Potential milk production from silage of different corn genotypes

T. N. Martin[1], P. Bertonceli[2], S. Ortiz[2], F. A. Piran Filho[2], T. L. Habitzreiter[2], I. Api[2]
[1] *Universidade Federal de Santa Maria, Centro de Ciências Rurais, Santa Maria, Brazil.*
E-mail: martin.ufsm@gmail.com
[2] *Universidade Tecnológica Federal do Paraná, Dois Vizinhos, Brazil.*

Introduction The Brazilian livestock is based on pastures, and the intensification of pasture production may be restricted by climatic factors, limiting the production of quality forage throughout the year. The possibility of simulating scenarios from data regarding the production system contributes in the process of decision making, especially with the use of mathematical models. There is a need for rapid assessment to the results of the maize experiments because genetic breeding is dynamic. The aim of this study was to evaluate different maize genotypes concerning the potential for milk production per ton of forage and per hectare in the Southwest of Paraná, Brazil.

Material and Methods The experiment was conducted at the experimental area of "Universidade Tecnológica Federal do Paraná", *Campus* Dois Vizinhos, in the 2009/2010 harvest, the region comprising the third plateau of Paraná, with 520m altitude, latitude 25° 44'South and longitude 53º04'West, the climate is mesothermal humid subtropical (Cfa) according to Köppen classification. To carry out this work, 32 maize genotypes from the Southern super early cycle experiment were evaluated for silage production in the Southwest of Paraná. The genotypes are part of the field trials of maize cultivars that are organized by EMBRAPA and are conducted annually in various regions of Brazil. The experiment was carried out in a simple lattice design. The characters evaluated were the production of dry matter per genotype (DM, t/ha), the number of plants per hectare (NP), green matter (GM, t/ha), and neutral detergent fiber (NDF, % DM). These variables were used as input to the model developed by Undersander et al. (1993). The production of milk per ton of forage (MP, L/t) and milk production per hectare (MP, L/ha) were observed as variable output.

Results and Discussion The NDF content did not differ by analysis of variance (F test), with values between 40.22 and 61.02% DM (2A550 and H2002ALTA genotypes, respectively), and with an average of 49.44%. Therefore, it is clear that the variability of the NDF is high because this variable is directly related to the consumption of forage by animals, which interferes with the milk production. For the milk production of per ton of silage provided (MP/t) there was no statistical difference between genotypes (Table 1). However, milk production ranged from 314.34 liters (H2002ALTA) to 768.61 liters (2A550), with an average of 553.98 liters/t. Milk production per hectare (MP/ha) was different between genotypes, and the genotype with the highest production was the 30A37 with 15,517.90 liters/ha, which according to the number of plants, production of dry matter and low NDF content, provided high milk production. The GNZ2500 genotype with high content of NDF had lower production, 4,572.55 liters/ha. The average observed for all genotypes was 9,188.56 liters of milk per hectare.

Conclusions The use of the deterministic model enabled us to identify which are the best genotypes of corn for silage in the Southwest of Paraná. The genotypes 30A37, AS 1572, 30A77, 20A78, Dx 603, 2A550, 2B433, 2A106 and Dow XBX80822 Test presented characteristics of forage production and biological efficiency in milk production.

References

Undersander, D. J. Howard, W. T. and Shaver, R. D l. 1993. Milk per acre Spreadsheet for combining yield and quality into a single term. J. Agric. Prod. v.6, n.2, p.231-235.

Table 1. Average traits of corn genotypes for the Southern super early cycle.

Genotype	NP*	GM		DM%		NDF	MP/t	MP/ha	
AS1555 YG	61.4	7,783	a*	20.8	ab	49.5	565.4	11,803.7	abcd
AS1572 YG	60.0	6,139	efghij	17.6	abcdefghi	41.7	735.9	13,015.5	ab
AS1578 YG	61.4	5,582	ghijk	14.3	ghijkl	46.7	625.5	8,830.68	bcdef
30A37	62.1	7,564	abcd	21.5	a	42.9	709.6	15,517.9	a
30A77	61.4	6,373	bcdefghi	18.3	abcdefg	47.5	608.9	11,155.8	abcde
20A78	64.2	7,159	abcde	19.1	abcde	43.8	690.3	13,043.3	ab
Dx 908	56.4	6,125	efghij	17.4	abcdefghi	51.8	514.1	9,204.75	bcdef
Dx 603	63.5	6,806	abcdefg	19.8	abcd	46.2	636.1	12,597.5	ab
2A550	58.5	6,288	cdefghij	16.7	bcdefghij	40.2	768.6	12,889.9	ab
2B587	56.4	5,241	ijk	13.7	hijkl	46.6	629.1	8,730.90	bcdef
2B433	62.8	6,609	abcdefgh	16.9	bcdefghij	48.2	592.6	9,865.72	bcdef
AL2007A	61.4	6,648	abcdefgh	18.9	abcdef	49.6	563.3	10,288.7	bcde
H2002ALT	59.2	6,524	abcdefgh	16.4	cdefghijk	61.0	314.3	5,027.80	fg
H25ALTA	61.4	5,252	ijk	12.4	klm	48.7	582.6	7,374.67	cdefg
EMBRAPA	61.4	7,658	abc	19.4	abcde	49.4	566.9	1,1047.9	abcde
EMB.	53.5	3,017	l	8.71	m	48.7	583.3	5,015.67	fg
EMB. Sint.	60.7	5,766	fghijk	15.1	efghijkl	50.6	540.6	8,189.14	bcdef
GNZ 2500	56.4	5,637	ghijk	12.9	jklm	60.2	331.5	4,572.55	g
GNZX 0743	50.7	5,605	ghijk	12.4	klm	50.5	543.1	6,708.60	defg
PRE 12S12	53.5	5,764	fghijk	13.4	ijkl	54.2	461.7	6,238.37	efg
PRE 22S11	58.5	5,593	ghijk	13.7	hijkl	51.2	528.6	7,211.91	cdefg
PRE 22T10	67.1	7,848	a	19.2	abcde	54.9	446.5	8,616.42	bcdef
PRE 22T12	53.5	5,046	jk	14.3	ghijkl	47.8	602.1	8,669.35	bcdef
PREXT010	58.5	7,029	abcdef	17.9	abcdefgh	51.1	530.9	9,698.51	bcdef
PRE 22D11	48.5	5,065	jk	14.5	fghijkl	52.7	493.9	7,130.08	cdefg
SHS-7090	59.2	5,732	fghijk	16.0	defghijk	49.8	559.5	8,961.76	bcdef
SHS-7111	57.8	4,657	k	11.5	lm	51.6	519.5	6,069.87	efg
XBX80822	65.0	6,256	defghij	17.0	bcdefghij	43.3	699.6	11,911.0	abc
AG9040	58.5	5,382	hijk	14.3	ghijkl	52.8	492.6	7,007.67	cdefg
Dow 2A106	62.1	4,694	k	14.5	fghijkl	45.7	647.7	9,462.69	bcdef
BRS3035	60.0	5,338	hijk	14.4	ghijkl	47.8	601.6	8,700.45	bcdef
DKB330	61.4	7,693	ab	20.6	abc	54.3	460.6	9,474.76	bcdef
Average	59.3	6,058		16.0		49.4	567.1	9,188.56	
CV	13.7	11.20		13.3		12.5	23.85	27.27	

* Means followed by different letter differ at 5% probability, DMS-t test.

**Number of plants (NP, 1,000 ha^{-1}), green matter (GM, t/ha), dry matter (DM, t/ha), neutral detergent fiber (NDF,%DM), milk production per feed ton (MP/t, liter) and milk production per hectare (MP/ha, liter).