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Santa Inês sheep supplementation on urochloa grass pasture during the dry season: intake, nutrient digestibility and performance[1]

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ABSTRACT - This study was conducted with the objective of evaluating the effect of concentrate supplementation, formulated with different ingredients (Mesquite pod meal, sorghum meal or wheat meal and mineral supplementation) on performance, intake and digestibility of nutrients in Santa Inês lambs grazing on urochloa grass during the dry season. Twenty-four uncastrated weaned Santa Inês sheep, with average body weight (BW) 20±2 kg with an average of 120 days of age were used in the assay. The experiment lasted 75 days. The animals grazing deferred Urochloa grass (*Urochloa mosambicensis* (Hack) Daudy) were distributed into four treatments consisting of mineral supplementation provided *ad libitum* and concentrated supplements containing mesquite pod meal, sorghum meal or wheat meal, supplied 10 g /kg BW on dry matter basis. The intakes of dry matter (DM) and crude protein (CP) were affected by the intake of concentrate supplement, regardless of the ingredients used in the supplements, compared with the mineral supplementation treatment, since the consumption of forage was reduced in 30% with mesquite pod meal supplement, and neutral detergent fiber (NDF) intake was not affected in relation to treatments. The digestibility of DM and CP were higher for treatments with supplements, and NDF digestibility did not differ between treatments. A significant difference was observed in the values of average daily gain for the treatments with concentrate supplementation compared with the one of mineral supplementation. The supplementation with concentrate in grazing enables improvement of performance, intake and digestibility of nutrients regardless of the ingredient used in the supplement.

Key Words: alternative food, grazing, multiple supplement, semiarid, *Urochloa mosambicensis* (Hack) Daudy, weight gain

Introduction

The Northeast region of Brazil has a natural predisposition for agricultural exploitation, but it is largely affected by climatic factors, among which are low rainfall and its poor distribution throughout the year, marked for determining the availability and quality of pasture with striking consequences on livestock production, especially in the sheep industry, with low animal performance during the drought. In this critical period, animals lose weight, thus delaying the age at slaughter, causing huge losses to producers and to the economy in general, also creating fluctuations in the offer of animal products and supply to the population.

Seeking a breakthrough in productivity and competitiveness in the production of sheep in the semi-arid region, several technological alternatives have been proposed; among the alternatives, the use of pasture supplementation has assumed a prominent position when compared with confinement, due to the lower production costs.

Thus, grasslands represent the most economical source of nutrients to ruminants, making sheep breeding a profitable activity. The exclusive use of pastures cannot meet the nutritional requirements of animals, especially in relation to the categories of higher nutritional requirement. In turn, the use of supplement concentrate for grazing animals should comply with basic conditions, such as the genetic potential of the livestock, the quality and quantity of forage available, the price of the concentrate and the price of livestock products generated (Voltolini et al., 2008).

The evaluation of grazing sheep with supplements has received growing attention of researchers in the last ten years (Barbosa et al., 2003; Frescura et al., 2005; Voltolini et al., 2009).

All these factors emphasize the importance of further studies on the supplementation for sheep grazing in the semiarid region, including the grazing of urochloa grass (*Urochloa mosambicensis* (Hack) Daudy), present in almost

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all the farms of the region and with few scientific studies. Therefore, the objective of this study was to evaluate the effect of concentrate supplementation, formulated with different ingredients (mesquite pod meal, sorghum meal or wheat meal), and mineral supplementation on performance, intake and digestibility of nutrients in Santa Ines sheep grazing on urochloa grass in the dry season.

Material and Methods

The experiment was conducted at CEPECOS - Research Center for Sheep and Goat in the Semi-Arid, owned by Fazenda Palmares, located in Boa Vista do Tupim, zoned as a semi-arid region of Bahia, in partnership with Universidade Estadual do Sudoeste da Bahia – UESB, Itapetinga, Bahia.

Twenty-four uncastrated weaned Santa Ines lambs, with initial body weight (BW) averaging 20±2 kg and an average of 120 days of age were used in this experiment. The experimental design was completely randomized with four treatments and six replications; each animal was considered a replication. The experimental period lasted for 75 days in the dry season between August and November, 2008, with an adjustment period of 15 days. Rainfall in 2008 was 623 mm, but during the study period there was no precipitation.

The animals were assigned to four treatments consisting of animals consuming forage in deferred pasture of urochloa grass with supplements formulated with different ingredients (mesquite pod meal, sorghum meal or wheat meal), provided in the ratio of 10 g/kg of body weight of the animal, and mineral supplementation.

The supplements were formulated to meet the nutritional requirements to gain 150 g/day for this animal category, as recommended by the NRC (2007) (Table 1).

The lambs in all treatments remained together on pasture of Urochloa grass provided with mobile troughs in a total area of 4 ha, divided into 10 paddocks of 0.40 ha; throughout the grazing season a fixed stocking rate of 6 lambs/ha were maintained. The pasture was evaluated every three days, during the entrance and exit of animals from the pickets; to estimate the availability of dry matter (DM) of each picket, 12 samples were cut at ground level with a square of 0.25 m^2, as described by McMeniman (1997) (Table 2).

Animals were collected daily at 4:00 pm and distributed, according to the treatment, in collective pens (6 m^2) equipped with water trough, where they had access to the supplement provided collectively in the trough in the proportion of 10 g/kg BW, showing no leftovers, returning to the pickets the following day at 7:00 am. The animals of the mineral supplement treatment had access to mineral salt (Ovinofós® - commercial formula for sheep) and water *ad libitum*.

To control verminosis, at the beginning of the experiment and every 30 days, all animals were dewormed using levamisole phosphate-based anthelmintic, according to the recommendations of the manufacturer. The animals also received an application of coccidiostat (Coccifin®) at the beginning of the experiment.

Animals were weighed after fasting for 14 hours, at the beginning and end of the experiment; intermediate weighings were also performed without fasting every 15 days to evaluate the performance and regulation of supplementation.

Table 2 - Mean values for the proportions of green leaf, green stem and senescent material in the whole plant: leaf/stem ratio, availability of DM/ha; kg of DM leaf/ha; kg of DM of stem/ha; and kg of senescent material/ha

Item	Dry season
Green leaf (g/kg)	420.0
Green stem (g/kg)	325.0
Senescent material (g/kg)	626.0
Leaf/stem ratio	0.13
Availability of DM (kg/ha)	3.769
kg DM leaf/ha	184.0
kg DM stem/ha	1.225
kg DM senescent material/ha	2.360

DM - dry matter.

Table 1 - Composition of the supplements (g/kg)

Ingredient	Concentrate supplement		
	MPM	WM	SM
Corn	411.5	420.0	411.5
Soybean meal	207.9	200.0	208.0
Mesquite pod meal	353.2	0.00	0.00
Wheat meal	0.00	352.6	0.00
Sorghum meal	0.00	0.00	353.1
Urea	9.7	9.7	9.7
Mineral supplement[1]	17.7	17.7	17.7

MPM - supplement containing mesquite pod meal; SM - supplement containing sorghum and WM - supplement containing wheat meal.
[1] Calcium - 120.00 g; phosphorus - 87.00 g; sodium - 147.00 g; sulfur -18.00 g; copper - 590.00 mg; cobalt - 40.00 mg; chrome - 20.00 mg; iron - 1.800.00 mg; iodine - 80.00 mg; manganese - 1.300.00 mg; selenium - 15.00 mg; zinc - 3.800.00 mg; molybdenum - 300.00 mg; fluorine (max.) - 870.00 mg; solubility of phosphorus (P) in 2% citric acid (min.) - 95.00%.

The feed conversion (FC) was determined as a function of intake and animal performance according to the equation: FC = (DMI/ADG)
where DMI is the daily intake of dry matter in kg and ADG is the average daily gain, in kg.

The dry matter intake (DMI) of forage and digestibility of nutrients were estimated from the fecal output, verified with the use of chromic oxide (Cr^2O^3) as external marker and indigestible acid detergent fiber (iADF), as internal marker. Two daily doses of one gram of chromic oxide were offered according to the method described by Ladeira et al. (2002), for eleven days; the first six days were the period of adaptation of animals to handling and the period taken for the chromium to be constant in the feces; in the remainder five days, in the morning and afternoon, feces were collected from the animals rectum, and a daily dose of the indicator was administered. Stool samples collected were stored at -20 °C and subsequently thawed, dried in a ventilated oven at 55 °C, ground in a 1-mm sieve and analyzed for levels of chromium in atomic absorption spectrophotometer, as described by Willians et al. (1962).

The determination of fecal production was made according to the equation:

$$\text{Dry matter fecal (g/day)} = \frac{\text{Amount of indicator supplied (g)}}{\text{Concentration of the indicator in the feces (\%)}} \times 100$$

The concentration of iADF in supplement samples, forage consumed and feces was obtained after incubation *in situ* for 264 hours, according to Casali et al. (2008). The voluntary intake of DM was estimated by the ratio between fecal excretion and indigestibility from the internal indicator iADF, as described above, using the equation proposed by Detmann et al. (2001):

$$DMI = \{[(FE \times MCF) - CIS]/CIFOR\} + DMIS$$

where: DMI = dry matter intake (kg/day); FE = fecal excretion (kg/day); MCF = marker concentration in the animal feces (kg/kg); CIS = concentration of iADF in the supplement (kg/day); CIFOR = concentration of iADF in forage (kg/kg); and DMIS = intake of supplement DM (kg/day). Supplement intake was measured by the quantity supplied divided by the number of animals of the treatment.

The estimate of the quality of forage consumed was performed by analyzing the samples, using the technique for manual simulation of grazing (Euclides et al., 1992), by visual observation of the animals. The contents of dry matter (DM), crude protein (CP), ether extract (EE), mineral matter (MM), neutral detergent fiber (NDF), acid detergent fiber (ADF), neutral detergent insoluble nitrogen (NDIN) and lignin (H_2SO_4 72% p/p) were determined in the forage and supplement samples, according to the recommendations described by Silva & Queiroz (2002). The content of neutral detergent fiber corrected for ash and protein (NDFap) was obtained according to the recommendations by Licitra et al. (1996) and Mertens (2002) (Table 3).

The levels of non-fibrous carbohydrates corrected for ash and protein (NFCap) in samples of feed, scraps and feces were calculated in the adaptation to the recommendations proposed by Hall (2000), as follows:

$$NFCap = 100 - (CP + EE + MM + NDFap)$$

where: NFC = estimated content of non-fibrous carbohydrates (g/kg of DM); CP = CP content (g/kg of DM); EE = EE content (g/kg of DM); MM = MM content (g/kg of DM); NDFap = NDF content corrected for ash and protein (g/kg of DM).

Statistical analysis of data were performed using the SAEG statistical package (Statistical and Genetic Analysis System, version 9.1) and the results were statistically interpreted by analysis of variance and comparisons between the means by the Dunnett test, adopting the level of 0.05 as significance.

Table 3 - Nutritive value of supplements and Urochloa grass sample obtained via simulation of grazing

Item (g/kg of DM)	Supplement			Forage
	MPM	SM	WM	
Dry matter	887.0	883.5	884.7	851.1
Organic matter	950.9	960.7	953.6	857.4
Crude protein	221.1	219.6	240.3	66.4
Ether extract	11.8	30.4	27.0	18.7
Total carbohydrates	718.0	710.7	686.3	772.3
Non-fibrous carbohydrates	475.9	463.3	377.4	139.9
Neutral detergent fiber	259.5	268.6	328.3	764.2
NDFap	242.1	247.4	308.9	632.4
Acid detergent fiber	136.1	114.6	126.2	501.7
Lignin	21.7	16.1	17.5	164.9
ADFi	71.5	51.6	65.1	321.5
Mineral matter	49.1	39.3	46.4	142.6

MPM - supplement containing mesquite pod meal; SM - supplement containing sorghum; WM - supplement containing wheat bran; NDFap - neutral detergent fiber corrected for ash and protein; ADFi - indigestible acid detergent fiber.

Results and Discussion

The total dry matter intake was affected (P<0.05) by the supply of concentrate supplement, regardless of the ingredients used in the supplements, compared with the treatment with mineral supplement (Table 4), whose values were 0.810; 0.888; 0.876 and 0.593 kg/day for the treatments with supplements containing mesquite pod meal (mesquite pod meal), sorghum meal, wheat meal and mineral supplement, respectively. However, when the dry matter intake was expressed in g/kg of body weight (BW) there was no difference (P<0.05) between wheat meal treatment and the other treatments (mineral supplementation; mesquite pod meal and sorghum meal). When the total dry matter intake was expressed in relation to the metabolic weight (g/kg$^{0.75}$), the sorghum meal and wheat meal treatments showed values higher (P<0.05) than DM and mesquite pod meal. A possible explanation for this is that mesquite pod meal, as an energy source in the composition of the supplement, showed inhibitory effect on dry matter intake, which can be proved also by the lower intake of forage dry matter, expressed in g/kg of BW, which resulted in lower consumption of total dry matter in g/kg$^{0.75}$, resembling the dry matter intake provided by mineral supplementation.

Similar results to the mineral supplementation treatment for total dry matter intake (g/kg$^{0.75}$) were reported by Ramirez et al. (1995), who assessed the nutrient intake by sheep grazing on buffel grass (*Cenchrus ciliaris*) and the animals reached an average consumption of 53.7 g/kg$^{0.75}$.

For the consumption of forage dry matter in kg/day, there was no difference (P>0.05) between the animals supplemented with concentrate or maintained solely on pasture with mineral supplement. However, when expressed in g/kg of BW, the forage dry matter intake had lower value (P<0.05) for the mesquite pod meal treatment in relation to the others (sorghum meal, wheat meal and mineral supplementation), which may indicate the substitutive effect of forage by the concentrate in this treatment, confirmed by the replacement ratio of forage by the supplement of the treatment (Table 4). Thus, animals supplemented with concentrate containing mesquite pod meal reduced the intake of forage, possibly due to the physical factor of intake control.

Argôlo et al. (2010) observed a reduction in microbial protein synthesis when using diets with increasing levels of mesquite pod meal for lactating goats. According to Silva et al. (2010), the lower degradability of dry matter observed in tests of gas production using alkaloidal extract (200 mg.mL^{-1}) from mesquite pods is related to the inhibition of fibrolytic microorganisms, thereby reducing the degradation of the fiber.

The effects of substitution of forage by the concentrate are more pronounced when the qualitative aspects of the forage offered are higher. This effect, in turn, can be used in the production system as a tool to increase the stocking rate of pastures (Voltolini et al., 2009).

One may notice that the use of concentrate supplementation promoted the increase in dry matter intake, regardless of the effect on dry matter intake of forage for the

Table 4 - Estimates of average daily consumption as a function of the supply of different supplements for grazing sheep

Item	Supplements				CV (%)
	MS	MPM	SM	WM	
		kg/day			
Dry matter	0.593	0.810*	0.888*	0.876*	17.62
Forage	0.581	0.521	0.606	0.629	24.13
Supplement	0.012	0.289	0.282	0.247	—-
Ether extract	0.011	0.013	0.020*	0.018*	16.69
Neutral detergent fiber	0.44	0.47	0.54	0.56	21.25
Crude protein	0.038	0.098*	0.102*	0.101*	10.75
Non-fibrous carbohydrates	0.081	0.210*	0.216*	0.181*	11.21
Total digestible nutrients	0.243	0.438*	0.476*	0.444*	12.77
		g/kg of BW			
Dry matter	26.7	28.7	31.8	35.3*	15.15
Forage	26.2	18.3*	21.5	25.2	19.77
Supplement	0.5	10.0	10.0	10.0	—-
Organic matter	22.5	25.6	28.3*	31.2*	14.89
Neutral detergent fiber	20.0	16.7	19.1	22.6	17.42
		g/kg$^{0.75}$			
Dry matter	57.90	65.89	72.86*	78.75*	14.14
Organic matter	48.63	58.71	64.81*	69.68*	13.80
		g of forage/g of supplement			
Substitute forage	—	0.20	—	—	—

*Different by the Dunnett test at 0.05 significance.
MS - mineral supplement; MPM - supplement with mesquite pod meal; SM - supplement with sorghum; WM - supplement with wheat meal; BW - body weight; kg^{0,75} - unit of metabolic weight; CV - coefficient of variation.

mesquite pod meal treatment compared with animals with mineral supplementation, since the additive effect is also seen with average daily gain of animals (Table 6). Voltolini et al. (2009) observed that the addition of concentrate supplementation was insufficient to promote greater intake of total dry matter, which may evidence, in these cases, the occurrence of rumen acidosis.

The values of dry matter intake and forage dry matter intake-to-concentrate supplement treatments observed in this study are higher than those reported by Voltolini et al. (2009), who worked with Santa Inês × UB (undefined breed) crossbred sheep on irrigated Tifton 85 pastures receiving 180 g/day of concentrate supplement. According to the authors, the dry matter intake and mean forage intake were 0.595 and 0.417 kg/day, respectively; but when comparing the dry matter intake and forage intake of animals grazing only on pasture, the results obtained by these authors are higher: 0.628 kg/day. This difference can be explained by the quality of the forages with respect to crude protein (CP) (108.2 g/kg vs. 66.4 g/kg of CP) and neutral detergent fiber (NDF) (737.4 g/kg vs. 764.2 g/kg of NDF).

Camurça et al. (2002), in a study with sheep supplemented with 10 g/kg of BW with corn and soybean meal-based concentrate, found for the dry matter intake, values of 0.943 kg/day, 32.4 g/kg of BW and 75.11 g/kg$^{0.75}$, similarly to treatments with concentrate supplementation. With regard to forage intake (Urochloa grass), they found values of 0.660 kg/day, 22.8 g/kg of BW and 52.58 g/kg$^{0.75}$, which are close to that in this study for all treatments. The values of the chemical composition of urochloa Grass reported by these authors are similar to those found in this study (Table 3), as 851.0 g/kg of DM; 68.6 g/kg of CP; 17.5 g/kg of EE; 832.7 g/kg of NDF and 121.2 g/kg of MM.

Results similar to those found in this study for treatments with supplements with sorghum meal and wheat meal were found by Camargo et al. (2009) who, when conducting research with sheep grazing millet with levels of concentrate supplementation, observed higher forage intake for the treatments with 5.0 and 10.0 g/kg of BW, thus demonstrating the additive effect of the supplement on the total dry matter intake.

The organic matter intake, in g/kg of BW and g/kg$^{0.75}$ was similar (P>0.05) between the animals of mineral supplementation treatment and those of the mesquite pod meal treatment, which differed from the sorghum meal and wheat meal treatment. It is noteworthy that the mesquite pod meal treatment provided a lower intake of forage which may have contributed to a lower intake of organic matter from forage (Table 4).

The ether extract intake, in kg/day, was similar (P>0.05) between the animals that received mineral supplementation and mesquite pod meal. However, animals supplemented with sorghum meal and wheat meal consumed more ether extract than those that received mineral supplementation. Animals that received mineral supplementation obtained, via feeding, ether extract from the forage consumed, while animals supplemented with sorghum meal and wheat meal, as well as forage, acquired ether extract by the intake of concentrate supplementation; however, this fact probably explains the lower intake of ether extract for the mineral supplementation treatment.

The intake of neutral detergent fiber, expressed in kg/day and g/kg of BW, did not differ (P>0.05) between treatments (mineral supplementation, mesquite pod meal, sorghum meal and wheat meal). The average intake of neutral detergent fiber, in kg/day and g/kg of BW was 0.503 kg/day and 19.6 g/kg of BW, respectively. Similar results to those obtained in this study were reported by Camurça et al. (2002), who observed mean values of 515.04 kg/day and 18.2 g/kg of BW, respectively.

The crude protein intake was affected by the concentrate supplementation, and was higher (P<0.05) than the treatment with mineral supplementation. The higher intake of crude protein for mesquite pod meal, sorghum meal and wheat meal treatments is due to the intake of concentrate supplement, supplied at 10 g/kg of BW, with an average of 227.0 g/kg of CP. The mean value for the treatment with concentrate supplementation was 0.100 kg/day; this result was lower than that obtained by Camurça et al. (2002), who evaluated the intake of sheep fed urochloa Grass supplemented with concentrate at 10 g/kg of BW and obtained an intake of crude protein of 0.151 kg/day. These higher values of crude protein intake are explained by the high crude protein content (CP) of the concentrate used by the authors (335.0 g/kg of CP).

Voltolini et al. (2009), supplementing sheep grazing with different protein sources, found crude protein intake of 0.068 kg/day for the exclusive treatment in pastures; for the sheep with diet supplemented, the authors observed a variation from 0.074 to 0.087 kg of crude protein, i.e., 6 to 19 g more protein compared with animals kept on pasture; results lower than those of the present study. These results were probably influenced by the substitute effect reported by the authors and by the quality of the forage (108.6 g/kg of CP).

The non-fibrous carbohydrates and total digestible nutrients intake was affected (P<0.05) by the supply of concentrate supplement, regardless of the ingredients used in the supplement, in comparison with the treatment with mineral supplement (Table 4). These results demonstrate that concentrate supplementation, especially in dry periods, increases the supply of nutrients to the animal and can improve performance (Table 6).

The digestibility of dry matter, organic matter, crude protein, non-fibrous carbohydrates and total digestible nutrients were higher (P<0.05) for treatments with supplements (mesquite pod meal, sorghum meal and wheat meal) with respect to mineral supplementation (Table 5). This can be explained by the higher digestibility of the concentrate supplement, irrespective of the ingredient of the supplement, compared with grazing.

The factor that may have contributed to this difference was the higher intake of crude protein in the treatments supplemented with concentrates, thus having a greater amount of nitrogen supplying the deficiency of rumen microorganisms and, as a consequence, positively increasing the rumen activity.

Results in improving the digestibility of forage with supply of concentrate supplementation were found by several authors with cattle (Mallmann et al., 2006; Gomes et al., 2006; Acedo et al., 2007; Oliveira et al., 2004; Santos et al., 2004).

The ether extract digestibility was greater for animals that received supplements containing wheat meal and sorghum meal (Table 5). This result was obtained possibly due to a greater intake of ether extract provided by these treatments, when compared with mineral supplementation (Table 4).

The digestibility of neutral detergent fiber was not affected (P>0.05) by the supplementation of concentrate, possibly because the concentrate was supplied only once a day in the afternoon, causing no pronounced changes in the activity of cellulolytic microorganisms.

The concentrate supplements influenced (P<0.05) the final body weight and average daily gain compared with treatment with mineral supplementation (Table 6). The similar production performances found for the treatments with concentrate supplementation can be justified by the similar total intakes of dry matter and chemical composition.

Animals receiving mineral supplementation presented reduced average daily gain of 7.2 g/day (Table 6), which can be explained by the advanced state of maturation of urochloa grass, which presented high values of ADF and NDF and low values of CP. As a result there was a higher retention time of feed in the rumen and lower consumption of nutrients by animals, leading to lower rumen microbial growth and protein flow to the duodenum of animals, resulting in poor performance.

Similar results of average daily gain of animals supplemented with concentrate were found by Camurça et al. (2002), mean value of 100 g/day for the treatment with Urochloa grass and 10 g/kg of BW of supplement. Similarly, Brum et al. (2008), in a study that evaluated the animal performance and forage characteristics in feeding systems for rearing of grazing sheep found mean daily gain of 87.3 g/day.

Table 5 - Means of the digestibility coefficients according to the supply of different supplements for grazing sheep

Item	Supplement				CV (%)
	MS	MPM	SM	WM	
Dry matter	26.05	42.58*	39.74*	37.37*	14.44
Organic matter	27.72	44.98*	42.26*	39.77*	15.17
Ether extract	46.29	54.52	68.92*	62.48*	17.48
Crude protein	5.92	55.94*	50.06*	51.44*	18.24
Neutral detergent fiber	37.89	37.15	38.44	37.84	10.39
Non-fibrous carbohydrates	75.01	91.13*	88.27*	86.76	10.71
Total digestible nutrients	40.93	54.24*	54.30*	51.37*	9.48

*Different by the Dunnett test at 0.05 of significance.
MS - mineral supplement; MPM - supplement containing mesquite pod meal; SM - supplement with sorghum; WM - supplement with wheat meal; CV - coefficient of variation.

Table 6 - Performance of grazing Santa Inês sheep subject to the supply of different supplements

Item	Supplement				CV (%)
	MS	MPM	SM	WM	
Initial body weight (kg)	21.90	21.50	20.60	18.83	23.75
Final body weight (kg)[1]	21.27	28.10*	28.22*	26.42*	4.63
Mean daily gain (g/day)	7.2	98.67*	100.89*	78.22*	21.87
Feed conversion[2]	82.36	8.21*	8.80*	11.20*	21.75

*Different by the Dunnett test at 5%.
MS - mineral supplement; MPM - supplement with mesquite pod meal; SM - supplement with sorghum; WM - supplement with wheat meal; CV - coefficient of variation.
[1] Co-variable = Initial weight = 20.60 kg.
[2] kg DM ingested/kg of gain.

As to feed conversion, there was a significant difference (P<0.05) between treatments, with the best feed conversion found in supplemented animals, regardless of the type of energy source used in the supplement, with means of 9.63 (kg of DM ingested/kg of gain). This result is in accordance with that obtained by Camurça et al. (2002), of 10.2 (kg of DM ingested/kg of gain), for lambs fed urochloa Grass and 10 g of supplement/kg of BW.

Conclusions

Supplementing diets of Santa Inês sheep grazing Urochloa grass with concentrate during the dry period increases animal performance, voluntary intake and diet digestibility.

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