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PRODUCTIVE AND REPRODUCTIVE PERFORMANCES OF RABBITS RAISED BY SMALL HOLDERS IN RURAL DEVELOPMENT EGYPTIAN VILLAGES OR RAISED IN A LARGE SCALE RABBITRY

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ABSTRACT

A total of 180 does and 60 bucks of three breeds (New Zealand, White Californian and Bouscat White (Giant White)) were divided equally between small holders and a large-scale rabbitry. Small holders consisted of 30 farmers. Each farmer received a battery with 3 does and a buck. Each 10 farmers represented a breed. The objective of the study was to compare the reproductive and productive abilities of rabbits under large and small holders (farmers) conditions during one year. Twenty-five small holders succeeded to continue the study for one year, while 5 discontinued and sold their animals or faced some reproductive problems. Analysis were based on results obtained by those producing during the whole year. Animals were naturally mated and generally raised with the same methodology (cages, pelleted feeds, etc.). In the small holders system, the three breeds showed an average live weight production per doe and per year quite similar (71.7 kg/doe/year) but increased by 58% above the values observed in the large-scale rabbitry. This difference was mainly a consequence of a greater number of litters /doe/year (6.74 vs 5.66) and a higher prolificacy under the small holders system (5.65 kits weaned per litter vs 4.53). Bouscat breed showed usually significantly better results in litter size at kindling, at weaning, and for the number of parities/doe/year than the other two breeds, especially in the large-scale rabbitry. However, New Zealand White rabbits showed a higher individual weight at 1 and 3 month. The authors could recommend that both of Bouscat or New Zealand White rabbits could be used for rabbit raising under small holder's conditions of the rural development villages in Egypt.

INTRODUCTION

In Egypt mainly small holders carry out rabbit production. Thus it's imperative to make any substantial improvement in rabbit production with consideration this sector. It has been reported by (FAO, 1992) that rabbit production needs great attention mainly because this species is a good source of good quality meat.

It is well known that the Egyptian farmer is very keen to keep poultry and rabbits of good reproductive performance. Local rabbits with their limited economical characteristics could not be raised on a commercial basis. Egyptian governerate and breeders used to import several breeds of rabbits for their projects. The adaptation of these foreign breeds to the Egyptian environment is always questionable and should be an area of research. Maximum net income depends on the use of genetically improved male and female rabbits. Faster genetic improvement also would be expected through the use of proven bucks (Abo-Warda, 1994).

Many dedicated research works have been carried out on the reproductive and productive performances of foreign rabbit breeds at experimental stations (governmental and/or universities) farms in Egypt (Afifi *et al*, 1982; El-Maghawry *et al.*, 1988; Askar, 1989; Tag-El-Din *et al*, 1989; Abdel-Moty, *et al*, 1991; El-Bogdady *et al*, 1992; Abo-Warda, 1994).

On the contrary, there is little available information on the productive and reproductive

performance of rabbits owned in small number by peasants, under particular Egyptian economic and environmental conditions.

El-Beheira Governorate is one of the 25 governorates of the Arab Republic of Egypt. In view of the importance of improving yields and animal production in order to increase the farmer's income, a comparative study has been designed to compare the production and reproduction of some foreign rabbit breeds raised in governmental farm or by small holders in rural developmental villages.

MATERIALS AND METHODS

The present study was carried out on a flock of rabbits comprising of three breeds (New Zealand White (NZW), Californian and Bouscat White (giant white) belonging to an Animal Breeding Station, Ministry of Agriculture. The study was carried out for a period of one year. The rabbits of the different breeds were raised under the same managerial conditions and were housed individually in galvanised wire cages. Throughout the experiment the animals were fed a commercial concentrated pelleted diet containing at least 16% total crude protein, 14% crude fibre and at least 2700 kcal DE/kg. Berseem hay was offered *ad libitum* with the pelleted ration. Fresh drinking water was freely available via automatic valves. All kindled kits were remained with their dams for suckling from birth to weaning age (at 30 days). Then they were moved to the growth batteries. At mating (3 days after parturition), each doe was transferred to the cage of the same buck's breed (more than year old) and returned to her own cage after mating. Pregnancy was detected by palpation 10 days after each mating, and does were re-mated if necessary.

A total of 180 does and 60 bucks (60 does and 20 bucks from each of the three breeds) were involved in the study. Animals were above one year old and average body weight was 2.8-3.3 kg. Animals were randomly divided equally between the small holders system (90 does + 30 bucks) and the large scale system (90 does + 30 bucks). Rabbits assigned to small holders were distributed between 30 farmers. Each farmer obtained a rabbit battery consisting in 4 cages to hold 3 does and one buck from the same breed. Each ten farmers obtained animals of one breed. Thus, ten farmers represented each breed.

Reproductive and productive parameters were measured for all animals for one year, (litter size at birth, at weaning, at 3 months of age, number of services/conception/year, number of parturition/ year, mortality rates %, kg live weight produced/doe/year. The data obtained were statistically analysed by using ANOVA procedure of SAS (1985). Least significant difference (LSD) procedure was used to test the differences between means. Some proportions were tested with a chi-square test.

RESULTS AND DISCUSSION

Twenty-five small holders succeeded to continue the study for one year, while 5 discontinued and sold their animals or faced some reproductive problems. Analysis was are based on results obtained by those producing during the whole year of the experiment.

The overall mean's of the productive and reproductive parameters estimated for each of the three foreign rabbit breeds (New Zealand White, Californian and Bouscat White) in the 2 raising systems are shown in table 1. The results of the statistical analysis of variance are also shown in this table.

Table 1. Productive and reproductive parameters of three foreign rabbit breeds raised by small holders or in a large-scale rabbitry, and results of the statistical analysis.

Raising system		Small holders			Large scale rabbitry			LSD value (P=0.05)	Significance of effects		
Breeds		NZW	Calif	Bouscat	NZW	Calif	Bouscat		Rais. Syst.	Breed	R x B
Animal weight at starting (kg)	male	3.013d	2.905e	3.044d	3.351a	3.255b	3.194c	0.059	**	**	**
	female	2.912b	2.787b	2.838c	3.110a	3.069a	3.084a	0.047	**	**	*
Number of services	/conception	1.62	1.60	1.57	1.65	1.68	1.68	-	-	-	-
	/year	10.91	10.74	10.66	9.29	9.46	9.60	-	-	-	-
Litter size at birth	total	6.92b	7.06b	8.72a	5.62c	6.98b	8.40a	0.73	**	**	**
	alive	5.58	5.97	7.43	4.79	5.49	6.46	-	**	**	-
	dead	1.33bc	1.13cd	1.37bc	0.84d	1.57b	2.12a	0.34	*	**	**
Litter size at weaning	alive	5.37	5.50	6.07	4.12	4.64	4.84	-	**	**	-
	dead before weaning	0.91	0.84	1.54	0.79	0.89	1.80	-	-	**	-
Individual weight at	1 month (g)	602a	554b	562b	497c	472c	568b	29	**	**	**
	3 month (kg)	2.02a	1.89b	1.76c	1.84b	1.76c	1.72c	0.06	**	**	*
Average mortality (%)	at birth	15.0bc	15.6c	14.9c	14.2c	22.4ab	25.1a	4.9	**	-	**
	birth-wean.	14.7c	14.9c	15.2c	21.3b	25.9ab	27.3a	-	**	**	*
N° parturitions/doe /year kg Live weight/doe & /year		6.71b	6.72b	6.79a	5.63c	5.63c	5.71b	0.64	**	-	-
		72.7a	69.8b	72.6a	42.7d	46.0c	47.6c	2.3	**	**	**

- : non significant; * P<0.05 ; ** P<0.01. With the same letter in one line, values are not significantly different (P>0.05). Letter "a" was attributed to the highest values.

Significant differences were observed between the initial weight of males and females involved in the two raising systems, with breed x system significant interactions. The differences are most probably due to an imperfect random distribution of the initial stock, but the average values remained in the acceptable range of weight for the 3 breeds.

The breed or the raising system did not affect the number of services necessary to obtain a litter. This result agrees with the results obtained by Afifi and Khalil (1982) and by Asker (1989).

The average litter sizes at kindling (total born, alive or dead born) were significantly affected by breed as by raising system. On average, the Bouscat does were the more prolific ones and the NZW does were the worst, especially in the large rabbitry. The interaction was highly significant for the total number of kits born per litter. On average the litter size was 7.57 total born kits by the small holders, and only 7.00 in the large-scale rabbitry (P<0.01). In addition, the number of dead born per litter was significantly lower by the small holder, situation which increases the effect of the raising system on litter size expressed as kits born alive: 6.33 for the small holders and only 5.58 per litter in the large-scale rabbitry (P<0.01).

The results obtained from the present study could agree with the results obtained by Abo-Warda (1994). They don't disagree with the results obtained by Tag El-Din and Mervat (1989) which found no significant difference between imported breeds in litter size at birth for Californian, Bouscat, Flanders and New Zealand White rabbits (7.06, 8.57, 6.76 and 6.50 kits per litter, respectively), but as in the present work the highest value was observed for the Bouscat and the lowest for the New Zealand White.

The average litter sizes at weaning were significantly ($P < 0.01$) affected by raising system and breed, while the interaction wasn't significant. Bouscat does could keep their superiority to those of the other two breeds. With respect to the number of kits dying between birth and weaning, Bouscat does induced significantly higher losses the two other breeds whatever the raising system. This can be directly related to the higher prolificacy of this breed inducing greater numerical losses.

Average birth to weaning percentage of mortality was significantly lower under the small holders raising conditions than in the large rabbitry ($P < 0.01$), without significant difference between breeds under small holders' conditions. On the contrary in the large-scale rabbitry, a higher mortality was observed for the Bouscat litters. Our results only partly agree with those of Abo-Warda, (1994) which showed that dam effect on mortality percent before weaning is more profound than the effect of environmental conditions.

The individual weight at weaning (1 month) was larger under the small holders system than in the large-scale rabbitry: 573 g vs 512 g on average ($P < 0.01$). The difference between the three breeds were highly significant, but in significant interaction ($P < 0.01$) with the raising system: the NZW kits were the heaviest (602 g vs 554-562 g) under the small holders system, but the heaviest were the Bouscat ones under the large rabbitry system (568 vs 472-497 g).

The individual weight at selling time (3 months) was also significantly ($P < 0.01$) affected by the breeds and the raising systems. The interaction Raising System x Breed was significant. New Zealand White rabbits showed superiority in growth ability and reached a higher weight than those of the other two breeds whatever the raising system. These results completely agreed with those of Tag-El-Din and Mervat (1989) and Abo-Warda (1994).

Table 1 analysis shows that the average values of the number of parities/doe/year were nearly close for the three breeds (New Zealand, Californian, and Bouscat) within each environmental systems: 5.63 - 5.63 and 5.71 respectively under the large-scale rabbitry system, while it was 6.71 - 6.72 and 6.79 under the small holders system. In addition, the number of parities/doe/year under the small holders system was significantly higher ($P < 0.01$) than under the large-scale system: 6.74 kindlings per year vs 5.66. The interaction Raising-System x Breed was not significant.

The average live weight productions expressed as kg/doe/year were significantly ($P < 0.01$) affected by the breed and also by the system of raising. The interaction Raising System x Breed was also highly significant. However, Bouscat rabbits, showed superiority for live white production under the large scale system; but under the small holders system, Bouscat and NZW does produced the same amount of live weight per year: 72.6 and 72.7 kg. This similar total was obtained tanks to a high prolificacy of does and a relatively low growth rate of the young in the Bouscat breed and the opposite for the New Zealand White breed. Under small holders conditions, the Californian does produced a quantity of live weight significantly lower than that obtained by the 2 other breeds, but the reduction was small (- 4%). On the contrary, on average, does raised under the large scale system produced clearly less live weight per year than the same does raised under the small holders system (- 37% ; $P < 0.01$).

CONCLUSION

The excellent result and higher live meat production under the small holders system was most probably due to the great interest of farmers to succeed and to the small number of animals kept by each farmer. The consequence was that each animal received more care.

The results are very interesting and showed that private sector could succeed to produce more meat production than the large-scale rabbitry. From the above results, it could be advised to use Bouscat or New Zealand White rabbit breeds under the small holders raising system in Egypt for improving rabbits production and economic income. As a support of this conclusion, it could be underlined that at end of the study, 25 out of the 30 farmers continue to raise the rabbits received, while only 5 farmers got out of business and sold out their animals as previously mentioned. One of the 25 farmers bought more animals to obtain the 3 different breeds.

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