DOI: 10.5965/223811712332024367

Revista de Ciências Agroveterinárias 23 (3): 2024
Universidade do Estado de Santa Catarina

Productive characterization and nutritional value of pastures on the 7 Quintas farm, Waco-Kungo, Angola

Caracterização produtiva e do valor nutritivo dos pastos implantados na fazenda 7 Quintas, Waco-Kungo, Angola

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Submission: 04/01/2024 | Accepted: 28/05/2024

RESUMO

O presente estudo foi desenvolvido com o objetivo de caracterizar o potencial produtivo e o valor nutritivo das espécies forrageiras implantadas na fazenda, de outubro de 2018 a março de 2019. As espécies identificadas são *Brachiaria Brizantha* e gênero *Cynodon.* O delineamento experimental utilizado foi o de blocos ao acaso com dois tratamentos e três repetições, técnica direta (método de quadrado) que consiste em seis gaiolas metálicas de 0,50 m x 0,50 m fixadas, sendo três por cada parcela. A cada 30 dias realizou-se o corte da massa de forrageira em cada uma das gaiolas a uma altura de 10 cm do solo, e enviadas ao laboratório Central Agroindustrial do Ministério da Agricultura em Luanda para análise bromatológica. Variáveis analisadas: matéria mineral (MM) 10,7% e 7,6%; umidade (U) 24,12% e 32,9%; proteína bruta (PB) 3,93% e 3,19%; fibra bruta (FB) 0,35% e 3,19%; extrato etéreo (EE) 1,14% e 0,98%; cálcio (Ca) 0,39% e 0,33%, fósforo (P) 0,12% e 0,16%; potássio (K) 3,56% e 2,47% de médias respectivamente para as espécies identificadas são *Brachiaria Brizantha* e gênero *Cynodon* . Calculou-se o Extrato não nitrogenado, Carboidratos, Energia bruta, produtividade da pastagem e a capacidade de lotação. A produtividade de MS foi considerada relativamente baixa em ambos os gêneros com média de 195,06 kg e 178,08 kg para a *Brachiaria Brizantha* e gênero *Cynodon,* respectivamente*.* Todavia os dados obtidos podem servir como base para a continuidade de estudos, além da sua importância para o estabelecimento de banco de dados sobre produtividade e valor nutritivo das pastagens, haja vista a falta dessas informações em Angola.

PALAVRAS-CHAVE: produção; forragens; nutrição.

ABSTRACT

The present study was developed with the objective of characterizing the productive potential and nutritional value of forage species implemented on the farm, from October 2018 to March 2019. The species identified are *Brachiaria Brizantha* and the genus *Cynodon.* The experimental method used was the direct technique (square method) which consists of six metal cages measuring 0.50 m x 0.50 m fixed, three for each plot. Every 30 days, the forage mass was cut in each of the cages at a height of 10 cm from the ground and sent to the Central Agroindustrial laboratory of the Ministry of Agriculture in Luanda for bromatological analysis. Variables analyzed: mineral matter (MM) 10.7% and 7.6%; humidity (U) 24.12% and 32.9%; crude protein (CP) 3.93% and 3.19%; crude fiber (FB) 0.35% and 3.19%; ether extract (EE) 1.14% and 0.98%; calcium (Ca) 0.39% and 0.33%, phosphorus (P) 0.12% and 0.16%; potassium (K) 3.56% and 2.47% of averages respectively for the identified species are *Brachiaria Brizantha* and genus *Cynodon.* The non-nitrogen extract, carbohydrates, gross energy, pasture productivity and stocking capacity were calculated. DM productivity was considered relatively low in both genera with an average of 195.06 kg and 178.08 kg for *Brachiaria Brizantha* and genus *Cynodon,* respectively. However, the data obtained can serve as a basis for continuing studies, in addition to its importance for establishing a database on the productivity and nutritional value of pastures, given the lack of this information in Angola.

KEYWORDS: production; forage; nutrition.

INTRODUCTION

Of the world's agricultural land, 77% is used for grazing and growing animal feed. Half of the planet's habitable areas are used exclusively for food production (51 million km²), 37% are forest areas (39 million km²), and 11% are shrublands (RITCHIE & ROSER 2013).

Ruminant production relies on pasture systems (grasses and legumes), which are economically the most viable feed source in a production system (SILVA et al. 2016). Determining forage availability is of fundamental importance for planning the rational exploitation of commercially managed areas (DE OLIVEIRA et al. 2021).

Forage refers to all plant-based feed consumed by animals, primarily grasses and legumes. It is the most crucial component in ruminant diets. Through the ingestion of forage dry matter (DM), essential nutrients (carbohydrates, proteins, lipids, vitamins, and minerals) are metabolized in the gastrointestinal tract and absorbed into the bloodstream. These nutrients, processed through chemical and physiological mechanisms, meet the animals' needs for maintenance, production, and reproduction (SILVA et al. 2016).

One of the factors contributing to low livestock productivity is the seasonal nature of tropical forage plant production during drier periods of the year (SOUZA et al. 2009). Seasonality does not determine pasture age but can influence pasture productivity at the time of use, while leaf/stem composition affects the nutritional value of forage (DANTAS et al. 2016).

The nutritional value of forage plants is determined by their chemical composition and the nutrients directly responsible for dry matter digestibility, crude protein content (CP), and acid detergent fiber (ADF) (DANTAS et al. 2016). The association between chemical composition, digestibility, voluntary intake, and the interaction of hereditary and environmental factors determines the quality of a forage plant, which ultimately reflects its potential to generate animal performance (MOORE & MOTT 1994).

According to VAN SOEST (1994), tropical forage plants have lower digestibility compared to temperate ones, making grazing management in tropical environments a complex challenge, given the need to promote economic productivity that is sustainable and environmentally friendly.

Angola is a country with a tropical climate characterized by grasslands categorized according to the South African classification system into: Sour veld, High veld or acre pastures; Mixed veld, Middle veld or mixed pastures; Sweet veld, Low veld or sweet pastures, with excellent conditions for the establishment of improved pastures, already visible in the last decade in many production units in the south, center and north of the country (DIAS et al. 2012). However, research on pasture productivity and nutritional value years after establishment remains inadequate.

Most livestock production units in Angola have very low productivity rates and are characterized by management deficiencies, including the lack of monitoring and control of pasture conditions and forage production in grazing areas. The periodic estimation and monitoring of forage biomass variation, as well as its nutritional value, is one of the most effective ways to generate input for pasture management decision-making processes (SILVA et al. 2019). Pasture assessments in specific areas of the country could help establish standard knowledge about forage conditions in Angola, since in some regions producers are unable to conduct any analyses, although in many cases specific treatment for each region is necessary. In this regard, the aim was to assess the productive potential and nutritional value of forage species grown at Fazenda 7 Quintas in Waco-Kungo, Cuanza Sul.

MATERIALS AND METHODS

The study was conducted at Fazenda 7 Quintas, as shown in the location map in Figure 1. According to data from the Geographic and Cadastral Institute of Angola (ICGA 2024), the area receives an annual rainfall of 1350 mm and has an average temperature of 20.6°C.

The farm has a herd of 520 beef cattle, including Bonsmara, Brahman, Simmental, and native breeds. According to the Geographic and Cadastral Institute of Angola (IGCA 2024), Fazenda 7 Quintas is located in Agricultural Zone 17, in the locality of Aldeamento 1, Waco-Kungo Commune, Cela Municipality, Cuanza Sul Province.

Figure 1. Map of Cuanza Sul with indication of the municipality of Cela, Waku Kungo. Source: IGCA 2024.

The climate is characterized by two seasons: a seven-month rainy period (October-April) and a five-month dry period (May-September). The elevation ranges from 1,250 to 1,400 meters, with an average rainfall of 1,350 mm and an average temperature of 30°C (86°F). The relative humidity in the dry season varies between 40 and 50% and in the rainy season it rises to 90%, with an average annual temperature range of less than 4 ºC (DINIZ 2006). The dominant vegetation is open woodland or miombo forest, as described in J. Gossweiler's Phytogeographic Map of Angola, characterized by species such as Isoberlinia, Brachystegia, and Julbernardia.

The experiment took place from October 2018 to March 2019. The farm has an area of 51 hectares planted with *Brachiaria Brizantha* and 58 hectares for the *Cynodon* genus, maintained under rotational grazing. A 625 m^2 plot was selected from one hectare of each of the two areas with their respective forages identified according to farm records. The experimental design used was a randomized block design with two treatments and three replications, using a direct technique (quadrat method) consisting of six fixed metal cages measuring 0.50 m x 0.50 m, with three cages per plot, spaced 50 m apart, according to (SILVA et al. 2016).

Every 30 days, the grass was cut to a height of 10 cm above the ground. The contents of the three subsamples from each plot were combined to form a single sample per plot. 18 sub-samples were collected, with three monthly samples taken from each plot of the analyzed forage crop during the experimental period.

The collected field samples were placed in plastic bags, weighed, and sent to the Central Agroindustrial Laboratory of the Ministry of Agriculture in Luanda, where parameters were analyzed according to the methodologies and standards referenced in Table 1.

Table 1. Parameters, methodology and regulations used in the Laboratory.

Parameters	Methodology	Normative
Ashes	Gravimetry 550 °C	Inmetro
Humidity	ISO 712:2009	Codex Stan 152/1985
Etherium extract	Soxelt	Codex Stan
Crude protein	Kjeldahl	Codex Stan 152/1985
Crude fiber	Solubility with H_2OSO_4	Codex Stan
Calcium	Flame photometry	PD no. 140/16-07-07
Phosphorus	Olsen	PD no. 140/16-07-07
Potassium	Flame photometry	PD no. 140/16-07-07

The nitrogen-free extract (NFE) was calculated according to the formula described in SALMAN et al. (2010), ((ENN = 100 - (PB + EE + FB + MM)) where ENN (Non-Nitrogenous Extract), PB (Crude Protein), EE (Ethereal Extract), FB (Crude Fiber) and MM (Mineral Matter). Carbohydrates (CHO) using the formula: CHO = FB + ENN and energy in the food according to the expression: Energy in kcal/100 g =PB x 5.65 Kcal + EE x 9.40 Kcal + CHO x 4.15 Kcal (RODRIGUES 2010).

The biomass yield per hectare for each plot was assessed through sampling by harvesting three representative subsamples from each plot using 0.5 m x 0.5 m metal frames. After mixing, the total sample weight for each month was measured. Productivity was calculated using the formula proposed by CARVALHO (2008): Productivity = Total sample weight x 0.2 x 0.7. The determination of animal stocking capacity was calculated according to HODGSON et al. (2000) is shown in Table 2.

Table 2. Animal stocking level.

Animal Unit (A.U)	450 Kg P.V
Dry matter consumption	2.5 % of P.V per day.
1 animal weighing 450 kg P.V x 2.5%	9 Kg MS/dia.
Occupation time	1 day.
Dry Matter Production (Kg)	11.25 kg DM/day.

Microsoft Office 365, specifically Excel, was used for data analysis, allowing for the creation of a database and input of result values. The statistical analysis was performed using SPSS version 22.0, including simple and multiple regression analysis, as well as standard deviations, means, minimum and maximum values, and F-tests.

RESULTS AND DICUSSION

Ash in *Brachiaria Brizantha* and *Cynodon*

The results obtained from the ash analysis (Figure 2) showed values ranging from 2.98% to 10.00%, which are within the standards reported in the literature for these genera. LINN & MARTIN (1999) reported that most forages have an ash content ranging from 3% to 12%, and VALADARES FILHO et al. (2010) obtained for B. *Brizantha* was 6.38 %. MALAFAIA et al. (1998) pointed to a value of 8.69% for the *Cynodon* genus, showing consistency with the results of this work. However, MACHOGU (2013), in a comparative study of the productivity of B. *Brizantha* variety Mulato II with native species in Nairobi, Kenya, obtained values 16% higher than those obtained in the present trial.

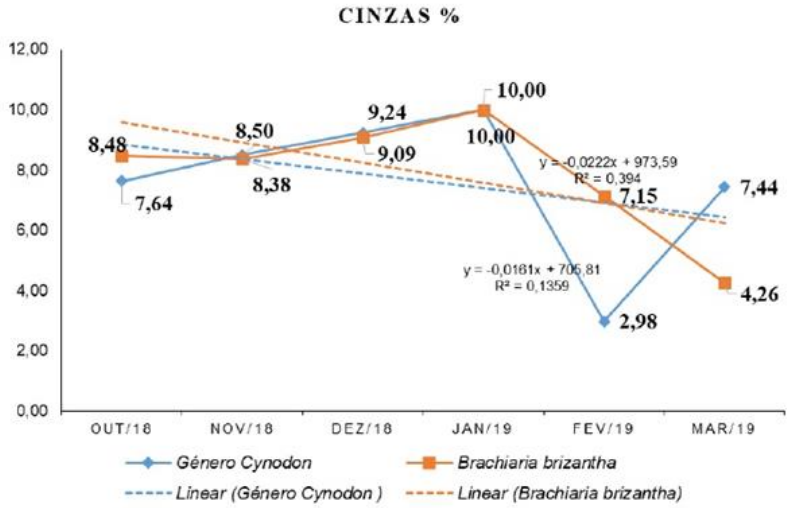

Figure 2. Variation in ash from *Brachiaria Brizantha* and the *Cynodon* genus between October and March, expressed as a percentage.

Moisture in *Brachiaria Brizantha* and *Cynodon*

Analyzing the moisture percentage (Figure 3), it was observed that in the last four months (December, January, February, and March), both genera showed higher percentages, which can be attributed to the increased rainfall characteristic of this period. Water is an essential nutrient for all animals and should be consumed freely, but it has no caloric value and no nutritional economic value. For ruminants, the moisture content of diets can vary from 20 to 90% (i.e. 10 to 80% DM) (MEDEIROS et al. 2015).

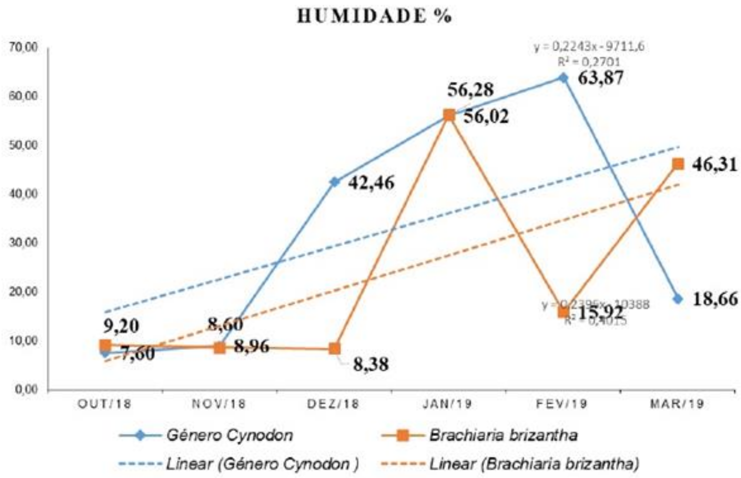

Figure 3. Variation in moisture content of *Brachiaria Brizantha* and *Cynodon* species from October to March, expressed as a percentage.

Ether extract in *Brachiaria Brizantha* and *Cynodon*

The results of the ether extract (EE) percentage (Figure 4) are significantly lower than those reported in scientific literature, considering its functions in animal nutrition as one of the main food components, along with proteins, carbohydrates, fiber, vitamins, and minerals. Its presence and quantity in food plays several important roles: source of energy, palatability and flavor, transport of fat-soluble vitamins, texture and consistency, satiety, protection of organs.

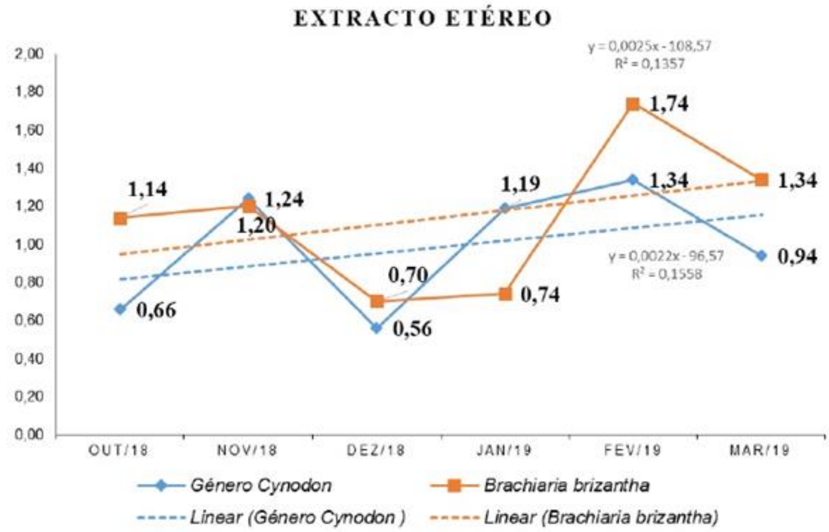

Figure 4. Ethereal extract values of *Brachiaria Brizantha* and *Cynodon* between October and March, expressed as a percentage.

In the present study, the values obtained for *Brachiaria Brizantha* are similar to those reported by VILELA (2012) for B. *Brizantha* cv Marandu and B. *Brizantha* cv MG4 at 1.1% and 1.5%; B. *Brizantha* cv MG5 at 1.3% and 1.6%; B. *humidicola* at 1.0%; and B. *ruziziensis* at 2.3% and 1.9% in cuts made at 60 days of growth and after flowering, respectively.

However, REIS et al. (2008) and DAVID (2001), when evaluating the chemical composition of tropical grasses cut at 30 days, obtained values of 4.55% for B. *Brizantha* and 3.67% for the *Cynodon* genus, values higher than those obtained in the present study. FERREIRA et al. (2007) reported average contents of 0.46% at 35 days of age, in six cuts of B. *Brizantha* cv *Marandu.*

DE FARIA (2012) and MACHOGU (2013), in their studies on the nutritional value of Tifton 85 hay at different cutting ages and a comparative study of *Brachiaria* Mulato II variety productivity with native species in Nairobi, Kenya at 27 days, obtained average values of 2.09% and 2.5%, respectively, which are similar to the results obtained in this study.

Protein in *Brachiaria Brizantha* and the genus *Cynodon*

Considering that crude protein below 7% limits voluntary intake and reduces digestibility (VAN SOEST 1994, SANTOS et al. 2008) the forages examined under the climatic conditions during the research period do not adequately meet the minimum protein requirements of ruminants (Figure 5). This element is crucial in ruminant nutrition to ensure a balanced diet and good productive and reproductive outcomes. Except in October and December for B. *Brizantha* (6.99%), the values are close to the ideal 7%, consistent with findings by SANTOS (2006) for crude protein (CP). Santos reported average levels of 7.25% at 35 days of age across six cuts of *Brachiaria Brizantha* cv *Marandu*. In contrast, MACHOGU (2013) in Nairobi, Kenya obtained 13.3% CP in a comparative study of *Brachiaria* Mulato II productivity against native species.

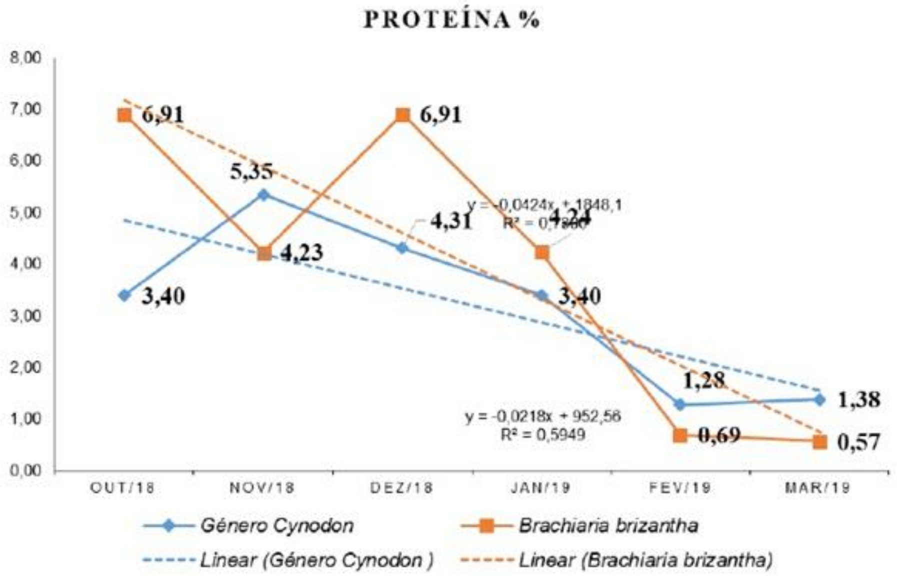

Figure 5. Crude protein values in *Brachiaria Brizantha* and *Cynodon* between October and March, expressed as a percentage.

According to VILELA (2012), the most commonly used *Brachiaria Brizantha* species for tropical pastures show the following percentages: *Brachiaria Brizantha* cv Marandu and *Brachiaria Brizantha* cv MG4 10.5% and 6.2%; *Brachiaria Brizantha* cv MG5 11.5% and 7.2%; after 60 days of growth and after flowering, respectively.

According to EUCLIDES (1995), protein deficiency also limits animal production, either because the available forage may contain insufficient protein or the crude protein concentration is below the critical minimum level (7%) for rumen function.

Crude fiber in *Brachiaria Brizantha* and *Cynodon*

Regarding crude fiber (CF), it's crucial to note that its levels (Figure 6) fall within ideal proportions. This is extremely valuable in the diet, as it plays an essential role in ruminant nutrition due to its influence on digestive processes and overall animal welfare: stimulating rumination, promoting rumen motility, encouraging volatile fatty acid production, regulating food intake, supporting gastrointestinal health, and aiding in rumen development and maintenance.

These results fall within the levels considered ideal for high-quality forage grasses according to VAN SAUN (2006), as the fiber percentage is less than 50%, with low quality being associated with percentages above 60%. On the other hand, MEDEIROS et al. (2015) reported that in beef cattle, some feed formulation systems have stipulated a critical level of 15%, with fiber content varying from 15 to 60% of dietary dry matter.

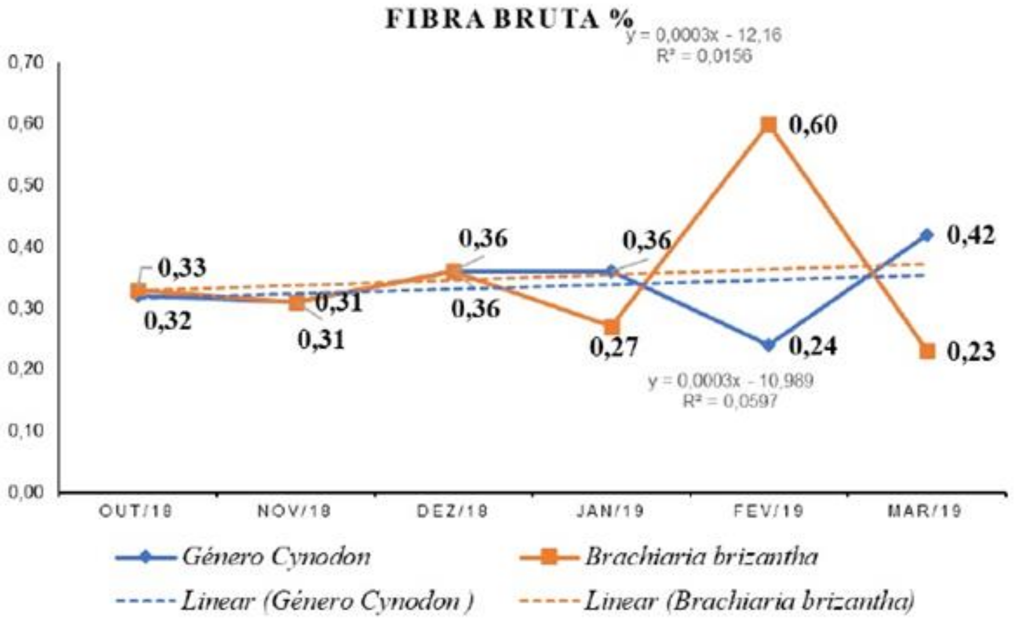

Figure 6. Crude fiber values of *Brachiaria Brizantha* and the *Cynodon* genus between October and March, expressed as a percentage.

Calcium in *Brachiaria Brizantha* and the genus *Cynodon*

The results obtained for *Brachiaria Brizantha* in November, January, and February were (0.40%, 0.40%, and 0.53%), and for the *Cynodon* genus in March it was (0.46%). These results meet the minimum Ca requirements for ruminant nutrition (Figure 7), as according to DANTAS & NEGRÃO (2010), beef cattle require a dietary Ca intake between 0.40 - 0.80% for healthy growth. Similarly, the results of this study align with those reported by VILELA (2012) for *Brachiaria Brizantha* cv Marandu (0.29%) and *Brachiaria Brizantha* cv MG5 (0.30%), after 60 days of growth and flowering, respectively.

For the *Cynodon* genus, the values obtained ranged from 0.20% to 0.46%, close to those obtained by RIBEIRO & PEREIRA (2011), when assessing the mineral composition of Tifton 85 grass with cuts at 28 days, with average contents of 0.48%; and those obtained by REIS et al. (2008) and DAVID (2001), with *Cynodon* cut at 30 days, obtaining 0.52%.

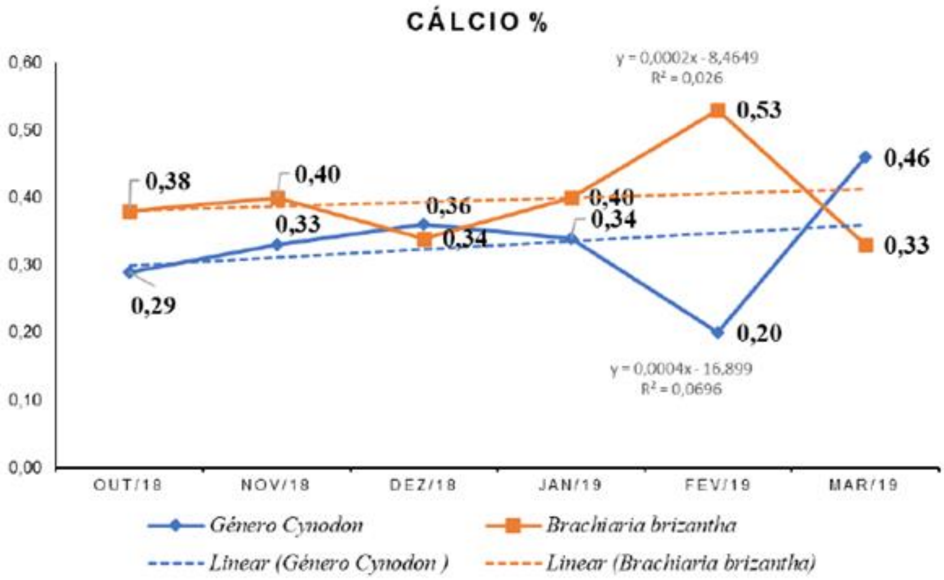

Figure 7. Calcium values in *Brachiaria Brizantha* and *Cynodon* between October and March, expressed as a percentage.

Phosphorus in *Brachiaria Brizantha* and *Cynodon*

The decreasing trend in phosphorus (P) observed in this study may be related to regrowth age and seasonal factors, as the decline in P percentage was noted throughout the forage development months (Figure 8). This could potentially impact the health of grazing animals in the area. The results obtained for B. *Brizantha* (0.30% in October) and *Cynodon* (0.45%, 0.22%, and 0.23% for November, December, and January, respectively) are similar to those reported by DANTAS & NEGRÃO (2010), who state that beef cattle require a dietary P intake between 0.22 - 0.50% for healthy growth.

For B. *Brizantha* in December and January, with results of 0.15% and 0.18%, these were similar to those reported by VILELA (2012) for B. *Brizantha* cv MG4 and *Brachiaria Brizantha* cv MG5 at 0.18% after 60 days of growth and after flowering, respectively, demonstrating consistency in the current study.

The variation in P percentage of the *Cynodon* genus in this study ranged from 0.01 to 0.45%. RIBEIRO & PEREIRA (2011), when evaluating the mineral composition of Tifton 85 grass at different regrowth ages at 28 days, reported a reduction in P levels with increasing age of forage regrowth, ranging from 0.27% to 0.16%. Meanwhile, DE FARIA (2012), in a study on the nutritional value of Tifton 85 hay, observed 0.38% P in the 27-day cutting.

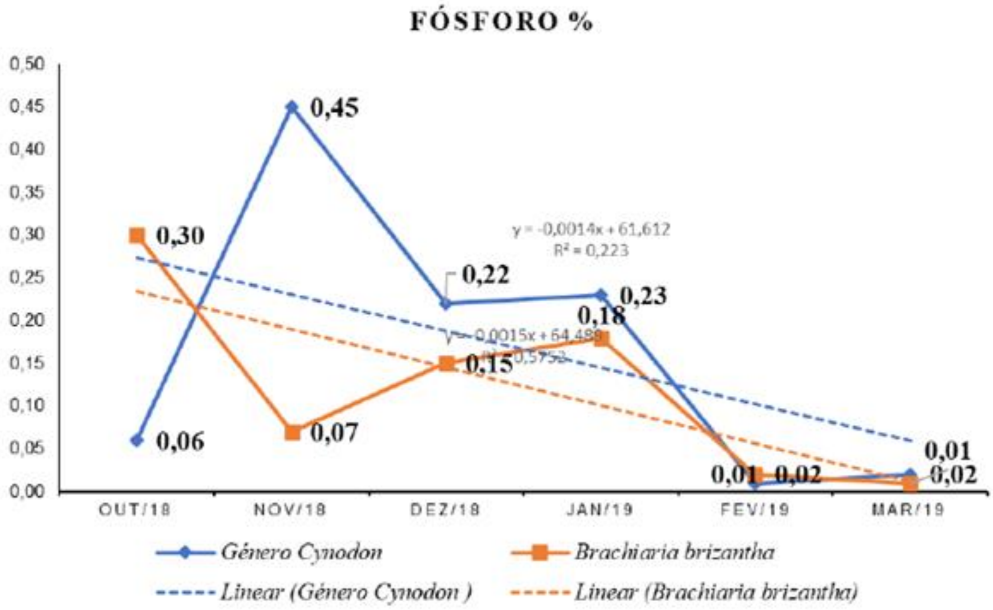

Figure 8. Phosphorus values in *Brachiaria Brizantha* and *Cynodon* between October and March, expressed as a percentage.

Potassium from *Brachiaria Brizantha* and the genus *Cynodon*

For the present study, the percentages ranged from 1.39% to 5.40% for *Brachiaria Brizantha* and from 1.06% to 3.62% for the genus *Cynodon* (Figure 9). These findings align with those reported by RODRIGUES (2010), indicating that plant tissue K content typically ranges from 0.2 to 10%. The NRC (1996) recommends a minimum of 0.60% for growth and finishing, while forage generally contains 1-4% K.

Potassium is known as the mineral element of greatest nutritional importance for animals (SILVA et al. 2000). It is the third most abundant mineral element in animal tissues, and over 70% of the body's potassium is found in muscles, skin, liver, and bones. In general, potassium deficiency causes a decrease in growth; muscle weakness; paralysis; inappetence and neurological disorder, with the main visible symptoms being: gnawing on tree stumps and bark, (ANDRIGUETTO et al. 2002). The results obtained in this study fall within the ideal range for potassium requirements to meet the needs of growing, pregnant, and lactating cows.

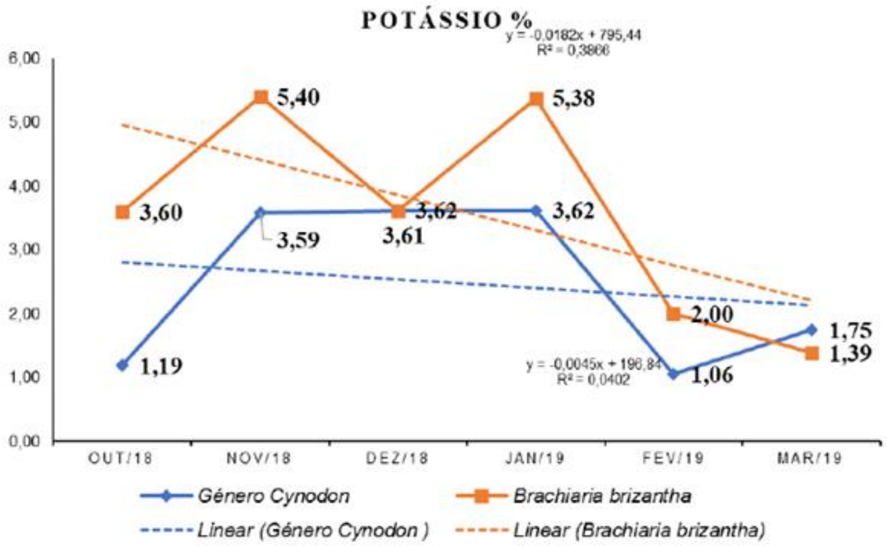

Figure 9. Potassium values in *Brachiaria Brizantha* and *Cynodon* between October and March, expressed as a percentage.

Non-nitrogenous extract and carbohydrates in *Brachiaria Brizantha* and *Cynodon*

Table 3 shows the calculated values of nitrogen-free extract (NFE) and carbohydrates (CHO) in the food. The findings corroborate those reported by VALADARES FILHO et al. (2010), in *Brachiaria Brizantha* varieties with carbohydrate percentages of 69.99% and *Brachiaria decumbens* 72.06%. It should be noted that the October figures represent the cumulative total from previous months prior to the test cuts. In this way, they meet the carbohydrate levels for tropical forages with values above 65%.

Table 3. Non-nitrogenous extract and carbohydrates in *Brachiaria Brizantha* and *Cynodon* , between October and March, expressed as a percentage.

Table 3. Non-nitrogenous extract and carbohydrates in Brachiaria Brizantha and genus Cynodon , between October and March, expressed as a percentage.

	NFE %		CHO %	
Months	*Brachiaria Brizantha*	Genus *Cynodon*	*Brachiaria Brizantha*	Genus *Cynodon*
October/18	44,21	80,38	74,27	80,7
November/18	77,28	75,64	77,59	75,95
December/18	74,56	43,07	74,92	43,43
January/19	28,47	29,03	28,47	29,39
February/19	73,9	30,29	74,5	30,53
March/19	47,3	71,16	47,52	71,16

According to VAN SOEST (1994), older forages are rich in structural carbohydrates and lignin, resulting in lower digestibility and protein content. Additionally, a portion of this protein is tightly bound to fibrous fractions, leading to reduced utilization of this nutrient.

Energy production in *Brachiaria Brizantha* and *Cynodon*

Table 4 shows the food energy production during the study period, with similar values for *Brachiaria Brizantha* in October, November, and December. Similar findings were reported by REIS et al. (2008) and DAVID (2001), obtaining at the 30-day cut values of 1.26 Mcal/kg in *Brachiaria Brizantha* and 1.21 Mcal/kg for the *Cynodon* genus, noting that the October values are the accumulation of previous months before the cuts for the trial.

In addition, MACHADO et al. (2012) demonstrated that a grazing beef cattle weighing 300 kg and 350 kg live weight have an energy requirement of 3.26 Mcal/kg LW and 3.57 Mcal/kg LW, respectively. These findings align with the results obtained in this study for *Brachiaria Brizantha* in December and February, and for the *Cynodon* genus in November and December, respectively, demonstrating that they meet the animals' energy requirements.

Table 4. Energy production in *Brachiaria Brizantha* and *Cynodon* between October and March, expressed in Kcal/kg.

	Kcal/100g		Kcal/kg		Mcal	
Months of study	*Brachiaria Brizantha*	*Gender Cynodon*	*Brachiaria Brizantha*	*Gender Cynodon*	*Brachiaria Brizantha*	*Gender Cynodon*
October/18	357,99	360,3	3580	3603	3,58	3,60
November/18	357,08	357,1	3571	3571	3,57	3,57
December/18	356,5	308,3	3565	3083	3,56	3,08
January/19	149,7	152,4	1497	1524	1,50	1,52
February/19	329,6	146,5	3296	1465	3,29	1,46
March/19	213,1	313,7	2131	3137	2,13	3,18
Average	281,196	255,6	2812	2556	2,81	2,56

Evaluation of forage productivity

Table 5 shows the quantity in kilograms and corresponding tons per hectare during the study period, with the lowest value in November (93.4 kg DM/ha) and the highest value in March (242.6 kg DM/ha) for the *Cynodon* genus. For *Brachiaria Brizantha*, an inverse behavior was observed, with 172.2 kg of DM/ha in March and 238.9 kg of DM/ha in November, with October showing an accumulation from previous months before the cuts for the study.

Table 5. Dry matter production of *Brachiaria Brizantha* and *Cynodon* during the period from October 2018 to March 2019, at Fazenda 7 Quintas do Waco Kungo.

Months of the year	Kg of DM/ha *Brachiaria Brizantha*	*Gênero Cynodon*	Tons of DM/ha *Brachiaria Brizantha*	*Gênero Cynodon*
October/18	524,6	302,4	0,5246	0,3024
November/18	238,9	93,4	0,2389	0,0934
Dec/18	212,8	158,6	0,2128	0,1586
January/19	176,4	190,4	0,1764	0,1904
February/19	175	205,4	0,175	0,2054
March/19	172,2	242,6	0,1722	0,2426
Average	195,06	178,08	0,19506	0,17808

Table 5 shows that October produced the highest amount of dry matter, as it marked the beginning of the study when the biomass was cut at the frame placement sites. The other months show lower production due to growth rates and the 10 cm cutting height. We can also infer that there was little growth or limited regrowth capacity every 30 days.

These results are lower than those reported by VILELA (2012) for B. *Brizantha* cv Marandu, B. *Brizantha* cv MG4, and B. *Brizantha* MG5 Vitória varieties, which showed dry matter production ranging from 10 to 23 tons/DM/ha/year, with a minimum of 833.3 kg DM/ha/month (0.833 tons/DM/ha) and a maximum of 1916 kg DM/ha/month (1.916 tons/DM/ha), respectively. The lower values obtained in this study may be related to the seasonality determined by the uneven distribution of production throughout the year, given that the pasture's production capacity is intrinsically linked to the prevailing environmental conditions in the area and management practices (DANTAS et al. 2016).

Stocking capacity

The values shown in Table 6 are three to four times lower than the stocking rates per hectare described in the consulted literature regarding the relationship between forage productivity and carrying capacity, considering data from VILELA (2012). This takes into account that the varieties B. *Brizantha* cv *Marandu*, B. *Brizantha* cv MG4, and B. *Brizantha MG5* Vitória have a dry matter production of 10 to 23 t DM/ha/year, with 833.3 kg DM/ha/month (0.833 tons DM/ha) as the minimum productivity and 1916 kg DM/ha/month (1.916 tons DM/ha) as the maximum productivity, respectively.

Table 6. Stocking capacity of animals per hectare in the park with *Brachiaria Brizantha* and *Cynodon* in the period from October 2018 to March 2019.

Months of the year	No. of animals per ha (A.U./day) Brachiaria *Brizantha*	No. of animals on 58 ha (A.U./day) *Brachiaria Brizantha*	No. of animals per ha (A.U./day) Genus *Cynodon*	No. of animals on 51 ha (A.U./day) Genus *Cynodon*
Oct/28	47	2705	26	1371
Nov/18	21	1232	8	423
Dec/18	19	1097	14	719
Jan/19	16	909	17	863
Feb/19	16	902	18	931
Mar/19	15	888	22	1100

Pasture management strategies according to productivity and nutritional value at Fazenda 7 Quintas

Low animal production is attributed to low dry matter intake, that is, low energy consumption, and protein and mineral deficiencies in pasture. Table 7 shows the monthly and daily DM production from October 2018 to March 2019, Animal Unit (AU) of 450 kg live weight, daily DM intake of cattle 2.5% of LW (HODGSON et al. 2000) A.U. as a function of the cattle's daily dry matter intake.

Table 7. Monthly dry matter yield per hectare and monthly stocking rate.

Months	Kg of DM/ha		A.U	DM/ha/day	No. of animals	A.U/ha/month	
	Brachiaria Brizantha	*Gênero Cynodon*		2.5% PV		*Brachiaria Brizantha*	*Gênero Cynodon*
Out	524,6	302,4				47	27
Nov	238,9	93,4				21	8
Dec	212,8	158,6				19	14
Jan	176,4	190,4				16	17
Feb	155	205,4				16	18
sea	172,2	242,6	450 Kg PV	11.25 Kg BW	520	15	22

Monthly and daily dry matter productivity

Table 8 shows the dry matter production of *Brachiaria Brizantha* and *Cynodon* species from October 2018 to March 2019 at Fazenda 7 Quintas Waco-Kungo, with averages of 195.06 kg DM/month and 178.08 kg DM/month, respectively.

Based on the number of animals utilized in the production unit where the study was conducted, considering a daily dry matter intake of 2.5% of body weight, which corresponds to 11.25 kg of dry matter per day, there is a need for 5,850 kg of dry matter per day, equivalent to 175,500 kg of dry matter per month to meet the animals' nutritional requirements. This value is below those found in the present study, as shown in Table 7, which clearly demonstrates the low pasture productivity during the period in question.

Table 8. Monthly and daily Dry Matter (DM) productivity and daily stocking rate.

Months	Kg of DM/ha/month		Kg of DM/ha/day		A.U/ha/day	
	Brachiaria Brizantha	*Gênero Cynodon*	*Brachiaria Brizantha*	*Gênero Cynodon*	*Brachiaria Brizantha*	*Gênero Cynodon*
October	524,6	302,4	17,5	10,08	1,5	0,9
November	238,9	93,4	7,96	3,1	0,7	0,27
December	212,8	158,6	7,1	5,28	0,63	0,47
January	176,4	190,4	5,88	6,34	0,52	0,56
February	175	205,4	5,83	6,85	0,52	0,6
March	172,2	242,6	5,74	8,09	0,51	0,72

In general, the DM productivity for the genera with values of 195.06 kg and 178.08 kg for *Brachiaria Brizantha* and *Cynodon* genus, respectively, is below 750 kg of DM and classified as poor pasture with a stocking rate of less than 1 AU/ha. However, this data can serve as a valuable source of nutritional information about forage in this region of Angola, contributing to improved animal management and nutrition throughout the year.

The nutritional composition of the studied forages varied, showing a decreasing trend based on their growth stage during the study period, demonstrating the need for soil amendment to balance nutrients and meet desired productivity levels.

The strategies to be followed by Fazenda 7 Quintas should include: liming the soil; fertilizing the pasture; using supplementary roughage such as corn silage, hay, haylage and soybean meal that can be produced on the farm; setting up a protein bank; knowing the average forage production in the remaining months of the year for correct management and dividing the animals into plots and categories.

CONCLUSION

A produtividade de MS foi considerada relativamente baixa em ambos os gêneros com média de 195,06 kg e 178,08 kg para a *Brachiaria Brizantha* e gênero *Cynodon*, respectivamente.

However, these findings can serve as a foundation for further research and are valuable for establishing a database on pasture productivity and nutritional value, given the lack of such information in Angola.

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