EVALUATION OF THE REPRODUCTIVE PERFORMANCE OF A LOCAL POPULATION OF RABBITS IN SOUTH BENIN

Akpo Y.[2], Kpodékon T.M.[1,2]*, Tanimomo E.[1], Djago A.Y.[2], Youssao A.K.I.[1], Coudert P.[3]

[1]Ecole Polytechnique d'Abomey-Calavi Laboratoire de Recherche en Biologie Appliquée (LARBA), Unité de Recherche Cunicole et Cavicole (URCC), 01 BP 2009 Cotonou, Bénin
[2]Centre Cunicole de Recherche et d'Information (CECURI), 01 BP 2009 Cotonou, Bénin
[3]INRA – Tours, Laboratoire de pathologie du lapin, BP 37380 Nouzilly, France
*Corresponding author: kpodekon@bj.refer.org

ABSTRACT

The aim of this study was to make an initial evaluation of the does (n=147) which will be introduced in a selection program in CECURI. The reproductive parameters of 400 litters were recorded and analyzed. The fertility rate of the herd was 65% and the interval between kindling varied from 63 to 44 days according to the parity. The mean weight of the litters at weaning was higher in the second than in the first parities (1612 g vs. 2313 g; $P<0.05$). The mean individual mean weight at 28 days was 396±132 g. The rate of weaning was 94, 90 and 86%, respectively for the first, the second and the third kindling. The mean litter size was 5.7 born alive. It was significantly lower in the first litter (5.1) than in the following parities. The stillbirth rate was 2.5, 2.3 and 2.2%, respectively for the first, the second and the third kindling of the does.

INTRODUCTION

An important variability of the reproductive performances has been observed in the Centre Cunicole de Recherche et d'Information (CECURI) and in the rabbit breeders farms in the South of Benin (Kpodékon and Coudert, 1993; Kpodékon *et al*., 2006). The size of the litters at birth observed between 1988 and 1991 varied from 3.8 to 6.2, and from 2.8 to 5.1 at weaning, (Kpodékon and Coudert, 1993). The mortality rate from birth to weaning varied from 6 to 22% (Kpodékon *et al.*, 2006). According to Rashwan and Marai (2000), the viability of the young rabbits depends on the maternal qualities, the litter size and the young rabbits weight at birth. Thus, to improve the numeric productivity of the common population of rabbits of South Benin, a program of selection will be undertaken in CECURI. The main purpose of this work is to make an initial evaluation of the herd in order to choose the future criteria of selection.

MATERIALS AND METHODS

Management of animals

Data collection on the reproductive performance of the does in selection has been achieved from May to December 2006 in CECURI, in the academic campus of Abomey-Calavi (Benin). The herd was composed of 147 nulliparous does (mean weight at first mating: 2043 g), plus 32 replacement females. The animals were all of local populations coming from CECURI and other departments of Benin. Five reproductive groups based on geographical origin have been constituted. To limit the consanguinity, females were never mated with males of the same group.

Female rabbits were reared in single wired cages, disposed in flat-deck. These cages have been placed in naturally ventilated buildings and illuminated by the light of the day. The individual cages dimensions used for the does in reproduction were 75 x 45 x 30 cm. Animals were fed *ad libitum* with coarsely ground concentrate produced by the Association Cunicole de Provenderie-La Providence

(ACP-LP). The fresh forage, given in complement to the animals, was palm tree leaves (*Elaeis guineensis*).

The parturition started in May and ended in December 2006.The rabbits were bred in a semi-intensive rhythm (mating 10 days post–partum). Abdominal palpation for pregnancy determination was performed 14 days after service. The nest-box was put 14 days after a positive palpation. The day of kindling, the total number born, born alive and stillborn were recorded. As far as possible the litters were standardised to 6 for the first parturitions and to 7 for the following parturitions while nicking the ear of adopted young rabbits coming from the supplementary does. Young were weaned 28 days after birth and the litter was weighed.

For the sanitary prophylaxis, disinfectants solutions have been placed at the entry of the raising building. The preventive treatment against the coccidia has been done with anticoccidian incorporated in the food (Cycostat 66®). The complex of vitamins used regularly was the Alfaceryl®. The Oxytetracycline® 50% has been used for the bacterial infection prevention. As for the treatment against scabies, it has been done by the using of the Ivomec D®.

Data recording and analysis

At each mating, the following data have been recorded: tattoo number of the doe and the male, date of mating, weight of the female at mating, result of the palpation for pregnancy, date of parturition, abortions, littering out nest-box and case of mortality of the females, the total number born, born alive and stillborn, number adopted or retired, date of weaning, number of weaned, litter weight at weaning. The following parameters have been calculated: fertility rate, kindling interval, stillbirth rate, rate of viability at weaning, mean individual weight of kits at weaning.

According to the date of mating, three seasons have been defined : from May to 15th July it is the “full rainy season” (1) from 15 July to end August the “small dry season” (2) and from September to November the “small rainy season”(3).

The means have been compared between parities or between seasons by the Student’s t test. The rates have been compared by the bilateral Z test.

RESULTS

Fertility rate and interval between litters

The mean rate of fertility was65 %. The intervals between litters was 63 and 65 days between the first two parturitions and was meaningfully more elevated ($P<0.05$) than the interval between next parturitions (Table 1).

Table 1: Interval between littering of the does

Litter number (parity)	Interval 1 to 2	Interval 2 to 3	Interval 3 to 4	Interval 4 to 5
Number of litters	126	92	31	4
Number of days	63±19	65±23	51±12	44±2

Litter size at birth

The mean size of the litters was 5.7 alive new-born. The rate of stillborn was rather low (2.2%). As usually observed, the size of the first litter was lower (Table 1).

The most frequent litter sizes (59%) were 5, 6 and 7 alive new born and only 19% of the does had a higher litter size (Figure 1).

Table 2: Litter size of the 147 does according to the parity

Parity	Litter 1	Litter 2	Litter 3	Litter 4	Litter 5	Litter 1 to 5
Nb of litters	143	128	93	32	4	400
alive	5,1±1.6	6,0±2.0	6,3±1.9	6,1±1.8	6,3±1.0	5,7±1,9
stillborn	2,5%	2,3%	2,2%	0,0%	10,7%	2,2%

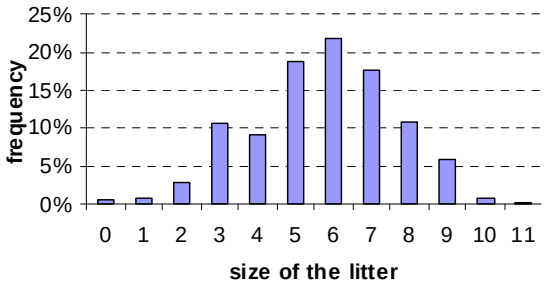

Figure 1: Distribution of the litter sizes at birth

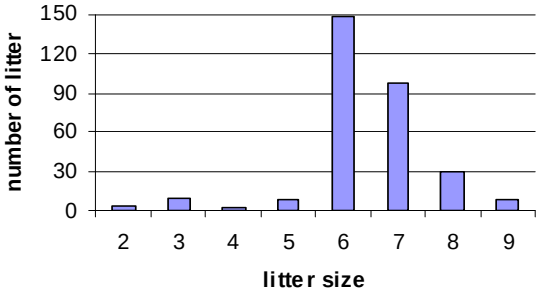

Figure 2: Distribution of the litter size after equalisation

Weaning rate

Influence of the parity

At weaning we have to take in account that, as far as possible, the litter sizes were equalised to 6 or 7 pups at birth and therefore the litter of some does was totally distributed to other does. After adoption the distribution of litter size is strongly modified (Figure 2). The most frequent litter size after adoption (day 0) was of 6 young. The mean litter size at weaning was 5.5.

The mean mortality rate, excluding litters without any live pup at 28 days, was 15%. The mean rate of weaning was 0.91. No meaningful difference has been observed between the ranks of litter; however, this rate tended to decrease from the 1st to the 4th litter.

Table 3: Influence of the parity of the litter on the rate of weaning

Litter rank (parity)	Number of alive litters at day 0	Number of litters without alive young at weaning (day 28)	Rate of weaning
1	139	8	0,94
2	122	12	0,90
3	69	10	0,85
4	13	2	0,85
total	343	32	0,91

Influence of the season on mortality

Between May and November there is no marked variation of the temperature (26-28°C during the night and 30-33°C during the day). Nevertheless from May to 15th July it is the "full rainy season" (1) from 15 July to end August the "small dry season" (2) and from September to November the "small rainy season"(3). The large dry season (December to April) was not tested.

There were no significant differences between the seasons for the weaning rate or the mortality rate.

Table 4: Influence of the season on mortality

Season	Initial number of litters	Rate of weaning (%)	Initial number of suckling pups (*)	% of mortality
1	148	0,95	823	13%
2	98	0,91	576	15%
3	98	0,85	597	17%
total	344	0,91	1996	15%

(*) the pups from litter without alive young at weaning were excluded

Mean litters weight at weaning (28 days)

The mean litter weight at 28 days was 2055±656 g and the mean individual weight was 396±133 g. We observed that 12% of the does were able to rear more than 7 young without strong diminution of their individual weight (Table 5).

Table 5: Mean litter weight at weaning according to litter size after equalisation

Initial litter size	Litter size at weaning	Number of weaned litters	Total litter weight	Mean individual weight
2	1,8	4	1129	651
3	2,6	10	1502	592
4	4,0	3	2038	510
5	4,0	9	1647	439
6	5,1	149	1876	376
7	5,9	97	2223	397
8	7,0	30	2624	380
9	7,9	9	2755	354
total	5,5	311	2055	396

DISCUSSION

With a fertility rate of 65% and a mean interval between litters of 62 days, this farm have a quite intensive production taking in account the tropical climate.

The strain used have a prolificacy at birth of 5.7±1.9 alive new born. 59% of the litters have 5 to 7 alive new born but 18% have a higher prolificacy. The mean size of the litters at birth grew of 18% between the first and the second parturition, and a growth of 6% between the second and the third parturitions. These results are in agreement with those registered by Lebas *et al.* (1996) who noted that the size of litter increases from 10 to 20% between the first and the second parturitions and undergoes a growth more or less limited from the second to the third parturitions.

The low rate of stillborn (2.2%) is in agreement with those recorded in CECURI from 1988 to 1991 (Kpodékon and Coudert, 1993). The rate of stillbirth is rather low and have not been influenced by the parity of the litter in the present survey. According to Depres *et al.* (1994), it would be more influenced by the physiological state of the doe at mating. It could also depends on the season, Houenon (2004) observed 3.4±1.4% and 8.1±2.5%, respectively for the big rainy season and the big dry season in South of Benin.

To evaluate the dairy capacity and the influence of different factors on mortality, the litter size was equalized to 6 or 7 pups at birth. The mean size of the litters at weaning was 5.5 young rabbits. These results, as the total born number, are better than that recorded in the CECURI from 1995 to 1998 and in earlier years (Kpodékon and Coudert, 1993). However, this comparison is limited because in previous results there were no adoptions. Nevertheless these results show a satisfying potential of the strain.

The rate of weaning was 91%. Independently of litters with complete mortality of young, the mortality rate was 15%. We suspected that the rather intensive rhythm of reproduction could have an adverse influence but this hypothesis is not confirmed. The does are already able to rear more than 7 young and adoption can be used. The mean litter weight at 28 days (2055 g) and the mean individual weight (396 g) are also important factors to evaluate the potential of the strain but it will be necessary to include analyses of the food in further studies to be able to compare the results of different years. The quality of the food is not constant and is an important limiting factor in sub-tropical countries.

CONCLUSIONS

The main aim of this study was an appreciation of the initial performances of the strain and its potential of progress. It is evident from this survey that the sizes of litters at birth and at weaning could be improved. Nevertheless the comparison of these results with our former observation indicates that the variation of some environmental factors (as quality of the food) will have an important influence.

REFERENCES

Depres E., Theau-Clément M., Lorvelec O. 1994. Productivité des lapines élevées en Guadeloupe: influence du type génétique, de l'allongement de la durée d'éclairement de la saison et du stade physiologique. *In: Proc. 5èmes Journées de la Recherche Cunicole en France, Tome I, Communications N°6 et 7.*

Houenon R. 2004. Effet des saisons de l'année et de l'indice de température humidité relative de l'air sur quelques paramètres zootechniques des lapines au CE.CU.R.I. *Mémoire de fin de formation. EPAC, Abomey-Calavi, 58 p.*

Kpodékon M., Youssao A.K.I., Koutinhouin B., Djago Y., Houézo M., Coudert P. 2006. Influence des facteurs non génétiques sur la mortalité des lapereaux au Sud du Bénin. *Ann. Med. Vet., 150 (2), 197-201.*

Kpodékon M., Coudert P., 1993. Impact d'un centre cunicole et de recherche et d'information sur la recherche et le Développement de la cuniculture au Bénin. *World Rabbit Science, 1 (1), 25-30.*

Lebas F., Coudert P., de Rochambeau H., Thibault R. 1996. Le lapin: élevage et pathologie. *Collection FAO: Production et santé animales, N°19, FAO, Rome, pp 40-120.*

Rashwan A.A., Marai I.F.M. 2000. Mortality in young rabbits: a review. *World Rabbit Sci., 8 (3), 111-124.*