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ANNUAL PRODUCTIVITY OF THE RABBIT DOE UNDER THE CONVENTIONAL SYSTEM OF PRODUCTION IN EGYPT.

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Introduction

Number and total weight of bunnies kindled and weaned per doe within year of production can be regarded as good indicators for the rabbit doe productivity. Both traits at kindling are functions of reproductive effeciency and potential maternal ability expressed in the number of litters given per doe within year of production in addition to the sizes and weights of these litters. At weaning, these two traits are functions of number and total weight of the bunnies born per doe within year of production, postnatal maternal ability that influences preweaning litter losses and preweaning gain in litter weight. Ratios of total weight of bunnies given per doe within year of production at kindling and at weaning to doe's weight can be added as other indicative aspects for the rabbit doe productivity. Information about all these aspects are lacking in Egypt except those reported on number of litters kindled per doe per year of production by Afifi and Emara, /1986/, number of bunnies born and marketed per doe within year of production by Anwar et al., /1986/. Number and/or total weight of bunnies born and/or weaned per doe per year of production were studied in countries other than Egypt by different investigators /Kawinska and Niedzwiadek, 1973; Perry, 1983; Partridge et al., 1984; Szendro et al., 1984 and others/.

The present study was set up to investigate the effects of breed of doe, order of doe's breeding season and year of production on number and total weight of bunnies kindled and weaned per doe throughout the year of production and on the ratio of the total weight of bunnies at both ages to doe's weight under the conventional system of production which prevails in Egypt.

Materials and Methods

Data of the present work were collected over three consecutive years of production (1976/77-1978/79 inclusive) on bunnies produced by Bauscat (B), White Flander (F), Giza White (G) and Baladi Red (R) breeding rabbit does and bucks that entered a diallele crossbreeding program described by Afifi and Emara, /1987/. Breeding bucks and does were raised at Dokki Experimental Station of The Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture, Egypt. The distribution of numbers of doe productivity records obtained throughout the three years of production of the study according to order of the doe breeding season and year of production is given in table 1. Does started their first breeding season when they were between 6 and 11 months old.

Table (1): Distribution of numbers of doe productivity records of the study according to order of the doe breeding season and year of production.

Year of production	Doe breeding season			Total
	First	Second	Third	
1976/77	66	25	6	97
1977/78	21	30	22	73
1978/79	11	2	17	30
Total	**98**	**57**	**45**	**200**

Under the conventional system of production, prevailing in Egypt, the breeding season of the rabbits in each year of production is limited within the period from September to the next April (about eight months) to avoid the detrimental effects on fertility in rabbits caused by high atmospheric temperatures that prevails during summer months /Oloufa et al., 1951; Sittmann et al., 1964 and Enos et al., 1979/. According to the breeding plan, bucks were assigned at random for breeding the does with a ristriction to avoid parent-offspring, full-sib and half-sib matings. Does were transferred to the hutchs of the assigned bucks to be bred and returned to their own hutchs after copulation. They were palpated 10 days post-mating to detect pregnancy and those failed to conceive were returned to the same mating-bucks to be rebred. Detection of pregnancy and returning the barren does to the same bucks were repeated every other ten days until pregnancy was established. All does were

rebred seven days after kindling. Rabbits of the study were fed throughout the year according to the normal system of feeding that prevails in the Egyptian experimental rabbitries. Fresh clean water was available to rabbits all time. Details of housing and feeding regime of the flock of the study were described by Afifi and Emara, /1986 & 1987/.

Number and total weight of the young of each kindled litter were recorded within 12 hours after kindling and at weaning which was done at five weeks of age. Data of the studied traits were analysed using the least-squares procedure described by Harvey, /1960/. A linear model including the effects of breed of doe, doe's breeding season and year of production as independent factors was specified. All factors of the model of analysis were assumed to be fixed except the residual term.

Results and Discussion

The least squares general means of the total number and weight of bunnies, respectively, given per doe per annum were 15.5 young 876.3 gm at kindling and 8.1 young and 3669.1 gm at weaning at five weeks of age (Table 2). The total weight of bunnies kindled and weaned per doe per annum in the present study accounted, on the average, to 0.27 and 1.12 times of its weight. Anwar et al., /1986/ with rabbits raised under the same system of production in Egypt, reported that the number of bunnies born per doe per year of production averaged 19.08, 16.35 and 10.75 young for French SPF, NewZealand White and German Giant rabbits, respectively. They showed that the averages for the number of rabbits marketed per doe per year of production for the three breed groups in the same order were 14.2, 12.2 and 4.41 young. Rabbit does of most of the available studies undertaken in countries other than Egypt showed higher performance than that of the present study. Kawinska and Niedzwiadek, /1973/ reported that the average of the total number of progeny given by the NewZealand White doe in a full calendar year varied from 23.3 to 29.5 young at kindling and from 20.6 to 24.5 young at weaning. Ocetkiewicz et al., /1979/ showed that the annual production of the French Silver doe averaged 9.6 young. Partridge et al., /1981/with NewZealand White and Californian rabbits noted that the expected annual mean number of bunnies weaned per doe ranged between 16.8 and 42.6 young. Perry, /1983/ indicated that the average number of progeny produced by the NewZealand White doe per year of production varied with parturition-remate interval from 43.5

Table (2): Least squares constants of factors influencing annual doe productivity traits under the conventional system of production prevailing in Egypt.

Classification	Number of records	Bunnies born/doe/annum		Bunnies weaned/doe/annum		Bunnies weight/doe's weight ratio	
		Number	Total weight	Number	Total weight	At birth	At weaning
		Const.±S.E.	Const.±S.E. gm	Const.±S.E.	Const.±S.E. gm	Const.±S.E. gm/gm	Const.±S.E. gm/gm
General mean	200	15.5±0.67	876.3±34.64	8.1±0.42	3609.1±177.12	0.27±0.011	1.12±0.057
Breed of doe		F.value = n.s. 0.21	F.value = n.s. 0.24	F. value = n.s. 0.68	F. value = n.s. 0.28	F. value = n.s. 2.50	F. value = n.s. 1.81
Baucat	55	0.6±0.92 a[1]	27.3±47.53 a	-0.2±0.58 a	-135.4±243.04 a	0.03±0.01 ad	0.05±0.08 ab
White Flander	27	-0.5±1.18 a	-30.5±60.86 a	-0.5±0.74 a	-113.0±311.69 a	-0.04±0.01 c	-0.16±0.10 bc
Giza White	86	0.3±0.83 a	-18.1±42.79 a	0.0±0.52 a	135.6±218.78 a	0.01±0.01 ae	0.16±0.07 a
Baladi Red	82	-0.4±1.12 a	21.3±57.53 a	-0.2±0.70 a	112.6±294.68 a	0.00±0.02 dce	-0.04±0.09 ac
Doe breeding season		F. value = n.s. 0.24	F. value = n.s. 0.36	F. value = n.s. 1.13	F. value = n.s. 2.56	F. value = n.s. 1.56	F. value = n.s. 0.40
First	98	-0.5±0.77 a	-26.5±39.85 a	-0.7±0.49 a	-452.2±203.77 a	0.02±0.01 a	-0.02±0.06 a
Second	57	0.3±0.83 a	25.4±42.71 a	0.3±0.52 a	56.5±218.38 ac	-0.01±0.01 a	-0.05±0.07 a
Third	45	0.2±0.94 a	1.1±48.66 a	0.4±0.59 a	395.7±248.80 bc	-0.01±0.02 a	0.07±0.08 a
Year of production		F. value = n.s. 2.25	F. value = n.s. 2.74	F. value = * 3.53	F. value = ** 9.91	F. value = ** 4.68	F. value = ** 12.92
1976/77	97	-0.6±0.84 a	-36.1±43.47 a	-0.8±0.53 a	-407.5±222.24 ac	-0.02±0.01 a	-0.16±0.07 ac
1977/78	73	1.7±0.81 a	85.9±41.79 bc	1.3±0.51 bc	919.6±213.68 b	0.03±0.01 bc	0.32±0.07 b
1978/79	30	-1.1±1.07 a	-59.8±55.02 ac	-0.5±0.67 ac	-512.4±281.84 c	-0.01±0.02 ac	-0.14±0.09 c

1 Multiple range test (Duncan, 1955), values within each classification having common letter are not significanty different, otherwise they do. Residual d.f. 192.

* P<0.5 ** P<0.01 n.s. P>0.05

to 70.4 young at kindling and from 33.9 to 48.3 young at 28 days after kindling. The average of the same trait for does of the same breed was found by Szendro et al., /1984/to range between 40.3 and 53.3 young at kindling and between 35.8 and 43.7 young at 21 days after kindling. Partridge et al., /1984/observed that the average number of bunnies produced per NewZealand White-Californian crossbred doe over one-year production cycle ranged between 59.1 and 75.0 young at kindling and between 33.3 and 48.3 young at weaning. Parillo and Vasenina, /1981/ estimated the average production of young in kilograms per doe annually as 17.2, 13.0 and 19.8 for Soviet Chincilla, White Giant and Californian White rabbits, respectively. The average of the total weight of bunnies produced per doe per year varied between 2.37 and 3.81 Kg at kindling and between 18.95 and 26.79 Kg at 28 days after kindling /Perry, 1983/. The lower performance of does of the present work than that of those of different available reports /Kawinska and Niedzwiadek, 1973; Perry, 1983; Szendro et al., 1984 and Partridge et al., 1984/ may be due to that does of this study were bred according to the conventional system of production which limits the breeding season within the year of production for only about eight months. The low number of litters (2.53) given per doe per year /Afifi and Emara, 1986/, the relatively small litter size (6.29 young) at birth /Afifi and Emara, 1987/ and the high preweaning losses (56.3%) within litter /Afifi and Emara, 1984/ recorded by the same does during the period of the study could be added as other causes in this respect.

All doe productivity traits of the study, varied with breed group of doe, without significant differences (Table 2). In spite of that, Bausact does ranked first for number and total weight of bunnies produced per doe per year at kindling and for ratio of total weight of bunnies given per doe per year at kindling to does' weight. However, Giza White does ranked first for the three traits at weaning. In disagreement with findings of the present study, Anwar et al., /1986/in a study on French SPF, New Zealand White and German Giant rabbits found that breed differences for total number of bunnies produced per doe per year was highly significant ($P<0.01$) at birth and at marketing.

Differences in all the studied rabbit doe productivity traits attributed to order of doe's breeding season did not prove any significant effect (Table 2). Effects of order of doe breeding season on doe productivity

traits are reflections for changes in physiological efficiency and reproductive and maternal capacity of the doe which are associated with advance in age. Talbert et al., /1968/ as cited by Larson and Foote, /1972/ reported that reproductive capacity in older females decreased with advancing age at a rate characteristic of the species. The decrease in the reproductive effeciency with increasing maternal age has been attributed to uterine ageing /Biggers, 1969 and Adams, 1970/, inadequate milieu /Maurer and Foote, 1971/ and reduced rate of uterine blood flow /Larson and Foote, 1972/.

Effects of year of production were not significant on average of total number and weight of bunnies born per doe per year, significant ($P<0.05$ or $P<0.01$) on the two traits at weaning and highly significant ($P<0.01$) on ratios of total weight of bunnies given per doe per year at kindling and at weaning to doe's weight. The relative sizes of F-value for all factors included in the model of analysis show that year of production was the most important factor that influenced all traits of the study. Differences due to year of production in traits of the study could be attributed to yearly changes in managerial, feeding, hygiene and climatic conditions.

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Summary

Number and total weight of bunnies kindled and weaned per doe per year in addition to ratios of total weight of bunnies given per doe per year at kindling and at weaning to doe's weight were analysed for the effects of breed of doe, order of doe's breeding season and year of production as independent factors, the least squares procedure was followed. Records of Bauscat, Giza White, White Flander and Baladi Red does in three years of production were used. The average number and weight of bunnies given per doe per year were 15.5 bunnies and 876.3 gm at kindling while 8.1 bunnies and 3609.1 gm at weaning. The ratios of total weight of bunnies produced per doe per year at kindling and at weaning to doe's weight averaged 0.27 and 1.12 gm/gm, respectively. Differences in all traits studied attributed to effects of breed of doe and order of doe's breeding season were not significant. Effects of year of production contributed significantly to the variance of number and total weight of bunnies weaned per doe per year ($P<0.05$ or $P<0.01$) and constituted a highly significant ($P<0.01$) source of variance in the ratios of total weight of bunnies kindled and weaned per doe per year to doe's weight.

SOMMAIRE

Le nombre et le poids total des jeunes lapins allaites et eleves par lapine par annee et le poids total de la nichee a la naissance et au sevrage par annee ont ete analises concernant les lapines, tenant compte des sequences des saisons et de l'annee de production comme facteurs independants. Le resultat de trois annees de production des suivantes races ont ete utilises: Bauscat, Giza Blanc, Flander Blanc et Baladi Rouge Le nombre et poids moyen de jeune lapins donnes par lapine par annee etaient 15.5 jeune lapins et 876.3 gr au sevrage et 8.1 jeune lapin et 3609.1 gr a l'elevage. Le poids total des jeunes lapins produit par annee par lapine au sevrage et a l'elevage compare au poids moyen de la lapine etait 0.27 et 1.12 gr/gr respectivement. Les differences a attribuer aux races et aux sequences des saisons de production des lapines n'etait pas relevants. L'effet de L'annee de production contribue significativement a la variation du nombre et du poids total des jeunes lapins eleves par lapine par annee: ($P<0.05$ ou $P<0.01$) et constitue un fait tre significatif ($P<0.1$) source de variation dans le poid total des jeunes lapins sevres et eleve par lapine par annee en rapport du poids de la lapine.