SUMMARY

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The present study were carried out using records of 2257 off-spring of New Zealand White (NZW) and 1748 of Californian (CAL) rabbits collected from the experimental rabbitry of Faculty of Agriculture at Moshtohor, Zagazig University for four consecutive years started in September, 1989. Postweaning body weights at 5, 6, 8, 10 and 12 weeks and livabilities at the intervals of 5-6, 6-8, 8-10 and 10-12 weeks were studied. Variance components and heritabilities were estimated for these traits using Henderson's method and Restricted Maximum Likelihood procedure (REML). Linear mixed models were used for analyzing the data. Transmitting abilities for sires and dams (animals with and without records) were estimated using a sire model (SM) or using a dam model (DM) or using an animal model (AM). The results obtained could be summarized:

(i) **Means and Variation:**

Postweaning body weights and livabilities in NZW were slightly higher than those in CAL rabbits. For both breeds, percentages of phenotypic variation (V%) for body weights at earlier ages in NZW and CAL were higher than at older ages where V% ranged from 17.4 to 25.4% for body weights and 17.9 to 35.4% for livabilities in NZW, respectively and from 14.6 to 26.5% for body weights and 17.9 to 20.5% for livabilities in CAL.

(ii) **Sire variance components (σ^2s):**

For both breeds (i.e. NZW and CAL), sire variance components estimated using Henderson's and REML were low. Percentages of sire component of variance using REML were higher than those obtained using Henderson's

method for most postweaning body weights and livabilities. For both methods, percentages of σ^2s for postweaning body weights were relatively higher in CAL than those obtained in NZW. Using Henderson's method in NZW, they averaged 6.4 and 1.9% for body weights and livabilities, respectively *vs* 7.9 and 2.8 % in CAL in the same order. The percentages of σ^2s in NZW using REML method averaged 9.2 and 0.9% for body weights and livabilities, respectively *vs* 11.9 and 3.6% for respective traits in CAL.

(iii) Dam variance components (σ^2d):

Generally, dam components of variance (σ^2d) estimated by REML were relatively higher than those obtained by Henderson's method. For both methods (Henderson and REML), percentages of σ^2d for postweaning body weights and livabilities were higher in NZW than in CAL rabbits. They averaged 15.2 and 5% for body weights and livabilities in NZW rabbits, respectively *vs* 14.2 and 4.0% in CAL rabbits. With NZW rabbits, percentages of σ^2d using Henderson's method ranged from 14.1 to 16.5% for body weights and 0.0 to 11.8% for livabilities, while the respective traits ranged from 17.9 to 23.1% and 0.1 to 13.9% when using REML method.

(iv) Sire Heritability (h^2s):

Estimates of h^2_s obtained using REML method were higher than those obtained using Henderson's method for most postweaning body weights and livabilities in both NZW and CAL rabbits. With NZW, estimates of h^2_s obtained using Henderson's method ranged from 0.177 to 0.452 with an average of 0.256 for body weights and from 0.006 to 0.177 with an average of 0.069 for livabilities. While they ranged from 0.258 to 0.354 with average 0.393 for body weights and from 0.043 to 0.150 with an average of 0.103 for livabilities in CAL rabbits. Estimates of h^2_s when using REML in NZW ranged from 0.228 to

0.718 with an average of 0.379 for body weights and from 0.002 to 0.112 with an average of 0.034 for livabilities, while the respective estimates in CAL ranged from 0.266 to 0.552 with an average of 0.549 and from 0.055 to 0.177 with an average of 0.1.

(v) Dam Heritability (h^2d):

Estimates of h^2_d obtained using REML method were higher than those obtained using Henderson's method for most postweaning body weights and livabilities in both NZW and CAL rabbits. With NZW, estimates of h^2_d obtained using Henderson's method ranged from 0.565 to 0.660 with an average of 0.608 for body weights and from 0.002 to 0.428 with an average of 0.202 for livabilities. While they ranged from 0.5 to 0.605 with average of 0.567 for body weights and from 0.043 to 0.288 with an average of 0.165 for livabilities in CAL rabbits. Estimates of h^2_d when using REML in NZW ranged from 0.716 to 0.925 with an average of 0.815 for body weights and from 0.004 to 0.569 with an average of 0.209 for livabilities, while the respective estimates in CAL ranged from 0.544 to 0.830 with an average of 0.732 and from 0.004 to 0.230 with an average of 0.111.

(vi) Sire transmitting ability (STA):

The ranges in estimates of STA for body weights in NZW rabbits at 5, 6, 8, 10 and 12 weeks of age were 110.9, 77.9, 127.3, 560.0 and 291.1 grams when using the sire model (SM with A^{-1}) *vs* 41.2, 28.7, 35.2, 139.5 and 206.5 grams when using the animal model (AM) in the same order. For livabilities in NZW, the ranges in STA were 1.6, 11.7, 1.7 and 0.3% at 6, 8, 10 and 12 weeks of age when using the sire model *vs* 0.5, 2.2, 0.8 and 0.2% when using the animal model in the same order. In CAL rabbits, the ranges in estimates when using the sire model were 205.5, 209.0, 267.5, 239.1 and 199.2 grams for body weights at

5, 6, 8, 10 and 12 weeks, respectively *vs* 216.1, 181.4, 213.5, 207.6 and 232.7 grams when using the animal model. For livabilities in CAL rabbits, they were 5.5, 13.8 and 5.1% at 6, 8 and 12 weeks when using the sire model *vs* 3.8, 12.6 and 4.1% when using the animal model. For the list of all sires in both breeds, the largest ranges in STA were obtained when using the sire model in most traits followed by the animal model. Generally, ranges in estimates of STA in both methods of sire evaluation were relatively higher in CAL rabbits than those recorded in NZW rabbits for most body weights, while the reverse trend was observed for livabilities. In both two methods of sire evaluation, CAL rabbits recorded generally the largest ranges in estimates of STA followed by NZW rabbits for most traits studied when considering the list of all sires or the top 10% of sires. Ranges in estimates of transmitting abilities for dams of sires (animals without records) were lower than those obtained for transmitting abilities of sires themselves (animals with records) in most traits. About 50% of the sires recorded positive transmitting abilities. For most traits studied in both methods of sire evaluation, numbers and percentages of sires with transmitting abilities of positive signs in CAL breed were relatively higher than in NZW breed. The overall ranking of sires changes much between both methods of sire evaluation.

(vii) <u>Dam transmitting abilities (DTA):</u>

The ranges in estimates of STA for body weights in NZW rabbits at 5, 6, 8, 10 and 12 weeks were 307.9, 333.4, 324.3, 478.7 and 446.2 grams when using the dam model (DM with A^{-1}) *vs* 137.8, 131.5, 143.6, 214.5 and 241.1 grams when using the animal model (AM) in the same order. For livabilities in NZW, the ranges in DTA were 4.7, 40.2 and 0.4% at 6, 8 and 10 weeks of age when using the dam model *vs* 5.0, 22.7 and 0.6 when using the animal model in the same order. In CAL rabbits, the ranges in estimates when using the dam

model were 197.2, 276.6, 278.7, 284.6 and 320.3 grams for body weights at 5, 6, 8, 10 and 12 weeks, respectively *vs* 197.2, 154.7, 167.7, 172.4 and 186.2 grams when using the animal model. For livabilities in CAL rabbits, they were 0.4, 11.6, 8.0 and 16.1% at 6, 8, 10 and 12 weeks when using the dam model *vs* 11.4, 5.5, 5.0 and 4.2% when using the animal model. For the list of all dams in both breeds, the largest ranges in DTA were obtained when using the dam model in most traits followed by the animal model. Generally, ranges in estimates of DTA in both methods of dam evaluation were relatively higher in NZW rabbits than those recorded in CAL rabbits for most body weights. In both two methods of dam evaluation, NZW rabbits recorded generally the largest ranges in estimates of DTA followed by CAL rabbits for most traits studied when considering the list of all dams or the list of the top 30% of dams. Ranges in estimates of transmitting abilities for sires of dams (animals without records) were lower than those obtained for dams themselves (animals with records) in most traits. About 50% of the dams recorded positive transmitting abilities. For most traits studied in both methods of dam evaluation, numbers and percentages of sires with transmitting abilities of positive signs in CAL breed were relatively higher than in NZW breed. The overall ranking of dams changes much between both methods of dam evaluation.