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Title: (Use Normal style (Times New Roman 12). Only capitalise the first letter of the first word. No full stop at the end of the title)

Effect of *Macroptilium atropurpureum* (siratro) inclusion in *Cenchrus ciliaris* (buffel grass) pasture on herbage chemical composition and in vitro digestion and fermentation characteristics

Summary: (Your summary (Times New Roman 10) must use Body text style and must not be longer than this box)

Application *Cenchrus ciliaris* cv Molopo is a perennial grass with low nutritive attributes when preserved as dry hay. Intercropping with Siratro improved its nutritive value and in vitro fermentation

Introduction *Cenchrus ciliaris* is native to Botswana but the nutritive value of the improved Molopo is not adequate for maintenance and production of ruminants. Crude protein range between 30 and 100 g/kg and digestibility range from 300 to 600 g/kg. Therefore, intercropping it with a legume would improve its nutritional value. Previous research in Botswana (APRU 1979) evaluated biomass production of *Cenchrus/Siratro* sward and not its nutritive value. Therefore, the objective of this study was to determine the nutritive value and fermentative parameters of *Cenchrus/Siratro* sward.

Material and methods Samples *cenchrus* (C), *Cenchrus/Siratro* sward (CS) and *Siratro* (S) were randomly obtained during 2015 and 2016 at a *Cenchrus* plot at University campus. Three sampling were obtained during the rainy and dry seasons in each year and pooled according to C, CS and S. In 2016 during the dry season the *cenchrus/siratro* sward was not available. Sub-samples were obtained and standard AOAC procedures were employed to determine chemical composition in duplicates. *In vitro* gas production was conducted in two runs using calibrated syringes according to modified methods of Menke and Steingass (1988). Samples (0.5g) in duplicates were filled into Ankom fibre bags and incubated in syringes containing rumen/buffer mixture. Ankom buffer solutions A & B were used and the syringes incubated in a water bath at 39°C for 3, 6, 12, 24, 48, 72 and 96hrs during which gas volume was recorded. *In vitro* dry matter digestibility (IVDMD) was determined after incubation once NDF was completed on the residues. Gas data was fitted into Ørskov and McDonald' (1979) equation without the zero hr but with a lag time. Effective degradability ($ED = bc/(c+k)$; Ørskov, 1992) was estimated at assumed outflow rate of 0.03/hr (ED_3) or 0.05/hr (ED_5). Differences due to forage type was determined using GLM of SAS (2002-08). Season, year and their interactions were also specified in the model (not reported). The results are reported as LSD means \pm SEM.

Results There were differences due to forage type except for ash (Table 1). Intercropping *Cenchrus* with *Siratro* reduced NDF but increased CP. For in vitro fermentation characteristics, intercropping also reduced lag time.

Table 1 Nutritive value (g/kg DM) and in vitro fermentative characteristics of *cenchrus/siratro* sward

Forage	Ash	CT	ADF	ADL	NDF	CP
Nutritive Value						
C	88.8 \pm 13.5	1.8 \pm 0.5 ^b	488.8 \pm 6.2 ^a	86.8 \pm 7.3 ^a	821.9 \pm 10.0 ^a	71.8 \pm 2.8 ^c
CS	91.0 \pm 21.4	2.2 \pm 0.8 ^b	480.8 \pm 9.8 ^a	95.7 \pm 11.6 ^{ab}	776.5 \pm 15.7 ^b	87.1 \pm 4.5 ^b
S	86.9 \pm 13.5	4.5 \pm 0.5 ^a	399.2 \pm 6.2 ^b	117.6 \pm 7.3 ^b	526.8 \pm 10.0 ^c	171.6 \pm 2.8 ^a
P value	0.9865	0.0059	<.0001	0.0337	<.0001	<.0001
Fermentation						
	b (ml/0.5g)	c (ml/hr)	Lag (hrs)	ED₃ (ml/0.5g)	ED₅ (ml/0.5)	IVDMD (g/kg)
C	53.06 \pm 0.601 ^b	0.044 \pm 0.0006 ^b	2.14 \pm 0.121 ^c	31.47 \pm 0.487 ^b	24.81 \pm 0.417 ^b	537.5 \pm 12.7 ^c
CS	53.92 \pm 0.951 ^b	0.044 \pm 0.0009 ^b	1.66 \pm 0.191 ^b	32.23 \pm 0.770 ^b	25.46 \pm 0.659 ^b	601.6 \pm 15.5 ^b
S	58.55 \pm 0.601 ^a	0.048 \pm 0.0006 ^a	1.19 \pm 0.121 ^a	36.18 \pm 0.487 ^a	28.85 \pm 0.417 ^a	702.9 \pm 12.7 ^a
P value	<.0001	<.0001	<.0001	<.0001	<.0001	<0.0001

Conclusion Fortifying *Cenchrus* with *Siratro* on pasture improved its CP but reduced NDF. This led to improved DM digestibility and likely to increased supply of nutrients. Reduced time lag due to intercropping means less time to degrade the mixed forage than when *Cenchrus* was the only substrate.

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References

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