GENETIC VARIABILITY ON POST-WEANING GROWTH TRAITS IN CREOLE GOATS REARED ON PASTURE

N. Mandonnet[1], A. Menendez-Buxadera[1], R. Arquet[2], M. Naves[1] and G. Alexandre[1]

[1] Institut National de la Recherche Agronomique, Unité de Recherches Zootechniques, Domaine Duclos, 97170 Petit Bourg, Guadeloupe (F.W.I.)
[2] Institut National de la Recherche Agronomique, Domaine expérimental de Gardel, 97129 Moule, Guadeloupe (F.W.I.)

INTRODUCTION

Goat production is widespread in the tropics and is gaining in popularity in the developed countries (FAO, 2001). Breeders ask for increased meat production efficiency. Growth traits can therefore not be bypassed.

Creole goat is an efficient meat breed in the Caribbean islands. Its exceptional productivity and adaptation in grazing systems have been put forward by Alexandre *et al*. (1999) and Menendez Buxadera *et al*. (2002). However, individual growth and conformation performances of Creole goat are unfortunately low, as generally reported in local breeds (Warmington and Kirton, 1990).

Genetic variability available on those traits had to be described before introduction into a breeding scheme. Menendez Buxadera *et al.* (2002) have already explored genetic variability in pre-weaning weights and total productivity in Creole goats. In this study, genetic parameters of post-weaning growth traits are estimated in an experimental flock of Creole goats of Guadeloupe (F.W.I.).

MATERIAL AND METHODS

Data. The data of 3384 kids born between 1992 and 1999, sired from 100 bucks and 508 does, were collected from the experimental Creole goat flock of INRA-Gardel, located in the French West Indies. All over the year, the flock grazed on *Digitaria decumbens* irrigated pastures managed in a rotation system. Kids were weaned at an average age of 82 days. They were weighed at monthly intervals up to 11 months of age, when they were sold or kept for breeding. Live weights at fixed age (90, 120, 180, 240 and 300 days) were calculated. Average daily gain between 90 and 180 days, between 180 and 300 days and between 90 and 300 days were also estimated. Pedigree was traced back up to foundation in 1979.

Statistical analysis. The VCE program (Groeneveld, 1993) was used to estimate genetic parameters by means of REML methodology. The more complete model, including direct and maternal genetic effects plus maternal environmental effect, was fitted since unnecessary random effects never led to biased estimations (Clement *et al*., 2001). Rearing type, parity of the dam and combined effect of sex-cohort-management were added as fixed effects when significant. Genetic parameter estimates were obtained from one univariate analysis (ADG90_300) and 3 multitraits analyses (LW90-LW120-LW180-LW240, LW120-LW180-

LW240-LW300, ADG90_180-ADG180_300). Genetic correlations between LW and ADG were obtained from bivariate analyses. As results were very consistent between analyses, only one set of estimations will be presented.

RESULTS AND DISCUSSION

Direct heritability estimates on live weight traits (table 1) were ranged from 0.14 to 0.24. The management system on pasture strictly enabled the expression of genetic variability. References on goat post-weaning growth traits are scarce. Nevertheless our results tend to be higher than those reported by Nicoll (1985), Warmington and Kirton (1990), Schoeman *et al.* (1997), Mourad and Anous (1998). As we used more complete and less biased models than they did, our estimates should be more realistic.

Table 1. Genetic parameters for post-weaning live weight in Creole goats[B]

Traits[A]	n	Mean (hg)	CV_d	CV_m	h^2_d	h^2_m	c^2	ρ_{dm}
LW90	3384	85.74	8.11	6.35	0.14	0.09	0.15	-0.52
LW120	3344	98.63	9.14	6.06	0.20	0.08	0.13	-0.50
LW180	3251	118.29	8.94	4.99	0.24	0.07	0.11	-0.53
LW240	3117	143.67	7.83	4.89	0.19	0.07	0.11	-0.47
LW300	2037	166.58	7.11	5.07	0.17	0.09	0.09	-0.47

[A] Live Weight at 90, 120, 180, 240, 300 days of age.
[B] CV_d = coefficient of direct genetic variation ; CV_m = coefficient of maternal genetic variation ; h^2_d = direct heritability ; h^2_m = maternal heritability ; c^2 = coefficient of maternal permanent environment ; ρ_{dm} = genetic correlation between direct and maternal effects.

Our levels of genetic variability are within the range of CVg published for different economic characters. Maternal heritability and maternal environmental effect were lower than those estimated by Menendez Buxadera *et al.* (2002) in creole kids before weaning. However they were not negligible. For this local breed reared under tropical conditions, kids performances will be dependant on maternal abilities all life long. Estimates of genetic correlation between direct and maternal components were negative. Such negative values are also evident in most other studies, in cattle (Naves *et al.*, 2002), in sheep (Nesser *et al.,* 2001) and in goats (Shoeman *et al.,* 1997). According to these trends, genetic improvement would be difficult since an increase in one component would result in a decline in the other. The optimum genetic progress in each component will have to be researched.

Lower heritabilities were found on growth rates (table 2). Maternal components were less important than in body weight traits. They were however more antagonistic with direct genetic effects.

In order to propose a selection criterion for post-weaning growth improvement on pasture, genetic correlations between traits were estimated. Genetic correlation between ADG90_180, ADG180_300 and LW180 were respectively 0.83 and 0.63. At the same time, LW180 was also strongly correlated to live weight at the end of fattening (LW300) : 0.92.

Table 2. Genetic parameters for post-weaning growth rates in Creole goats [B]

Traits [A]	N	Mean (g/d)	CV_d	CV_m	h^2_d	h^2_m	c^2	ρ_{dm}
ADG90-180	3251	35.57	14.82	6.89	0.14	0.03	0.03	-0.62
ADG180-300	2037	40.65	9.27	8.16	0.08	0.07	0.02	-0.82
ADG90-300	2037	38.92	8.76	5.54	0.13	0.05	0.05	-0.80

[A] Average daily Gain between 90 and 180 days of age, between 180 and 300 days of age, between 90 and 300 days of age.
[B] See Table 1 for meaning of genetic parameters.

CONCLUSION

From our results, genetic improvement on LW180 in Creole goats is possible. It should lead to rapid increase of overall growth performances during fattening and to heavier animal at slaughter. Taking previous study (Mandonnet *et al.,* 2002) into account, the consideration of resistance to parasitism and LW180 together as selection criteria is bound to improve global post-weaning performances in Creole goats. We demonstrated that selection in low input pasture management systems is feasible in humid tropic environments. Emphasis will now be put on carcass traits.

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