

REPRODUCTION PERFORMANCES OF LOCAL ALGERIAN DOES RAISED IN RATIONAL CONDITIONS

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ABSTRACT.

Thirty-two young rabbit does of the Algerian local breed were purchased from small breeders of the Tizi-Ouzou area. Their breeding performances were measured in the Tizi-Ouzou University facilities (wire mesh cages placed in a building with natural ventilation) from March to September 1998 (3.37 litters on average/doe). Theoretical reproduction rhythm was a remating interval of 10-12 days after parturition. Does were fed *ad libitum* a commercial pelleted feed (17% proteins and 12.3% crude fibre). Males were of the same origin. The average proportions of mating acceptance and of kindlings per mating were 90.4% and 82.1% respectively. Average litter sizes were 7.52 total born, 6.65 born alive and 5.62 weaned at 28 days per kindling. Average litter weight and kit's individual weight were 341g and 49.7g at kindling, and 2256g and 368g at weaning respectively. Stillbirth mortality rate was 12.8% and birth-to-weaning mortality was 13.9%. Average doe's milk production measured every day between parturition and the 21st day of lactation was on average 16.9g/kit and /day, *i.e.* a total of 2130g of milk produced during this period. The average interval observed between 2 consecutive litters was 43.7 days, corresponding to a calculated production of 46.9 kits weaned per doe and per year.

INTRODUCTION

In Algeria, rabbit raising rationalisation is in progress since about 10 years, but remains still in the testing ground (BERCHICHE and Lebas, 1994, GACEM and LEBAS, 2000). One of the factors limiting its development is the availability of different factors of production. For example, only unselected rabbits of the local population are available for reproduction. These animals are presently raised by small breeders, but without knowledge of real potentialities. Before to promote the utilisation of these local rabbits in preference to more or less adapted imported rabbits, it's necessary to evaluate their effective productivity when raised in rational conditions, *i.e.* rearing in wire mesh cages, feeding with pelleted balanced diets and watering with automatic drinkers. Some studies were done in this area, but only on growth performances (BERCHICHE *et al.*, 1996). The aim of the present study was to improve knowledge on reproduction performances of the Algerian local rabbits when raised in rational conditions.

MATERIAL AND METHODS

General conditions

The study was performed in the Tizi-Ouzou University facilities between March and September 1998.

A total of 45 young rabbits was purchased from local breeders of the Tizi-Ouzou region. These local animal have never been selected; the fur colour was very varied. The age at

buying was theoretically 3 months (uncontrollable). Buying live weight varied from 900 to 1500g. From this initial stock, 32 does were selected for the study on the basis of their health status. The 4 males were from the same origin, but were present in the University Unit since a longer time.

The animals were reared in individual wire mesh cages placed on one level (flat deck). The building with natural ventilation was considered as suitable for rabbit production. No special attempt was made to control inside temperature.

Breeding conditions

All the animals were fed *ad libitum* a pelleted diet formulated and manufactured locally. The analytical composition was protein 17.0% and crude fibre 12.3%. Water was provided *ad libitum* through automatic drinkers.

The young does were introduced in the male's cage for natural mating at first time when weighing 2 kg at minimum, *i.e.* at about at 4 to 4.5 months of age. Following parturition, a new presentation to a male was realised after a delay of 10-12 days. Pregnancy was controlled by abdominal palpation 10 days later, and non -pregnant does were presented to a male the following day. A doe was eliminated after 3 consecutive non-fertile matings. A nest box was made available for the female 48 hours before the expected kindling day. Immediately after parturition, the litter size and litter weight were controlled (alive and stillborn kits). Every day from day 1 until day 21, litter weight was measured before and after suckling in order measure the doe's milk production. At weaning (28th day) litter size and weight were controlled again.

Statistical analysis

Mean, standard error and coefficient of variation of all recorded data were calculated with the "Chadoc" statistic package.

RESULTS and DISCUSSION

During the 7 month of the experiment the average number of litters obtained per doe was 3.37.

Numerical productivity

The average percentage of mating acceptance was 90.4%, and 82.2% of these matings were fertile (table 1). This high level of fertility may be related to the semi-intensive rhythm of reproduction employed during this series of observations and to the *ad libitum* feeding with a balanced diet (FORTUN and BOLET, 1995). This level of fertility was largely higher than the 59.1% observed with the same population bred by local small farmers which were not able to utilise balanced diets (BERCHICHE and ZERROUKI, 1998). It was also largely higher than the 43.6% observed in Algeria with imported selected rabbits some year ago (BERCHICHE, 1992). This better fertility observed with local population may be also partly a consequence of the improvement of rearing conditions. It would be also emphasised that this fertility rate was higher than the average percentage of fertility observed in France after natural mating of selected does (77% on average; GUERDER, 1999), despite the fact that our period of observation included the hot Algerian summer. On average, the interval between 2 litters was only 43.7 days.

According to these results, it can be assumed that when raised under rational conditions, does of the local Algerian population had a fertility at least equivalent or a little bit higher than that

of selected rabbit does. Bred in climatic conditions similar to the Egyptian ones, the Algerian rabbits were able to obtain higher fertility rates than the Egyptian Giza White or Baladi breeds (82.2 vs 75 to 76%; KHALIL, 1988).

Litter size at birth was 7.52 and 6.65 for the total born and kits born alive (table 1). These figures were higher than the 5.04 and 4.79 observed by BERCHICHE and ZERROUKI (1998) for does of the same population bred by local farmers. This is most probably a consequence of the better feeding conditions in the present study. Effectively this situation was similar to that described with Tunisian local breed does: 6.8 total born and 6.6 alive / litter when feeding conditions met the requirements and only 4.9 and 4.8 respectively when feeding conditions were not optimum (KENNOU and LEBAS, 1990). The relatively high stillborn rate (12.8%) may be considered as an imperfection of the raising conditions and could be most probably improved in the next future. With good breeding conditions, stillborn rate was generally observed between 5% and 8% (ROUSTAN, 1980), even in hot conditions (DESPRÉS *et al.*, 1996).

Table 1 : Main numerical reproduction characteristics of the Algerian local breed does raised in rational conditions

	Number of observations	Mean	Standard error	Coefficient of variation
• % of mating acceptance	133	90.4	1.4	15.6
• % of kindling /matings	129	82.2	3.4	46.6
• Litters per initial doe	106	3.37	0.10	31.2
• Total born / parturition	106	7.52	0.22	30.7
• Born alive / parturition	106	6.65	0.29	44.4
• % stillborn / parturition	106	12.8	1.89	152
• Weaned / parturition	106	5.62	0.28	2.84
• % birth-to-weaning mortality	106	13.9	1.4	106

At weaning, the litter size was 5.62 *i.e.* reduced by 13.9% (table 1). This birth-to-weaning mortality was in the range of the values encountered in correctly managed rabbitries (11.2% in 72 commercial French rabbitries in 1998; PONSOT, 2000), even if lower values such as 5-8% are frequently observed. The higher variability of litter size observed at weaning than at birth (coefficient of variation of 50.5% vs 30.7% for the total born) is the mathematical consequence of taking in account litters with no kit alive at weaning. The coefficient of 30.7% observed at kindling was similar to that observed for example by YANG *et al.* in 1996 for the Saibei rabbits (31.4%)

Live weights and milk production

The average individual weight at weaning (28 d) was 368 g only (table 2). This low value is directly related to the relatively low milk production of the local does : 16.9 g per day and per kit from kindling to day 21 on average (table 3). This figure is effectively significantly lower than the values obtained from selected does : 20.4 g/d/kit according to ALABISIO *et al.* (1996), 21.4 g according to PASCUAL *et al.* (1996) or 20.8 to 23.8g observed by LEBAS and FORTUN-LAMOTHE (1996) with crossbred does according to diet's composition. Nevertheless, this low

weaning weight must also be related to the low adult weight of this local breed (around 3 kg), and the correlative low growth potential of the young. The 368 g individual weight at weaning in litters of 5.6 kits was higher than the 339 g observed in Egypt at the same age by RASHWAN *et al* (1997) for Baladi Red kits in litters of only 2.3 young. It could also be favourably compared to the 408 g observed at 31 days for the local breed young rabbits observed in Benin (tropical conditions) by KPODEKON *et al.* (1998) for litters equalised at 6 young.

table 2 : Average individual and litter weights, and milk production obtained by of Algerian local breed does raised in rational conditions

	Number of observations	Mean	Standard error	Coefficient of variation
• Litter weight (alive) at kindling (g)	99	341	11	31.5
• Average kits weight at birth (g)	99	49.7	0.9	17.9
• Litter weight (alive) at weaning (g)	94	2258	68	29.2
• Average kits weight at weaning (g)	94	368	11	27.5

It must be emphasised that a sharp increase of milk production was observed from the 1st to the 3rd week of lactation : milk produced during the 3rd week represents 43.3% of the total obtained for the whole 0-21 days period (table 3). Corresponding values obtained from selected does are only 38.9% for an Hyla strain sample (ALABISIO *et al.*, 1996), or 41.0% for some NZW x Calif crossbred does (PASCUAL *et al.*, 1996). Because as well known since a long time (LEBAS, 1976) this situation of sharp milk production increase is favourable to kits survival, it can be assumed that despite the low quantitative milk production, does of this Algerian breed have good ability to raise their young until weaning age. In addition, it could also be underlined that productivity parameters were only slightly affected by the parity number in this breed (table 4).

Table 3 : Milk production (in grams) of the Algerian local breed does raised in rational conditions

	Number of observations	Mean	Standard error	Coefficient of variation
• milk /doe during 1st week	75	499	15.6	27.1
• milk /doe during 2nd week	75	733	19.0	22.4
• milk /doe during 3rd week	75	899	27.9	26.9
• 0-21 days milk produced / doe	75	2130	56.2	22.8
• milk /day, average /doe (0-21days)	75	101.5	3.1	26.3
• average milk /day /kit (0-21 days)	75	16.9	0.6	32.1

table 4 : Some parameters recorded during the successive litters (mean \pm standard deviation)

	Parity number		
	1	2	3 or more
<i>N° observations</i>	32	28	43
• Average individual birth weight (g)	47.0 \pm 9.0	51.8 \pm 7.9	50.5 \pm 10.0
• Average individual weaning weight (g)	354 \pm 96	388 \pm 110	367 \pm 100
<i>N° observations</i>	32	25	16
• Milk intake / kit/ day (g)	16.2 \pm 6.4	17.6 \pm 5.1	16.9 \pm 3.7

CONCLUSION

When bred with natural mating and a 10-12 days remating interval after kindling, does of the Algerian local breed may be suitable for commercial reproduction under rational conditions. The fertility rate and litter size at kindling as at weaning are sufficient for a commercial utilisation. The observed interval between 2 kindlings (43.7 days) and the litter size at weaning (5.62 kits/litter) make possible to calculate a yearly production of 46.9 rabbits weaned per doe. This is an estimation made with a limited number of does during only 7 month of observation, thus this interesting tendency must be confirmed. Nevertheless the authors are confident in the reproductive qualities of the breed since the period of observation included the hot summer period during which reproduction is more difficult. On the other hand, the weaning weight of young rabbits was light 338 g at 28 days. An improvement could be searched in the future through the utilisation of a heavier males crossed with the local Algerian does. But the interest of this suggestion would be the object of a other experience, because one part of the high fertility rate mentioned for the does must be also counts in local Algerian males favour, and it is not proved that males of other origin would obtain the same good fertility.

REFERENCES

- ALABISIO M., BONNANO A., ALICATA M.L., LETO G., TODARO M., 1996. Productivity of rabbit does subjected to artificial insemination and natural mating. *Proc. 6th World Rabbit Congress, Toulouse, France, 9-12/07/1996, vol. 2:29-32.*
- BERCHICHE M., LEBAS F. 1994. Rabbit rearing in Algeria : family farms in the Tizi-ouzou area. *Cahiers Options Méditerran., 8:409-415.*
- BERCHICHE M., LEBAS F., LOUNAOUCI G., KADI S. A. 1996. Feeding of local population rabbits : effect of straw addition to low fibre pelleted diets, on digestibility, growth performance and slaughter yield. *Proc. 6th World Rabbit Congress, Toulouse, France, 9-12/07/1996, vol. 1:89-92*
- BERCHICHE, M, 1992. Systèmes de production de viande de lapin au Maghreb. *Séminaire approfondi sur les Systèmes de Production de Viande de Lapin CIHEAM Saragossa (Spain) 24-26 Sept. 1992.*
- BERCHICHE, M., ZERROUKI, N., 1998. Étude de l'élevage fermier de lapin dans la région de Tizi-Ouzou (*Unpublished data*)

- FORTUN-LAMOTHE L., BOLET G., 1995. Les effets de la lactation sur les performances de reproduction chez la lapine. *INRA Production Animale*, **8**:49-56.
- GACEM M., LEBAS F., 2000. Rabbit husbandry in Algeria. Technical structure and evaluation of performances. *7th World Rabbit Congress, Valencia (Spain) 4-7 July 2000* (accepted communication)
- GUERDER F., 1999. RENALAP 97: des résultats techniques et économiques en baisse. *Cuniculture*, (N°145), **26**:3-8.
- KENNOU S., LEBAS F. 1990. Résultats de reproduction des lapines locales tunisiennes élevées en colonie au sol. *Options Méditerranéennes*, **A8**:93-96
- KPODEKON M., ADEHAN R., DJAGO A.Y., LEBAS F., COUDERT P., 1998. Growth performance until weaning of young rabbits born in France and fostered in Benin at 3 adys of age, in comparison with local rabbits. *World Rabbit Science*, **6**:285-289.
- KHALIL M.H., 1998. Model for description of rabbit genetic resources in Mediterranean countries. Application to the Egyptian breeds Giza White and Baladi. *Mediterranean rabbit working group*, 41 p.
- LEBAS F. 1976. Relations entre la forme de courbe de lactation maternelle et la croissance des lapereaux. Étude sur 975 courbes individuelles. *1er Congrès International de Cuniculture, Dijon, France, 31 mars 2 avril 1976*, communication 9, 1-4.
- LEBAS F., FORTUN-LAMOTHE L., 1996. Effects of dietary energy level and origin (starch vs oil) on performance of rabbit does and their litters. average situation average after 4 weanings. *Proc. 6th World Rabbit Congress, Toulouse, France, 9-12/07/1996*, **vol. 1**:217-222.
- PASCUAL J.J., CERVERA C., BLAS E., FERNANDEZ-CARMONA J., 1996. Milk yield and composition in rabbit does using high fat diets. *Proc. 6th World Rabbit Congress, Toulouse, France, 9-12/07/1996*, **vol. 1**:259-262.
- PONSOT J.F., 2000. Bilan GTE 1998 : quasi stabilité. *Cuniculture* (N°151), **27**:3-7.
- RASHWAN A.A., YAMANI K.A., ABDE EL-GHANI A.I., 1997. Performance of 3 rabbits strains and their reciprocal crosses in Egypt during summer. *World Rabbit Science*, **5**:55-60.
- ROUSTAN, A., 1980. Première analyse des résultats de mortalité des lapereaux avant sevrage dans les élevages pratiquant le contrôle de performances sur la productivité numérique des lapines. *Cuniculture Suppl. au N°31*, 3-13.
- YANG Z., WU Z.F., WU F.C., ZHANG J.Y., WU S.Q. 1996. The primary estimation of heritabilities of several main characters in Sabei rabbits. *Proc. 6th World Rabbit Congress, Toulouse, France, 09-12/07/1996*, **vol. 2**:389-392.