standard deviations (s.d.) were calculated. The level of significance between least square means was tested with the Bonferroni's test (Samuels, 1989).

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Results and Discussion

Goats commonly selected grasses and herbaceous flowering plants (Tettheh, 1974 as cited by NRC, 1981). As pasture quality decreases with maturity (Relling *et al*., 2001; Van Niekerk *et al*., 2002), quality parameters should be relatively low in the case of a foggage.

Table 1 Mean (±s.d.) chemical composition of oesophageal samples of *Cenchrus ciliaris* cv. Molopo and Gayndah during winter

Parameter		Molopo	Gayndah
CP (g/kg DM)			
	Week 1	93[a] (8)	122[b] (36)
	Week 2	101[a] (14)	109[a] (10)
	Week 3	84[a] (5)	89[a] (4)
	Week 4	76[a] (5)	78[a] (7)
	Week 5	94[a] (12)	135[b] (2)
IVDOM, %			
	Week 1	568[a] (25)	624[a] (69)
	Week 2	604[a] (17)	608[a] (48)
	Week 3	556[a] (42)	549[a] (29)
	Week 4	558[a] (37)	532[a] (65)
	Week 5	591[a] (61)	642[a] (20)
NDF (g/kg DM)			
	Week 1	680[a] (28)	660[a] (27)
	Week 2	647[a] (50)	675[a] (19)
	Week 3	716[a] (13)	708[a] (46)
	Week 4	681[a] (31)	711[a] (35)
	Week 5	671[a] (31)	547[b] (56)
ADL (g/kg DM)			
	Week 1	63[a] (11)	60[a] (12)
	Week 2	57[a] (9)	66[a] (8)
	Week 3	64[a] (6)	70[a] (6)
	Week 4	57[a] (9)	86[b] (11)
	Week 5	56[a] (15)	61[a] (6)

CP - crude protein; NDF - neutral detergent fibre; ADL - acid detergent lignin;
IVDOM - *in vitro* digestible organic matter
Row (a,b) means with common superscripts do not differ ($P > 0.05$)

The CP values of Gayndah were significantly higher than CP values of Molopo during weeks 1 and 5 of the grazing period. The concentration of CP didn't decrease beneath 6% where feed intake will be reduced leading to a combined deficiency of energy and protein (NRC, 1981). Muir & Abrao (1999) reported similar CP values for *C. ciliaris*. No significant differences in IVDOM concentrations could be found between Molopo and Gayndah during the grazing period. The IVDOM values in this study were similar to IVDOM values reported by Shinde *et al*. (1996) for *C. ciliaris.*

In Week 5 the NDF concentrations were lower ($P < 0.05$) at Gayndah than during the other weeks. The lower NDF value of Gayndah suggested the selection of green plant growth (O'Reagain & Owen-Smith, 1996) and the higher CP and IVDOM during the same week supported this. The NDF concentration in this study was slightly lower than concentrations reported by Mero & Udèn (1998) for six and 10 week regrowth of *C. ciliaris*. Molopo had a significant lower ADL concentration in Week 4 than Gayndah. Relling *et al*. (2001) reported that NDF and ADL concentrations will increase with advanced maturity, as can be expected of a foggage. These high NDF and ADL values were therefore expected. The ADL concentrations in this study were lower than values reported for *C. ciliaris* in the literature (Shinde *et al.*, 1996; Mero & Udèn, 1998).

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Conclusion

Quality parameters for *C. ciliaris* cv. Molopo and Gayndah selected were low but probably not low enough to limit intake. The differences between Molopo and Gayndah plant material were not constant enough to decide which type will be better suited as foggage for utilization by small stock. The quality of material selected was however slightly better than values one would expect for foggages of tropical grasses.

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