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GROWTH PERFORMANCES OF CALIFORNIA AND LINE V RABBITS REARED IN TURKEY

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SUMMARY: Data coming from 69 California and Line V rabbits are analysed. The trait studied are weights at birth and at 3, 6, 8 and 10 weeks; and daily gains between the previous ages. The model used for analysis is a mixed model, being the month of birth and the breed the fixed effects; the litter size at birth is used as a covariate and the animal and litter are considered as a random effects. Contrasts, comparing the breeds effects, are carried out.

Key words: Line V, California, Growth Performance

RESUME: *Les données provenant de 69 California et la lignée 120 V de Lapins sont analysées. Les caractéres étudiés sont les poids a la naissance et aux 3^{e}, 6 ^{e}, 8 ^{e} et 10 ^{e} semaines et les gains journalier entre les ages préalables. Le medéle employé pour l'analyse est un medéle mixte. Étant le mois de naissance et la race et les eefets établis. Le nobre de portée a la naissance est utilise comme une covariante et l'animal et la portée sont considérés comme les effets au hasard. Par contre, la comparaison des effets des races réalisée.*

Most-clés: *lignée V, California, performance de croissance*

INTRODUCTION

Meat rabbit production in hot climates countries use local breeds that are better adapted to the heat stress than the exotic ones. Nevertheless, the productivity of the local breeds use to be low and efforts to introduce more productive animals, despite their worse adaptation, are done recursively. The exotic breeds have reared as purebreds or as crossbreds trying to improve the adaptation (Khalil, 1997). The main criterion to introduce foreign rabbits has been, in general, the belonging to breeds commonly used for meat production in temperate countries, as the New Zealand White, California; Chinchilla or Bouscat (Yamani, 1994; Testik, 1996). Nowadays, synthetic lines and lines derived of a breed are being developed by selection for defined objectives (Maertens, 1992; Gomez et al, 1996; Feki et al, 1996; Poujardieu et al, 1998). These lines, depending on their specialisation, perform better than the standard of the original breeds and the current production tends to rely on them. In addition, some lines are being selected in places where the climate is closer to a hot climate than to a temperate one and testing these lines in hot climate countries could be interesting. Sòme attemps have already been done and one of these lines has proved to be advantageous to standard California and New Zealand White for litter size traits and daily gain in Egypt (Yamani, 1994) and Turkey (Akin et al., 1996). Data reported by Testik (1996), coming from a non comparative study, also suggest the superiority of this line over standard California, Chinchilla and New Zealand White. The aim of this experiment is to compare, for individual growth traits, California V line rabbits reared in Turkey taking in to account factors as date of birth and birth litter size.

MATERIAL AND METHODS

The animals compared in this study are standard California and line V rabbits reared in the Farm of the Faculty of Agriculture (University of Çukurova, Adana/TURKEY) from birth to ten weeks of age. The line V come from the Department of Animal Science (Universidad Politecnica, Valencia/SPAIN) where is selected for litter size at weaning following a BLUP methodology under an animal-repeatabilty

model (Estany et al., 1989).

The traits studied have been individual weigts between birth and ten weeks of age, age close to the slaughter age of the growing rabbits, and daily gains. The rabbits were weighted at birth (week 0) and when the rabbits were 3, 6, 8 and 10 weeks old. The nomenclature used is W_i for individual weights recorded in rabbits i weeks old and Gi-j for daily gain between the weeks i and j. Negative regression coefficients have been reported in other studies, being more important for weights than for daily gains (Camacho, 1989; Cifre et al., 1998a,b).

The data were analysed using mixed model methodolgy (Henderson 1984) under an animal model taking into account the following effects :

- the line (Line V or California breed) considered as a fixed effect,
- the date of birth (rabbits born between 11/087/97 and 17/09/97 versus the rabbits born between 25/09/97 and 13/10/97) as a fixed effect,
- the litter size at birth, considered as a covariate,
- the genetic effect of the animal, considered a random effect, and
- the error of the model.

The relationships between the animals was considered through the numerator relationship matrix because the sire and the dam of the rabbits were recorded. The table 1 shows the number of sires, dams and records involved in the experiment.

Table 1. Distribution and number of records (Ni a) by line

Line	Sires	Dams	NO	N3	N6	N8	N10
V	4	16	116	104	97	91	91
California	3	10	63	57	53	51	49

a-Ni- number of rabbits weighted at the age of i weeks

The use of litter size at birth as a covariate allows to compare the lines for the growth traits corrected for the effect of the litter size. Table 2 gives figures of the litter size of does of the two lines.

Table 2. Litter size by line

Line	Maximum	Minimum	Mean
V	11	5	7.5
California	11	4	6.9

To solve the mixed model, the ratios of the genetic variance and birth litter variance to the phenotypic variance are needed for every trait analysed. The values used are shown in the table 3 and follow results of Camacho (1989).

Table 3. Heritability (h2) and ratio of litter of birth variance to phenotypic variance(c2) by traits

Traits	W0	G0-3	W3	G3-6	W6	G6-8	W8	G8-10	W10	G0-6	G6-10
h2	0.1	0.10	0.10	0.15	0.15	0.20	0.20	0.20	0.20	0.15	0.20
c2	0.2	0.15	0.20	0.05	0.15	0.05	0.15	0.05	0.10	0.10	0.05

a:Wi, weight(g) at the ith week Gi-j, daily gain (g/d) between the ith and jth week

The statistical significance of the regression coefficient of the covariate and the contrast between lines and dates of birth was tested by the corresponding F test.

RESULTS AND DISCUSSION

Table 4 gives the generalised least square means for the lines and date of birth of the analysed traits. The regression coefficient of the traits on litter size are also given in table 4. The sign of the coefficient is negative for all weights showing the influence of the size of the litter of birth on the subsequent growth. The same trend is observed for daily gains with the exception of the period between 8 and 10 weeks where the coefficient is positive, as if the rabbits that grew less until the week 8 exhibited afterwards a compensatory growth. Similar negative effects of litter size at birth on growth

have been found in other studies, being the values statistically significant for weights and daily gains but relatively more important for weights (Camacho 1989; Cifre et al. 1998a,b). Nevertheles, our estimates are non significantly different of zero because the size of the experiment is too small, only 26 sizes litters.

Table 4. Least square means 1 (± standard error) for line and date of birth, and regression coefficient (± standard error) on litter size at birth by trait2.

Trait	Line V	California	Date of birth		Regression Coefficient
			11/08-17/09	25/09-13/10	
WO	65.7±1.7	62.8 ± 1.8	63.7 ± 1.5	64.8±1.6	-0.65±0.60
GO-3	11.5a±0.3	9.6b ± 0.4	10.8 ± 0.4	10.3±0.4	-0.16±0.10
W3	308.4[a]±8.1	266.2b ± 10.5	292.1 ± 8.7	282.5± 9.3	-3.6±3.4
G3-6	21.7 ± 0.8	21.9 ± 1.0	21.9 ± 0.8	21.7±0.9	-0.30±0.29
W6	774.1 ± 20.0	732.3 ± 25.5	755.3 ± 20.7	751.1±22.3	-8.9±7.9
G6-8	28.1 ± 1.1	25.9 ± 1.4	27.0 ± 1.1	27.0±1.2	-0.25±0.41
W8	1179a ± 21	1103b ± 27	1139 ± 21	1142±23	-12.9±8.1
G8-10	35.8 ± 1.3	35.1 ± 1.6	36.4 ± 1.3	34.5±1.4	0.33±0.47
W10	1679a ± 26	1595b ± 33	1649 ± 27	1625±29	-8.8±9.9
GO-6	16.8 ± 0.5	15.9 ± 0.6	16.4 ± 0.5	16.3±0.5	-0.22±0.18
G6-10	31.9 ± 0.9	30.5 ± 1.2	31.7 ± 0.9	30.8±1.0	0.04±0.35
GO-10	23.0a ± 0.4	21.9b ± 0.5	22.6 ± 0.4	22.3±0.4	-0.13±0.14

1. Means within trait and effect with the same letter do not differ do not differ significantly
2. Wi, weight (g) at the ith week Gi-j, daily gain (g/d) between the ith and jth week

Concerning the effect of date of birth it has not been significant for any trait due, probably, to the proximity of both periods and the differences of temperatures between them should be very small, perhaps the differences would be higher for the six first weeks than for the last four. Results of Feki (1994) show that the effect of high temperatures lowering the growth rate is less important in rabbits younger than 6 weeks old than in older rabbits.

Referring the comparison between lines, that is the main concern of this study, the means given in table 4 show a general trend favouring line V. However, the differences are not significant for all traits, probably because of the small number of data. Significant differences have been observed for daily gain between birth and the 3rd week, birth and 10th week and for the weights at the 3rd , 8th and 10th weeks. The weights and daily gains achieved in this experiment are higher than the standard values given for local breeds as the Giza White and the Baladi rabbits in Egypt (Khalil, 1997) but are in the range of the figures achieved in the experiment. The explanation of this fact could be the differences expected in different populations of the same breed, because in rabbit breeds the within breed variance is presumably higher than the within line variance.

CONCLUSION

The results of this study, agree with the findings of similar experiments that compare in hot climate countries specialised lines with populations of standard breeds used for meat production in temperate countries. The result has been the superiority of the specialised line in growth traits, that are the traits studiedin this experiment, despite the line is being selected for litter size traits. It is valuable to notice that the climatic conditions of the place where the line is selected are intermediate between temperate and hot climates. The generality of these results suggest the possibility of continuing the selection of this kind of lines in places of hot climate, under the expectancy of increasing more the productivity.

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