REPRODUCTION PERFORMANCES OF LOCAL ALGERIAN DOES RAISED IN RATIONAL CONDITIONS

BERCHICHE M.*, ZERROUKI N.*, LEBAS F**.

* Laboratoire de Physiologie et de Nutrition animale, Unité de recherche en Biologie et Agroforesterie, Université Mouloud Mammeri, TIZI-OUZOU - Algeria
** Station de Recherches Cunicoles, INRA Centre de Toulouse, 31326 CASTANET Cedex - France

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 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

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

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.

\[ \text{Table 2 : Average individual and litter weights, and milk production obtained by of}
\]
\[ \text{Algerian local breed does raised in rational conditions} \]

<table>
<thead>
<tr>
<th></th>
<th>Number of observations</th>
<th>Mean</th>
<th>Standard error</th>
<th>Coefficient of variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litter weight (alive) at kindling (g)</td>
<td>99</td>
<td>341</td>
<td>11</td>
<td>31.5</td>
</tr>
<tr>
<td>Average kits weight at birth (g)</td>
<td>99</td>
<td>49.7</td>
<td>0.9</td>
<td>17.9</td>
</tr>
<tr>
<td>Litter weight (alive) at weaning (g)</td>
<td>94</td>
<td>2258</td>
<td>68</td>
<td>29.2</td>
</tr>
<tr>
<td>Average kits weight at weaning (g)</td>
<td>94</td>
<td>368</td>
<td>11</td>
<td>27.5</td>
</tr>
</tbody>
</table>

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).

\[ \text{Table 3 : Milk production (in grams) of the Algerian local breed does raised in rational}
\]
\[ \text{conditions} \]

<table>
<thead>
<tr>
<th></th>
<th>Number of observations</th>
<th>Mean</th>
<th>Standard error</th>
<th>Coefficient of variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>milk / doe during 1st week</td>
<td>75</td>
<td>499</td>
<td>15.6</td>
<td>27.1</td>
</tr>
<tr>
<td>milk / doe during 2nd week</td>
<td>75</td>
<td>733</td>
<td>19.0</td>
<td>22.4</td>
</tr>
<tr>
<td>milk / doe during 3rd week</td>
<td>75</td>
<td>899</td>
<td>27.9</td>
<td>26.9</td>
</tr>
<tr>
<td>0-21 days milk produced / doe</td>
<td>75</td>
<td>2130</td>
<td>56.2</td>
<td>22.8</td>
</tr>
<tr>
<td>milk / day, average / doe (0-21days)</td>
<td>75</td>
<td>101.5</td>
<td>3.1</td>
<td>26.3</td>
</tr>
<tr>
<td>average milk / day / kit (0-21 days)</td>
<td>75</td>
<td>16.9</td>
<td>0.6</td>
<td>32.1</td>
</tr>
</tbody>
</table>
table 4: Some parameters recorded during the successive litters (mean ± standard deviation)

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

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


