

# Evaluation of factors influencing milk ejection in the Brazilian Gyr dairy cattle

V. A. Praxedes<sup>a</sup>, R. S. Verneque<sup>\*,a</sup>, M. C. Pereira<sup>a</sup>, M. F. A. Pires<sup>a</sup>,  
M. A. Machado<sup>a</sup>, M. G. C. D. Peixoto<sup>a</sup>

<sup>a</sup> Embrapa Gado de Leite, Juiz de Fora, Rua Eugênio do Nascimento, 610, 36038-330, Brasil

## Abstract

The objectives of this study were to evaluate frequency and factors associated and contributing to milking ease in Gyr dairy cows in order to determine new selection goals. A total of 2,507 daughters of 364 sires from the Brazilian Program for the Improvement of Gir Dairy Cattle were evaluated for milking ease (ME) and temperament (T) by means of scores. Jointly, these cows were scored for temperament. For both traits, scores ranged from 1 to 9. A correlation analysis was carried out to verify the association between ME and T. The model for variance analysis of milking ease included the fixed effects of calving year-season, technician, herd and age of cow at observation, this last as a covariate. The value of Pearson correlation between ME and T was moderate (0.48). There was no trend of association between milk yield and milking ease, contrary to what was verified with the temperament of cows. All variables included in the model influenced ( $P < 0.05$ ) ME. Results suggest that ME are not a relevant trait to Gyr dairy cattle breeding program and that it can be handled into herds to get milking ease and good temperament cows.

**Keywords:** Milking ease; Temperament; Animal breeding; Zebu cattle

## 1. Introduction

Brazil is the largest milk producer in Latin America and is in seventh place in the world rank. This production could be maximized if more appropriate management practices and higher genetic livestock were introduced into herds. Aspects related to the efficiency of milk production have long being studied in the country to improve the current rates and the competitiveness of the Brazilian milk market.

From the standpoint of genetic improvement, there is currently concern about traits such as temperament and milking ease since most of the national dairy cattle consists of crossbred animals (European x Zebu) (Peixoto et al., 2009). Milking ease, expressed as milk flow, may be defined as the ratio between the time and effort spent in milking of cows. The milking ease is among the three most important features for the profitability of milk production, preceded only by the milk production and fat percentage (Sivarajasingam et al. 1984). Aspects related to quality of labor and udder health contribute to this result (Boettcher et al 1998). According to the authors, increased milk flow causes reduction in labor costs, in the incidence of mastitis, among others.

The Zebu cattle is considered bad temperament breeds and this is a barrier to its use for milk production. Milking in Zebu dairy cattle is performed at the presence of the calf which represents a complication to some breeders (Tancin et al., 2001). Otherwise, the Zebu breeds under milk selection have been increasingly used in milk production systems in some regions of Brazil, without loss of

productivity and without risks to the cowboy. However, scientific studies have been demanded by farmers to evaluate this aspect.

The Brazilian Program for the Improvement of Gyr Dairy Cattle conducted by Embrapa Dairy Cattle Research Center and Brazilian Dairy Gyr Breeders' Association has published the results of genetic evaluation for interesting management traits recorded since 1992. The objective of this study was to verify the frequency of scores for milking ease (ME) and temperament (T), to evaluate the association between them and to determine factors influencing ME.

## **2. Material and Methods**

Data from 2,507 daughters of 364 sires of Dairy Gyr breed controlled by the Brazilian Program for the Improvement of Gyr Dairy Cattle from 1992 to 2007 were used in this study. Observations of management traits, specifically milking ease and temperament, were conducted and repeated at posterior ages for the majority of animals (1.9 observations per cow). They were expressed by means of subjective scores, based on a numerical scale. Scores ranged from 1 to 9, being one designed to the easier milking cows and nine to the opposite ones. The CORR procedure was used to produce Pearson correlation between ME and T (SAS, 2003). The model for variance analysis of milking ease included the fixed effects of calving year-season, technician, herd and age of cow at observation as a covariate. The analysis was carried out by means of MIXED procedure available in the computational package SAS<sup>®</sup>, using the option REPEATED.

## **3. Results**

The frequency of scores for milking ease (ME) and temperament (T) is presented in table 1. The most frequent scores for both ME and T were 2 and 3 respectively. These results pointed out that Gyr cows do not have so much problems as milking flow and temperament are regarded. The tendency of the joint frequency distribution for scores of both traits indicates the possibility of association between them. The value of Pearson correlation between ME and T was 0.48.

Averages of milk production for each class of ME and T can be seen in table 2. Considering ME, there was little variation in the milk production averages (3,400 to 4,900) without a strong association with the trend of ME. However, there was large amplitude of variation in milk production averages in function of the scores for T with a clear trend of association between these traits. Cows with bad temperament had higher averages than those with more docile temperament.

The results of variance analysis of ME are shown in table 3. It was verified that all variables included in the model influenced ( $P < 0.05$ ) ME. Environmental conditions affected ME, as much as the technician who proceeded to the score. Regarding age at calving, both linear and quadratic effects were significant. There was a significant frequency of older cows in the lower scores of ME (Fig. 1).

## **4. Discussion**



Results became evident that milking ease as well as temperament is not a problem in Gyr dairy cattle production systems that adopted milking at the presence of calf. It can be attributed to the higher oxytocin release in the post-partum period (Tancin et al., 2001). The value of correlation for these traits can be considered moderate. So, there is some association between ME and T, which can be attributed to both management practices and genetic factors. Stress in bad temperament cows can cause peripheral inhibition of oxytocin effects on mammary gland and of oxytocin release by the central nervous system. These inhibitions are consequence of respectively elevated catecholamines, mediated by  $\alpha$ -adrenergic receptor stimulation, as well as higher cortisol concentrations with reduction in milk production (Bruckmaier and Blum, 1998). Further studies must be carried out to evaluate the contribution of these sources to the variation in those traits and to estimate genetic parameters involved with these association.

The low frequency of milking difficulty and bad T cows can be also consequent to early disposal or adaptation of these animals to the management practices in the herds (Munksgaard et al., 2001). An important aspect to be considered is the possibility of milk selection brings correlated response about milking ease performance since there is an association. The maintenance of some animals with milking difficulty and bad temperament can be explained by their high productivity. Economically, costs with labor seem to be compensated by high milk production, since it represents one of the main factors increasing the production costs (Cardoso et al. 2004). Concerning to the age effect, beyond the disposal of cows due to bad performance in these traits, the effect of training can be interfering to the management of milking and be responsible for those results.

## **5. Conclusion**

Milking ease is not problem to management practices of Gyr dairy cattle and at this moment these traits do not need to be a selective goal in this breed. Disposal of cows with milking difficulties will imply in disposal of some bad temperament cows. The significance of fixed effects suggests that changes in management practices of the herd can result in milking ease and good temperament cows.

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**Table 1.** Frequency of scores for milking ease (ME) and temperament (T) in Gyr dairy cows.

ME	Frequency	Percentage	T	Frequency	Percentage
1	540	11.76	1	535	11.2
2	1491	32.48	2	1420	29.8
3	1833	39.93	3	2023	42.5
4	551	12.00	4	555	11.7
5	73	1.59	5	114	2.4
6	75	1.63	6	83	1.7
7	23	0.50	7	27	0.6
8	4	0.09	8	3	0.06
9	1	0.02	9	3	0.06

**Table 2.** 305-d milk production averages of cows in each score of milking ease.

ME	Milk average	Min-Max	N	T	Milk average	Min-Max	N
1	3414.60±1709.05	183-17078	657	1	3406.45±1738.90	136-17078	684
2	3519.19±1658.02	158-13194	2178	2	3338.51±1542.89	183-14598	1907
3	3402.81±1479.41	136-14598	2490	3	3511.33±1517.69	158-12102	2654
4	3803.30±1804.91	244-13620	918	4	3846.08±1896.56	244-13620	934
5	4865.54±2014.43	151-10427	120	5	3886.58±1731.24	173-9509	160
6	3881.90±1759.32	595-11176	141	6	4383.69±1922.61	990-11597	168
7	3625.68±1674.44	362-8389	38	7	4265.82±1835.90	1107-7975	38
8	3270.18±947.94	1284-4226	11	8	4376.33±604.95	3678-4740	3
9	3143.00	3143-3143	1	9	6546.67±2524.39	3474-10427	6

**Table 3.** Variance analysis of milk ease.

Variable	Num DF	Den DF	F value	Pr>F
Year-season	27	4522	21,42	<.0001
herd	22	4522	14,73	<.0001
Technician	14	4522	30,49	<.0001
Age (linear)	1	4522	4,51	0.0338
Age (quadratic)	1	4522	5,81	0.0160

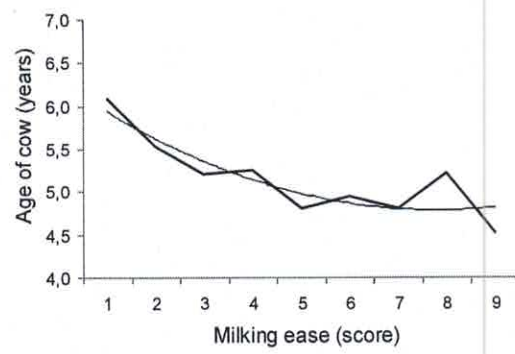


Figure 1. Milking ease scores in function of the cows' age.



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