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ESTIMATION OF HERITABILITY OF LIVE WEIGHTS AND WEIGHT GAINS IN DIFFERENT AGES OF RABBITS

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Introduction

Lines selected for special traits is a breeding method that has been used for decades in rabbit production. Within lines the selection has two main directions. In one part of the lines the breeding animals are selected for maternal traits (littes size, milk production, kindling frequency etc.). The other part of the lines is selected for paternal characteristics (weight gain, feed conversion, carcass yield etc.). By decreasing the number of selection traits genetic progress may be accelarted. This paper report the heritability of life weight and weight gain at different ages and the phenotypic and the genetic correlations between these traits.

Material and methods

Data of a New Zealand White line were used in the calculations. Production data were collected from the herd book and covered approximately 1.5 year. Data of rabbits were collected that had complete set of figures of weights and weight gain measured at 3, 6 and 10 weeks of age and between 0-3, 6-10 and 3-10 weeks of age, respectively. Altogether data of 2750 young rabbits were process in the present investigation. These young rabbits were progenies of 93 bucks and 556 does.
Heritability and genetic correlations were estamited by analisis of paternal half sibs (Tamási and Tóth, 1974) and data were set into order of hierarchy according to bucks and does.

Results and discussion

Values of heritability

Heritability values of examined traits are summarized in Table 1. These data indicate an irreal value (over 1.0) for the weight at 3 weeks of age which is attributed to the significant maternal effect (first of all the litter size). As the age progressed (by decrease the maternal effect) values of heritability became smaller. These data indicate that although the effect of does decreased their presence can not fully be exluded. This is proven by heritability of weight gain between 3-6 and 6-10 weeks of age.

Some earlier examinations (Szendrő, 1980; Ouhayoun, 1983) indicated that weight of young rabbits is strongly infulenced by metarnal effect and this distorting effect disappear in the post weaning weight gain.

Table 1.

Heretability values of examined traits

Caracteristics	h^2_{S+D}	h^2_{S+D} x
Live weight at 3 weeks of age	1.17 ± 0.12	1.15
at 6 weeks of age	0.88 ± 0.10	0.85
at 10 weeks of age	0.66 ± 0.09	0.63
Weight gain between 3 and 6 weeks of age	0.68 ± 0.09	0.64
6 and 10 weeks of age	0.36 ± 0.06	0.32
3 and 10 weeks of age	0.54 ± 0.08	0.49

x calculated on basis of data compared to monthly averages.

After having the first results it was suspected that in many instances irreal h^2 values were caused not only by the maternal effect but also by other factors. One of these might be environmental that differed among animal groups which were born and grew up at the same period of the year. Since we had small number of data to calculate the results for 10 days periods of birth, monthly averages were computed and basal figures were also expressed in percentual form = $\frac{\text{individual weight gain}}{\text{average of weight gain of the month}} \times 100$. These relative value were also used for estimation of the heritability. Second column of the Table 1. summarises, the h^2_{S+D} values calculated on basis of data compared to monthly averages. The h^2 values calculated on basis of relative figures hardly differ from data of the 1st column (0.02-0.05).

Genetic correlations

Values of genetic correlations calculated for all possible variations among traits tested are summarised in Table 2.

No or minimal genetic correlations were found between live weight at 3 or 6 weeks of age, weight gain in the perios of 3-6 weeks of age and weight gain between 6-10 weeks. Similar results have been communicated by Randi and Scossiroli (1980). These results prove that weight gain before and after weaning is influenced by different factors.

Genetic correlations of 0.64-0.84 order among weight measured at 3, 6 and 10 weeks of age and the fact that correlation between live weights of rabbits that were closer to each other in respect of age was found more close, were attributed that live weight measured at younger age were involved (as initial data) in the weight gain of older age. The same relationships were found among live weight at different ages by Varela-Alvarez et al. (1976) and by Randi and Scossiroli (1980).

It is also worth to mention that only 0.35 genetic correlation was found between live weight at 3 weeks of age and weight gain between 3-6 weeks of age. This data prove again that weight gain in the period of changing from milk diet to solid food is determined primarily by not genetic factors.

Table 2.

Genetic correlations between the examined traits

Characteristics	1	2	3	4	5	6
Weight at 3 weeks of age	1	0.35	0.77	0.05	0.64	0.27
Weight gain between 3-6 weeks of age		1	0.87	0.14	0.77	0.77
Weight at 6 weeks of age			1	0.12	0.86	0.67
Weight gain between 6-10 weeks of age				1	0.62	0.74
Weight at 10 weeks of age					1	0.91
Weight gain between 3-10 weeks of age						1

Phenotypic correlations

Phenotypic correlations among traits tested (Table 3) were similar to value of genetic ones and to data of the literature (Ouhayoun, 1978; Dorozynska et al., 1985; Randi and Scossiroli, 1980). Generally, highly significant correlations were found among examined traits. The only exception was the lack of correlations between live weight of 3 and 6 weeks old rabbits and weight gain in the period of 3-6 and 6-10 weeks of age, resp. This is explained by the fact that before weaning maternal factors (milk production for one suckling rabbit), after weaning individual capacity for weight gain have primary effects. Week correlations were found between weight at 3 weeks and weight gain in the period of 3-6 and 3-10 (r = 0.28 and 0.19, resp.). In respect of the other correlations 0.5 or higher values were found.

Table 3

Phenotypic correlations between traits tested

Characteristics	1	2	3	4	5	6
Weight at 3 weeks of age	1	0.28^{xx}	0.67^{xxx}	0.0[illegible]	0.49^{xxx}	0.19^{x}
Weight gain between 3 and 6 weeks of age		1	0.90^{xxx}	0.03	0.64^{xxx}	0.62^{xxx}
Weight at 6 weeks of age			1	0.03	0.71^{xxx}	0.56^{xxx}
Weight gain between 6 and 10 weeks of age				1	0.72^{xxx}	0.80^{xxx}
Weight at 10 weeks of age					1	0.95^{xxx}
Weight gain between 3 and 10 weeks of age						1

Conclusions

On the basis of the present study and data of the literature following conclusions are made:

- At calculation of heritability values (h^2_{S+D}) one may have higher values than reality owing to the distorting effect of maternal traits. In case of live weights at 3 and 6 weeks of age, and in case of weight gain between 3-6 weeks the overestimation is considerable, however, we may get real values in respect of weight gain between 6 and 10 weeks of age (0.36).
- Magnitude of h^2 is influenced by season of the year and by date of birth.

By calculation with data compared to relevant means the error of eatimation can be decreased.

- Weight gain between 6 and 10 weeks of age is independent, viz. after 6 weeks of age there is no maternal effect.
- No connections can be demonstrated between weight gains in the period of 3-6 and 6-10 weeks of age therefore in these periods different factors influence the weight gain.
- There were medium or higher correlations between live weights measured at younger (3 or 6 weeks) and older (10 weeks) ages. Live weight measurements at younger age gives no reliable information about weight gain at older age. Connections among body weights may be traced back to differences in litter size and maternal effect.

References

Dorozynska, D., J., Bienek, J. Jamrozik, Z. Stalinski (1985): Studies on meat performance in rabbits. I. Effect of breed and mating system on body weight of rabbits. 13th Conf. Meat Rabbit Breeding, Nitra, 61-71.

Ouhayoun, J. (1978): Etude comparative de races de lapins differant par le poids adulte. Indicence du format paternal sur les composantes de la croissance des lapereaux issus de croisement terminal. These, Academie de Montpellier

Ouhayoun, J. (1983): La croisance et le development du lapin de chair. Cuni-Sciences, 1.1. 1-15.

Randi, E., R.-e. Scossiroli (1980): Genetic analysis of production traits in Italian New Zealand White and California pure-bred populations. II. World Rabbit Cong., Barcelona, 191-201.

Szendrő Zs. (1984): Examination of live weight and weight gain of growing rabbits in respect of breeding. (in Hung.) Állattenyésztés és Takarmányozás, 33.4. 355-359.

Tamássy, Tóth S. (1974): Kisérletek tervezési elvei és értékelési eljárásai az állattenyésztésben, Agrártudományi Egyetem, Gödöllő (jegyzet)

Varela-Alvarez, H., Valderrama, D.G., Gromez, V.A. (1974): Anim. Sci., Cairo 1. 151-152.