

**CHARACTERISATION OF A LOCAL POPULATION OF RABBITS IN ALGERIA:
REPRODUCTIVE PERFORMANCE OF THE DOES**

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INTRODUCTION

The production of rabbit meat in Algeria is estimated at 27000 tons per year and could be greatly increased using local populations (Gacem and Lebas, 2000). This requires their characterisation. Some measurements have already been made on growth (Berchiche *et al.*, 2000, Gacem and Lebas, 2000). The aim of the present experiment was to provide data on reproductive performance of females of a local population.

MATERIAL AND METHODS

Animals. The work was carried out at the animal unit of the University of Tizi-Ouzou over four generations (each one being studied over one year of production) on a total of 159 reproductive females and 30 males. The 32 females and 6 males making up the "G0" generation were acquired in 1998 from farmers in the Tizi-Ouzou region, roughly representative of the local rabbit population. To produce each of the three following generations (G1 to G3), about 40 females and 8 males were chosen among offspring of the best females (adapted to the breeding system, reproducing regularly and in a good state of health). Each generation was divided into families, composed of a male and 5 or 6 females descended from other families of the previous generation, so as to minimise inbreeding.

Management. The breeding unit consisted of 46 breeding cages divided into three cells. The animals were housed individually in wire mesh cages arranged on a flat deck. The animals of the G0 and G1 generations received the same commercial rabbit feed containing 16.6% crude protein and 12.3% raw cellulose. Another feed was formulated by the laboratory and fed to animals of the following two generations (17.8% crude protein and 14.4% raw cellulose). The feed was given *ad libitum* and watering was automatic. Natural lighting was used for G0, G1 and G2, but for G3 the day length was fixed at 16h per day. For each generation, the reproductive process was initiated mostly in the autumn. The reproductive rhythm was semi intensive (minimum interval between kindling and mating 10-12 days) with natural mating. Females were first exposed to males at the age of 4.5 months. A diagnosis of gestation of the females was made by abdominal palpation 10 days after the mating. The females testing negative or which had refused the buck were presented again to the male the following day. If they refused, they were not represented to the male until the following week. A female was eliminated after 5 successive failed matings. Receptivity was defined as the proportion of females which had accepted service, and fertility as the proportion of mated females giving

birth. The litters were counted and weighted at birth and at weaning. Weaning was carried out on the 28th days after birth.

Statistical analysis. Two models were used for the analysis of variance. Both included the fixed effects of the generation (4 levels) and of the mating season (4 levels: autumn, winter, spring, summer). For the analysis of receptivity and fertility rates and weight of does at mating, we added the effect of the mating number (5 levels: 1, 2, 3, 4, 5 and more) and the physiological state (lactating or not) of the females within mating number. For the analysis of litter data (size, weight, mortality), we used the effect of litter number (4 levels : 1, 2, 3, 4 and more) and the physiological state of the females (lactating or not) within litter number.

RESULTS

The does weighed less than 3 kg. They were characterised by a high receptivity rate but a rather low fertility (70%) and prolificacy : 7.3 born in total with 5.6 born alive per parturition and 5.5 weaned rabbits per weaned litter. The individual mean weight of the young rabbits was 49 g at birth and 445g at weaning. The stillbirth rate was high: 23.4%; the mortality between birth and weaning recorded over the course of the experiment was lower, at 12.6%.

Table 1 : Effect of season and mating number on the fertility and the weight of the does.

	Receptivity rate (%)	Fertility rate(%)	Weight at mating (g)
Number of data	1013	795	1011
Mean	80.0	70.3	2890
Residual S.D.	38.0	45.0	378
<i>Effect of season:</i>	***	NS	***
Autumn	88.0 c	77.5	2601 a
Winter	74.4 a	65.7	2836 b
Springs	81.5 bc	72.1	2889 b
Summer	79.7 b	75.5	2944 b
<i>Effect of mating number:</i>	*	NS	**
1	73.1 a	65.8	2802 ab
2	78.2 ab	71.5	2852 b
3	86.3 c	75.2	2848 b
4	85.4 bc	73.8	2867 b
5 and more	89.0 bc	75.7	2730 a

* P<0.05 ** P<0.01 ***P<0.001 NS : Not significant.

Means with different letters are significantly different (P<0.05)

Effect of season. The females were significantly less receptive in winter (74,4%) than in the other seasons. The highest receptivity rate was recorded in autumn (88 %) while in this season the weight of the does at the mating was lower (P<0,001) than in the 3 other seasons (table 1). The highest total number of young born per parturition was observed following autumn and winter mating (7.8 and 8.0). It decreased significantly in spring (7.1) and reached its minimum value in summer (6.5). This effect was not significant for the number of born alive. The losses

7th World Congress on Genetics Applied to Livestock Production
Montpellier, France, 19-23 August 2002,
 Session 4 0-4 2002, 4-41

of young between birth and weaning, which were very high after autumn mating (24.6%) were no more than 7.1% in spring and summer. The season had no effect on the other traits (table 2).

Table 2 – Effect of season, parity and physiological state of does on litter traits.

	Litter size			Average weight of young (g)		Litters weaned (%)	Young mortality (%)	
	Born alive	Total born	Weaned	at birth	at weaning		At birth	Between birth and weaning
Data	560	560	423	506	423	506	560	423
Mean	5,61	7,31	5,50	49,3	445	83,6	23,4	12,8
Residual S.D.	2,97	2,48	2,26	9,8	107		31,8	18,3
<i>Season effect</i>	NS	**	NS	NS	NS	***	NS	***
- Autumn	6,09	7,81 c	5,42	48,8	449	75,7 a	22,0	24,6 c
- Winter	6,35	8,01 c	5,63	49,5	451	77,9 a	21,0	18,8 b
- Spring	5,38	7,06 b	5,75	49,0	433	88,3 b	25,6	7,4 a
- Summer	5,20	6,48 a	5,14	50,0	447	95,1 c	20,6	7,1 a
<i>Phys. state</i>	NS	NS	NS	***	NS	***	**	**
Parity 1	5,24	6,68	5,40	46,1 a	438	77,3 a	22,3 ab	9,0 a
Parity 2 :								
- lactating	6,00	7,35	5,44	54,0 b	471	88,7 bc	17,5 a	14,0 a
- no lactating	5,74	7,09	5,57	46,3 a	432	78,5 ab	22,2 ab	12,1 a
Parity 3								
- lactating	5,83	7,51	5,74	52,4 b	464	86,4 bc	21,2 ab	11,0 a
- no lactating	6,00	7,53	5,23	45,3 a	441	75,8 ab	23,9 ab	26,2 b
Parity 4 or +								
- lactating	6,43	7,67	5,67	52,6 b	447	92,9 c	15,2 a	13,4 a
- no lactating	5,10	7,56	5,36	48,3 a	416	81,6 ab	34,1 b	16,1 a

* P<0.05 ** P<0.01 ***P<0.001 NS : Not significant.

Means with different letters are significantly different (P<0.05)

Effect of mating number. The multiparous females were significantly more receptive than the nulliparous ones, but not significantly more fertile. The weight of the females at mating increased slightly to the 4th mating and then fell significantly.

Effect of the physiological state of the females combined with their parity. Lactating females at mating were always more receptive. Their young were significantly heavier at birth (+14%), but not at weaning. Litter size was not significantly different.

DISCUSSION

The adult weight of the females reached at the 3rd or the 4th mating (about 3,0 kg) is lower than that of females of average size of the selected strains. The mean receptivity rate of the population studied is similar to that observed by Garcia and Perez (1989) in New Zealand does bred with the same reproductive frequency. The fertility and the prolificacy at birth or at weaning of the females of this local population are low compared with results obtained in well-managed French rabbit farms (77.1% and 7.7 weaned; Guerder, 2001). In Egypt, Galal and Khalil (1994) recorded fertility rates in Giza White females of 76%. On the other hand, Kennou and Bettaïb (1990) found fertility rate of only 61% for does of local Tunisian population. In our case, the low fertility was due to problems of abortion and to the occurrence of pseudo gestation in females. Birth out of the nest box and the poor maternal behaviour of some females, causing losses of the whole litter, explain the reduced number of young born alive. The season exerts an influence on few of the reproduction traits of the females. The summer, characterized by high temperatures in Algeria (average of 30°C), does not seem to affect the fertility of the females, whereas Arveux (1988) emphasised the difficulties of inducing mating in hot weather. The lowest litter sizes (total born) were recorded after summer mating. This fall however was associated with a fall in the number of still born young and losses during the suckling period, so that the litter size at weaning was not significantly lower. On the contrary, the mean weight at weaning of young was not affected by the season whereas Hassan *et al.* (1994) found a very clear reduction in litter weight at weaning for animals born in June or July in Egypt. The favourable effect of the lactation state at mating on some reproduction traits is contrary to classical results (Poujardieu and Theau-Clement, 1995). It may be explained by the non conventional elimination criteria, as females were not eliminated after three non fertile matings.

CONCLUSION

This first study on animals of a local Algerian population, maintained as a closed population, has provided figures for the main characteristics, namely an adult weight of the females of 3 kg, a mean fertility (70%), rather low prolificacy worsen by a very high still birth rate, probably due to rather poor housing conditions. On the other hand, one should point out that it was very little affected by the summer heat. In parallel with this study, growth experiments were carried out on the same population. All these results will provide a definition of the objectives to be sought for creating and improving a breed of rabbit for meat.

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Abstract

CHARACTERISATION OF A LOCAL POPULATION OF RABBITS IN ALGERIA: REPRODUCTIVE PERFORMANCE OF THE DOES. N. Zerrouki*, M. Berchiche, G. Bolet and F. Lebas. University of Tizi Ouzou, Laboratoire de Physiologie et Nutrition Animales, Algeria.

A total of 159 females and 30 males of an Algerian local population was studied at the University of Tizi-Ouzou over 4 years. The females were put in reproduction at the age of 4.5 months in natural mating with a theoretical rhythm " 42 days ". The females are characterized (average \pm standard deviation) by a rather low prolificacy at birth and weaning (7.3 ± 2.5 born of which 5.6 ± 3.0 born alive and 5.5 ± 2.3 weaned), with receptivity and fertility rates of $80 \pm 38\%$ and $70 \pm 45\%$ respectively. The adult weight of the females at mating (at the 2nd or 3rd litter) was 2890 ± 377 g. The hot summer season did not seem to affect the fertility and litter size at weaning of the females. Together with growth data, these results will provide a definition of the objectives to be sought for creating and improving a breed of rabbit for meat.