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Enriched Palm Forage Meal for Feeding Sheep and Goats

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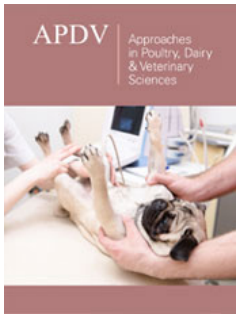

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Taking into account that for the animal to express its maximum potential, adequate food is necessary and that, according to Ribeiro [1], food costs can reach 80% of production costs (normally between 50 and 60%), if the choice is not judicious. It is essential to know the characteristics of foods. The cactus Opuntia ficus indica (L.), popularly known as forage palm, is used in different ways, mainly in animal feed during periods of low rainfall, as it is a water stress tolerant crop [2] it originates from tropical and subtropical America, but is currently found in a wide variety of agroclimatic conditions, in wild or cultivated forms, throughout the American continent. The same author estimates that there are currently approximately 600,000 ha cultivated with palm cultivars, despite recent government efforts to diversify the use of the crop, most of the planted areas are still dedicated to forage production.

Based on Bravo apud Oliveira & Cavalcante Filho [3] "forage palms belong to the class Liliateae; Cactaceae family; subfamily Opuntioideae, tribe Opuntiae; genus Opuntia, subgenus Opuntia and Nopalea; from the Vegetablia kingdom; subkingdom Embryophita; Division Angiospermae. Common names: nopal (Spanish); forage palm, sweet palm, small palm (Portuguese)". According to Jr Dubeux [2], "in Brazil, forage cactus was introduced in 1818, in Rio de Janeiro Lira and, due to edaphoclimatic conditions, it is estimated that there are 500,000 ha cultivated with the species O. ficus-indica (cv Gigante and Redonda) and N. cochenillifera (cv. Miúda), mainly in the Northeast region [4]". According to Oliveira & Cavalcante Filho [3], these species are cacti without thorns, with fast growth and higher moisture content than other cacti.

The reason for the vast area planted with palm in Brazil is possibly due to credit agents, government support policies, rural extension, the private sector, the milk processing industry and the outstanding role of the research carried out, which culminated in the advancement of productivity of culture [2,4] emphasizes this issue by saying that, "in regions with a semi-arid climate, such as the Brazilian Northeast, cactus pear (Opuntia fícus-indica Mill) represents a strategic reserve of nutrients and water for periods of drought." [5], explains that this is due to the efficient use of soil water through high CO2 uptake and reduced water loss that usually occurs at night. Alvarez & Rodriguez apud [6], indicated the cultivation of palm as a strategic resource to reduce water consumption by goats in the Villa Araure region, State of Lara. Bishop [4] observed that water consumption decreased linearly as the levels of cactus in the diet increased, as a result of greater consumption of water via cactus. [7] concluded that palm meal showed great potential for use as an alternative source of energy for ruminants.

Candid; Araújo; Cavalcante [5] confirms these statements by saying that cactus pear contains up to 90% water, which guarantees the satiation of the herds during the dry months, even in regions where the water sources have all been exhausted. The palm used in animal feed can become richer in nutrients when some substrates are added to the bran, which according to Cândido; From Araújo; Cavalcante is the dehydrated palm, which is an excellent

energy concentrate, supplying the energy shortage of the herds during the dry season, keeping them in good body condition, and may even provide reasonable gains, as long as it is supplied within a diet that balances its low protein and fibrous carbohydrate content. Given this, Araújo Filho report that to obtain enriched palm meal, a fermentation process and the action of microorganisms in the presence of a mineral mixture are used.

Diets for protein enrichment can be made with different types of food, Araújo; Silva; Brito; Junior Oliveira; Santos mention that the abundant and low-cost substrates commonly used in Brazil are: banana, apple, cashew, pineapple, flour, corn on the cob, sugar cane, sugarcane bagasse, molasses, vinasse, wheat straw bran, chickpeas, coffee pulp, cooked rice, lemon peel, orange, waste from the manufacture of frozen acerola, passion fruit, guava and strawberry pulp; cashew nut and cactus mandacaru without thorns and forage palm. However, when diets using cactus pears are not balanced, they can cause digestible problems due to the fiber content. Mattos and Wanderley apud Santos [4] "associated palm to different sources of roughage and found no digestive disorders. After all, when there is a balance between the amounts of fibrous and non-fiber carbohydrates in the diet, diarrhea does not occur [5]".

Oliveira & Cavalcante Filho [3] studying the Opuntia and Nopalea subgenera found that the paddles of plants of the genus Nopalea are less heavy and smaller than those of the genus Opuntia. Santos apud Santos [4] mentions that cactus pear has a chemical-bromatological composition with low levels of dry matter and protein and high levels of carbohydrates and minerals, which vary according to the species, age of the articles and time of production. year. Partially disagreeing with this statement, Oliveira & Cavalcante Filho [3] say that cactus pear, despite being poor in protein, has a high production of digestible dry matter and can be fed to animals along with other foods such as straw. crops, dry pastures, cutting grasses, hay (source of fiber) to prevent the occurrence of diarrhea and cottonseed cake and soybean meal, for protein enrichment. Silva apud Verás pointed out that "cactus, unlike other forages, presents a high rate of ruminal digestion, with dry matter being extensively and quickly degraded, favoring a higher rate of passage and, consequently, consumption similar to that of concentrates". About this, Teles Wanderley Santos. apud Santos [4], comments that the extremely high Ca: P ratio is related to the reduction in dry matter intake and the appearance of kidney stones in goats and that the K: Na ratio in cactus pear is also high, although it can vary widely due to variation in K content.

The use of up to 56.0% cactus pear in place of elephant grass hay increases the intake and improves the use of nutrients in diets for sheep Bispo. Veras [7] observed DM consumption with values close to those verified by Cunha, when working with sheep fed diets based on cactus pear in natura, elephant grass and concentrate (2.79% BW and 70.25g/kg 0.75). Bishop assume that the probable high digestibility and high digestion rate of cactus pear have provided a better energy: protein balance in the treatments that contained this ingredient, resulting in lower ruminal NH3 concentration in the animals that received diets with higher palm levels. In a study in which the substrate used for protein enrichment was cactus pear (Opuntia ficusindica Mill) giant variety, and the microorganism used for the bioconversion process of cactus pear was the yeast Saccharomyces cerevisiae, pressed, of the commercial type fresh biological yeast, with 80% moisture (wet basis) and average crude protein content of 45% (dry basis), Araújo; Silva; Brito; Junior Oliveira; Santos observed that the CP values found with the nutritional enrichment of cactus pear were higher than the minimum protein content of 8% recommended by the NRC (Nutrient..., 1996), to keep microorganisms in the animal rumen.

These same authors verified that the optimal time to reach the highest value of crude protein in the enriched substrate was 48 hours of the process. At concentrations of 5, 10 and 15% of Saccharomyces cerevisiae yeast, it obtained maximized values of crude protein of 14.4, 22 and 26%, respectively". Tosto [8,9] reported that Menezes [10] found a CP digestibility coefficient of 85.79% in diets based on cactus pear "in natura" and dehydrated wine residues, associated with increasing levels of urea (1, 2 and 3%). On the incorporation of greater protein intake with the inclusion of palm meal Araújo; Bade; Menezes; Do Socorro; Sa; De Oliveira explain that CP consumption increased due to the higher content of this fraction in bran, thus explaining the increase in nutrient consumption.

Veras [7] analyzing sheep fed diets containing increasing levels of replacement of corn by palm meal concluded that, "there was no effect (P>0.05) of the levels of replacement of corn by palm meal on consumption of nutrients. This result can be explained by the fact that consumption was limited to 2.5% of live weight and the experimental diets had a very similar composition". When did palm oil replace Araújo cassava shavings; Bade; Menezes; Do Socorro; Sa; De Oliveira found that water consumption provided an increasing linear behavior with the replacement of cassava scrapings by palm bran, and at each 25% increment of bran, there was an increase of 300mL in water consumption Water. Perazzo Neto apud Araújo; Silva; Brito; Junior Oliveira; Santos using Aspergillus niger + urea in the protein enrichment of cactus pear, found a value of 21.4% of crude protein; Carvalho, in the same cactus, when using Aspergillus niger + Fusarium + urea, obtained 24% of CP and Araújo, when using 15% of the yeast Saccharomyces cerevisiae, obtained 26% of CP. In that same study, the author recorded a higher concentration of dry matter content of approximately 9% in relation to the value found in the in natura form corresponding to 8%.

Bishop, explain that when the proportions of cactus pear in the diets increased, DM Intake, in the three forms in which it was expressed, increased linearly, probably due to the increasing effect on DM digestibility and MO. Similar results were found by Veras [7] in which palm bran did not affect nutrient intake and digestibility, as there was greater efficiency in ruminal fermentation, with the exception of acid detergent fiber, in which a linear increase was observed with the inclusion of bran of palm [11]. For Bispo, palm

also contains 12.9% starch, a relatively high value for forages in general. This high percentage of fast-digesting carbohydrates probably increased microbial activity and VFA concentration, resulting in a drop in pH [12-13]. Bispo also talks about the mucilage contained in the palm which leads to the production of foamy tympanism and, consequently, can reduce the absorption of VFAs, resulting in a lowering of the pH, but without compromising the digestion of nutrients.

The use of forage palm bran in place of cassava shavings did not change the performance and commercial cuts of carcasses of crossbred sheep in confinement in the edaphoclimatic conditions of the northeastern semi-arid region, and may be a potential substitute for cassava shavings [3]. Araújo Filho cites the work of Véras when evaluating the performance and carcass characteristics of sheep fed diets containing four levels of replacement of ground corn with palm meal, in which feed conversion ranged from 5.71 to 10.07. Thus, forage cactus enrichment improves ruminal dry matter digestibility and little increases the nutritional value of this food through the addition of microorganisms and mineral mixture, and its use is recommended to feed sheep and goats in the critical period of the semi-arid region.

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