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GENETIC PARAMETERS FOR SOME POST WEANING GROWTH TRAITS IN BAUSCAT, CALIFORNIAN AND GABALI RABBIT BREEDS RAISED UNDER EGYPTIAN CONDITIONS

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ABSTRACT

Data on 2774 records (1110 Bauscat(B), 895 Californian and 769 Gabali) produced by 124 does (44 B, 42 Cal and 38 Gab) were collected during two successive years of production (2007/08 and 2008/09). The present study was carried out to evaluate the genetic aspects of Bauscat (B), Californian (Cal) as an exotic breeds and Gabali (Gab) as an Egyptian local breed rabbits for post-weaning growth traits. Data were analyzed for each breed separately using single-trait animal model to estimate direct additive effects (i.e. Heritability) and common litter effect for studied traits. Results showed that heritability estimates for live body weight at 6, 8, 10 and 12 wks of age and daily gain during the periods 6-8, 8-10 and 10-12 wks were ranged between low and moderate in all three rabbit breeds studied with slightly higher value (0.365) in Gab as compared with B and Cal rabbits at 8 wks of age. The estimates of common litter effects (C^2_e) to the phenotypic variance for all traits studied were ranged from 0.226 to 0.559 for all breeds studied which were higher than those of additive genetic effects at earlier ages reflecting that post-weaning body weights could be affected by common maternal environment. Conclusively, these results revealed that selection of individual body weight could be more efficient to improve growth performance traits, particularly in Gab breed at 8 weeks due to the high estimate of heritability at such age, under Egyptian environmental conditions.

Keywords: Genetic parameters, post-weaning, growth traits, rabbits.

INTRODUCTION

Rabbits have a number of characteristics that would make them particularly suitable as meat-producing animals, especially when compared with other herbivorous animals. Rabbits could contribute significantly in solving the problem of meat shortage (Taylor, 1980 and Lebas, 1983). In recent years, domestic rabbits have been considered as a good alternative source of animal protein for the increasing human population in developing countries (Lukefahr and Cheeke, 1992).

Some growth performance traits such as live body weight (LBW) and daily gain (DG) in rabbits are important since heavy marketable LBW controls the economics of rabbit farms. DG is an expression of rabbit's growth where the economics of a given meat rabbit breed is greatly determined by its growth rate and fecundity (Afifi and Emara, 1990).

So, several studies were carried out to investigate the productive potentialities of native and exotic breeds of rabbits under the Egyptian conditions, but till now there is a need to obtain more information about the genetic, environmental and managerial aspects of rabbit production to create a profitable industry. Also, the genetic parameters are very important in the progress of genetic improvement of different breeds and in designing its breeding programs that allow the genetic evaluation of such a breed and study its genetic properties (Reda, 2011).

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Nowadays, the single-trait animal model is widely used for the evaluation of rabbits breeding programs and facilitates obtaining good estimates of variance components (Lukefahr *et al.*, 1996 and Iraqi *et al.*, 2006). Also, using single-trait animal model is the best model since it increases the accuracy of genetic evaluation and selection when the genetic and environmental correlations between growth traits, as well as, other relevant information are included (Ferraz and Eler, 1996).

The genetic potential for improvement of rabbits is dependent on largely heritability of the trait measured and its relationship with other traits of economic importance. Better understanding of sources of random environmental variation that influence growth, and that can be controlled by management, is required to enhance effectively the amount of genetic variation that can be exploited through selection in rabbit populations. So that, inclusion of common litter effects (C^2_e) in the model of analysis for post-weaning growth traits leads to accurate estimates of direct genetic effects associated with considerable reductions in proportions of error (e^2) in most cases.

Therefore, the present study was carried out to estimate direct additive effects, heritabilities and common litter effects for post-weaning body weights and daily gains in Gab as an Egyptian local breed, B and Cal as an exotic breeds rabbits raised under Egyptian conditions when single-trait animal model was used in the analysis.

MATERIALS AND METHODS

The present study of data records was carried out in Rabbitry Farm, Department of Poultry, Faculty of Agriculture, Zagazig University, Zagazig, Egypt, during the period from September 2007 to August 2009. Single-trait animal model was used in the analysis to evaluate the genetic aspects of B, Cal and Gab rabbits for post-weaning of some growth traits.

At the beginning of the breeding season, the breeding rabbits, within each breed, were divided into groups. Each group was made up by five does and one buck that were chosen to avoid mating between close relatives (avoiding full- sib, half- sib offspring mating). Each buck breed was allowed to produce all its litters from the same breeding does. Such mating design permitted the production of several litters and progeny from each successful sire-dam combination. Each doe was transferred to the assigned buck to be mated and returned back to her cage. Does were palpated 10 days post mating to detect pregnancy and those remained not pregnant were returned after palpation to the same buck for another service.

At weaning age (35 days), the young rabbits were separated from their mothers' cages, sexed, weighted, ear-tagged and lodged in collectives cages in breeding groups having automatic drinkers. All animals were fed *ad libitum* a pelleted ration containing 16.3% crude protein, 13.2% crude fiber and 2.5% fat. Cages of all animals were cleaned and disinfected before each kindling regularly. Manure was collected daily and removed outside the rabbitry. All animals were treated and medicated similarly throughout the work period under the same managerial and climatic conditions, under Sharkia Governorate conditions.

Data and Models of Analysis

Data on 2774 records (1110 B, 895 Cal and 769 Gab) produced by 124 does (44 B, 42 Cal and 38 Gab) were collected all over the period of the study on individual body weight at 6, 8, 10 and 12 weeks of age, as well as, daily body weight gain during the periods 6-8, 8-10 and 10-12 weeks of age to estimates of genetic parameters for progeny growth traits.

Data of each breed were analyzed separately using single-trait animal model. MTDFREML program of Boldman *et al.* (1995) was used. Variances obtained by REML method of VARCOMP procedure (SAS, 2007) were used as starting (guessed) values for the estimation of variance components. Analyses were performed using this model (in matrix notation):

$$Y = Xb + ZaUa + ZpUp + e$$

Where: Y = Vector of observation; X= Incidence matrix of fixed effects; b = Vector of fixed effect of year-season (12 levels), parity (7 levels), litter size at birth (8 levels) and sex (2 levels) for analyzing post-weaning growth traits; Za and Zp = Incidence matrices respective to random direct additive effects and permanent environmental effects; Ua and Up = Vectors of animal random effects and permanent environmental effects random, respectively; e = Vector of random errors.

The relationship coefficient matrix (A^{-1}) among animals was considered in such single-trait animal model. MTDFREML program of Boldman *et al.* (1995) was adapted to use the sparse matrix package, SPARSPAK (George and Ng, 1984). Convergence was assumed when the variance of the log-likelihood values in the simplex reached <10^{-12}. Occurrence of local maxima was checked by repeatedly restarting the analyses until the log-likelihood did not change beyond the first decimal. The Single-Trait Animal Model was used to estimate proportions of direct additive genetic effects of representing heritability (h^2_a), repeatability (t), permanent environmental effects (p^2), and error (e^2) in each breed.

Heritability (h^2a) was computed as

$$h^2_a = \sigma^2_a / (\sigma^2_a + \sigma^2_c + \sigma^2_e)$$

Common litter effects (C^2) were computed as

$$C^2 = \sigma^2_C / (\sigma^2_a + \sigma^2_C + \sigma^2_e)$$

Where σ^2_a = Additive genetic variance, σ^2_C = Common litter variance and σ^2_e = Error variance.

RESULTS AND DISCUSSIONS

Actual Means and Standard Deviations

Actual means and their standard deviations (SD) for individual post-weaning LBW and DG in each of B, Cal and Gab breed rabbits are presented in Table 1 for the population used. B rabbits showed the highest LBW and DG for all ages studied followed by Cal and Gab rabbits, respectively and increased as age advanced. However, the recorded means of BW at different ages are within the range of Youssef (2004); Farid *et al.* (2006) and Reda (2011), which means that improvement of growth traits in rabbits (i.e. BW and DG) through phenotypic selection is quiet possible.

Variance Components

Variance components estimates expressed as a proportion of the total phenotypic variance, Direct additive genetic, σ^2_a, common litter effect, σ^2_c, and error variance, σ^2_e for progeny growth traits (BW and DG) at different periods of ages studied in all breeds studied are given in Table 2.

Table 1. Actual means and standard deviations (S.D.) for some growth traits in Bauscat, Californian and Gabali breed rabbits

Traits	Bauscat			Californian			Gabali		
	N	Means	SD	N	Means	SD	N	Means	SD
Body weight at:									
6 wks	1110	869.32	109.80	895	794.78	138.85	769	709.99	87.04
8 wks	1092	1282.94	151.71	854	1125.66	190.50	757	1004.59	122.59
10 wks	1072	1644.72	173.06	826	1455.58	199.21	746	1319.18	151.86
12 wks	1065	2005.36	239.30	814	1834.93	218.33	737	1651.67	197.16
Daily gain at:									
6-8 wks	1092	29.39	6.26	854	22.92	6.99	757	20.89	5.19
8-10 wks	1072	25.32	6.39	826	22.72	6.15	746	22.21	6.27
10-12 wks	1065	25.56	8.34	814	26.86	6.73	737	23.44	7.47
6-12 wks	1065	26.89	4.72	814	24.36	3.65	737	22.30	4.10

Table 2. Variance components of each of additive genetic (σ^2_a), common litter effect (σ^2_{Ce}), errors (σ^2_e) and phenotypic (σ^2_P) variances for post-weaning of some growth traits (body weight and daily gain) in Bauscat, Californian and Gabali breed rabbits

Traits	σ^2_a	%	σ^2_{Ce}	%	σ^2_e	%	σ^2_P
			Bauscat				
Body weight at							
6 wks	972.990	9.28	5857.009	55.87	3653.944	34.85	10483.943
8 wks	3007.387	19.40	5627.286	36.30	6867.192	44.30	15501.865
10 wks	4019.789	20.37	6868.133	34.80	8845.289	44.82	19733.211
12 wks	4339.703	23.02	5141.127	27.27	9373.702	49.72	18854.532
Daily gain at							
6-8 wks	2.476	17.12	4.994	34.53	6.991	48.35	14.461
8-10 wks	2.905	20.01	6.084	41.91	5.526	38.07	14.516
10-12 wks	6.522	24.37	14.452	54.00	5.791	21.64	26.765
			Californian				
Body weight at							
6 wks	1162.288	18.06	2481.423	38.56	2791.080	43.37	6434.792
8 wks	6501.390	23.21	9646.850	34.43	11867.670	42.36	28015.910
10 wks	9043.313	25.19	11164.063	31.10	15692.885	43.71	35900.260
12 wks	13464.848	27.10	13477.569	27.12	22752.412	45.78	49694.829
Daily gain at							
6-8 wks	7.653	19.46	10.819	27.52	20.847	53.02	39.319
8-10 wks	7.554	25.23	7.772	25.95	14.620	48.82	29.946
10-12 wks	7.850	27.16	6.950	24.05	14.100	48.79	28.900
			Gabali				
Body weight at							
6 wks	480.268	5.48	3125.605	35.66	5159.501	58.86	8765.375
8 wks	10921.390	36.53	8456.850	28.29	10517.650	35.18	29895.890
10 wks	7814.156	22.22	11445.104	32.54	15911.635	45.24	35170.896
12 wks	12592.540	20.76	13706.031	22.60	34356.181	56.64	60654.752
Daily gain at							
6-8 wks	8.163	25.58	7.989	25.03	15.761	49.39	31.913
8-10 wks	2.391	21.03	5.259	46.26	3.719	32.71	11.369
10-12 wks	6.872	18.42	10.154	27.21	20.288	54.37	37.314

Percentages of additive genetic variance (σ^2_a) for BW and DG were low and moderate in all breeds studied and increase as the rabbit advanced in age (Table 2). These results reflect the importance of the common litter effect on post-weaning body weight in rabbits. In this respect, Ferraz *et al.* (1992) and Iraqi *et al.* (2002) reported that common litter influences might be more important than additive genetic effects for post-weaning growth in rabbits. Furthermore, Gad (2007) with Gab breed rabbits observed that σ^2_a was 11, 10 and 0.0 % for BW at 4, 8 and 12 wks, respectively.

Variance components attributed to common litter effect (σ^2_{Ce}) for BW and DG traits are presented in Table 2. The estimates of σ^2_{Ce} were moderate or high and ranged from 27.27 to 55.87% for post-weaning BW and from 34.53 to 54.00% for DG during the intervals of 6-8, 8-10 and 10-12 wks of age in B rabbits. The corresponding values in Cal were 27.12 to 38.56% and 24.05 to 27.52%, but in Gab it were 22.60 to 32.66% and 25.03 to 46.26%, respectively. Iraqi *et al.* (2002); Iraqi (2003); Youssef (2004) and Gad (2007) reported that common litter influences might be more important than additive genetic effect for post-weaning growth in rabbits. These results showed a rapid reduction of maternal and/or common environmental effect with advance of the rabbit's age.

Heritability Estimates

Estimates of direct additive genetic h^2_a for BW at 6, 8, 10 and 12 wks of age and DG during the intervals studied in each breed are given in Table 3. Heritability estimates were ranged between low and moderate in all three rabbit breeds studied with slightly higher values in Cal breed as compared with B and Gab breed rabbits in most ages studied. In most cases, proportions of additive genetic effects in all breeds could be possibly achieved through selection. This may be due to high non-additive genetic effects such as common litter effects as stated before, which is quite agreeable with Sabra *et al.* (2001) and Youssef (2004).

The differences in heritability estimates for LBW in three breeds studied could possibly due to variation in genetic make up of three breeds (Estany *et al.*, 1992 and Ferraz *et al.*, 1992). Based on animal model, Gharib (2008) with Cal rabbits, heritability estimates were 0.17 and 0.18 for 8 and 12 wks of age in Cal rabbits, while the values were 0.16 and 0.19 for DG during the period of 4-8 and 8-12 wks of age, respectively when multi-trait animal model were used. Similarly, results were reported by Ashour *et al.* (2011) Heritability estimates were ranged from 0.06 to 0.13 for body weights and from 0.04 to 0.09 for daily gain in CAL rabbits.

Proportion of Common Litter Effects

In Table 3, the estimates of common litter effects (C^2_e) to the phenotypic variance for LBW were 0.559, 0.363, 0.348 and 0.273 with B breed rabbits; 0.386, 0.344, 0.311 and 0.271 with Cal breed and 0.357, 0.283, 0.325 and 0.226 with Gab breed rabbits at 6, 8, 10 and 12 wks of age, respectively. From these results, it can be concluded that the ratios of C^2_e were always higher than the heritabilities in all breeds studied, and the C^2_e decreased over the time. These tendencies agree with those reported by McNitt and Lukefhar (1996) and Garcia and Baselga (2002).The C^2_e estimates in the present study were 0.345, 0.419 and 0.54 for daily gain during periods 6-8, 8-10 and 10-12 wks of age in B breed rabbits, but these were 0.275, 0.26 and 0.24 during the same periods in Cal rabbits. While, the corresponding values in Gab rabbits were 0.25, 0.463 and 0.272 (Table 3). The same trend was observed by Ferraz *et al.* (1992); Iraqi *et al.* (2002) and Gad (2007). Moreover, Ferraz and Eler (1996) and McNitt and Lukefahr (1996) noted that common litter effects were important for growth traits, and they recommended that it should be considered in animal models of such traits. Argente *et al.* (1999) reported higher common litter effects with a range between 0.52 and 0.58.

Conclusions

Because the common litter effect is very important for post-weaning growth traits, one can conclude that this effect should be included in the genetic evaluation of breeding programs. Since the estimates of genetic parameters for post-weaning LBW in the local Gab breed rabbits were higher than foreign rabbit breeds studied (B and Cal). It can be conclude that selection for body weight is more effective at 8 weeks of age to improve post-weaning growth traits in Gabali rabbits as local breed, under Egyptian environmental conditions.

Table 3. Heritability (h^2), common litter effect (C^2_e) and errors (e^2) for post-weaning live body weight and daily gain in Bauscat, Californian and Gabali rabbits

Growth traits	h^2_a±SE	C^2_e±SE	e^2±SE
Body weight at:			
		Bauscat	
6 wks	0.093 ± 0.08	0.559 ± 0.04	0.349 ± 0.07
8 wks	0.194 ± 0.11	0.363 ± 0.05	0.443 ± 0.08
10 wks	0.204 ± 0.12	0.348 ± 0.06	0.448 ± 0.08
12 wks	0.230 ± 0.16	0.273 ± 0.05	0.497 ± 0.11
		Californian	
6 wks	0.181 ± 0.17	0.386 ± 0.09	0.434 ± 0.10
8 wks	0.232 ± 0.19	0.344 ± 0.11	0.424 ± 0.13
10 wks	0.252 ±0.17	0.311 ± 0.12	0.437 ± 0.12
12 wks	0.271 ± 0.19	0.271 ± 0.10	0.458 ± 0.13
		Gabali	
6 wks	0.055 ± 0.06	0.357 ± 0.03	0.589 ± 0.04
8 wks	0.365 ± 0.03	0.283 ± 0.06	0.352 ± 0.03
10 wks	0.222 ± 0.01	0.325 ± 0.02	0.452 ± 0.02
12 wks	0.208 ± 0.01	0.226 ± 0.03	0.566 ± 0.02
Daily gain during intervals			
		Bauscat	
6-8 wks	0.171 ± 0.13	0.345 ± 0.05	0.483 ± 0.08
8-10 wks	0.200 ± 0.11	0.419 ± 0.06	0.381 ± 0.07
10-12 wks	0.244 ± 0.10	0.540 ± 0.07	0.216 ± 0.07
		Californian	
6-8 wks	0.195 ± 0.16	0.275 ± 0.09	0.530 ± 0.11
8-10 wks	0.252 ± 0.20	0.260 ± 0.10	0.488 ± 0.17
10-12 wks	0.272 ± 0.21	0.240 ± 0.12	0.488 ± 0.12
		Gabali	
6-8 wks	0.256 ± 0.15	0.250 ± 0.08	0.494 ± 0.11
8-10 wks	0.210 ± 0.16	0.463 ± 0.10	0.327 ± 0.13
10-12 wks	0.184 ± 0.20	0.272 ± 0.11	0.544 ± 0.12

REFERENCES

Afifi, E.A. and Emara, M.E. (1990). Breed group and environmental factors influencing post-weaning daily gain in weight of purebred and crossbred rabbits. J. Appl. Rabbit Res., 13: 114- 118.

Argente, M.J., Santacrcau, M.A., A. Climent and A. Blasco (1999). Phenotypic and genetic parameters of birth weight and weaning weight of rabbits born from unilaterally ovariectomized and intact does. Livestock Production Sci., 57:159-167.

Ashour, E.A.M., A.M. El-Maghawry, GH.A. El-Sayiad and Y.M.K. Youssef (2011). Genetic evaluation for some post weaning growth traits in New Zealand White and Californian rabbits raised under egyptian conditions. Zagazig J. Agric. Res., 38 : 5.

Boldman, K.G., L.A. Krises, L.D. Van Vleck, C.P. Van Tassell and S.D. Kachman (1995). A manual for use of MTDFREML a set of programs to obtain estimates of variances and covariance [DRAFT]. U.S. Department of Agriculture Research Service, USA.

Estany, J., J. Camacho, M. Baselga and A. Blasco (1992). Selection response of growth rate in rabbit for meat production. Genet. Sel. Evol., 24: 527-537.

Farid, A.. G.E.Y.A. Attalah and M.G. Gharib (2006). Genetic and non-genetic factors affecting weaning and post-weaning growth traits in Bauscat and Baladi Red rabbits and their crosses. J. Agric. Sci. Mansoura Univ., 31 (11): 6957-6969.

Ferraz, J.B.S. and J.P. Eler (1996). Comparison of animal models for estimation of (co) variance components and genetic parameters of reproductive, growth and slaughter traits of Californian and New Zealand White rabbits raised under tropical conditions. 6th World Rabbit Cong., Toulouse, France, 2 : 279-248.

Ferraz, J.B.S., R.K. Johnson and L.D. Van Velck (1992). Estimation of genetic trends and genetic parameters for reproductive and growth traits of rabbits raised sub- tropics with animal models. J. Appl. Rabbit Res., 15: 131-142.

Gad, S.O.A. (2007). Genetic analysis for productivity of Gabali rabbits raised in the north-western coast of Egypt. Ph.D. Thesis, Fac. Agric., Moshtohor, Banha Univ., Egypt.

García, M.L. and M. Baselga (2002). Genetic response to selection for reproductive performance in a maternal line of rabbits. World Rabbit Sci., 10 (2): 71-76.

George, A. and E. Ng (1984). A new release of SPARSPAK: The waterloo sparse matrix package. Mimeo, Department of Computer Science, University of Waterloo, Waterloo, Ontario, Canada (Agricultural Research Service, USA, 1995).

Gharib, G.H.M. (2008). A Study of some productive and reproductive traits in two strains of rabbits and their crosses. Ph.D. Thesis, Anim. Prod. Dept., Fac. Agric., Al-Azhar Univ., Egypt.

Iraqi, M.M. (2003). Estimation and evaluation of genetic parameters for body weight traits of New Zealand White rabbits in Egypt using different multivariate animal models. Livestock Research for Rural Development, 15 (6) 2003 http://www. cipav. org.co/ lrrd/ lrrd15/ 6/ iraq 156. htm.

Iraqi, M.M., M.K. Ibrahim, N.S.H. Hassan and A.S. El-Deghadi (2006). Evaluation of litter traits in purebred and crossbred rabbits raised under Egyptian conditions. Livestock Research for Rural Development, 18 : 6.

Iraqi, M.M., Y.M.K. Youssef, A.M. El-Raffa and M.H. Khalil (2002). Genetic and environmental trends for post-weaning body weights in New Zealand White and Z-line rabbits using the animal model approach. The 3rd Scientific Conference on Rabbit Production in Hot Climates, Hurghada, Egypt 8-11 October, 89-101.

Lebas, F. (1983). Small-Scale rabbit production. Feeding and management systems. World Animal Review, 46: 11-17.

Lukefahr, S.D. and P.R. Cheeke (1992). Rabbit project development strategies in subsistence farming systems. World Animal Review, 69: 26-35.

Lukefahr, S.D., P.R. Cheeke and N.M. Patton (1996). Heritability of milk production and 21-day litter weight and litter size in purebred and crossbred rabbits using an animal model. 6th World Rabbit Cong., Toulouse, France, July 9 – 12 (2): 319-323.

McNitt, J.I. and S.D. Lukefahr (1996). Genetic and environmental parameters for post-weaning growth traits of rabbits using an animal model. 6th World Rabbit Cong., Toulouse, France, July 9 – 12 (2): 325-329.

Reda, F.M. (2011). Molecular genetics and its relation with inheritance of some productive and reproductive traits in rabbits. Ph.D. Thesis, Faculty of Agriculture, Zagazig Univ., Egypt.

Sabra, Z.A., M.H. Khalil, M. Hanafi and H.A. Gad (2001). Estimation of sire and paternal Grand dams breeding values for growth traits in New Zealand White and Californian rabbits using the animal model. Egyptian Journal of Rabbit Sci., 11 (1): 103-114.

SAS (2007). User's guide statistics. SAS Institute, Inc.

Taylor, S.C. (1980). Live weight growth from embryo to adult in domestic mammals. Animal Production., 31:223-235.

Youssef, M.K. (2004). Heritabilities and common litter effects estimated by an animal model for post-weaning growth traits in New Zealand White and Baladi Red rabbits. Egypt. Poult. Sci., 24 (1): 205-216.

المعايير الوراثية لبعض صفات النمو بعد الفطام لسلالات أرانب البوسكات، الكاليفورنيا والجبلي المرباة تحت الظروف المصرية

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تم استخدام بيانات ٢٢٧٤ أرنب نامي (١١١٠ بوسكات، ٨٩٥ كاليفورنيا و ٧٦٩ جبلي) أنتجت من ١٢٤ أم (٤٤ بوسكات، ٤٢ كاليفورنيا و ٣٨ جبلي) جمعت خلال سنتين إنتاجيتين (٢٠٠٨/٢٠٠٧ ، ٢٠٠٩/٢٠٠٨). وقد أجريت هذه الدراسة لتقييم الجوانب الوراثية للأرانب البوسكات والكاليفورنيا كسلالات أجنبية والأرانب الجبلي كسلالة محلية لبعض صفات النمو بعد الفطام. وقد تم تحليل بيانات كل سلالة منفردة باستخدام برنامج نموذج الحيوان لتقدير المكافئ الوراثي والتأثير المشترك للبطن. أظهرت النتائج أن قيم المكافيء الوراثي لصفات النمو عند عمر ٦، ٨، ١٠ و١٢ أسبوع ومعدل الزيادة اليومية خلال الفترات ٦-٨، ٨-١٠ و ١٠-١٢ أسبوع كانت تتراوح بين المنخفضة والمتوسطة في السلالات الثلاثة محل الدراسة ولكن مع ارتفاع طفيف (٠,٣٦٥) في سلالة الجبلي عند عمر ٨ أسابيع مقارنة بكلا من البوسكات والكاليفورنيا. كانت قيم تأثير البطن المشتركة لكل الصفات المدروسة تتراوح من ٠,٢٢٦ إلى ٠,٥٥٩ في كل السلالات وقد كانت أعلي من قيم المكافئ الوراثي في الأعمار المبكرة بعد الفطام مما يعكس أن الأرانب عند الأعمار المبكرة بعد الفطام تكون حساسة للتأثير الامي والبيئى وبتقدم الأرانب فى العمر تقل تلك التأثيرات تدريجيا إلى أن تتلاشى لتعتمد الأرانب على مقدرتها الوراثية للتعبير عنها. أوضحت النتائج أنه نظراً للارتفاع النسبي لقيمة المكافيء الوراثى عند عمر ٨ أسابيع فى سلالة الأرانب الجبلي فإنه يمكن التوصية بالانتخاب لصفة وزن الجسم عند هذا العمر لتحسين صفات النمو بعد الفطام فى سلالة الأرانب الجبلي.