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USE OF MAIZE AND SORGHUM FOR SILAGE PRODUCTION IN A FAMILY DAIRY FARM

USO DE MILHO E SORGO PARA PRODUÇÃO DE SILAGEM EM UNIDADE FAMILIAR DE PRODUÇÃO DE LEITE

USO DE MAÍZ Y SORGO PARA LA PRODUCCIÓN DE ENSILAJE EN UNA UNIDAD FAMILIAR DE PRODUCCIÓN DE LECHE

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Abstract: The objective of this work was to assist a small producer in the implantation of an area of corn and sorghum for the production of silage for feeding dairy cows during the dry season, from 2018 to 2020. The work was carried out at the Mariane site, in the Capão Bonito I settlement, in the municipality of Sidrolândia - Mato Grosso do Sul.

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Periodic visits were carried out to survey the property's production system, and the implementation of 1.5 ha for silage production was therefore recommended. and feeding the animals during the dry season. Soil analysis was carried out, followed by the recommendation of fertilization, in both cultivation areas, with the use of lime for pH correction. For planting fertilization, application of phosphorus in the form of rock powder and chicken litter was indicated. In the 2018 harvest, the planting of K9960 vip3 hybrid corn was oriented for silage production, while in the 2019 harvest it was recommended to plant the biomass sorghum "Bolivian giant sorghum" Agri 002E. Thus, the planting of corn and sorghum provided enough roughage to feed the animals during the dry season, maintaining milk production.

Keywords: Agriculture, Dairy cattle, Extension.

Resumo: Objetivou-se, com este trabalho, auxiliar um pequeno produtor na implantação de área de milho e sorgo para produção de silagem destinada a alimentação de vacas de leite no período da seca, do ano de 2018 a 2020. O trabalho foi desenvolvido no sitio Mariani, no assentamento Capão Bonito I, município de Sidrolândia - Mato Grosso do Sul. Foram realizadas visitas periódicas para levantamento do sistema de produção da propriedade, sendo então recomendada a implantação de 1,5 ha para produção de silagem e alimentação dos animais no período da seca. Foi realizada análise do solo, seguida da recomendação de adubação, nas duas áreas de cultivo, com o uso de calcário para correção do pH. Para a adubação de plantio foi indicada aplicação de fósforo na forma de pó de rocha e cama de frango. Na safra do ano de 2018 foi orientado o plantio do milho hibrido K9960 vip3, para produção de silagem, já na safra de 2019 foi recomendado o plantio do sorgo biomassa "sorgo gigante Boliviano" Agri 002E. Assim o plantio do milho e do sorgo proporcionou produção de volumoso suficiente para alimentar os animais no período da seca, mantendo a produção de leite.

Palavras-chave: Agropecuária, Bovinocultura de leite, Extensão.

Resumen: El objetivo de este trabajo fue ayudar a un pequeño productor a implementar un área de maíz y sorgo para la producción de ensilaje para la alimentación de vacas lecheras durante la época seca, de 2018 a 2020. El trabajo se desarrolló en el predio Mariani, en el asentamiento Capão Bonito I, municipio de Sidrolândia, Mato Grosso do

Sul. Se realizaron visitas periódicas para evaluar el sistema de producción de la propiedad, y posteriormente se recomendó implementar 1,5 ha para la producción de ensilaje y la alimentación animal durante la época seca. Se realizó un análisis de suelo, seguido de una recomendación de fertilización en ambas áreas de cultivo, utilizando piedra caliza para corregir el pH. Para la fertilización de la siembra se recomendó la aplicación de fósforo en forma de polvo de roca y estiércol de pollo. En la cosecha 2018 se recomendó la siembra de maíz híbrido K9960 vip3 para producción de ensilaje, mientras que en la cosecha 2019 se recomendó la siembra de sorgo biomasa "sorgo gigante boliviano" Agri 002E. De esta manera, la siembra de maíz y sorgo proporcionó una producción suficiente para alimentar a los animales durante la estación seca, manteniendo la producción de leche.

Palabras clave: Agricultura, Ganadería lechera, Extensión.

INTRODUCTION

Brazilian agricultural production has undergone major transformations in recent years. However, small producers have difficulty increasing their production, mainly due to the difficulty in receiving technical advice on the use of technologies.

Among the various activities carried out by small producers, dairy farming stands out for generating financial resources throughout the year. In Brazil, it is estimated that 60% of milk production comes from family farming (MAPA 2018). However, most of the time, producers find it difficult to maintain production, mainly due to the costs of feeding the animals, leading to a drop in production and compromising their income.

To increase milk production on small farms, technical assistance is needed so that producers can use techniques that maximize the inputs available on the property. In this regard, rural extension carried out by universities acts as an alternative to help producers develop their production. In addition, the inclusion of this among producers means that the knowledge developed through research is applied, bringing technology and development to society and fulfilling its social role.

In view of the above, the aim of the work was to implement an area for growing forage for the production of silage to feed dairy cows , based on the practice of soil management with a focus on animal production, where it will serve as a model for other settlers or small rural producers in the region.

MATERIAL AND METHODS

The work was carried out at the Mariani site, in the Capão Bonito I settlement, municipality of Sidrolândia-MS , from January 2018 to March 2020. The property consists of 20.8 hectares, where the main activity developed is dairy farming.

In order to implement the grass cultivation area, visits were made to diagnose and assess the conditions of the property to maintain milk production. During the first visit, carried out in January 2018, the main points that hindered production were diagnosed, where it was found that one of the main problems was the difficulty in providing food to the animals during the dry period of the year, as the producer did not use any bulk conservation technique to supplement the animals during this period and, at this time, the pastures were unable to produce enough biomass in both quantity and quality to meet the nutritional requirements of the animals. In addition to not storing food for the dry period, the pasture areas on the property presented low productivity, due to low soil fertility and inadequate pasture management.

Given the observations, an area of 1.5 hectares was chosen for planting forage for silage production. In the first step, soil samples were collected and sent to the laboratory for fertility analysis and subsequent recommendation of correction and fertilization practices, according to SOUSA et al., (1987).

The work was carried out over two years, with the recommendation of implementing the K9960 vip3 hybrid corn crop in 2018, and in 2019 the implementation of the " Bolivian giant sorghum " Agri 002E sorghum was recommended for silage production, due to the good nutritional value and productive capacity of these forages.

For both corn and sorghum planting, after soil correction, the area was harrowed to decompact and incorporate organic matter. Sowing was carried out using a mechanical seeder, with a spacing of 80 cm between rows and 6 plants per linear meter, so that the plants had high development and biomass production.

After the corn harvest, due to the sandy soil characteristics, it was recommended to plant millet to produce straw and help recover the soil structure and organic matter, favoring the following year's crop. The area was harrowed to decompact, and then conventional millet seeds available on the local market were sown for planting. The seeds were broadcast and incorporated into the soil. After the millet grew, it was incorporated into the soil and the area remained fallow until the beginning of the next rainy season of

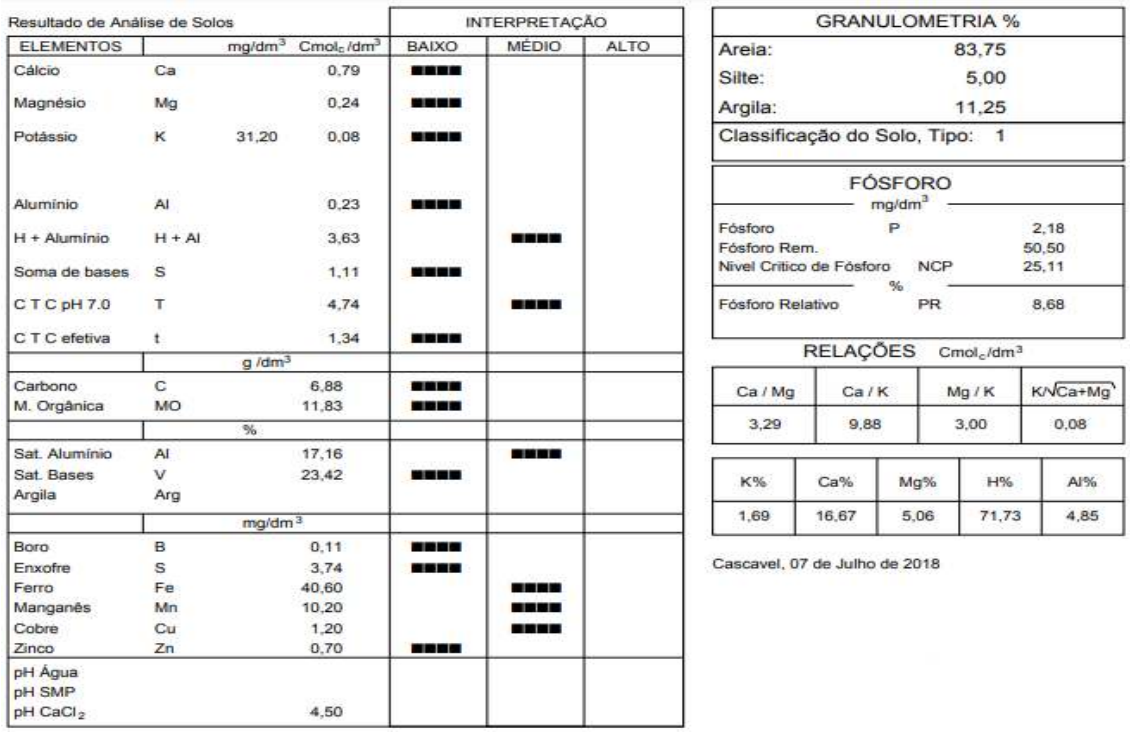
the 2019/2020 agricultural year, when recommendations were made for planting sorghum.

After the cultivation cycle, of 100 days for corn and 120 days for sorghum, the production evaluation was carried out by randomly cutting 5 points of one linear meter, excluding the edges. Afterwards, the material was weighed, a sample collected and sent to the laboratory for determination of dry matter, and thus, the weight found was extrapolated to an area of 1 hectare. After that, the corn was harvested through mechanized harvesting using a traction forage harvester coupled to the tractor. The harvested material was stored in a surface silo and the material was compacted with the help of a tractor throughout the harvest and filling of the silo.

Productivity assessments of the areas were carried out annually, in addition to bromatological analyses regarding the content of Dry Matter, Fiber in Neutral Detergent, Fiber in Acid Detergent, Crude Protein and Mineral Matter, to assess the nutritional value of the food provided to the animals according to AOAC (1995).

RESULTS AND DISCUSSION

The recommendations for soil correction and fertilization for the corn area, according to soil analysis, are presented in Figure 1. For pH correction , 900 kg of limestone/hectare were applied. For planting fertilization, the application of 600 kg of phosphorus/hectare in the form of rock powder was recommended. This input was recommended due to its slow availability over time, reducing losses due to leaching, in addition to being a byproduct with a lower acquisition cost. According to Junior et al. (2020), rock powder can be used to fertilize crops as a replacement for chemical fertilizers in order to maintain good production levels.



Resultado de Análise de Solos

ELEMENTOS		mg/dm³	Cmol$_c$/dm³	INTERPRETAÇÃO BAIXO	MÉDIO	ALTO
Cálcio	Ca		0,79	■■■■		
Magnésio	Mg		0,24	■■■■		
Potássio	K	31,20	0,08	■■■■		
Alumínio	Al		0,23	■■■■		
H + Alumínio	H + Al		3,63		■■■■	
Soma de bases	S		1,11	■■■■		
C T C pH 7.0	T		4,74		■■■■	
C T C efetiva	t		1,34	■■■■		
	g /dm³					
Carbono	C		6,88	■■■■		
M. Orgânica	MO		11,83	■■■■		
	%					
Sat. Alumínio	Al		17,16		■■■■	
Sat. Bases	V		23,42	■■■■		
Argila	Arg					
	mg/dm³					
Boro	B		0,11	■■■■		
Enxofre	S		3,74	■■■■		
Ferro	Fe		40,60		■■■■	
Manganês	Mn		10,20		■■■■	
Cobre	Cu		1,20		■■■■	
Zinco	Zn		0,70	■■■■		
pH Água						
pH SMP						
pH $CaCl_2$			4,50			

GRANULOMETRIA %

Areia:	83,75
Silte:	5,00
Argila:	11,25
Classificação do Solo, Tipo:	1

FÓSFORO mg/dm³

Fósforo	P	2,18
Fósforo Rem.		50,50
Nivel Critico de Fósforo	NCP	25,11
%		
Fósforo Relativo	PR	8,68

RELAÇÕES Cmol$_c$/dm³

Ca / Mg	Ca / K	Mg / K	K/√(Ca+Mg)
3,29	9,88	3,00	0,08

K%	Ca%	Mg%	H%	Al%
1,69	16,67	5,06	71,73	4,85

Cascavel, 07 de Julho de 2018

Figura 1. Physical-chemical analysis of the soil at the Mariani site, Sidrolândia-MS.

The soil on the property has a sandy texture and low organic matter content. These characteristics make it difficult for plants to take advantage of nutrients and harm their development and productivity (SOUSA et al., 1987). Given these conditions, the application of 9 tons/hectare of composted chicken litter was recommended , as it is a low-cost product, helps in the availability of nitrogen for plants, and increases soil organic matter (SOUSA et al., 1987).

The cultivated area presented a good plant stand (figure 2), obtaining an average productivity of 7.27 tons of dry matter/hectare.



Figura 2. Stand of corn plants used for silage production.

The production achieved in the corn and sorghum crops (Table 1) was sufficient to feed 15 lactating cows for a period of 120 days, during the months of May to August, which are the months of greatest food deficit for the animals in that region. Combined with the volume of biomass produced, corn silage is characterized by its high nutritional value, capable of meeting part of the nutritional requirements of the animals and increasing milk production (VAN SOEST, 1994).

Table 1. Chemical-bromatological composition of corn and sorghum silages produced at the Mariani site, Sidrolândia-MS S.

Item	Corn	Sorghum
Production (NM t/ha)	30	75
DM %	24,25	22,00
NDF %	56,95	41,51
ADF %	33,55	50,65
CP %	8,31	11.29
MM %	5,66	4.20

NM- Natural matter, DM- Dry matter, NDF- Neutral detergent fiber, ADF- Acid detergent fiber, PB- Crude protein, MM- Mineral matter.

Millet presented a good plant stand (figure 3) and good productivity, since the crop has a high straw production capacity in low fertility soils, being able to produce more than 6 tons/ha of straw (SILVA et al. 2015).



Figura 3. Millet crop in cultivation area.

In the 2019 harvest, due to the climatic difficulties faced, the implementation of sorghum (figure 4) was recommended for the production of silage and animal feed. This choice was made due to its greater tolerance to water deficit, reducing the risk of losses (MAY et al., 2013). The sorghum variety chosen was the " Bolivian giant sorghum " Agri 002E due to its high production potential. For soil fertilization, the use of 10 tons/ha of rock dust was recommended.



Figura 4. Forage sorghum at the beginning of harvest.

Sorghum productivity reached 16.5 tons of dry matter, a value two and a half times the value achieved with corn in the previous harvest, in 2018, demonstrating that the choice of the species to be used has great importance on the productivity of the property.

The chemical composition of corn and sorghum silages showed good nutritional value for cattle feeding (Table 1). According to Oliveira et al. (2017), food production and conservation is one of the main points to be observed in cattle production, since this food can comprise between 60 and 100% of the animals' food source. Thus, efficient production, both in volume for the entire dry period of the year and with good nutritional value, can determine the profit or loss of the activity.

The results achieved with the practices applied on the property demonstrated the importance of applying technologies, through rural extension, in the development of small producers. According to Monção et al. (2019), the transfer of technologies to rural producers through extension and technical assistance helps the development of food production and the development of rural areas.

FINAL CONSIDERATIONS

The extension actions developed on the property helped in the production of bulky feed for supplementing animals during the dry season and, consequently, for milk production. Based on the results observed in this study, it is possible to highlight the importance of extension in the management of family properties, ensuring sustainable

and economical production , contributing to the preservation of resources and the retention of people in the countryside.

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