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Fine mesquite pod meal on performance, palatability and feed preference in lambs

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ABSTRACT. We evaluated the effect of inclusion of fine mesquite pod meal (FPM) in the diet on performance, preference and palatability of diets in feedlot lambs. Five diets were formulated with increasing levels of FPM (0, 1.5, 3.0, 4.5 and 6.0%). For performance evaluation, the design was completely randomized with five treatments and seven replications. For palatability and preference analysis, the same design was used, but the treatments consisted of diets with 0 and 3% FPM and fourteen replications. The palatability was assessed considering the amount of feed consumed within 30 min., and the preference, considering the feed intake after 24 hours. FPM had no influence on weight gain, but caused a reduction in intake and an increase in dry matter digestibility for inclusion level above 2.4%. The greatest contribution of FPM inclusion is due to the increase in neutral detergent fiber digestibility. The preference and palatability in feedlot lambs is not affected by the inclusion of 3% FPM.

Keywords: additive, food, intake, digestibility, average daily gain, sheep.

Farelo fino de algaroba sobre desempenho e preferência de ovinos e palatabilidade das rações

RESUMO. Avaliou-se o efeito da inclusão de farelo fino de algaroba (FFA) na ração sobre o desempenho, a preferência e a palatabilidade de dietas em cordeiros confinados. Cinco rações foram formuladas com níveis crescentes de FFA (0; 1,5; 3,0; 4,5 e 6,0%). Para a avaliação de desempenho, o delineamento foi inteiramente casualizado com cinco tratamentos e sete repetições. Para as avaliações de palatabilidade e preferência foi utilizado o mesmo delineamento, porém os tratamentos corresponderam as rações com 0 e 3% de FFA e quatorze repetições. A palatabilidade foi avaliada considerando a quantidade de ração consumida em 30 min. e a preferência considerando o consumo das rações após 24h. O FFA não afeta o ganho de peso de ovinos, mas reduz a ingestão e aumenta a digestibilidade da matéria seca para nível de inclusão acima de 2,4%. A maior contribuição da inclusão de FFA deve ao aumento na digestibilidade da fibra em detergente neutro. A preferência e a palatabilidade de dietas em cordeiros confinados não é afetada pela inclusão de 3% de FFA.

Palavras-chave: aditivo, alimento, consumo, digestibilidade, ganho médio diário, ovino.

Introduction

The growing demand for high quality sheep meat increased production of lambs for slaughter, which generated the need to improve production systems to meet the customer requirements (Schönfeldt & Gibson, 2008). However, setbacks remain in relation to animal feed, which undoubtedly is one of the most important aspects in animal production chain.

The understanding of the processes of food intake and the intervening factors in animals is of great importance for nutritionists, since these determine the potential amount of nutrients ingested and, according to digestibility, indicate the amount of nutrients available to meet the requirements for maintenance and production (Maggioni et al., 2009). However, the effect of food on consumption is dependent on several characteristics of the food (volume, energy value, palatability) and animal (production stage, adaptation), which are important in the preparation of an appropriate nutritional and food planning (Macedo Júnior et al., 2010).

In relation to the use of alternative foods, mesquite pod meal stands out not only for the availability of mesquite pods (*Prosopis juliflora,* Fabaceae) in all geo-environmental regions of the semi-arid Northeast, with over 500,000 hectares (Araujo, Correia, Araujo & Lima, 2006), but also for its chemical composition. Thus, it has been used by herds in the dry areas of the northeast, evidencing the productive and economic potential of livestock in the region (Almeida et al., 2011). The use of mesquite pods in the diet of ruminants does not influence the consumption of nutrients, but promotes a reduction in feed costs (Pereira et al., 2013).

Palatability can be defined as the appetite displayed by an animal when consuming a particular food or feed, which can be a quantitative measure, provided that it is measured the amount of food consumed during a certain time (Baumont, 1996). Ruminant animals learn to associate the after-feeding consequences of a food with its sensory properties and use their preferences or aversions to select food.

Several studies have indicated the potential use of mesquite pod meal in animal feed (Mahgoub et al., 2005). The fine mesquite pod meal is a by-product derived from the processing of mesquite pods. This is a low density ingredient, in the form of yellowish powder and has excellent binder and flavoring characteristics probably because it consists of readily available carbohydrate, but, this characteristic has not yet been properly studied.

In this way, this study evaluated the effect of inclusion of fine mesquite pod meal in the diet on performance, intake, digestibility, palatability and preference of diets offered to feedlot lambs.

Material and methods

Two experiments were conducted in the Sector of Sheep and Goat (SETOC), Department of Rural and Animal Technology, State University of Southwest Bahia (UESB), in the municipality of Itapetinga, Bahia State, Brazil. The first experiment evaluated the influence of increasing levels of fine mesquite pod meal (FPM) in the diet on performance, dry matter intake and digestibility of diets in feedlot sheep. The second experiment analyzed the palatability and preference for diets containing or not the FPM.

In the first experiment, 35 intact male lambs, from crosses between Santa Inês and unidentified breed animals, average initial body weight (BW) of 20.51 ± 0.53 kg, 100 ± 10 days of age, mean body condition score of 2.43 ± 0.09 (range 0-5), were distributed in five treatments according to a completely randomized design with seven replications per treatment, each animal being a replication. The use of animals was approved by the Ethics Committee on Animal Experimentation of UESB (Protocol 02/2012).

Lambs were kept in feedlot regime, housed in individual roofed pens of 1.5m^2, provided with feeders and drinkers. The experiment lasted 88 days; the first 20 days used for adaptation of animals to facilities, management and diets, 63 days used for evaluation of performance and feed intake and five days for feces collection. Before the adaptation period, animals were ear-tagged and subjected to the control of endo- and ectoparasites. During adaptation, animals were given the same diet of the experimental period, in accordance with the treatments. At the end of the adaptation period, all animals were fasted for 16 hours for later weighing and recording of the initial weight. Weight values were recorded and the experimental period began, which was distributed in three periods of 21 days.

Diets were composed of Tifton 85 hay (*Cynodon* spp.) and concentrate at 40:60 roughage:concentrate ratio. Concentrates were made up of: ground corn, FPM, conventional urea, soybean meal and mineral mixture (Table 1).

Diets were formulated to be isonitrogenous and isocaloric and contained nutrients for weight gain of 200 g animal^{-1} day^{-1}, according to equations proposed by the NRC (2007), based on the chemical composition of ingredients (Table 1).

Table 1. Proportion of dry matter (DM) of the ingredients and calculated values of crude protein (CP) and total digestible nutrients (TDN) according to levels of fine mesquite pod meal in diets.

Ingredients	% Fine Mesquite Pod Meal				
	0.0	1.5	3.0	4.5	6.0
Tifton 85 hay	40.0	40.0	40.0	40.0	40.0
Ground corn	47.0	45.5	44.0	42.0	40.0
Fine Mesquite Pod Meal	0.0	1.5	3.0	4.5	6.0
Conventional urea	1.5	1.5	1.5	1.5	1.5
Soybean meal	10.0	10.0	10.0	10.5	11.0
Mineral Mix	1.5	1.5	1.5	1.5	1.5
Nutrients (% DM)					
CP	16.6	16.4	16.2	16.1	16.1
TDN [1]	68.6	68.2	67.9	67.5	67.2

[1]NRC (2001).

Treatments consisted of supplying middling diets with increasing levels of inclusion of FPM: 0.0; 1.5; 3.0; 4.5 and 6.0% dry matter (DM), twice a day, allowing leftovers of 10-15% of that provided, on a DM basis, in order to not restrict food intake by animals.

Daily, we recorded the amount supplied and the leftovers of hay and feed, which were provided at 7h am (40% of the total diet – TD) and 4:00 p.m. (60% TD). Leftovers were taken daily and packed in plastic bags, with appropriate identification of animals, treatment and period and stored in a freezer (-5 to -10° C). Every 21 days, from the start of the experiment, proportional composite samples of leftovers were made per animal and were again identified for subsequent laboratory analysis.

Weighing of animals was performed at the beginning of the experiment and every 21 days, always at the same time, before the first meal, after fasting for 16 hours. Upon completion of 63 experimental days, animals were weighed to obtain the final weight, total weight gain (TWG) and average daily gain (ADG).

Dry matter intake (DMI) was calculated as the difference between the food supplied and leftovers. Feed conversion (FC) and gross feed efficiency (GFE) were calculated using the equations: FC = DMI/ADG and GFE = ADG/DMI.

To obtain the apparent digestibility of dry matter, crude protein, neutral detergent fiber, acid detergent fiber, we collected feces directly from the rectum. Feces were taken after the performance period, that is, from the 84th day after starting the experiment, for five consecutive days, twice a day, at 7:00 a.m. and 4:00 p.m. After collected, feces were placed in plastic bags properly identified, sealed and stored in a freezer (-5 to -10° C) for further analysis.

For the determination of the nutrient digestibility coefficient (DC), we used the equation described by Schneider and Flatt (1975): DC = [(consumed nutrient – excreted nutrient)/consumed nutrient] x 100.

The daily fecal excretion (kg DM Day^{-1}) was estimated with the aid of an internal indicator, indigestible neutral detergent fiber, determined in samples of food provided, leftovers and feces through the *in situ* digestibility procedure, for 240h, according to the methodology proposed by Casali et al. (2008).

At the end of the experiment, samples of food provided, leftovers and feces were thawed at room temperature, pre-dried in a forced ventilation oven at 60 ± 5°C, for 72h and ground in a Wiley mill with a 1 mm sieve, for further analysis of the dry matter (DM), organic matter (OM), crude protein (CP), ether extract (EE), according to the methods recommended by the Association of Official Agricultural Chemists (AOAC, 2005).

Analysis of neutral detergent fiber (NDF) and acid detergent fiber (ADF) were made according to the method proposed by Van Soest et al. (1991), but, carried out in an autoclave, following recommendations of Pell and Schofield (1993). In NDF analysis, the samples were treated with thermostable alpha-amylase and corrected for residual ash (Mertens, 2002). Correction of NDF and ADF for nitrogen compounds and estimation of insoluble nitrogen content in neutral and acid detergents were made according to Licitra, Hernandez and Van Soest (1996).

The content of non-fiber carbohydrate (NFC), expressed as a percentage of DM, was calculated according to Sniffen, O'Connor, Van Soest, Fox and Russel (1992), where in: CNF = 100 - (%NDFcp + %CP + %EE + %MM); where NDFcp is neutral detergent fiber corrected for ash and protein. The total digestible nutrients (TDN) were obtained according to the equation adopted by the NRC (2001), where: TDN = [digestible CP + digestible NDFcp + NFC + (2.25 x digestible EE)].

Sugars of fine mesquite pod meal (Table 2) were analyzed by ion chromatography equipped with column ion-exchange and electrochemical detector, and pectin consisted of the neutralization of the overall charge of free uronic acid residues by calcium ions causing gelation and precipitation of pectin.

Table 2. Quantification of sugars and pectin in fine mesquite pod meal.

Component	Content (% DM)
Fructose	8.88
Glucose	26.29
Raffinose	< 0.005
Saccharose	49.23
Maltose	< 0.005
Arabinose	1.18
Fucose	0.14
Galactose	0.75
Manose	< 0.005
Rhamnose	0.22
Xylose	1.58
Pectin (expressed as calcium pectate)	0.89

The second experiment consisted of two evaluations, one to assess the palatability of feed and another to evaluate the preference of sheep between two diets. To this end, 14 intact male lambs, from crosses between Santa Inês and unidentified breed animals, average initial BW of 31.0 ± 3.5 kg, 196 ± 10 days of age, were distributed in a completely randomized design with two treatments and 14 replications. The use of animals was approved by the Ethics Committee on Animal Experimentation of UESB (Protocol 02/2012).

The expression of palatability and preference for diets containing or not FPM was evaluated with the use of two diets: with no FPM added and with addition of 3.0% FPM in MS, as it is an intermediate value between levels examined.

The methodology used to evaluate the preference of animal for diets and feed palatability was adapted from Walker (1994) and Quaranta et al. (2006). The palatability test lasted eight days, four for adaptation of animals to facilities and management, and four days for data collection.

For palatability evaluation, the animals received only concentrate for 30 minutes; half of the animals (n = 7) received feed without FPM and the other half received feed containing 3.0% FPM. To control the effect of animal, treatments were reversed every day, totaling four observation days per group and fourteen replications per treatment. After that time, the leftovers were taken and weighed, and only ground Tifton 85 hay was provided to animals until 6:00 p.m., when the hay was removed and the animals were fasted up to 8h a.m. Water was supplied *ad libitum* throughout the experimental period.

The variables analyzed were: intake of feed dry matter within 30 minutes (DMIg), dry matter intake according to the metabolic weight (DMIpm), real time spent by animals for consumption (g $min.^{-1}$) and the relationship of feed dry matter intake per minute (DMIm). Palatability was assessed by considering the amount of feed consumed within 30 minutes after the supply and the time the animal spent for consumption.

For preference evaluation, the same animals and the same feed of palatability evaluation in sheep were used. After four days for adaptation, eight consecutive days were used to collect data. All animals received ground hay and feed concentrates (with and without 3% FPB), simultaneously, in separate troughs. To prevent bias, troughs with concentrate feeds remained side by side and had their positions daily reversed. Preference evaluation comprised a 24 hour-period. The variable analyzed was the DMIpm. All food was provided only once, at 8h, after collection of leftovers. The supply was estimated to allow 30% leftovers.

Data were subjected to analysis of variance at 5% probability using the MIXED procedure of SAS (2004). In the test of the effect of FPM levels in the first experiment, it was also determined the contrast between the treatment without FPM versus FPM (0 vs FPM), linear (L) and quadratic (Q) polynomial contrasts and regression analysis.

Results and discussion

The increase in FPM levels in the diet had a quadratic effect on the dry matter intake per kg metabolic weight, with a maximum point when included 2.4% FPM (Table 3). However, the nutrient intake in relation to metabolic body weight was not affected.

In DM ingested (Table 3), the content of crude protein (CPI) had a quadratic response, with a maximum of 3.9% FPM, but the content of total digestible nutrients (CNDT) was similar ($p > 0.05$).

The inclusion of FPM did not influence the TWG, ADG and FC (Table 3), with mean values of 10.48 kg, 174 g and 5.94, respectively. Nevertheless, the GFE was lower and showed a quadratic behavior in BCS (Figure 1) with inflection point at 3.21% inclusion of FPM.

Table 3. Mean values and standard error of the mean (SEM) for the characteristics of food and nutrient intake in relation to metabolic weight, performance and feed efficiency of lambs fed diets containing increasing levels of fine mesquite pod meal (FPM).

Parameter	% FPM						L	Q	0 vs FPM
	0	1.5	3.0	4.5	6.0	SEM			
DMIPM	85.3	91.8	88.4	87.1	80.3	1.3	0.088	0.019[a]	0.416
CPIMW	12.7	14.4	13.7	14.5	13.0	0.3	0.689	0.084	0.128
NDFIMW	29.1	32.6	30.6	32.7	29.3	0.8	0.917	0.1315	0.210
ADFIMW	12.1	12.9	12.1	13.0	11.6	0.3	0.679	0.299	0.661
NFCIMW	23.8	25.4	24.1	25.6	23.0	0.7	0.700	0.275	0.637
TDMIMW	44.4	43.0	49.0	46.3	44.9	1.2	0.629	0.371	0.655
CPC (%)	17.6	18.2	18.2	18.2	18.2	0.1	0.001	0.001	<.0001
TDNC (%)	62.4	55.3	67.8	57.9	62.7	2.2	0.810	0.944	0.799
TWG (kg)	10.6	10.9	10.5	11.6	8.8	0.4	0.305	0.189	0.843
ADG (g)	177	181	175	192	146	0.0	0.306	0.182	0.846
FC	5.5	6.2	6.1	5.7	6.2	0.2	0.431	0.685	0.119
GFE	18.3	16.4	16.8	16.3	16.3	0.4	0.114	0.378	0.037
BCS	2.8	3.2	2.9	3.4	2.9	0.1	0.540	0.072	0.039

DMIPM: dry matter dry matter intake in relation to metabolic weight; CPIMW: crude protein intake in relation to metabolic weight; NDFIMW: neutral detergent fiber intake in relation to metabolic weight; ADFIMW: acid detergent fiber intake in relation to metabolic weight; NFCIMW: non-fiber carbohydrates intake in relation to metabolic weight; TDNIMW: total digestible nutrients intake in relation to metabolic weight; CPC: crude protein content in the consumed dry matter; TDNC: total digestible nutrients content in the consumed dry matter; TWG: total weight gain; ADG: average daily gain; FC: feed conversion; GFE: gross feed efficiency; BCS: body condition score (range 1-5); [a]DMIPM = 85.4512 ± 1.117* + 3.9504 ± 1,1,5618FPM*** - 0.8092 ± 0.2951FPM^2**; *($p < 0.0001$); **($p < 0.01$); ***($p < 0.05$).

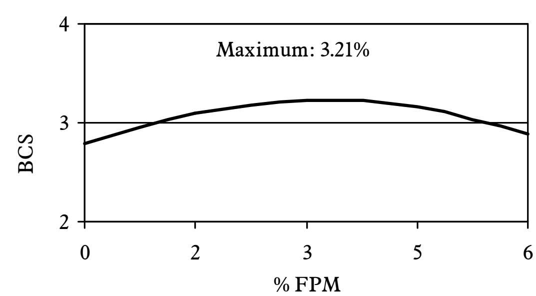

Figure 1. Body condition score (BCS) according to levels of inclusion of fine mesquite pod meal (FPM) in the diet of feedlot lambs at the performance phase (BCS = 2.7866 ± 0.09938 + 0.2738 ± 0.1178X – 0.04262 ± 0.02011X^2).

FPM is composed of 49.2% sucrose, 8.9% fructose and 26.3% glucose, making up a total of 84.4% for these sugars. It was also detected the presence of arabinose, fucose, galactose, rhamnose and xylose in small proportions, as well as pectin (Table 2). As the FPM is sugar-rich, the highest proportion of this meal in the diet promoted changes in the rumen probably causing changes in dry matter intake.

The inclusion of soluble CHO in the diet of ruminants (3.0 to 7.5%) can positively affect intake, through factors related to the energetic supply, readily available to the rumen microorganisms and thus increasing microbial growth, resulting in improved digestibility and increased passage rate through the rumen, resulting in increased consumption (Oba, 2011; Sannes, Messman & Vagnoni, 2002). Nonetheless, the increased concentration of fatty acids in the rumen raises plasma glucose levels. Regarding the relationship between plasma glucose level and the regulation of appetite, the glucostatic theory may explain the quadratic effect on dry matter intake.

The type of accumulated tissue (gain composition) may explain the similarity in weight gain, considering the density of the tissues, since there is an increase in the thickness of subcutaneous fat with increasing body condition (Cartaxo & Sousa, 2008).

At the end of the performance experiment, animals showed intermediate BCS (2.5 to 3.5) according to the classification proposed by Russel, Doney and Gunn (1969), but the inclusion of FPM has led to an average increase of 11% in BCS, which can be explained by the fiber digestibility. Acetate is the main precursor of fatty acid synthesis in ruminants. Usually the excess energy is converted into fatty acids, but in this experiment, there was no change in TDN intake with the inclusion of FPM in the diet, reinforcing the argument of greater availability of acetic acid due to increasing fiber digestibility with the addition of FPM.

During the digestibility evaluation period (Table 4), IMSPM was similar to the performance evaluation period (Table 3).

Table 4. Intake and digestibility of nutrients according to inclusion levels of fine mesquite pod meal (FPM) in sheep diet during the digestibility period.

Parameter	% FPM						L	Q	0 vs FPM
	0	1.5	3.0	4.5	6.0	SEM			
DMIPM	85.6	100.4	93.3	86.4	80.9	2.4	0.026	0.004[a]	0.137
DMD (%)	65.9	64.4	63.5	64.2	67.3	0.5	0.167	0.007[b]	0.036
CPD (%)	66.9	63.7	63.2	64.5	67.5	0.7	0.302	0.004[c]	0.009
EED (%)	79.3	72.4	74.8	76.8	82.7	1.1	0.045	0.001[d]	0.026
NDFD (%)	53.9	52.8	57.6	58.2	62.4	0.9	<.0001[e]	0.412	<.0001
ADFD (%)	43.4	34.8	36.3	35.2	40.8	1.6	0.952	0.078	0.271
CNFD (g)	310	320	250	250	220	1.0	<.0001[i]	<.0001	<.0001

DMIMW: Dry matter intake per kg metabolic weight; DMD: Dry matter digestibility; CPD: Crude protein digestibility; EED: Ether extract digestibility; ADFD: Acid detergent fiber digestibility; NDFD: Neutral detergent fiber digestibility; CNFD: Digestible non-fiber carbohydrates. ⋆(p < 0.0001); ⋆⋆(p < 0.01); ⋆⋆⋆(p < 0.05); ⋆⋆⋆⋆(p < 0.1); NS (p > 0.1); SEM = Standard error of the mean; Equations: [a]DMIMW = 87.1361 ± 2.5046⋆ + 6.1404 ± 2.2915X⋆⋆⋆ - 1.2927 ± 0.4111X^2⋆⋆; [b]DMD(%) = 79.1618 ± 1.0489⋆ - 4.1467 ± 1.2579X⋆⋆ + 0.7932± 0.2175X^2⋆⋆; [c]CPD(%) = 66.9108 ± 0.5675⋆ - 2.5586 ± 0.8002X⋆⋆ + 0.4492 ± 0.1678X^2⋆⋆⋆; [d]EED(%) = 79.2088 ± 1.0523⋆ - 6.4426 ± 1.6706X⋆⋆ + 1.1716 ± 0.2801X^2⋆⋆; [e]NDFD(%) = 52.8724 ± 1.5072⋆ + 1.2665 ± 0.3662X⋆⋆; [i]CNFD(%) = 0.3208 ± 0.01304⋆ - 0.01672 ± 0.003294X⋆.

There was effect of FPM inclusion levels (Table 4) on the digestibility of dry matter (DMD), crude protein (CPD), ether extract (EED) and neutral detergent fiber (NDFD). Except for NDFD, all other parameters showed a quadratic behavior, reaching minimum values with the inclusion of 2.6, 2.85 and 2.74% FPM, for digestibility of DM, CP, and ADF, respectively. The NDFD had increasing linear behavior, with an increase of 1.27 percent points in NDFD per FPM inclusion unit, amounting to a difference of 8.5% between zero and 6% inclusion. The acid detergent fiber (ADFD) was not affected by FPM inclusion.

Improved dry matter digestibility, among several factors, may be associated with intake, with an antagonistic behavior between these two factors; the main argument is represented by variations in feed passage rate through the rumen (Van Soest, 1994). This behavior can otherwise be observed by the proximity of DMIPW maximum and DMD minimum, 2.4 and 2.6% FPM inclusion, respectively.

The beneficial effect of sugars for ruminants is related to the rapid increase in microbial growth, due to the readily available energy level, higher efficiency of utilization of protein nitrogen sources of soluble or non-protein nitrogen (Kim, Lee & Kim, 2005; Oba, 2011), which supports the increased passage rate and digestibility of NDF.

The improved ruminal digestion of neutral detergent fiber is due to replacement of starch by sucrose, considering a reduction of 14.9% in the participation of corn in the diet with 6% FPM inclusion. This was also reported by Varga et al. (2001), who investigated the addition of molasses in the diet.

With the inclusion of FPM, participation of NDF from soybean meal increased over corn, which may partially explain the linear behavior of NDFD. According to Zambom et al. (2001), cell wall digestibilities of soybean meal and ground corn are 90.17 and 60.00%, respectively.

In addition to the metabolic and digestive aspects related to consumption, other factors may be associated with variation in intake in ruminants, including palatability and/or preference. In this study, there was no difference in palatability and preference of feed containing or not 3% FPM (Table 5).

Table 5. Mean and standard error of the mean (SEM) for palatability and preference of diets containing or not fine mesquite pod meal (FPM) in feedlot sheep.

Characteristics	0% FPM	3.0% FPM	Mean	SEM	P-value
CDMI (g $30min^{-1}$)	152.50	154.40	153.45	0.60	0.8922
Time (min.)	13.90	14.28	14.09	1.21	0.8580
DMIm (g)	13.89	14.28	14.08	2.04	0.7599
DMImw (g $kg^{-0.75}$)	13.06	13.18	13.12	0.58	0.9193

CDMI: concentrate dry matter intake; DMIm: dry matter intake per minute; DMIpm: dry matter intake per metabolic weight; SEM: standard error of the mean/P: Probability.

Santos et al. (2015) reported an increase in DM intake in sheep consuming diets with increasing levels of mesquite pod meal and attributed this behavior to the taste of the food as well as due to the reduction in NDF content of diets. In agreement with Valadares Filho (2006), sugars present in mesquite pod are composed of 75% sucrose.

Taking into account that FPM contains 84.4% sugars, including 49.23% sucrose (Table 2), it was expected an increase in the intake of animals fed diets with 3% FPM, once this had 4.2 times more sugars in its composition that feed without FPM. However, sucrose is a soluble carbohydrate rapidly degradable in the rumen (Van Soest, 1994) and can increase the production of acids in a short period, thus accelerating satiety. In this regard, the inclusion of lower levels must be also studied.

Fifteen minutes is the average time considered necessary for the start of post-feeding consequences, when the animal can reduce or stop consuming a food or feed according to metabolic responses of the organisms to the absorbed substances (Provenza, 1995). Thereby, there was no evidence that the FPM contains substances that provides negative consequences for the metabolism, which can reduce preference or consumption by the animal in this time interval.

As a result of lack of response to the inclusion of FPM in feed, in terms of amount of feed consumed within the observation time, it can be inferred that there was no preference displayed by sheep for concentrate prepared with 3% FPM. These features may be related to the absence of initial preference of those animals for the type of sensory characteristics of FPM.

The present study indicated that because FPM has a high amount of sugars in its composition, especially sucrose, it stimulated dry mater intake in sheep at levels below 2.4% inclusion, since it promoted the intake of dry matter in relation to the metabolic weight.

Conclusion

The fine mesquite pod meal has no influence on weight gain in sheep, but reduces intake and increases the digestibility of dry matter for inclusion levels above 2.4%.

The highest contribution of the inclusion of fine mesquite pod meal is related to the increase in neutral detergent fiber digestibility.

The preference and palatability of diets in feedlot lambs are not affected by the inclusion of FPM. Inclusion levels below 3% of fine mesquite pod meal should be further studied.

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