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Litter Size at Birth and at Weaning in Three Breeds of Rabbits and their Crosses

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DATA resulted from an experiment conducted at the experimental Farm of the Faculty of Agriculture, Ain-Shams University,at Shoubra Al-Khaima,were used to study some factors affecting litte size in rabbits at birth and at weaning at four weeks of ager Records of 499 litters born during three consecutive production. seasons representing three breeds (Bauscat (BB), Chinchilla (CC) and Giza White (GG) and their crosses were used. Least squares method was carried out.

The general means of litter size in 1965/66, 1966/1967 and 1967/68 seasons studied were 6.37, 5.89 and 5.89 youngs at birth, and 5.88, 4.06 and 4.29 youngs at weaning at four weeks of age, respectively. Among the three pure breeding groups, the largest litters, were recorded by Giza White, Bauscat and Giza White at birth ; and by Giza White, Bauscat and Chinchilla at weaning in the three seasons, respectively. Within the six single crosses obtained, the best performance at birth and at weaning, was shown by Giza White - Bauscat litters in 1966/67 season and by Bauscat - season and by Bauseat - Giza White litters in 1967/68 season. However, differences in litter size due to breeding group effects were not statistically significant in any of the three seasons either at birth, or at waning at four weeks of age.

Generally, crossbreeding of either the litters or the does was associated with the presence of hybrid vigour in litter size at ages studied.

Maternal and sex-linked effects expressed in the differences between reciprocal crosses were neither considerable nor significant in all cases.

Litters born by does in their first production season were significantly larger at birth than litters given by does in their second production season. Age-of-doe effects neither showed definite trend nor contributed significantly in litter size at four weeks of age.

Litter size increased with parity at birth, while no consistent trend could be observed at weaning at four weeks of age being only significant in 1965/66 at birth.

Regression of litter size either at birth or at weaning on doe's weight revealed a positive relationship between the two variables which tended to be significant only at birth.

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Litter size is one the important economic traits in the production of polytocus animals. It affects individual birth weight, total litter weight, individual live weight till certain ages and growth, survival and mortality rates. While the size of the litter is mainly controlled by heredity (largely non-additive within the breed), the environment plays a great role in its determination. This investigation was carried out to study, the effect of some factors thought to affect litter size at birth and at four weeks of ages (time of weaning) in three greeds of rabbits and their crosses.

Material and Methods

The material used in this investigation was obtained from an experiment conducted on the rabbit flock of the Faculty of Agriculture, Ain-Shams University at Shoubra-Al-Khaima. Records of 499 litters kindled during three consecutive production seasons (1965/66, 1966/67, and 1967/68) were used. In the first season only litters of the three pure breeds : Bauscat (BB), Chinchilla (CC) and Giza White (GG) were produced. While in both the second and third seasons, litters of the three pure breeds, as well as of all possible single crosses and their reciprocals were obtained. Moreover, in the third season, two double crossbred groups were produced as a result of crossing Chinchilla - Bauscat bucks by Giza White - Bauscat does and its reciprocal.

More details on design of the experiment (and/or of matings), management and feeding practices were described by Afifi *et al.*, (1973).

Least squares method of analysis was performed due to unequality of subclass numbers (Harvey, 1960). A linear model comprising the effects of parity, age of doe ; breeding group and regression on doe's weight at conception was assumed to study litter size at birth and at weaning. Due to differences in the levels of each factor in different seasons of the study each year data were analysed separately.

Results and Discussion

Litter size at birth

The overall mean of litter size at birth was 6.37 youngs for 1965/66 season and 5.89 young for each of 1966/67 and 1967/68 season (Table 1).

The least squares mean of litter size at birth obtained for Giza White rabbits was 7.08, 5.88 and 6.99 youngs for the three seasons, respectively. El-Khishin *et al.* (1951), Hanafi (1959), Ragab and Wanis (1960), and Darwish (1969) gave estimates for the same breed ranging between 6.1 and 7.6 youngs which are in agreements with those reported here. For Bauscat rabbits, least squares means of litter size at birth were found to be 6.04, 6.16, and 5.81 youngs for the data of the three seasons analysed, respectively. These estimates were close to 6.20 obtained by Nasseir (1970) but less than those reported by El-Khishin *et al.* (1951), El-Bendary (1961), and Shawer (1963). Estimates for Chinchilla rabbits were 5.99, and 5.30 youngs for the first, second and third seasons, respectively. These estimates are less than 7.60 youngs reported

by Shawer (1963) and 6.80 youngs observed by Dascalu (1968), for the same breed. All these results may reveal that management, sesson and origin of breed could be factors responsible for differents between estimates observed for any breed.

Within pure breeds, the results of 1965/66 and 1967/68 seasons indicate that, with respect to litter size at birth, Giza White rabbits had the largest litters, while Bauscat recorded larger litters than Chinchilla ones. In 1966/67 season, the Bauscat rabbits ranked first, followed by Giza White and Chinchilla ones. The superiority of Giza White rabbits in this respect may be due to the continuous selection for large litter size performed for long time during the breed formation El-Khishin *et al.*, 1951). Among the six single crosses obtained. the best performance was shown by Giza White - Bauscat litters in 1966/67 season and by Bauscat - Giza White ones in 1967/68 season.

The effect of breeding groups on litter size at birth was not statistically significant in any of the three seasons studied (Table 2).

Heterosis percentages of crossbred liters, computed on the basis of their relative superiority in size over their mid purebred parents, showed that not all the crossbred groups exhibited positive heterosis (Table 1). Bogart *et al.* (1958), Mason *et al.* (1960) and Franks *et al.* (1962) found that heterosis in respect to litter size in mice was not detected in all the crosses obtained. These results together with those of the present study might indicate that crossbreeding of either the dam or offapring or both, usually but not always increases litter size.

The lack of heterosis observed in litter size at this stage could possibly be due tobeing a trait in which genes call for an intermediate performances since it is a fitteness trait. Large deviations from optimum will have adverse results to the breed.

Results of the analysis showed that maternal and sex-linked influences on litter size at birth as manifested in the differences between reciprocal crosses were not appreciable and were non-significant (Table 1). This may probably be due to that the three breeds crossed did not differ widely in their performance as it appears from Table 1. Eaton (1953) reported similar findings on mice.

Data of 1967/68 season showed that the average of the least squares means of litter size at birth for the double cross combinations (6.01-youngs) exceeded that for single crosses (5.78 youngs). Although the difference is small, it confirms the superiority of the crossbred dams over the purebred ones in producing larger litters, a phenomenon obsreved in mice and swine (Butler, 1958 and Smith *et al.*, 1960). The superiority of the crossbred does over the purebred ones in delivering crossbred litters with larger sizes may be a result of the heterotic effect of crossbreeding of the dam on ovulation rate as well as on prenatal environment provided. The maternal effect of the crossbred female includes an additive portion from each of the parental breeds plus a non-additive (dominance, epistatic or both) portion.

TABLE 1. Least squares estimates of factors affecting litter size at birth.

Classification	Season 1965/66			Season 1966/67				Season 1967/68			
	N	Const.±S.E.	a6b DMRT	N	Const. ± S.E.	DMRT	H %	N	Const±S.E.	DMRT	H%
General mean	90	6.37±0.24		161	5.89±0.20			248	5.89±0.15		
Parity											
1st	34	—1.28±0.38	a	35	—0.94±0.46	a		53	—0.72±0.35	a	
2nd	33	0.63±0.38	b	31	—0.23±0.46	ab		50	—0.42±0.35	ab	
3rd	23	0.65±0.42	b	27	—0.56±0.39	ab		50	0.12±0.32	ab	
4th				25	0.05±0.42	ab		40	0.14±0.32	ab	
5th				19	0.73±0.52	ab		25	—0.01±0.46	ab	
6th				24	0.95±0.48	b		30	0.90±0.43	b	
Age of doe											
1st age				90	0.85±0.33	a		157	0.80±0.27	a	
2nd age				71	—0.85±0.33	b		91	—0.80±0.27	b	
Breed group	18	—0.33±0.46	a	19	0.27±0.44	a		24	—0.08±0.42	ab	
BB	43	—0.38±0.38	a	16	—0.87±0.46	a		19	—0.59±0.47	ab	
CC	29	0.71±0.42	a	15	—0.01±0.48	a		13	1.10±0.56	a	
GG				18	0.09±0.43	a	6.68	17	—0.74±0.49	ab	—7.29
BC				21	—0.18±0.41	a	2.15	22	—0.81±0.44	b	—8.55
CB				17	0.04±0.45	a	—1.50	16	0.81±0.52	ab	4.69
BG				17	0.37±0.44	a	3.99	24	—0.45±0.42	ab	-15.00
GB				20	0.36±0.42	a	14.68	15	0.57±0.54	ab	5.13
CG				18	—0.08±0.43	a	6.60	17	—0.04±0.49	ab	—4.80
GC								39	0.07±0.37	ab	—0.33
CB-GB								42	0.17±0.36	ab	1.34
GB-CB											
Reg. on doe's Weight		0.0014±0.0007			0.00003±0.0005				0.0022±0.0005		

a = Duncan new multiple range test (1955) after Steel and Torrie (1960).

b = Within the same classification, the appearance of the same letters with 2 constants signifies that they do not differ significantly(5% level), otherwise they do.

c = The breeds were symbolised as : Bauscat= B, Chinchilla = C, and Giza white = G. The symbol of breed of buck is listed before that of the doe.

The effect of age of the doe on litter size at birth illustrated that the size of litters produced by does of the first age group (producing their first crop of litters) excelled that given by does of the second age group (producing their second crop of litters) by 1.70 and 1.60 youngs per litter in 1966/67 and 1967/68 seasons, respectively (Table 1). The differences were statistically significant in 1966/67 season and highly significant in 1967/68 season (Table 2). These results may probably be due to higher activity of the overies at the younger age. The differences between the two ages could mean that the point of maximum litter size was attained some time within the first age group. This point could have been more precisely located if classification of age of doe was put into several classes to show the pattern of curvilinearity, if any does exist.

TABLE 2. **Least squares analysis of variance for litter size at birth.**

Source of variation	1956/1966 season			1966/1967 season			1967/1968 season		
	D.F.	Mean Square	% of Variation	D.F.	Mean Square	% of Variation	D.F.	Mean Square	% of Variation
Parity . . .	2	37.3208^{++}	13.7	5	5.2748	1.5	5	7.0730	1.3
Age of doe	—	—	—	1	24.1880^{+}	24.4	1	38.1430^{++}	19.9
Breed group	2	9.9432	1.6	8	2.3782	0.0	10	5.7934	1.2
Regression on doe's weight .	1	26.1860^{+}	—	1	0.0128	—	1	96.8399^{++}	
Residual .	84	6.6234	84.7	145	3.6772	74.1	230	4.4286	77.6

+ Significant at 5% level.
++ Significant at 1% level.

Meek (1947) reached opposite results by reporting a tendency of the older does to give larger litters. Kheireldin (1950) in Giza White rabbits noted that the averagae size of litters was 4.70, 5.30, and 4.90 youngs when the does were one, two and three years old, respectively, while Wanis (1958) working on the same breed, found the corresponding figures to be 6.85, 6,62 and 6.63, respectively. The last two authors reported no significant differences in litter scize among dams of different age groups. Tihonova (1953) working with Chinchilla rabbits, indicated that no relation was established between age of parents and litter size.

Results in Table 1 exhibit a general trend indicating that birth litter size increased with parity (little sequence) in the three seasons of this investigation. This trend deviates from curvilinearity which had been reported for different breeds of rabbits by Wanis (1958). Helder (1963). Darwish (1969) and Nosseir (1970).

Differences in litter size at birth due to parity effects were statistically highly significant in 1965/66 season, but non-significant in either 1966/67 or 1967/68 season (Table 2). These conflicting results may be due to that in the first season each of the three litters obtained occurred nearly in a distinct time of the season, while in both the other two seasons, the time of pregnancy of each parity overlap on that of the other parities. Rollins *et al.* (1963) working with New Zealand White rabbits produced during 1946-1953, indicated a highly significant effect of litter sequence (parity) on either number born or number weaned. However, Santoro and Hernandez (1967), showed that none of the differences in litter size due to parity was significant. Within the first and second age of dam effect, differences obtained in litter size parities may also be due to differences in the mean age of the doe. Moreover, differences due to the abundance of green fodder with its nutritive quality and in weather conditions during the production season may be added as other possible causes. This almost agrees with what was reported by Wanis (1958), Drawish (1969) and Nosseir 1970).

The effect of doe's weight on litter size at birth indicated that, for each 100 g increase in the doe's weight there was an increase in litter size at birth of 0.14, 0.003 and 0.22 youngs for 1965/66, 1966/67 and 1967/63 seasons, respectively (Table 1) . Table 2 shows that this effect was significant in the first season and highly significant in the first season and highly significant in the third season, while non-significant in the second one. These results are in agreement with those reported by Wanis (1958) on rabbits and by Eckstein and McKeown (1955) in guinea pigs. Heaver doe, tend to provide their litters with better intra-uterine environment.

Litter size at weaning

The overall mean for the number of youngs weaned per litter, at four weeks of age, was estimated as 5.88, 4.06 and 4.29 youngs for the 1965/66, 1966/67 and 1967/68 seasons, respectively (Table 3). In the same order, it accounted for 92.3, 68.9 and 72.8% of the corresponding means of litter size at birth. This inconsistency among the seasons studied may perhaps be a reflection of the differences in mortality percent per litter among seasons of the study.

Least squares means of litter size at weaning in Bauscat, Chinchilla and Giza White rabbits obtained in 1965/66, 1966/67 and 1967/68 seasons show no definite breed trend, and this is thought to be due to breed groups by season interaction. Among the single crosses (in agreement with that observed on birth litter size) Giza White-Bauscat cross combination showed the best performance in 1966/67 season, while in 1967/68 season Bauscat-Giza White cross combination ranked first.

Breeding groups were found to have no significant effects on litter size at weaning (at 4 weaks of age) in any of the three seasons studied (Table 4). These observations are inaccordance with those of birth litter size.

TABLE 3. Least square estimates of factors affecting litter size at weaning (at four weeks of age).

Classification	Season 1965/66			Season 1966/1967				Season 1967/68			
	N	Const ± S.E.	DMET[ab]	N	Const ± S.E.	DMRT	H %	N	Const. ± S.E.	DMRT	H %
General mean .	78	5.88 ± 0.25		104	4.06 ± 0.12			198	4.29 ± 0.05		
Parity :											
1st	28	—0.46 ± 0.39	a	18	0.16 ± 0.58	a		42	0.45 ± 0.34	a	
2nd	28	0.28 ± 0.38	a	25	0.12 ± 0.52	a		43	0.07 ± 0.33	a	
3nd	22	0.18 ± 0.41	a	18	—0.33 0.47	a		36	0.21 ± 0.31	a	
4th				12	—0.44 ± 0.54	a		30	—0.64 ± 0.31	a	
5th				14	0.47 ± 0.62	a		21	—0.14 ± 0.44	a	
6th				17	0.01 ± 0.58	a		26	0.05 ± 0.40	a	
Age of doe :											
1st age . .				59	0.28 ± 0.39	a		122	—0.32 ± 0.27	a	
2nd age . .				45	—0.28 ± 0.39	a		76	0.32 ± 0.27	a	
Breed group[c]											
BB	14	—0.16 ± 0.48	a	18	0.48 ± 0.45	abc		22	—0.32 ± 0.38	ab	
CC	37	—0.48 ± 0.38	a	9	—0.52 ± 0.62	abc		12	0.06 ± 0.50	ab	
GG	27	0.65 ± 0.43	a	9	—1.22 ± 0.60	b		10	—0.17 ± 0.56	ab	
BC				8	—0.01 ± 0.63	abc	0.25	11	—0.42 ± 0.52	ab	—6.97
CB				16	0.55 ± 0.46	abc	14.11	15	—0.11 ± 0.46	ab	0.48
BG				11	—0.02 ± 0.56	abc	9.48	12	0.54 ± 0.54	ab	19.41
CG . . .				12	1.34 ± 0.52	a	46.34	19	0.12 ± 0.40	ab	9.02
GC . . .				8	—0.18 ± 0.63	ab	21.63	14	0.24 ± 0.49	ab	6.96
CB—GB .				13	—0.42 ± 0.50	b	14.11	14	—1.10 ± 0.46	a	-24.68
GB—CB .								37	0.45 ± 0.34	b	15.61
								32	0.73 ± 0.37	b	22.44
Reg. on doe's weight . . .		0.0015 ±0.0008			—0.012 ±0.0006				0.0006 ± 0.0004		

a = Duncan new multiple range test (1955) after Steel and Jorrie (1960).
b = Within the same classification, the appearance of the same letters with 2constants signifies that they do not differ significantly (5% level), otherwise they do.
c = The breeds were symbolised as: Bauscat = B, Chinchilla = C, and Giza white = G. The symbol of breed of buck is listed before that of the doe.

TABLE 4. Least squares analysis of variance for litter size at weaning (at four weeks of age).

Source of variation	1965/1966 season			1966/1967 season			1967/1968 season		
	D.F.	Mean square	% of variation	D.F.	Mean square	% of variation	D.F.	Mean square	% of variation
Parity . . .	2	4.1159	0.0	5	1.4738	0.0	5	3.4861	0.2
Age of doe	—	—	—	1	1.8682	0.0	1	4.6567	1.9
Breed group	2	8.5118	2.3	8	5.6868	5.5	10	4.2347	1.8
Regression on doe's weight . . .	1	19.9263	—	1	13.4101	—	1	6.2668	—
Residual . .	72	5.6653	97.7	88	3.4994	94.5	180	3.2528	96.1

Heterosis percentage estimated for litter sizes at weaning, indicate that all crossbred combinations obtained exhibited positive heterosis except for Bauscat - Chinchilla and Giza White - Chinchilla ones in 1967/68 season (Table 3). Comparing the percentages of heterosis for this trait with those obtained for litter size at birth, it can be stated that heterotic effect was more pronounced on litter size at weaning than on litter size at birth in almost all cross combinations. Heterosis might not be an important element in prenatal mortality of the embryo, but it could assume a greater role in postnatal mortality. This would be due to the increased vigour and the ability of the crossbred youngs to suckle the dam more than purebred youngs.

The difference between the estimate of any cross combinaton and its reciprocal was found to be non-significant in all cases in 1966/67 and 1967/68 seasons (DMRT in Table 3), and this agrees well with previous results obtained in this study on litter size at birth.

The average of the least squares means of litter size at weaning for the double crosses (4.88 youngs) exceeded that of the single crosses (4.17 youngs). This trend coupled with the same trend at birth might suggest the superiority of the crossbred dams over the purebred ones in the ability for developing and rearing thier crossbred litters. This may be a result of heterotic effects in the corssbred does in their mothering ability.

Does of the first age group showed larger litter sizes than those of the second age group in 1966/67 season, while opposite observations were recorded in 1967/68 season. Differences in litter size at weaning due to the effect of age doe were not statistically significant (Table 4). Differences between

the results of the effect of age of doe on litter size at birth and those of the same effect on litter size weaning, may be due to that mortality percent per litter to four weeks of age in ltters of does of the first age group was higher than that in litters of the second age group (Afifi, 1971). Casady *et al.* (1962) noted that the number weaned in a litter of hutch-raised domestic rabbits was not affected by age dam.

Least squares means for litter size at weaning of different parities in the three seasons demonstrated that no consistent trend could be drawn for that effect (Table 3) and that it did not reach significance in all the three seasons (Table 4). The conflict between the effect of parity on litter size at birth and that on litter size at weaning exhibited in 1965/66 season, may be ascribed to differential mortality among rabbits of the three parities.

Constants of regression of 4-week weaning litter size on doe's weight showed that for each 100 g increase in the weight of the doe, the mean of 4-week litter size increased by 0.15 and 0.06 youngs in 1965/66 and 1967/68 seasons, while it decreased by 0.12 youngs in 1966/67 season (Table 3) being not significant in all seasons (Table 4). The discripancy of the results of 1966/67 season in the trend from the other two seasons may be due to the high mortality percent per litter till four weeks of age exhibited by the data of that season.

References

Afifi, E.A. (1971) *A study of some economical and productive characters in some strains of rabbits and their crosses.* Ph.D. Thesis, Fac. Agric. Ain-Shams Univ. A.R.E.

Afifi.EA,El-Tawil, E.A. Salah, E., Galal, E. and Khishin, S.S.(1973) Some aspects of production in three breeds of rabbits and their crosses. 1. Average individual weight per litter at birth. *Annals of Agric. Sci., Fac. of Agric, Ain Shams Univ.*, 18,1.

Bogart, R., Mason, R.W. Nicholson H. and Krueger,H. (1958) Genetic aspects of fertility in Mics. *Int. J. Fertil.* **3**, 86.

Butler, L. (1958) The inheritance of litter size, body weight and variability in a cross between two inbred strains of mice. *Cand. J. Zool.*, **36**, 969, *A.B.A.*, **27**, No. 950.

Casady, R.B., W.C. Rollins and D.B. Sittmann, (1962) Effect of season andage of dam in individual weaning weights, num, ers weaned and total litter weight of hutch- raised domestic rabbits. *Small Stook Mag.*, **64** (11), 7, *A.B.A.*, **3**, No. 3095.

Darwish, E.I. (1969) *Genetic parameters for selection in Giza rabbits.* M. Sc. Thesis, Fac. Agric. Cairo Univ. A.R.E.

Dascalu, A. (1968) Fertility, precocity and slaughters characters of Belgian Giant, White Termond and Chinchilla rabbits. *Lucr. Stunt. Inst. Agron. Iasi* **11**, 475, *A.B.A.* **38**, *Abst* No. 1808.

Eaton, Q.N. (1953) Heterosis in performance of mice. *Genetics*, 38, 609.

Eckstein, P. and Mckeown, T. (1955) The influence of maternal age, parity and weight on litter size in guinea pigs. *J. Endocrin.*, **12**, 115 A.B.A., **23**, No. 1863.

El-Bendary, S.E. (1961) Studies on the Palestinian rabbits in Gaza Strip. *Agric. Res. Review. Minist. of Agric. Cairo, A.R.E.* **39**, 315.

El-Khishin, A.F., Baderldin, A.L., Aloufa, M.M. and El-Din, M.A.K. (1951) Growth, development and litter size in two breeds of rabbits. Bull. *fac. Agric., Cairo Univ.* No. 2, 29 pp.

Franks, E., Fechheimer, N.S. and Cohen, C. (1962) An examination of heterosis in crosses of certain inbred strains of mice. *Ohio. J. Sci.*, 62, 178. *A.B.A.* 13, No. 3075.

Hanafi, M.S.M. (1959) Some factors affecting the differential growth in rabbits. M. Sc. U.S. Thesis, Cairo Univ. A.R.E.

Harvey, W.R. (1960) least-squares analyses of data with unequal subclass numbers. *U.S. Dep Agric. Res. Serv.* ABS 20-8 Weshington, D.C.

Helder, J.P. (1963) Modern production of broiler rabbits. *Veeteelt en Zuivelberichren*, 6, 98. *A.B.A.*, 31, No. 3323.

Kheireldin, M.A. (1950) *A comparative study of growth, development and litter size as applied to two breeds of rabbits.* M.Sc. Thesis, Fac. of Agric. Cairo Univ. A.R.E.

Mason, R.W., Nicholson, H.H., Bogart, R. and Krueger, H. (1960) *Predominance of hybrid losses or negative heterosis in mouse crosses.* Biometrical Genetics Ed. pp. by O. Kempthorn Un. Int. *Sci. Biol., B.* (College) No. 38, 188.

Meek, M.W. (1947) *Rabbitraising for profit.* New York : Greenberg IX + 356 pp (B). *A.B.A.* 16, No. 1202.

Nosseir, F.M. (1970) *A study on some economical characteristics in some local and foreign breeds of rabbits.* M.Sc. Thesis, Fac., Agric. Cairo Univ. A.R.E.

Ragab, M.T. and Wanis, A.A. (1960) Litter size in the Baladi rabbit as affected by herdity and environment. *Bull. Fac. Agric. Cairo univ.* No. 221 , 13 pp.

Rollins, W.C. Casady, R.B Sittmann K. and Sittmann, D.B. (1963) Genetic variance component analysis of litter size and weaning weight of New Zealand White rabbits. *J. Anim. Sci.* 22, 654.

Santoro, P. and Hernandez J.S. (1967) Investigations on some biozootechnical characters of rabbits reared for meat production. *Rev. Zootec. Agric. Vet.*, 5, 199 *A.B.A.* 36, No. 779.

Shawer, M.F.K. (1963) *A comparative study of production traits between Egyptian and standard - bred breeds of rabbits.* M.Sc. Thesis, Alexandria Univ.

Smith, H.J., Moorman, R.P. and McLaren, J.B. (1960) Performance of straight bred and crossbred swine. *J. Anim. Sci.* 19, 1227

Steel, R.G.D. and Torrie, J.H. (1960) "*Principles and Procedures of Statistics*". Mc. Graw-Hill Book Company, London.

Tihonova, M.P. (1963) The effect of age of parents on the growth and development of rabbits. Ucen. Zap. Harikovsh. Univ. 1963, 140, Trud. *Biol. Fak. Genet. Zool.*, 36, 49, *A.B.A.* 33, No. 667.

Wanis, A.A. (1958) *Genetical and environmental factors affecting fertility of Baladi rabbits.* M. Sc. Thesis, Fac. Agric. Cairo Univ. A.R.E.

عدد الولدة فى البطن الواحدة عند الميلاد وعند الفطام لثلاث سلالات من الارانب وخلطاتها

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والسيد صلاح الخشن
كلية الزراعة ـ جامعة عين شمس

استخدمت فى هذا البحث بيانات تجربة أجريت فى مزرعة الابحاث بكلية الزراعة جامعة عين شمس بشبرا الخيمة لدراسة تأثير بعض العوامل على عدد الولدة فى البطن الواحدة عند الميلاد وعند الفطام فى عمر اربعة أسابيع لثلاث سلالات من الأرانب وخلطانها . ثم تحليل بيانات ٤٩٩ بطنا من سلالات البوسكات والشنشلا والجيزة الابيض وخلطانها التى ولدت ثلاث مواسم انتاجية متتالية بدأت بالموسم ١٩٦٦/٦٥ وتتلخص النتائج فيما يلى :

بلغ متوسط عدد الولدة فى البطن الواحدة ٦٫٣٧ ، ٥٫٨٩ ، ٥٫٨٩ صغيرا عند الميلاد ثم ٥٫٨٨ ، ٤٫٠٦ ، ٤٫٢٩ صغيرا عند الفطام فى عمر أربعة أسابيع فى المواسم الانتاجية ١٩٦٦/٦٥ ، ١٩٦٧/٦٦ ، ١٩٦٨/٦٧ على التوالى .

لم يكن للاختلافات بين المجموعات التربوية Breeding groups تأثيرا معنويا على عدد الولدة فى البطن الواحدة سواء عند الميلاد أو عند الفطام .

بصفة عامة كان الخلط بين السلالات سواء بالنسبة للولدة أو الأمهات مصحوبا بظهور قوة الهجين فى عدد الولدة عند الميلاد وعند الفطام .

لم تكن للفروق فى مظهر الصفة بين الخلطان العكسية قيما واضحة أو دلالة معنوية عند الميلاد أو عند الفطام مما يفيد بأنه لم يكن للتأثيرات الامية والارتباط بالجنس تأثير على عدد الولدة فى البطن الواحدة حتى وقف الفطام فى عمر أربعة أسابيع .

سجلت البطون المولودة بمعرفة الأمهات التى كانت فى موسم انتاجها الأول أعلى عددا من تلك المولودة بمعرفة الأمهات التى كانت فى موسم انتاجها الثانى . هذا وكانت الاختلافات معنوية عند الميلاد وغير معنوية عند الفطام .

زادت أعداد الولدة فى البطن الواحدة عند الميلاد بتقدم ترتيب الولادة الا أن هذه الزيادة لم تكن معنوية الا فى الموسم ١٩٦٦/٦٥ . أما عند الفطام فلم يكن لتأثير ترتيب الولادة اتجاه واضح أو تأثير معنوى .

أوضح معامل اعتماد عدد الولدة فى البطن الواحدة على وزن الأم عند التلقيح وجود علاقة موجبة بين هذين المتغيرين سواء عند الميلاد أو عند الفطام وكانت هذه العلاقة معنوية عند الفطام فقط .