English Version

Production and forage quality of *Brachiaria* in Norte Fluminense Region

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Abstract

Most 'of the Brazilian milk production is based on the use of pastures, for constituting food of low cost. Among the used forages, the Brachiaria species occupy the biggest cultivated area, in function of its potential of production and good adaptation to acid and low fertility soils. However, the quality of these forages is considered low to take care of the nutrient requirements of animals with high genetic potential for milk production. The objective of the present work was to evaluate the productivity and quality of the different species of Brachiarias in Valley of the Paraíba, Norte-Fluminense Region. By using random blocks design, with three replications, the following varieties had been evaluated: Mulato (inter specific hybrid), Basilisk (*B. decumbens*), Marandu (*B. brizantha*), Xaraés (*B. brizantha*), Trulli (*B. humidicola*), *B. dictyoneura*, Common (*B. ruziziensis*) and *Brachiaria* spp. It was observed significant differences among varieties for productivity of dry matter (PMS), crude protein (PB), fiber in neutral detergent (FDN) and acid (FDA) and digestibility (DIVMS). The most productive varieties were Mulato, Xaraes and *Brachiaria* spp. The best quality of forage was presented by the Common variety of *B. ruziziensis*.

Index terms: Brachiaria ruziziensis, Brachiara brizantha, Brachiaria decumbens, Brachiaria humidicola, Brachiaria dictyoneura

Introduction

Pasture stands out in the Brazilian livestock sector, considering that the area occupied by forage plants responds for three quarters of the national agricultural area. Pastures are the main source of food of the Brazilian livestock, responsible for almost 90% of beef and by great part of the milk produced in the country (SOUZA SOBRINHO, 2005; PEREIRA et al., 2001).

Among the most cultivated forage in Brazil, it is emphasized the genus *Brachiaria, Panicum, Paspalum, Pennisetum* and *Andropogon.* The genus *Brachiaria* is the one which occupies the widest cultivated area (DUSI, 2001), in function of its greater tolerance to the conditions of acid soils and with low fertility from the tropics, allied to their good value as forage. The species of greatest importance as forage are *B. decumbens, B. brizantha, B. ruziziensis* and *B. humidicola* (RENVOIZE et al., 1996).

The index of productivity reached by the Brazilian livestocks are still low in function, mainly, of nutritional needs. Therefore, it is necessary an appropriate feed so that the animal may exprees all their productive potential. In order to make that, the availability of quality forage over the year becomes a demand (SOUZA SOBRINHO, 2005).

The improvement of forages aims, mainly, at making more productive cultivar available. As a practical results, it was recently release the first hybrid cultivar of *Brachiaria*, named Mulato. This material has been widely disseminate among producers, altough there have not yet been conclusive practical results about its use.

The objective of the present work was to evaluate the productive behavior and the quality of the forage from different species of Brachiarias in the Vale do Paraíba, Region Norte-Fluminense.

Material and methods

The experiment was conduced in the Experimental field of Santa Mônica da Embrapa Gado de Leite, located in Valença, RJ. It was evaluated the following cultivars: Mulato (interspecific hybrid), Basilisk (*B. decumbens*), Marandu (*B. brizantha*), Xaraés (*B. brizantha*), Trulli (*B. humidicola*), *B. dictyoneura*, Comum (*B. ruziziensis*) and *Brachiaria* spp. (unknown origin). Seeds from different origins

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were obtained in the local market.

The experiment was installed in a soil of hillside, classified as Argissolo Vermelho-Amarelo[1], distrófico, texture clayey-sandy. The liming was performed three months before the installation of the experiment, based on the results of the soil analysis for the increase of the base saturation to 60%, followed by harrowing, according to the recommendations for the crop (COMISSÃO..., 1999). As plant fertilizer, it was used 100 kg ha^{-1} of P_2O_5, 30 kg ha^{-1} of K_2O and 15 kg ha^{-1} of N, and phosphate fertilization lauched in the beginning of the period of water (100 kg ha^{-1} of P_2O_5). It was used the completely randomized design, with three replications and experimental plots constituted by two rows of 4 m of length, containing 16 plants.

Approximatelly 60 days after planting it was performed a cutting in order to make the plots uniform. The first evaluation cutting was performed in Nov 11, 2004, and nect it was performed more nive cuttings in Jan 06, March 23, Jun 01, Oct 04 and Dec 21, 2005 and in Feb 23, April 10, Oct 24 and Dec 18, 2006, respectivelly. In each cutting it was noted data referent to the total production of fresh matter and percentage of dry matter (% DM), which were used in the obtaining of the estmative of productivity of dry matter (PDM). In the second cutting, it was made the evaluation of characteristics related to the quality of the forage: percentage of crude protein (CP), fiver in neutral detergent (FND) and acid (FAD) and digerstibility in vitro of the dry matter (DIVDM). These characteristics were analysed trough the equipment of spectophatometer near to infrared (NIR's).

For each one of the ten cuttings it was performed statistic analysis, considering the model of randomized blocks, envolving the data of the PDM. Later it was maid the joint analysis considering the treatments disposed in the scheme of plot subdivided in time, considering the plots represented by the cultivars and the subplots by the cuttings (RAMALHO et al., 2000). The averages were compared using the SCOTT and KNOTT (1974) test.

Results and discussion

The experimental accuracy, evaluated by the estimative of the coeffient of variation (CV) of the statistic analyses, was good for all the characteristics evaluated, both for the individual analysis as for the joint (data not presented). The estimates of the CV were always below 20%, being inferior to the results presented by REIS et al. (2008) and SOUSA et al. (2007), evaluating elephant grass and brachiaria, respectivelly. It is evidenced, therefore, good reliability in the results obtained.

It was detected significant differenced between cultivars in all the cuttings, indicating the existence of variability in the productive potential of cultivars of *Brachiaria* evaluated. In the cutting 9, even tough the analysis of variance has showed the existence of variability, the average test was not capable of separating the averages of PDM of the cultivars (Table 1). Similar results were observed by DAHER (2003) and SOUZA SOBRINHO et al. (2005), when analysizing characteristics referent to the quality of the forage of interspecific hybrids between elephant grass and millet, and probably are due to defficiency in the detection of differences of the Scott-Knott test, which are similar to other tests, according to the comments by RAMALHO et al. (2000).

For the PDM involving the data of all the cuttings (joint analysis) it was also observed significant differeces between the cultivars (Table 1). It is evidenced, therefore, that the cultivars of *Brachiaria* available in the market present variations in the potentital of production of forage. For the sources of variation cuttings and the intercations cultivars and cuttings it was also detected significant differences in the joint analysis, indicating that the PDM is influenced by the period of growth (cuttings) and that the behavior of the cultivars was not consistent in the different cuttings performed.

The average productivity of dry matter of the cultivars ranged from 1.89 t DM/ha, in the cutting, to 8.85 t DM/ha in the third cutting. Cuttings 5 and 9 were those with the lower productivity average, respresenting precisely the plant growth in the dry period of the year (Table 1). In these two cuttings, in function of the unfavorable perios for the development of the tropical forages, the period of growth was increased, with intervals between

1 According to Brazilian Soil Classification.

Table 1. Average productivity of dry matter (t/ha) of different commercial cultivars of *Brachiaria* in ten evaluation cuttings and in their joint analysis.

Cultivars	Joint*[1]	09/11/04	06/01/05	23/03/05	01/06/05	04/10/05	21/12/05	23/02/06	10/05/06	24/10/06	18/12/06
Mulato	5.85a	6.28a	4.76a	10.62a	4.73a	2.75a	9.79a	6.76a	6.25a	2.31a	4.19b
Basilisk	4.42b	4.44b	3.43a	7.84c	4.00a	2.11a	7.27b	5.54a	4.20a	2.26a	3.15b
Marandu	4.48b	3.78b	2.48b	9.61b	3.94a	2.13a	6.88b	5.32a	5.09a	1.71a	3.88b
B. humidicola	2.71c	0.42d	1.86b	6.42c	1.43c	0.85b	5.41c	3.89b	1.73c	1.37a	3.73b
B. dictyoneura	3.40c	1.18d	2.55b	7.29c	1.25c	0.65b	7.39b	4.42b	1.77c	1.20a	6.31a
Xaraes	5.50a	4.57b	4.34a	9.56b	4.54a	3.17a	9.88a	5.84a	6.02a	2.48a	4.56b
B. spp	5.08a	4.78b	3.39a	11.21a	3.95a	2.38a	7.83b	5.35a	5.40a	2.92a	3.59b
Comum	3.51c	2.29c	2.23b	8.25c	2.81b	1.08b	6.80b	4.15b	3.57b	1.27[a]	2.63b
Média	4.41	3.47	3.13	8.85	3.13	1.89	7.05	5.16	4.05	1.94	3.99

** t/ha/cutting*

[1] Different letters, in the same column, indicate significant differences (P>0,05) by the Scott Knott test.

cuttings of four to five months. In the other cuttings, representative of more appropriated contitions of growth to the plants (temperature and humidity), the interval of growth was close to 60 days. Similar results were obtained by FAGUNDES et al. (2005), BOTREL et al. (1999 e 2002) and ALVIM et al. (1986), strenghtening the susceptibility of the tropical forages to low temperatures and the lack of water, which affects tremendously the offer of forage in the winter, leading to the necessity of food suplementation of livestock in order to maintain the production (OLIVEIRA et al., 2004 e 2007).

According to which was commented by SOUZA SOBRINHO et al. (2005), the objective of the producers is to obtain a pasture which presents higher productivity along the time and not only one in a few months. Therefore, the results of the joint analysis must be considered, because they represent the development of the cultivars in two years of cultivation.

In the average of the 10 cuttings of evaluation, the amplitude of variation of the PDM was 3.14 t/ha/cutting, corresponding to 71.2% of the overall average (Table 1). The averages were separated in three different groups by the Scott-Knott test, being cultivars Mulato, Xaraes and *Brachiaria* spp. those with higher productivity. This group produced 70.6% more dry matter than the cultivars Comum (*B. ruziziensis)*, *B. humidicola* and *B. dictyoneura*, representants of the less productive group. Cutivars Marandu and Basilisk, which occupied the widest areas of pasture in Brazil, presented productivity very similar to the overall average of the experiment which was 4.41 t of DM/ha/cutting (Table 1). The average of PDM obtained in this study was superior to the one found by PEREIRA et al. (2005) when evaluating interspecific experimental hybrids of *Brachiaria* (*B. brizantha* x *B. ruziziensis* e *B. decumbens* x *B. ruziziensis*) in the same environmental conditions, reinforcing the high productive potential of the cultivars available in the market.

Adding the PDM obtained in the three cuttings performed in the season of waters from 2004/2005 and the four from 2005/2006, it is observed the great potential of production of forage from the cultivars available. Considering the periods of evaluation, the best cultivars (Mulato, Xaraes e *Brachiaria* spp.) produced, in average, 19.84 and 23.81 t of DM/ha (Fig. 1). This productivity is superior to the one obtained by cultures traditionally used for forage storage, as maize, which produces between 10 and 19 t of DM/ha, depending on the region of cultivation (OLIVEIRA et al., 2004). Thus, based only in the productive potential, it may be considered the possibility of storage of the forage produced by brachiaria in the rainy period in order to supply some deficiencies of forage in the dry period.

The production of silage, for example, may be an intersting alternative, since the initial quality of forage is a little precarious, with average fall for different cultivars of barchiaria of 13.1% and 7.8% for %DM and crude protein, and increase of 0.6% and 2.2% for percentage of fiber in neutral detergent (FND) and acid (FAD) (OLIVEIRA et al., 2008). These authors also verified that the pre-drying of the forage does not have significant benefits for the

fermentative process nor for the final quality of the brachiaria silage, facilitating the operacionalization of the ensilage. Thus, the production of crachiaria silage may be a good alternative for the feed of livestock in the dry period. This species presents, still, the advantage of being perene, and thus it does not have annul cost of re-implantation of the crop. Besides that, in the period of draught there will be, in lower quantity depending of the period of the last cutting for ensilage, production of forage for livestock pasture.

For all the characteristis of quality of forage were detected significant differences in the analysis of variance, both for the data of the entire plant as for leave and stem separetly (Table 2). Considering the entire plant, cultivars Mulato, Basilisk, Marandu, B. spp. and Comum were classified in the best group for percentage of crude protein (CP), with averages superior than 6.2%. The amplitudes of variation for FND and FAD and DIVDM were 5.38, 4.78 and 3.93%, respectively. The most productive cultivars (Mulato, Xaraes e B. spp) presented high content of FND and low digestibility, being classified in the worst group for this characteristics. *B. ruziziensis* was noteworthy in relation to the quality of the forage, presenting the best digestibility among the evaluated material (Table 2).

Considering only leaves, as it was expected, the averages of CP and digestibility were higher and the fibers lower, reinforcing the afirmative that the higher quality of forage is in this part of the plant which is exactly the one whih is most consumed by animals (SOUZA SOBRINHO, 2005; SOUZA SOBRINHO et al., 2004; BRÂNCIO et al., 2003; GOMIDE et al., 2001). As well as the entire plant, the best results were obtained by the cultivar Comum (*B. ruziziensis*), which presented approximately 7.3% more DIVDM that the most productive cultivars (Mulato, Xaraes e B. spp.). This cultivar was the last classified in the group superior for all the characterists, in all the parta of the plant evaluated. It presents, therefore, the best quality of forage among the evaluated cultivars, i. e., high content of CP and digestibility and low fiber (Table 2). The superiority of *B. ruziziensis* for bromatologic characteristics of the forage was also verified by Hughes et al. (2000), evaluating different accesses of *B. brizantha, B. decumbens, B. humidicola* and *B. ruziziensis*.

It is verified, thus, that this material, altough it do not present high PDM, must be considered by the genetic improvement, mainly when it is aimed at improvement in the quality of the forage. It is worth to remember that it is the only *Brachiaria* species cultivated in Brazil which reproduces sexually, enabling the generation of variability for the selection (SOUZA SOBRINHO, 2005). Thus, it becomes

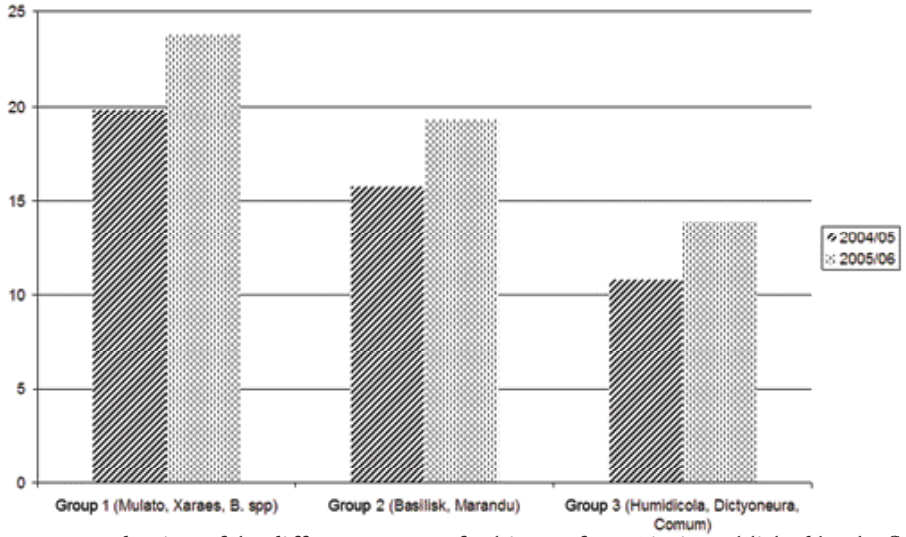

Figure 1. Average production of the different groups of cultivars of *Brachiaria*, stablished by the Scott-Knott test, in the season of waters from 2004/05 and 2005/06.

Table 2. Average percentage of crude protein (CP), fiber in neutral detergent (FND) and acid (FSD) and digestibility in vitro of the dry matter (DIVDM) of the forage of the entire plant, leaf and stem of commercial cultivars of *Brachiaria*, with 57 days of growth (cutting 2).

Cultivars	CP	FND	FAD	DIVDM
Entire plant				
Mulato	6.30a	78.75b	44.94c	53.89c
B. decumbens (Basilisk)	6.23a	78.85b	43.77c	54.80c
B. brizantha (Marandu)	6.92a	77.69a	41.51b	56.57b
*B. humidicola (*Trulli)	5.91b	81.88d	44.33c	54.37c
B. dictyoneura	5.58b	80.17c	44.55c	54.20c
B. brizantha (Xaraes)	5.69b	79.14b	44.68c	54.10c
Brachiaria spp	6.77a	77.73a	42.89c	55.49c
B. ruziziensis	6.60a	76.50a	39.90a	57.82a
Average	6.25	78.03	43.12	55.15
Leaf				
Mulato	8.47a	75.26c	40.19d	57.59d
B. decumbens (Basilisk)	8.94a	73.22b	36.72b	60.29b
B. brizantha (Marandu)	8.80a	75.42c	37.95c	59.33c
*B. humidicola (*Trulli)	8.84a	74.97c	38.17c	59.16c
B. dictyoneura	7.25b	75.63c	40.83d	57.09d
B. brizantha (Xaraes)	7.68b	74.89c	39.88d	57.83d
Brachiaria spp	9.27a	72.34b	35.84b	60.98b
B. ruziziensis	9.47a	69.91a	32.65a	63.46a
Average	8.59	73.95	37.48	59.46
Stem				
Mulato	4.22a	82.50a	50.43b	49.62b
B. decumbens (Basilisk)	3.74a	83.55a	50.47b	49.58b
B. brizantha (Marandu)	4.37a	80.39a	46.47a	52.70a
*B. humidicola (*Trulli)	4.15a	86.03b	48.06a	51.46a
B. dictyoneura	3.87a	83.33a	48.35a	51.23a
B. brizantha (Xaraes)	3.67a	82.77a	50.33b	49.69b
Brachiaria spp	4.38a	82.43a	49.70b	50.18b
B. ruziziensis	3.89a	82.17a	46.82a	52.43a
Average	4.04	82.89	48.83	50.86

** Different letters, in the same column, indicate significant differences (P>0.05) by the Scott Knott test.*

viable the obtantion of ains in productivity of dry matter, mantaining of rising even more the forage quality.

Conclusions

The most productive cultivars were Mulato, Xaraes and *Brachiaria* spp.

The best quality of forage was presented by cultivar Comum of *B. ruziziensis*.

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