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SOME FACTORS AFFECTING BODY WEIGHT IN GIZA RABBITS

BY

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SUMMARY

The present work was carried out at the Faculty of Agriculture, Cairo University, to investigate the relation between the growth and meat yield of the Giza rabbit and some related factors such as age, sex, litter size, weight and age of dam, month of birth and weaning age of litter.

Nearly 900 individuals were used from the two breeding seasons 1957 and 1958. Weights were obtained individually at weaning and continued monthly afterwards till 180 days of age. The major results could be summarized as follows :

1. Considering the average body weight at 30 days of age as 100 % the growing rabbits were able to double and triple this weight at 60 and 90 days of age respectively. At 180 days old the average body weight was 4.6-5.1 times the initial 30-days weight. It was also shown that growth rate and daily gain decreased by advancing age.

2. Litters of 5-8 young were generally of higher weights than litters of 9-12. Litters of less than 4 young were of heavier weights at the early ages but after 90 days old the 5-8 litters were heavier.

3. Progeny from dams of small body weights were lighter than those belonging to dams of medium and heavy weights. Those of heavy dams were superior at final ages to those from dams of medium weights.

4. Month of birth exerted its influence on the progeny. Earlier births were of higher weights than the later ones especially those produced at hotter times.

5. Extending the suckling period from 4 till 5 weeks gave better weights thereafter.

6. Sex of young and age of dam seemed to be of negligible effect.

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INTRODUCTION

The major environmental factors affecting growth are still unrevealed as far as rabbits are concerned. To detect their effect on meat yield will offer a good help to the breeder. Meanwhile, nature of growth in rabbits is not clearly investigated in relation to the best time of marketing. A test of the successive interrelationships between the growth response and meat yield will help in planning out a good scheme for rabbit production and consumption.

REVIEW OF LITERATURE

Several factors were found to have a direct effect on growth, such as age, breed, litter size and month of birth.

Dunlop and Hammond (1937), Sapiro and Palkin (1944) and Kheir El-Din (1950) reported that the body weight of rabbits was doubled then tripled by the end of the first and second weeks respectively. At six months of age, the body weight ranged between 50 %-80 % of the adult body weight. They also observed that the large breeds grow more rapidly than the small ones, while the small breeds were earlier in maturity than the large breeds.

The average birth weight and weaning weight of individual animals decreased with increasing litter size, but the total weight of the litter increased. The correlation between birth weight and litter size was negative and highly significant (Pickard, 1930; Menjsov, 1935; El-Khishin *et al.*, 1951; Johanson and Venge, 1952 and Wanis, 1958).

Under Egyptian conditions, Kheir El-Din (1950) and Wanis (1958) stated that the average size of litter and the birth weight of young increased gradually from October to March.

Wilson (1930) and Kheir El-Din (1950) found that there were no sex differences between the live weight of males and females in rabbits. On the other hand, the differences in weights between both sexes were noticeable in the large breeds than in the small ones (Hammond, 1932).

In addition, Menjsov (1935), Ragab *et al.* (1952) and Wanis (1958) observed that the offspring of young does tend to have a slightly lower weight and small litter size than the old dams, but the differences were not significant. They also found no consistent relation between the dam's weight and the total weight of the young at birth and at weaning.

MATERIALS AND METHODS

During the two seasons of 1957-1958 and 1958-1959, the present work was undertaken at the Animal Breeding Farm, Faculty of Agriculture, Cairo University, Giza, Egypt, U. A. R. The study included nearly 900 individuals of the Giza rabbit. This is a local improved breed, of medium size, albino type, which was raised on the farm since 1932.

The most favourable time for mating rabbits under Egyptian conditions is generally during autumn and winter seasons. Both males and females are kept separately. At serving time, the doe is transferred to the buck.

The rabbits are fed three times daily; the morning meal is usually composed of clover hay, while berseem (*Trifolium alexandrinum*) is offered at mid-day. The evening meal consists of 50 % barley and 50 % wheat bran. In summer, green corn-stalks replaced berseem.

Rabbits were tattooed and weighed to the nearest gram at 30 days after birth, then bi-weekly till 90 days of age monthly weights were obtained till the end of the experiment at 180 days of age. Data were analysed to detect the effect of the major factors affecting growth especially age, sex, litter size, age and weight of dam, month of birth and weaning age.

Statistical analysis was done according to Snedecor (1959).

RESULTS AND DISCUSSION

1. *Effect of age on growth :*

The live weight of the animals progressively increased with age in the first and second seasons (Table 1). It is clear that the rabbits of the second season were of much heavier weights and gains than those

TABLE 1

Average body weight, relative body weights compared to their values at 30 days of age, relative growth rate and the daily increase in body weight in Giza rabbits at different ages.

Age in days	First Season					Second Season				
	No.	Average body weight (Gms.)	Relative body weight (%)	Relative growth rate (%)	Daily gain (Gms.)	No.	Average body weight (Gms.)	Relative body weight (%)	Relative growth rate (%)	Daily gain (Gms.)
30	563	348 ± 7	100	72	13.1	308	428 ± 7	100	80	18.8
60	244	741 ± 18	213	32	9.3	174	992 ± 19	232	35	14.0
90	237	1019 ± 33	293	19	6.9	160	1411 ± 81	330	26	14.3
120	186	1226 ± 45	353	11	4.8	140	1840 ± 24	430	11	7.4
150	154	1371 ± 53	394	16	8.0	130	2063 ± 21	491	6	4.4
180	130	1611 ± 51	464			128	2194 ± 24	513		

Figures represent the mean ± the standard error.

of the first season. This was mainly due to the better system of feeding and management practiced in the second season, or due to month of birth.

Considering the average body weight at 30 days of age as 100 initially, it could be seen from Table 1 that animals of the two seasons doubled and tripled their weights at 60 and 90 days of age respectively. On reaching 180 days of age, the average body weight was 4.6 and 5.1 times the initial 30-day weight for the first and second seasons respectively. Moreover, growth rate and daily gain decreased with advancing age. The growth rate was somewhat around 70 % soon after weaning, when it sharply decreased to 30 % between 60-90 days of age. A relatively steady decrease followed this stage.

From these results, it seems profitable to finish the Giza rabbit for meat at 3-4 months of age, after which the relative growth rate and body gain become very low to compensate for the feed and managerial costs. At the same time, the body weight at this stage ranged between 3-5 pounds, and this is a suitable weight for rabbit consumers in the local market.

Furthermore, correlations between body weight at different ages were positive and highly significant. This fact offers a good help for the breeder to select for body weight in rabbit at earlier ages.

2. *Effect of sex on growth :*

Weights were classified for males and females since weaning time. The differences between sexes in the average body weight were statistically not significant all over the period of experiment in both seasons. These results are in agreement with the findings of Wilson (1930 and 1932), Hammond (1932), Kheir El-Din (1950), El-Khishin *et al.* (1951), Ragab *et al.* (1952) and Wanis (1958).

3. *Effect of litter size on growth :*

The litters were divided according to their size into three groups; 1-4, 5-8 and 9-12 young per litter. The average litter size of the first season was 7.6 ± 0.18 , while it was 6.1 ± 0.23 for the period of the second season.

The 5-8 group surpassed the 9-12 one in body weight all over the experimental period for the first season. The differences were much observed at older ages especially after 90 days of age (Fig. 1). In most

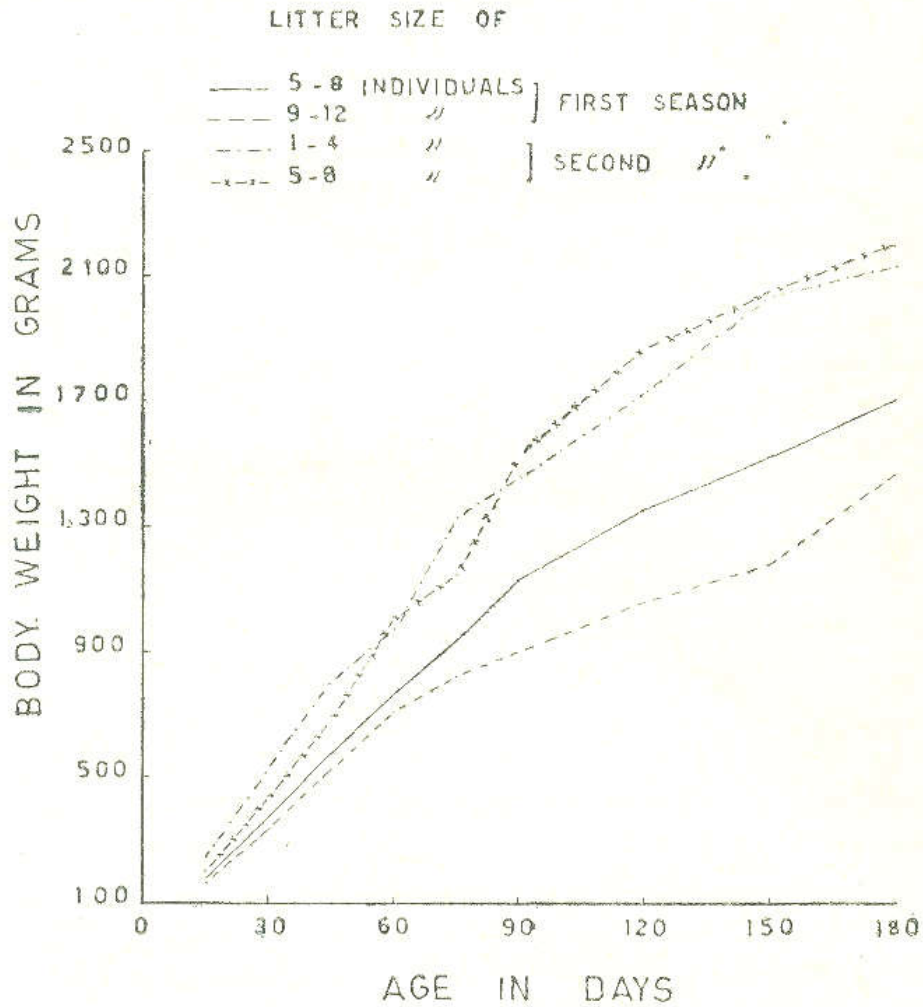


FIG. 1. — Effect of Litter Size on Body Weight in Giza Rabbits at Different Ages.

cases, the differences in body weight between the compared groups were statistically highly significant. During the second season, the 1-4 group surpassed the 5-8 group in body weight nearly up to the age of 90 days,

then the reverse occurred until the end of the experiment. In most cases the differences were statistically not significant.

The previous results could be explained by the fact that the dam has a limited ability for nourishing a large number of foetuses. During the pregnancy period, it is reasonable that in the case of small litter size every embryo gets a relatively large quantity of nutrients. Meanwhile, since the new born rabbits are dependent mainly on their dam's milk during the suckling period, it seems that the more young per litter the less share of milk the young will have. Furthermore, as the doe has a limited number of teats (6-8) competition for suckling is greater between the young of a large litter than those of a small one.

4. Effect of weight of dam :

Young were arranged in regard to their dam's weight into three groups; small mothers (below 2400 grams), medium mothers (2400-2600 grams) and large mothers (above 2600 grams). The progeny of small mothers tended to show a slower growth rate than the other two lots (Table 2). The young of both medium and large mothers showed more or less the same pattern of growth except at the final months of study where those of large mothers attained higher weights than the young belonging to medium mothers.

During the first season, body weight differences between young of the groups were statistically insignificant in most cases. However, the differences between the young born from small and medium mothers and those born from small and large dams of the second season were statistically highly significant up to the age of 90 days.

From the above results it can be stated that the young of medium and large mothers significantly surpassed those of small ones in their body weight up to 90 days of age. This may be due to the genetical constitution of the different groups as well as the maternal effect of the dam on her progeny either at the prenatal embryonic development or at the suckling period. The limited capacity of the small dam to offer a high amount of nourishment for her young as compared with a larger dam is a well known fact in the Animal Kingdom.

TABLE 2
 Mean weight of litter in relation to weight of dam for Giza rabbits at different ages.
 (First and second seasons)

Age in days	Mean litter weight											
	First season						Second season					
	No.	Small mothers	Medium mothers	Large mothers	No.	Large mothers	No.	Small mothers	Medium mothers	Large mothers	No.	Medium mothers
30	124	344 ± 21	363 ± 23	438 ± 32	76	438 ± 32	33	509 ± 26	436 ± 15	37	436 ± 15	512 ± 22
60	37	732 ± 44	733 ± 53	801 ± 31	42	801 ± 31	21	899 ± 56	1111 ± 39	25	1111 ± 39	1118 ± 49
90	41	960 ± 84	1091 ± 72	1087 ± 49	34	1087 ± 49	26	1416 ± 55	1622 ± 61	27	1622 ± 61	1576 ± 40
120	38	1107 ± 111	1325 ± 90	1272 ± 64	34	1272 ± 64	25	1808 ± 61	1917 ± 51	27	1917 ± 51	1886 ± 53
150	31	1204 ± 88	1338 ± 111	1399 ± 92	28	1399 ± 92	24	1985 ± 61	2072 ± 54	26	2072 ± 54	2069 ± 58
180	25	1354 ± 79	1509 ± 91	1643 ± 75	27	1643 ± 75	22	2188 ± 86	2270 ± 50	22	2270 ± 50	2290 ± 65

Figures represent the mean ± the standard error.

Small mothers weigh below 2400 grams.

Medium mothers weigh between 2400-2600 grams.

Large mothers weigh above 2600 grams.

5. *Effect of age of dam :*

Dams were divided into two age groups; the first was one year while the other was 2-3 years of age. During the first season, the live weights of the offsprings of the young does were slightly heavier than those of the old does. The reverse occurred during the second season where progeny of the old dams attained relatively higher weights than young dams' progeny. Statistical analysis failed to show any significant difference between the two lots. It seems that the effect of dam's age is of minor importance on the growth of her progeny than is the effect of weight of dam.

6. *Effect of month of birth :*

The young of the first and the second seasons, born from October to April, were used to find out the effect of month on growth. It is obvious that the young born in October, November and December showed a higher rate of growth after weaning than the January, February, March and April young (Fig. 2). Moreover, the December group was the heaviest at nearly all ages. The October youngs were relatively smaller in body weight than the November lot up to 60 days of age, after which time they accelerated their growth rate. The differences between the average body weights of the first three months were statistically significant up to 75 days of age, while these differences were not significant in most cases for the later four months.

These results could be explained on the basis that the offspring of October, November and December had a longer chance to be fed on more quantities of berseem of rather good quality than the other lots. It is known that the last cuttings of berseem contain more fiber and are less nutritive than earlier and medium cuttings. Moreover, atmospheric heat seems to have its depressing influence on the appetite, growth and food utilization of the younger animals of the late season than on the older and relatively stronger ones of the early season.

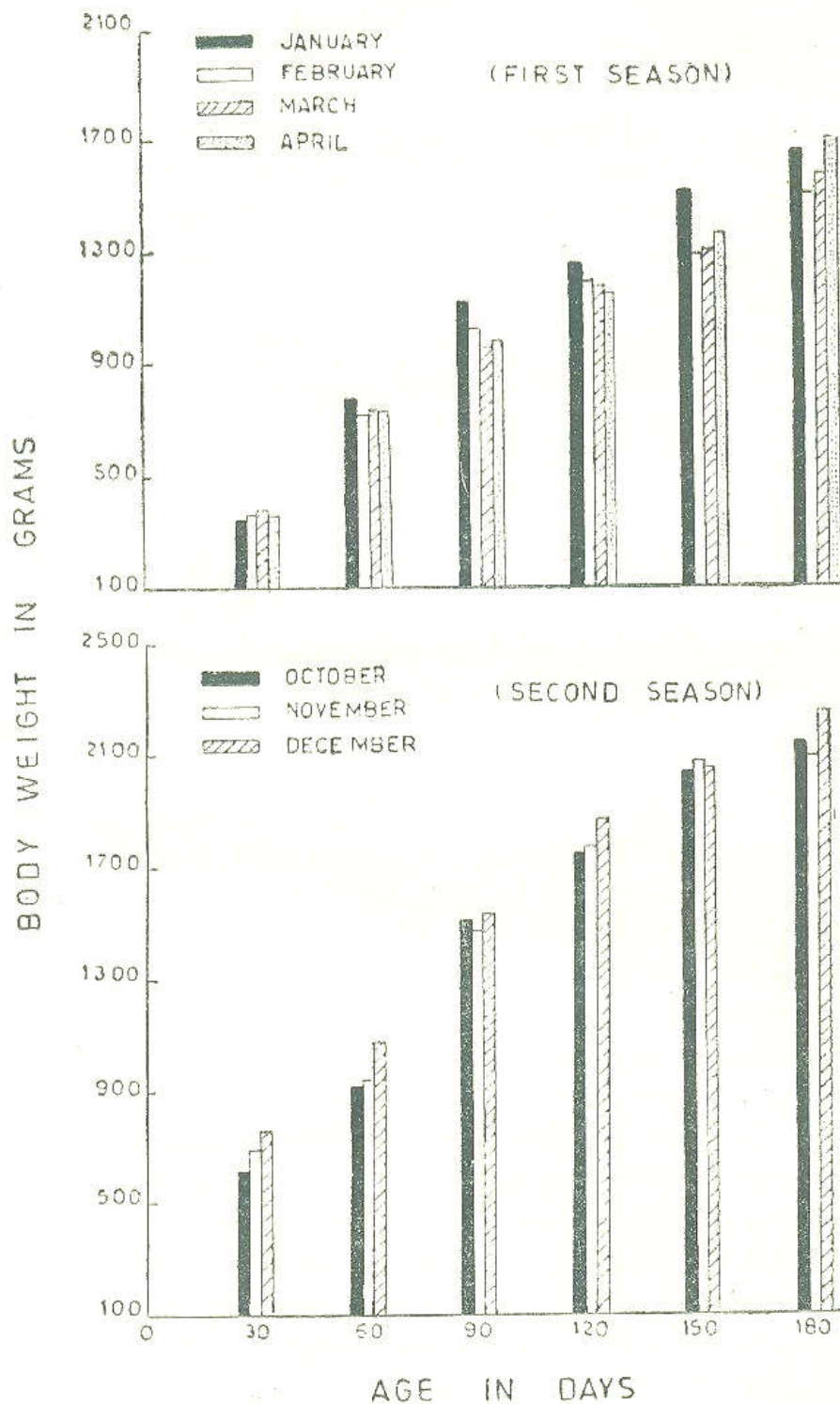


Fig. 2. — Effect of month of Birth on body weight in Giza Rabbits at different ages.

7. *Effect of weaning age :*

Births (332) of about the same date were arranged to be weaned at 4, 5 and 6 weeks of age. The young weaned at 5 weeks of age were generally heavier than the offspring weaned at 4 and 6 weeks. The differences between the three groups were significant in some cases (Fig. 3).

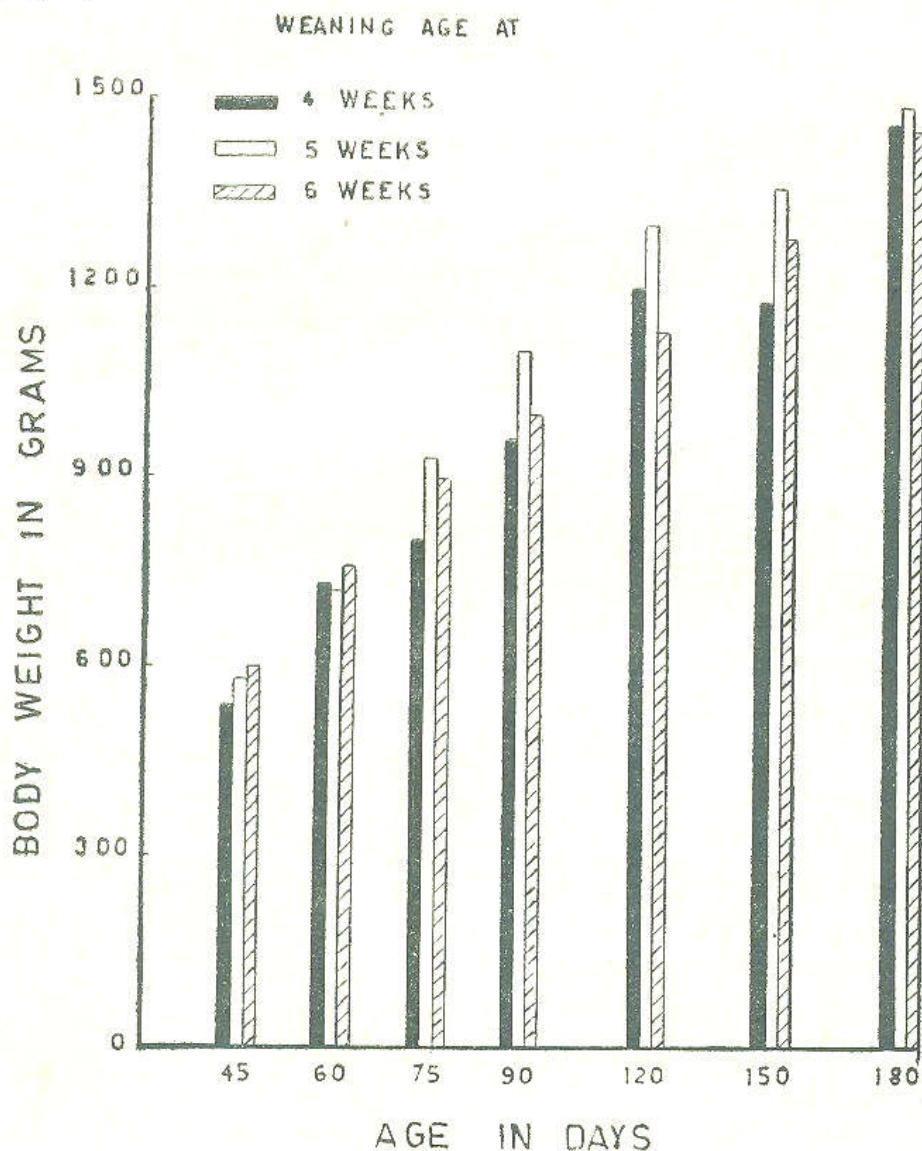


FIG. 3. — Effect of Weaning Age on Body Weight in Giza Rabbits at Different Age.

The superiority in the early growth of the 5-week group over that weaned at 4 weeks is rather natural, as it has more advantage in suckling. It is generally believed that activated growth in the early stages may encourage the vitality of the animals at subsequent ages to stand the hindering conditions that prevail afterwards. The benefit of longer suckling was apparent in the 6-weeks group at the early stages but failed to keep this favourable response at older ages.

PRACTICAL APPLICATION

It can be stated that Giza rabbits doubled and tripled their weaning weight at 60 and 90 days of age respectively. At 90 days of age, the average body weight was over one kilogram, and this is quite a reasonable weight for cooking as well as for the buying ability of the average consumer.

The breeder must select for breeding purposes the full grown doe to be capable of nourishing her young either at the prenatal stage or during the suckling period. The best litter size was found to be between 5-8 young, and this seems to be a suitable number of young for the dam to look after and to nourish carefully.

Season of birth was found to have a direct effect on the growth and well being of litters. The early season births seemed to have the best chances for growth, while those of the late season are severely handicapped by the less nutritive value of herseem, the rise of atmospheric temperature and unsuitable conditions of housing and sanitation. Therefore, the breeding season should not be extended further than March or April.

The weaned rabbit is more sensitive to change in diet and treatments, and unless it is weaned at a good weight and of better stamina; its growth rate after weaning and its viability may be unduly lowered. Therefore, it is rather better to wean the young rabbits at 5 weeks after birth instead of 4 weeks.

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الملخص

بعض العوامل التي تؤثر على وزن الجسم في نوع الارانب « جيزة أبيض »

أجرى هذا البحث في مركز أبحاث الدواجن بكلية الزراعة جامعة القاهرة لدراسة بعض العوامل التي تؤثر على النمو في الأرانب من الجيزة الأبيض وأهمها العمر والجنس وعدد الحلفة عند الميلاد وعمر ووزن الأمهات وشهر الولادة وعمر الفطام . وقد شملت الدراسة حوالي ٩٠٠ فرد من نتاج موسمي ١٩٥٧ ، ١٩٥٨ ، ابتداء من عمر الفطام حتى عمر ٦ شهور . ويمكن تلخيص أهم النتائج التي أدى إليها البحث فيما يلي :

- ١ - يتضاعف وزن الأرانب عند عمر شهرين بالنسبة لعمر الفطام (شهر) . وعند عمر ثلاثة شهور يصل الفرد إلى ثلاثة أمثال وزنه عند الفطام على حين تكون هذه النسبة بين ٤٦٠٪ - ٥١٠٪ عند عمر ٦ شهور . وعلى حين يزيد الوزن الحى يتقدم العمر يقل تدريجياً معدل سرعة النمو ومتوسط الزيادة اليومية .

- ٢ - كان متوسط وزن الأرانب في البطون ذات ٥ - ٨ أفراد أكبر في معظم الأعمار بالمقارنة بذات ٩ - ١٢ فرداً ، على حين كانت الأفراد في البطون ذات ٤ أفراد فأقل أثقل وزناً من البطون ذات ٥ - ٨ أفراد حتى عمر ٩٠ يوماً حيث فاقت الأخيرة الأولى بعد هذا العمر .
- ٣ - كان نتاج الأمهات الكبيرة والمتوسطة الحجم أثقل وزناً من نتاج الأمهات خفيفة الحجم .
- ٤ - البطون المبكرة في الموسم كانت أسرع في النمو من البطون المتأخرة .
- ٥ - إطالة فترة الرضاعة إلى ٥ أسابيع أدت إلى زيادة في وزن الأفراد عن زميلاتها التي فطمت عند عمر ٤ أسابيع فقط .
- ٦ - لم يكن لجنس الأفراد أو عمر الأم فرق واضح بالنسبة لنمو النتاج .