5. Summary

The present field data were collected from an investment company of rabbits in Ismalia governorate for three years (1987, 1988 and 1989). Two exotic breeds of New Zealand White (**NZW**) and Californian (**CAL**) raised under the Egyptian commercial conditions were included in the investigation. Data on 4702 litters was used to evaluate genetically some litter traits and reproductive intervals for these two breeds. The traits investigated were litter size at birth (**LSB**), number born alive (**NBA**), number born dead (**NBD**), litter size at weaning (**LSW**), number dead at weaning (**NDW**), litter weight at weaning (**LWW**) and average bunny weight at weaning (**AWW**), while reproductive traits included number of services till conception (**NSC**), days open (**DO**) and kindling interval (**KI**). Variance components and sire heritabilities within breed and parity were estimated for these traits using **Henderson** method and **Restricted Maximum Likelihood (REML)**. A comparison between estimators obtained from the two methods was attempted. A linear mixed models were used for analyzing such data. The results obtained could be summarized as:

(i) Litter traits

The performance of litter traits within parity for **NZW** and **CAL** rabbits did not show any definite pattern. The performance of the first two parities was the best for litter size at birth and number born alive, whereas litter size at weaning of the second and third parities were the best. The number dead either at birth or at weaning was maximum in the first parity and in later ones (from six and later parities). The performance of **NZW** does at birth and at weaning was slightly higher than those of **CAL** does with values of 8.4 vs 7.8, 7.4 vs 6.8, 1.95 vs 1.45, 5.6 vs 5.7, 2983 vs 2868 and 534 vs 512 for LSB, NBA, NBD, NDW, LSW, LWW and AWW, respectively. For both breeds, the percentages of phenotypic variation **(V%)** for litter traits were generally high and ranged from 15.5 to 38.7% at birth and from 6.9 to 137% at weaning. Litter traits at birth and at weaning were not significantly affected by sire of doe, whereas they were significantly affected by year-season effect.

(ii) Reproductive traits

Reproductive performance within parity for both breeds did not show any clear pattern. The averages were 1.6 for NSC, 18.8 day for DO and 48.9 day for KI. The reproductive performance of NZW does were generally better than those of **CAL** does with averages of 18.1 vs 19.5 days for DO and 47.9 vs 49.9 days for KI. The percentages of phenotypic variation **(V%)** for reproductive traits were high and ranged from 16.3 to 53.9%. The phenotypic variability of reproductive traits in **NZW** rabbits were generally higher than those in **CAL** rabbits. These estimates were 40.9 vs 38.9% for NSC, 53.9 vs 46.5% for DO and 17.2 vs 16.3% for KI in **NZW** and **CAL** rabbits, respectively. Reproductive traits were not significantly affected by sire of doe and also most of these traits were not significantly affected by year-season effect.

(iii) Additive genetic variance

The sire of doe has inconsistent effect on litter traits and reproductive intervals in different parities. For both breeds, estimates of sire variance component within parity were low and ranged from 3.6 to 6.8% for **LSB**, 1.8 to 3.5% for **NBA**, 1.2 to 5.7% for **NBD**, 2.6 to 6.4% for **NDW**, 1.1 to 3.3% for **LSW**, 0.8 to 4.3% for **LWW** and 4.7 to 6.2% for **AWW**. The estimates for reproductive performance were also low and ranged from 0.9 to 3.0% for **NSC**, 1.3 to 3.9% for **DO** and 1.6 to 2.3% for **KI**.

The additive genetic variance for litter traits and reproductine intervals obtained from using **Henderson** method in **NZW** rabbits were generally higher than those in CAL rabbits in almost traits. The estimates were 5.9% vs 3.6% for **LSB**, 2.3% vs 1.8% for **NBA**, 5.7% vs 1.2% for **NBA**, 6.4% vs 2.7% for **NDW**, 5.7% vs 4.7% for **AWW**, 2.8% vs 2.3% for **DO** and 2.3% vs 2.1% for **KI**. The same notations were also observed when using **REML** procedure.

Sire variance components resulted from **REML** procedure had larger estimators in 50% of the traits than those obtained using **Henderson** method. The two procedures gave nearly the same estimates in 20% of the traits, while there was unexpected increase in estimates of **Henderson** than in **REML** by only 30% of the traits.

(iv) Heritabiltiy

For both breeds, sire heritabilities (h^2) estimated using **Henderson's** method within parity ranged from 0.011 to 0.235 for **LSB**, 0.069 to 0.153 for **NBA**, 0.056 to 0.31 for **NBA**, 0.069 to 0.138 for **NDW**, 0.045 to 0.131 for **LSW**, 0.031 to 0.258 for **LWW**, 0.137 to 0.248 for **AWW**, 0.032 to 0.140 for **NSC**, 0.08 to 0.155 for **DO** and 0.058 to 0.091 for **KI**.

The sire heritabilities estimated using **Henderson** method within parity for litter traits in **NZW** rabbits were generally larger than those in **CAL** rabbits in almost traits. The estimates were 0.235 vs 0.144 for **LSB**, 0.092 vs 0.069 for **NBA**, 0.096 vs 0.069 for **NDW**, 0.219 vs 0.187 for **AWW**, 0.114 vs 0.081 for **DO** and 0.091 vs 0.085 for **KI**. The same trend was also observed for h^2 estimated using **REML** method.

Comparing h^2 estimated using **Henderson's** method with **REML** procedure, estimates show that **REML** had larger estimates than those for **Henderson** method in 45% of the traits. The two procedures gave nearly the same estimates in 5%, while there was unexpected increase in estimates of **Henderson** than in **REML** by 50% of the traits.