I. INTRODUCTION

In order to produce good-quality rabbit furs, the most important properties of the pelt must be considered. **Sandford (1957) and Lipichkin (1960)** reported that the prices to be obtained for different rabbit furs depend upon the breed, the quality (i.e. density, length, hair diameter, strength, colour, softness and brilliance) and the care with which it has been selected and handled. Production of superior fur demands a high quality of the raw material, i.e. the pelts. In the last decade, new standard breeds of rabbits were imported to Egypt such as New Zealand White and Californian rabbits. These standard breeds of rabbits deserve more attention to study their fur quality characteristics under the local conditions.

The quantity of rabbit fur produced is mainly influenced by many factors, such as genetic constitution, body weight, sex, nutrient supply, age and hair physical characteristics. According to investigations on Germon breeds, the heritability ranged from 0.6 to 0.7 for quantity of hair. The correlation between body weight and the quantity of hair produced is $r = + 0.568$. The hair quantity is greater in relation to weight in small animals. The nutrient supply influences the number of hairs / cm^2 of body surface. Hair production in rabbit coat, per kg of body weight, increases up to age of 60-70 weeks. Therefore studying growth traits (body weight, daily gain and livability) in postweaning period is considered very important for producing meat and mature hair coat **(Klaus Lampe 1985)**.

Genetic evaluation of rabbit's traits was often performed in recent years using different methods. Animal Model requires good estimates of variance components **(Ferraz et al., 1991 & 1992; Baselga et al., 1992; Reverter et al., 1994; Hassan, 1995)**. For obtaining variance components estimates, there is an evidence that confirm the fact that Restricted Maximum Likelihood **(REML)** produces the same estimators as Analysis of Variance **(ANOVA)** methods, when using blances data **(Corbeil and Searle, 1976 and Anderson et al., 1984)**. **REML** is preferred to be used for unbalanced data and for non-linear equations and could be used to remove bias from selection.

Therefor, the objectives of the present study were : (1) to bring some facts concerning fur and growth traits of New Zealand White (NZW) and Californian (CAL) rabbits raised in Egypt. (2) to estimate and compare variance components, sire heritabilies and sire transmitting ability estimated using **Henderson's and REML methods**, for fur and growth traits.

ABSTRACT

Two exotic breeds of New Zealand White (NZW) and Californian (CAL) rabbits raised under the commercial Egyptian conditions were used to quantify the variance components and sire heritabilities using **Henderson's** method and Restricted Maximum Likelihood (**REML**) for fur and growth traits. A comparison between estimators obtained from the two methods was attempted.

Results reveal that for both breeds, hair length, hair diameter and hair medullation of fur were low at 8 weeks, then increased with the advancement of age up to 12 weeks. Postweaning fur traits in CAL were slightly higher than those in NZW. Percentages of phenotypic variations in NZW and CAL for fur traits at earlier ages were slightly higher than at older ages with exception of hair length. Most fur traits were significantly affected by year-season-parity and litter size at birth.

The variance components estimated using **Henderson's** and **REML** methods in both breeds for most fur traits, were low and estimates of sire component of variance obtained using **REML** method in NZW and CAL rabbits were relatively higher than those obtained using **Henderson's** method. In both breeds, sire heritabilities estimated using **Henderson's** and **REML** methods were low for fur traits except hair length, which the values were moderate or high. In NZW rabbits, sire heritabilities estimated using **Henderson's** method were smaller than the corresponding estimates obtained by **REML**, while a reverse trend was observed for CAL rabbits.

For most fur traits in both methods of sire evaluation, the largest differences were recorded by NZW and the lowest differences were observed by CAL. The sir transmitting ability estimated for NZW and CAL rabbits using **BLUP** are nearly similar to those estimated using **Animal Model (AM)** except hair length. For **BLUP** method, the largest absolute differences in STA of most fur traits for NZW and CAL rabbits were recorded by the smallest number of sires. An opposite trend was observed by Animal Model procedure where the largest absolute differences were recorded by the largest number of sires. Also in this respect for fur traits, among all sires, the largest average of percentages of positive estimates of **STA** recorded by Animal Model. Also the largest percent of positive **STA** was recorded for hair diameter of down hair followed by hair length, medulla diameter of down hair, medulla diameter of guard hair, while the lowest percent was recorded for hair diameter of guard hair

For both breeds, daily gain and livability were low at the first week after weaning, then increased during 6-8 weeks and decreased gradually with advancement of age. Postweaning growth in NZW was slightly higher than that in CAL. Livability in both breeds were similar. The percentages of phenotypic variation (V%) for growth traits at earlier ages in NZW and CAL were higher than those at older ages.

Most postweaning growth traits were significantly affected by year-season-parity and litter size at birth. Postweaning growth performance of NZW and CAL rabbits born during autumn were significantly higher than those rabbits born during winter and spring.

For both breeds, differences in all growth traits due to sire effect were high and significant except weight at 6 weeks in CAL. For most growth traits, estimates of the sire component of variance obtained using **Henderson's** or **REML** methods were low. Estimates of sire component of variance obtained using **Henderson's** method are generally smaller than those obtained using **REML** method for both breeds.

Sire heritabilities estimated using **Henderson's** and **REML** methods for most growth traits in NZW and CAL rabbits were low. Although all estimates were generally low, heritability estimated by using **Henderson's** and **REML** methods for all growth traits in NZW rabbits were higher than those corresponding estimates in CAL rabbits.

Both methods, i.e **BLUP** and **AM** had the same trend in sires evaluation for postweaning growth traits. In CAL rabbits, the differences in STA using **BLUP** were slightly higher than those using **AM**. Except for later age in CAL rabbits, the largest absolute differences in most growth traits between **BLUP** with A^{-1} vs **Animal Model (Am)** for NZW and CAL rabbits were recorded by the smaller number of sires. Among all growth traits, percentages of positive estimates of **STA** were nearly similar in both breeds, i.e. the difference between the two methods were small in NZW and CAL rabbits.