GENETIC AND PHENOTYPIC PARAMETERS ESTIMATES AND GENETIC TREND OF MILK YIELD OF SAANEN GOATS IN SOUTHEAST OF BRAZIL[1]

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SUMMARY

The aim of this study was to estimate genetic and phenotypic parameters of Milk Yield (MY) of Saanen goats from a herd in Andradas city - MG, in Southeast region of Brazil.(Co)variance components and genetic and phenotypic parameters were estimated by Restricted Maximum Likelihood (REML), by an Animal Model. Heritability estimate of MY was 0.09 and repeatability was 0.20. Genetic trend of MY was obtained by the regression of breeding values of the goats on kidding year, with the first derivative of regression function representing genetic trend and the second derivative indicating annual change in MY. Genetic trend obtained was a quadratic regression and can be expressed by the equation $Y_{PL}=0.3654x^2-62.7726x+2693.3575$, with minimum point in the year 1986 and determination coefficient (R^2) equal to 0.70. There was a annual genetic gain of 0.7308 kg. The heritability and repeatability estimates were low and the trait can only be measured on females, so it could be recommended the Progeny Test as a method of sires evaluation. In addition more than one record per animal should be taken before the culling decision.

Keywords: Animal Model, Genetic trend, Goats, Heritability, Repeatability

INTRODUCTION

About 90% of caprine production in Brazil is found in Northeast region. The main purpose of those herds is the meat and leather production, using animals with no defined breed. There are several possibilities in raising goats as an economic activity. The herd can be taken in a very small piece of land and also a wide range of environments can be used. Goats can be raised in wild places and they are able to adapt to several production systems being a good source of revenue. Although the great number of herds in the Northeast region, the goat production has been rapidly increased in the Southeast, mainly herds of dairy breeds. One of the most important reasons to this improvement is the high prices of the row milk. These herds are composed by animals of dairy European breeds and the farms have been doing continuous crossbreeding system in order to absorb the native gene breeds to the European one, mainly Saanen, Toggenburg and Alpine breeds. In the last years, there were several importation of sires and semen of those breeds but the material that got in was very heterogeneous. Animals from temperate countries show great sensibility to photoperiod

changes, that reflects in their reproductive performance and, consequently, in their production. Then, the farmers have been selecting their goats but most of them in an empirical way. Only recently they have started collecting performance records as a routine and the first estimates of genetic parameters and genetic trends of economic traits could be obtained.

The aim of this study was to estimate genetic and phenotypic parameters of Milk Yield (MY) of Saanen goats from a herd localized in Andradas MG, Southeast region of Brazil.

MATERIAL AND METHODS

Data utilized in this study were obtained from Capril Serra de Andradas, a private business farm located in the Southeast. The farm is at 22^0 05' South latitude and 46^0 35' West longitude and the annual precipitation is around 1500 mm. Dairy goat production is the only Capril Serra de Andradas economic source of revenue with a herd size of 60 Saanen dams. The goats are taken in a semi-confined system receiving forages in a hod and the amount of concentrate ration according to their category and milk yield level. Water and mineral salt are given to them *ad libitum.* Thereupon the kidding, the kids are separated of does. The does are milked twice a day and milking is manual. Since 1993 the performance records of this herd has been collected and storaged in a computer system especially developed to dairy goat herds (Procapri (1994)).

Milk yield records of Saanen does used in this study were collected from 1982 to 1995 and the information was analyzed by Least Square Method using the procedure GLM (SAS, 1989). The model can be represented by:

$$\mathbf{y = X\beta + Z_1a + Z_2p + e}$$

where:

y = vector of dependent variable;

X = incidence matrix of fixed effects;

β = vector of fixed effects;

Z_1 e Z_2 = incidence matrices of random effects;

a = vector of random genetic additive effects;

p = vector of random permanent environmental effects;

e = vector of random errors associated to each observation.

The fixed effects considered were the contemporary group (defined as females that kidded in the same year and under the same photoperiod conditions), age of doe (1 to 6 years), lactation length (4 to 12 months) and kidding type (single or multiple).

Variance and covariance components estimates were obtained by Restricted Maximum Likelihood Method, using the program MTDFREML (Multiple Trait Derivative-Free Restricted Maximum Likelihood), developed by Boldman *et al.* (1993).

Genetic trend of MY was obtained using the quadratic regression of breeding values on kidding year, the first derivative of regression function representing genetic trend and the second derivative indicating annual change in MY.

RESULTS AND DISCUSSION

Heritability and repeatability estimates were obtained using a file of 1203 animals in the relationship matrix. The heritability estimate in this study was 0.09 (Table 1), value of low magnitude. This result enphatizes that the environmental conditions given to dairy goats have a very great importance in this farm. This value was lower to all references found in literature (Nongxueyuan, 1984; Constantinou *et al.*, 1985; Sullivan *et al.*, 1986; Constantinou & Mavrogenis, 1987; Constantinou, 1989; Bishop *et al.*, 1995; Gonçalves, 1996). Table 1 shows the estimates of the components of variance of genetic additive, permanent environment and temporary environment, heritability and repeatability of MY.

Table 1 - Estimates of the components of variance of genetic additive (σ^2_A), permanent environment (σ^2_{Pe}) and temporary environment (σ^2_{Te}), heritability (h^2) and repeatability (r) of MY.

Trait	σ^2_A	σ^2_{Pe}	σ^2_{Te}	h^2	r
MY	3350.00	3908.00	29808.00	0.09	0,20

MY = Milk yield

Heritability estimate in this study could be underestimated. Probably the use of information from just one herd was not enough to get good estimates of genetic and phenotypic parameters. On the other hand, they are one of the first estimates obtained to the dairy goat population in Brazil and should be taken just as an indication to the breeding program.

Repeatability estimate of MY was 0.20, that indicates the effect of permanent environment was much more expressive than the genetic additive one. This result was similar to the one reported by Gonçalves (1996) and lower than the one got by Sullivan *et al.* (1986), Constantinou & Mavrogenis (1987), Constantinou (1989) and Bishop *et al.* (1995). The environment was responsible for about 80% of total variation in MY, which suggests the importance of breeding management conditions.

The genetic trend obtained was a quadratic regression expressed by the equation $Y_{PL}=0.36540x^2-62.7726x+2693.3575$, with a minimum point in the year 1986 and determination coefficient (R^2) was equal to 0.70 (Figure 1). The annual genetic gain in MY was 0.7308 kg, showing an increment in animals breeding value during the last ten years.

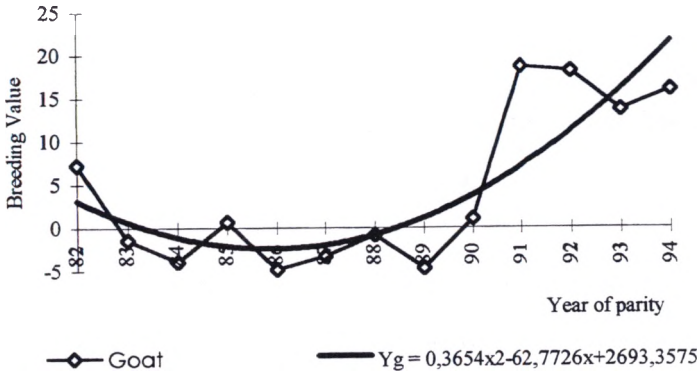

Figure 1. Genetic trend of Milk Yield of Saanen goats.

CONCLUSIONS

- The non-genetic effects were very important to the MY and they need to be controlled or adjusted when comparing animals;
- The low value of heritability estimate and also because the trait can only be measured in females, the Progeny Test is the best sire selection method to this trait;
- According to the repeatability estimate, it could be recommended more than one lactation per goat, before the culling decision;
- There was an increment in breeding value of animals during the last ten years.

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