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Breeds and prospects for research to improve rabbit meat production in Egypt

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SUMMARY - The present paper introduces rabbit meat situation in Egypt as well as research and development programs to improve production. The quantity of rabbit meat consumed (0.3 kg per person and year, 2.9 % of total meat consumption) could be increased since Egyptians have a taste for local rabbit breeds meat. The limiting factor is insufficient production. This aspect concerns local breeds: Giza (old Egyptian rabbit), Baladi, and adapted breeds: Bouscat, Flanders' giant. These breeds are of small adult size (weight below 3.6 kg the heaviest one). New Zealand White and California breeds have recently been introduced in view of a more intensive and rational production. Mean performance of litter size at birth and at weaning, and weighted growth of local breeds are stated as taken from a bibliography review. Annual numerical and weighted productivity at weaning of Bouscat, Flanders' giant, White Giza and Red Baladi breeds are indicated. These results are obtained according to the conventional breeding system followed in Egypt: mating season is restricted from September to April (8 months). The results of a preliminary study on reproductive performance in recently introduced populations of New Zealand White and Californian are mentioned (breed effects, parity, doe's weight at mating). Several teams contributed to the Research-Development programs with the aim of improving productivity and production through two main ways: rationalization and assistance for the development of small village farms and use of improved breeds. Two large scale integrated production projects were implemented, a state one (10,000 does, in cooperation with Hungary), and a private one (10,000 to 15,000 does), with the purpose of marketing the meat in urban areas.

Key words: rabbit, meat, Egypt, breeds, production, programs.

RESUME - "Les races et les recherches pour améliorer la production de viande de lapin en Egypte". On présente la situation de la production de viande de lapin en Egypte, ainsi que les projets de programmes de recherche et de développement de la production. La quantité de viande de lapin consommée (0,3 kg par habitant et par an, 2,9 % de la consommation totale de viande) peut s'accroître car les Egyptiens aiment consommer la viande de lapin des races locales. Le facteur limitant est l'insuffisance de la production. Celle-ci fait appel aux races locales: Giza (ancien lapin égyptien), Baladi; à des races acclimatées: Bouscat, Géant des Flandres. Ces races sont de petite taille adulte (poids inférieur à 3,6 kg pour la plus lourde). Les races Néo-Zélandaises Blanche et Californienne viennent d'être introduites pour une production rationnelle plus intensive. A partir d'une revue bibliographique on indique les performances moyennes de taille de portée à la naissance et au sevrage, et de croissance pondérale des races locales. La productivité numérique et pondérale annuelle au sevrage des lapins des races Bouscat, Géant des Flandres, Giza Blanc, Baladi Rouge est indiquée. Ces résultats sont obtenus suivant le système conventionnel de reproduction en Egypte: la saison de reproduction est limitée de septembre à avril (8 mois). Les résultats d'une étude préliminaire des performances de reproduction dans les troupeaux récemment constitués de Néo-Zélandais Blanc et Californien récemment introduits sont indiqués (effets de la race, parité, poids de la lapine à la saillie). Plusieurs équipes contribuent aux programmes de Recherche-Développement. Celles-ci visent à accroître la productivité et la production par deux voies principales: la rationalisation et l'aide aux petits élevages villageois pour leur développement, l'utilisation de races améliorées. Deux projets de production intégrée à grande échelle sont installés, l'un gouvernemental (10.000 lapines, coopération avec la Hongrie), l'autre privé (10.000 à 15.000 lapines), avec l'objectif de commercialisation dans les zones urbaines.

Mots-clés: lapin, viande, Egypte, races, production, programmes.

Relative values of rabbit meat production and consumption per capita in Egypt are presented in Table 1, from an inquiry of 1982.

In 1982, Egyptian population was 44.67 million people. Rabbit (2.9% of total meat consumption) comes after Buffaloes and chickens (27.4% for each one), cattle (24.5%), goats (4.7%) and sheep (3.8%). Rabbit meat consumption is traditional in Egypt, from the local breeds. People like very much eating rabbits, but the production has to be increased. This paper will make the point about conventional production systems and breeds and indicate the research projects in order to develop the production.

TABLE 1

Carcass production.
Consumption/per capita/per year

Species	Carcass production		Consumption	
	Tons	% relative to total	kg	% relative to total
Cattle	115 000	24.4	2.6	24.5
Buffaloes	128 000	27.2	2.9	27.4
Sheep	18 000	3.8	0.4	3.8
Goats	22 000	4.7	0.5	4.7
Camels	13 000	2.8	0.3	2.8
Chickens	130 533	27.8	2.9	27.4
Turkeys	3 310	0.7	0.1	0.9
Ducks	14 537	3.1	0.3	2.8
Geese	7 531	1.6	0.2	1.9
Pigeons	3 245	0.7	0.1	0.9
Rabbits	15 108	3.2	0.3	2.9
Total	470 264	100.0	10.6	100.0

Conventional production systems

Population size of local rabbit breeds decreased from 2053000 in Year 1975 to 1994000 in Year 1980. The deterioration in the population size of rabbits in Egypt may be due to the diseases, the unbalanced feed, the housing system and hot summer and the fail in managerial conditions and hygiene control. Local breeds are raised on a small scale and are characterised by small size (1.75 to 3.5 kg. adult weight), lower fecundity, poor carcass dressing percentage (48-49%), pure or spotted colours, but they are adapted to the prevailing climatic conditions (Central Agency for Public Mobilisation and Statistics, 1984) in Egypt (30 °N) represented as follows:

Location	Season	Max. temp. (°C)	Min. temp. (°C)
Cairo	Winter (W)	19.9	9.7
(Capital)	Summer (S)	34.2	20.8
Alexandria	W	19.3	9.8
(Mediterranean)	S	29.9	21.9
Fayoum	W	22.0	7.2
(Middle Egypt)	S	37.0	20.5
Zagazig	W	20.1	8.4
(Eastern Delta)	S	32.7	20.7
Aswan	W	25.8	9.6
(Upper Egypt)	S	42.0	24.8
El-Kharga(El-Wadi El-Gedid)	W	24.2	6.0
(Western Desert)	S	39.6	23.8
Hurgada	W	22.4	10.3
(Eastern Desert Redsea)	S	33.3	25.0

Local rabbits are characterised with their popular and delicious meat which is marketed in higher sale price than the commercial broiler rabbit meat. Domesticated local rabbits were known in Egypt since the ancient Egyptians (5-6 thousands years B.C.) as local breeds (*L. Aegyptius*). The rabbitries either on floor or in wooden or clay hutches did not exceed 30-40 does, and sometimes in grooves either in the countryside or the desert land.

Breeds and performance

Local breeds and breeds prevailing in Egypt are the following:

Local breeds:

Baladi	}	Lipus aegyptius
Baladi White		
Baladi Red		
Giza White		

Acclimated exotic breeds:

Bouscat*
Grey Giant Flander
White Giant Flander
Chinchilla

Recently introduced exotic breeds:

New Zealand White
Californian

According to the prevailing climatic conditions, by now, there is no mating of the does in summer time.

The following available results are reviewed from the literature on some local breeds and strains of Egyptian rabbits.

Breed of doe	Litter size		Litter weight at weaning (g)
	at birth	at weaning (5 weeks)	
Baladi red	6.4	4.4	1558
Baladi white	5.8	5.5	1677
Baladi	5.4	—	—
Giza white	6.5	4.3	1690

Breed of doe	Rabbit individual body weights (g) at weeks					
	4	5	6	8	10	12
Baladi red	—	450	532	736	907	1077
Baladi white	—	451	459	635	769	883
Baladi	335	495	559	714	869	969
Giza white	337	414	510	710	806	1028

Recently, AFIFI and EMARA (1988) re-analyzed data collected over three consecutive years of production (1976/77, 1978/79 inclusive) on bunnies produced by Bouscat, White Flander, Giza White and Baladi Red breeding does at Dokki Experimental Station of the Animal Production Research Institute. The purpose was to investigate the effects of breed of doe, order of doe's breeding season and year of production on number and total weight of rabbits kindled and weaned per doe throughout the year of production under the conventional system of production which prevails in Egypt. Under this the breeding season of the rabbits in each year of production is limited within the period from September to next April (about eight months). Remating interval after kindling was seven days. Abdominal palpation occurred 10 days after mating and the non pregnant does were remated. Table 2 gives the results. Average numbers of bunnies born and weaned per doe per year are respectively 15.5 and 8.1, without any significant difference between the doe breeds.

But Bunnies weight/doe's weight ratio at weaning is higher in Giza White, indicating a higher productivity in this doe breed according to its body weight. According to these data, doe's body weights are the following: Bouscat, (2.9 to 3.0 kg), White Flander (3.6 kg), Giza White (2.9 kg), Baladi Red (3.4 kg). Annual production per doe could be taken as a global indicator of doe productivity.

Another recent research (A.M. El MAGHAWRY, K.A. YAMANI and I.F.M. MARAI, 1988) is a preliminary

study on performance of some productive traits in New Zealand White and Californian rabbits under Egyptian environments. The study was carried out on the foundation stock of New Zealand White (N.Z.W.) and Californian (Cal) breeds at the Rabbitry of National Rabbit Project, Faculty of Agriculture, Zagazig University. As these two breeds were recently introduced in Egypt as commercial meat rabbit, it is interesting to throw some light on the performance of some productive traits: litter size, litter weight, mean bunny weight at birth and weaning and preweaning mortality, as affected by breed, parity, doe weight at conception, litter size at birth and month of kindling. This preliminary study is similar to that done by ROUVIER et al. (1973) in France. Some results are shown in Table 3. It is interesting to note that average litter sizes are in the usual range of values (see Le Lapin, FAO, Rome 1984) but could be increased. More studies will follow.

Research prospects

However, rabbit industry started in Egypt since the year 1983/1984 by introducing the know-how of modern rabbit industry. The aims will be to research how to improve productivity and increase the meat production quantity, by using local breeds if interesting, and newly introduced exotic breeds. Targets are small farmers in rural areas, but also some large scale production systems.

The participation of the scientific work and foregoing research may be summarized in the following:

1. Research Institute of Animal and Poultry Production (Ministry of Agriculture, Agricultural Research Centre); Dokki-Cairo: Breeding and producing Baladi and exotic breeds for the small farmers in cheap prices.

2. Ain Shams University, Faculty of Agriculture, Cairo. A project of Scientific approach through "University Linkage" with partnership of American colleagues to introduce new hybrids (Flemish Giant X New Zealand White). The team practised the ovulation promoters, artificial insemination, in special hanging cages in open windowed houses naturally ventilated.

3. Zagazig University, Faculty of Agriculture, Zagazig Egypt, "National Rabbit project" (Coordination between Academy of Scientific Research & Technology and Zagazig University).

The objective of this project:

(a) To carry out research on team basis in:

Breeding, management, nutrition, physiology, disease control and marketing.

(b) Distribution of purebred strains of New Zealand White and Californian, in cheap prices to the small farmers to develop the rabbit production in the villages on

Table 2.
LEAST SQUARES CONSTANTS OF FACTORS INFLUENCING ANNUAL DOE PRODUCTIVITY TRAITS UNDER THE CON-
VENTIONAL 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 gm	Number	Total weight gm	At birth gm/gm	At weaning 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
<i>Breed of doe</i>		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Bauscat	55	F.value - 0.21 0.6±0.92 a ¹	F.value - 0.24 27.3±47.53 a	F.value - 0.98 -0.2±0.58 a	F.value - 0.28 -135.4±243.04 a	F.value - 2.50 0.03±0.01 ad	F.value - 1.91 0.05±0.08 ab
White Flander	27	-0.5±1.18 a	-30.5±60.96 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	0.9±0.52 a	135.8±218.78 a	0.01±0.01 ac	0.15±0.07 a
Baladi Red	32	-0.4±1.12 a	21.3±57.63 a	-0.2±0.70 a	112.6±294.68 a	0.00±0.02 dee	-0.04±0.09 ac
<i>Doe breeding season</i>		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
First	98	F.value - 0.24 -0.5±0.77 a	F.value - 0.30 -26.5±39.85 a	F.value - 1.13 -0.7±0.49 a	F.value - 2.56 -452.2±203.77 a	F.value - 1.56 0.02±0.01 a	F.value - 0.49 -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
<i>Year of production</i>		n.s.	n.s.				
1976/77	97	F.value - 2.23 -0.6±0.84 a	F.value - 2.74 -36.1±43.47 a	F.value - 3.53* -0.8±0.53 a	F.value - 9.91** -407.5±222.24 ac	F.value - 4.68** -0.02±0.01 a	F.value - 12.32** -0.18±0.07 ac
1977/78	73	1.7±0.81 a	95.9±41.79 bc	1.3±0.51 bc	919.9±213.66 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 significantly different, otherwise they do.
Residual d.f. 192.
* P < 0.5 ** P < 0.01 n.s P > 0.05.
From AFIFI and EMARA, 1988.

scientific and applied basis and to modernise the rabbit production in the countryside.

(c) Providing extension service free of charge:

Staffmembers from: Faculty of Agriculture, Zagazig and Moshtohor, Faculty of Veterinary Medicine, Zagazig University, Research Institute of Animal and Poultry Production, and National Research Centre and Atomic Energy Authority are participating in the foregoing research work.

The capacity of the project is 400 does of New Zealand White and Californian, two-floor building, flat deck batteries, natural ventilation provided with electric fans.

4. Alexandria University, Faculty of Agriculture, started a project with a financial support from Development Republic Organization, Cairo, Egypt.

The aim of the project is to carry out research and to produce improved strains to the small farmers.

5. Giza White (Local breed) was introduced in Cairo University, Faculty of Agric., Giza Egypt.

6. "Baladi Red" was introduced in the Institute of Animal and Poultry Production, Dokki, Cairo, Egypt.

7. Research work is going on small scale as pilot and applied research at:

Mansoura University, Cairo University, Monofia University, Assiout University and Tanta University.

8. The Small Farmer's Project in coordination with the AID, U.S.A. and National Development Agriculture Bank contributed in raising rabbit production in rural areas through support of loans of low interest and free of charge extension services.

9. San-El-Hager Investment Company for Agriculture and Food Security, Sharkia Governorate, erected an extension service rabbitry imported from Hungary in the rural area to produce hybrids of New Zealand White X Californian and to show the know-how of raising the meat type rabbits.

Interest from many private breeders started raising up simultaneously on large scale and intensive production basis rabbitries of 1000, 500, 200 and 100 or less does. They turn to the rabbit for the table mainly as they find its succulence a very palatable change from fowl and other meat. They observed the increasing demand and the profitable investment.

As full, integrated projects two large scale production projects are erected in Egypt:

1. Governmental: Capacity of 10,000 does throughout a governmental loan between Egypt and Hungary. The objective of this project at Sharkiya Governorate, San. El.Hager Company for Agriculture and Food Security is to produce dressed rabbit meat, breeding rabbits, pelleted feed to the multipliers and the small farmers, and coope-

ratives in this rural area and to market the rabbit meat in the urban areas.

2. Al-Barary Investment Company, Ismailiya, Egypt. A full intergrated project with a capacity of 10,000 does will extend to 15,000 does for the same aforementioned basis and objectives but the investment prices are considered.

Commercial production targets as intensive production of 35-45 young reared/doe/year (5-7 litters) could be achieved. However lower levels such as the 12-18 young reared/doe/year (3-5 litters) currently being acheived now because of: poor feeding, diseases and/or managerial conditions and the potentiality and the origin of the breed. Growth of 2 kg. in 10-11 weeks is currently achieved from the purebreds and hybrids of New Zealand White and Californian as broiler rabbits. The same weight is available from Baladi Red at 12-16 weeks of age.

The goal of raising the New Zealand White and Californian strains is to realize the following targets:

Colour	White
Average adult weight	4.5 kg./Head
Litters	6 /year
Annual crop	45 heads
Marketable table rabbits	38 heads
Average weight of a broiler/rabbit	2.5 kg. at 90 days of age
Feed conversion ratio	3.6 kg. pellet feed/l kg growth

Conclusion

Rabbit meat production and research are developing in Egypt. Several fields are to be investigated. But hat of increasing the rabbit productivity, by breeding, feeding and management in hot climate with as low investment as possible, high technology, may be a common target to most Mediterranean countries. Necessary to look for the genetic variation and differences between the several breeds we can use and to determine how to use the local breeds and to do a genetic preservation program. Perhaps possible to find some interesting genes for adaptation to high temperature, to diseases or other things in local breeds according to the management system. Coordination of research from several Universities and Research National Center is made, and the Egyptian Rabbit Science Association has already been established in 1989 in the Department of Animal Production, Faculty of Agriculture, Zagazig University.

A Symposium on "Development of rabbit industry in Egypt" will be held at Zagazig University, Zagazig, September 1989.

Table 2.

LITTER SIZE OF NEW ZEALAND WHITE AND CALIFORNIAN RABBIT AT BIRTH AND WEANING AS AFFECTED BY SOME FACTORS, UNDER EGYPTIAN ENVIRONMENT.

Classification	At Birth				At weaning			
	New Zealand		Californian		New Zealand		Californian	
	Means + S.E.	C.V%	Means + S.E.	C.V%	Means + S.E.	C.V%	Means + S.E.	C.V%
Breed	7.05 ± 0.17a	31.26	6.70 ± 0.32a	23.8	5.59 ± 0.14a	34.2	5.52 ± 0.34a	37.9
Parity	*	N.S.	N.S.		N.S.		N.S.	
1 st	6.60 ± 0.21a	29.28	6.89 ± 0.48	36.90	5.73 ± 0.23	37.06	5.31 ± 0.63	43.09
2 nd	7.53 ± 0.32b	32.49	5.81 ± 0.63	50.07	5.94 ± 0.24	28.07	5.79 ± 0.48	31.20
3 rd	7.52 ± 0.46ab	29.69	7.38 ± 0.84	33.20	5.79 ± 0.43	32.82	5.55 ± 0.72	43.70
Weight of doe at conception (g ^m)	N.S.		N.S.		N.S.		N.S.	
3000	6.77 ± 0.26	29.81	6.50 ± 0.70	39.91	5.69 ± 0.32	37.44	5.18 ± 0.73	46.33
3000-3500	7.06 ± 0.26	30.91	6.67 ± 0.42	35.71	5.51 ± 0.25	35.69	5.40 ± 0.48	40.55
3500	7.40 ± 0.38	33.13	6.87 ± 0.80	52.17	5.60 ± 0.26	27.12	5.93 ± 0.46	30.19
Month of kindling:	**	*	*		N.S.		N.S.	
January	6.38 ± 0.22a	26.60	5.11 ± 0.88a	52.17	5.32 ± 0.30	40.27	6.00 ± 0.85	31.18
February	7.13 ± 0.38ab	36.20	6.59 ± 0.63ab	39.46	5.50 ± 0.31	33.52	5.00 ± 0.63	45.46
March	7.81 ± 0.43bcd	28.80	7.62 ± 0.93b	44.06	5.73 ± 0.38	31.50	5.38 ± 0.63	32.89
April	8.91 ± 0.50c	18.10	7.83 ± 1.06ab	33.70	6.80 ± 0.55	25.75	5.50 ± 0.83	37.70
May	6.85 ± 0.46abd	30.06	8.33 ± 1.06b	31.90	5.88 ± 0.33	22.30	7.00 ± 0.56	17.50
June	6.38 ± 0.59ab	27.40	6.30 ± 0.85ab	43.02	5.38 ± 0.71	37.13	5.33 ± 0.88	49.60

Means bearing different subscripts within the same classification, differ significantly ($P < 0.05$).

** $P < 0.01$ * $P < 0.05$ N.S. = Not significant.

From A.H. el Maghawry, K.A. Yamani, I.F.M. Marai, 1988.

The first conference on "Rabbit production in Mediterranean countries" will be held in Zagazig University in September, 1990.

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