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Factors Influencing the Productive and Reproductive Performance of Local Rabbit Strain in Algerian

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Abstract: The objective of the present work was to study the factors influencing productive and reproductive performances of local rabbit strain in Algeria and to determine the influence of the factors (the mode of reproduction, the age of the mothers and the parity) on the number of total born rabbits, rabbits born alive and the number of weaned rabbits in a hutch of breeding of local rabbit strain. A follow-up of breeding was carried out on a total number of 60 rabbits of which 47 reproductive females inseminated naturally (31) or artificially (16) and 08 males for natural mating and 05 for artificial insemination. The herd is composed of rabbits of variable phenotype but of the same strain (different colors of the coat) of local strain. We found that: The breeding method in rabbits had a non-significant effect ($P > 0,05$) on the reproductive performance as well as the productive performance (slaughter weight) of the rabbits. A slight superiority was observed in the lot conducted under artificial insemination (AI) compared to the one conducted under natural reproduction. On the other hand, the reproduction mode had a significant effect on the number of weaned rabbits ($P < 0.01$) with a remarkable superiority for the lot conducted under artificial insemination compared to the one conducted under natural reproduction (RN). The weights of the rabbits at slaughter resulting from natural or artificial insemination are very close for both reproduction modes.

Keywords: Local rabbit strain, Reproductive performances, Productive performances, Artificial insemination.

Introduction

Rabbit farming developed in Europe from the middle Ages onwards, but has only really taken off worldwide in recent years. Its main purpose is to produce meat, and sometimes hair (Angora rabbits) or fur, or even to supply laboratories with animals for experimentation. Rabbits are considered to be the only animal species that produces the most meat in the shortest time (1.3 kg of carcass in just 4 months) and at the lowest cost, using only the fodder provided and food residues that have no immediate value for humans (Kpodekon et al., 2007).

However, rabbit meat production in Algeria remains modest compared with other countries, with an annual output of 5,000 to 19,000 tonnes (Lebas et al., 1996). A few years after this period, rabbit meat production was estimated at 27,000 tonnes per year, and could be greatly increased by using local populations in breeding (Gacem & Lebas, 2000). When we talk about rabbit farming in Algeria, we immediately imagine the image of traditional, family-run rabbit farms with small numbers of rabbits, compared with those in other sectors. Today, rabbit farming remains timid.

Rabbit farming in Algeria has developed considerably over the last few years in rural areas. Traditional rabbit farming has a long history in our country, whereas rational rabbit farming is a recent development. Our study was carried out in the Setif region, with the aim of determining the effect of various factors (such as the age of the female, parity and breeding method) on the number of total-born rabbits, the number of live-born rabbits, the number of weaned rabbits, and the slaughter weight; with the aim of proposing solutions to improve the production level of rabbit farms in our region.

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Materials and Method

Animal Materials

The experiment was carried out in a hutch belonging to a private breeder in the municipality of Hammam Guergour in the north of the wilaya of Sétif. In total, there are 60 rabbits of which 47 reproductive females (31 females for natural reproduction and 16 females for artificial insemination) and 08 males for natural mating reproduction and 05 for artificial insemination. All the rabbits used in this study were of Algerian local rabbit strain. The breeding rabbits (males and females) are kept in individual cages. They were in good health, weighed between 4 and 5.5 kg for females and between 5.5 and 6.5 kg for males, and were between 12 and 24 months old for males and between 8 and 24 months old for females. The female rabbits are reared in the same building and under the same rearing conditions as the male rabbits used.

Artificial Insemination and Natural Mating Methods

After the sperm collection operation, we visually check the volume of the ejaculate by direct reading using the graduations on the collection tube, as well as the color of the ejaculate (absence of blood and traces of gel). After dilution, the semen is placed in warm water, heated to maintain a temperature of 35°C, just prior to insemination. We suck up 0.5 ml of the diluted semen beforehand and hold the rabbit in an upright position. We lift the posterior part by the tail and then introduce the sheath to the end of the vagina where we reject the semen. After inseminating the rest of the rabbits in the same way, we inject 0.25 ml of GnRH hormone intramuscularly to induce ovulation. As for natural mating, we introduce the female at random into the male's cage, the moment mating ends with ejaculation and the rabbit throws itself back and emits the characteristic cry, we return the female to her cage.

Statistical Processing and Analysis

The variables of reproductive performance (number of total born rabbits, rabbits born alive and number of weaned rabbits) and productive performance (slaughter weight at 77 days of age) were subjected to a least squares analysis of variance using the univariate general linear model. This analysis was performed with SPSS software (version 21). The general linear model was used to test the effects of the factors (mode of reproduction and age of the dams) on the different variables. Significance and homogeneity between the different subsets (comparison test between the different means) were carried out by applying the S.N.K test (Student-Newman-Keules).

Results and Discussion

Effect of Reproduction Mode on the Productive and Reproductive Performance of Rabbits

The results in Table 1 show that the method of reproduction in rabbits had a non-significant effect ($P>0.05$) on reproductive performance (number of total born rabbits, number of rabbits born alive) as well as productive performance of the rabbits (slaughter weight, slaughter weight at 77 days of age).

Table 1. Effect of reproduction mod on the productive and reproductive performance of rabbits

Variables	Naturel reproduction	Artificiel insemination	Mean	Signification
Total born rabbits	8.44	8.50	8.47	0.93 (NS)
Rabbits born alive	6	7.17	6.44	0.19 (NS)
Weaned rabbits	5.74 ^a	7.13 ^b	6.26	0.04 (*)
Weight at slaughter	2035,85	2093,63	2057,35	0.21 (NS)

NS=Not significant, *Significant. The different exponents indicate significant differences ($p<0.05$).

A slight superiority is observed in the batch conducted by artificial insemination (AI) compared to that conducted by natural reproduction (NR) for the variables of total born rabbits (8.44 vs 8.50 in NR and AI respectively) and for the number of rabbits born alive (6 vs 7.17 in NR and AI respectively). Our results are similar to those obtained by Dekkiche et al (2024) who found that the effect of reproduction mode had no impact on the number of total rabbits born, the number of rabbits born alive and weaned rabbits. They found a

number of a total born rabbits of (7.4 vs 6.9 in NR and AI respectively) and a number of born rabbits alive of (4.55 vs 5.75 in NR and AI respectively) and a weaned rabbits of (4.55 vs 5.75 in NR and AI respectively). This difference can be explained by the type of ovulation induction method used during AI, as Boudour et al (2019) indicated that the stillbirth rate was the only parameter affected by the ovulation induction method used during AI, where rabbits treated with GnRH had a lower rate (16.53%) compared with rabbits treated with PMSG (29.4%). Therefore, the protocol and stages of ovulation induction and the practice of artificial insemination, as well as natural control, must be carefully followed to achieve good results.

Concerning the weights of the rabbits at slaughter at 77 days of age from natural reproduction or artificial insemination, the weight values are very similar for the two reproduction modes (2035.85 vs 2093.63 in AI and NR respectively). This weight performance is much better than the results reported by Gacem et al (2020), who reported a weight of 1506 g at 77 days of age in synthetic strain bred in Algeria.

On the other hand, the method of reproduction in rabbits had a significant effect on the number of rabbits weaned ($P < 0.05$), with a remarkable superiority of the artificial insemination (AI) group over the natural reproduction (NR) group for the variable of rabbits weaned (5.74 vs 7.13 in NR and AI respectively). This difference can be explained as the result of mating frequency and its effect on the litter size of the female rabbits (in our study we used two collections in AI and more than two matings per male in natural reproduction).

Effect of Age and Parity of Female Rabbits on Productive and Reproductive Performance

The results given in Table 2 showed that the age of the breeding rabbits had a non-significant effect ($P > 0.05$) on the reproductive performance (number of total born rabbits, number of rabbits born alive and number of weaned rabbits) as well as on the productive performance (slaughter weight at 77 days of age) of the rabbits.

Table 2. Effect of age and parity of female rabbits on the productive and reproductive performance of rabbits

Age	8 Mouths	12 Mouths	18 Mouths	24 Mouths	Mean	signification
Total born rabbits	8.06	8.59	9.25	8.80	8.47	0.72(NS)
Rabbits born alive	5.88	6.94	5	7.80	6.44	0.36(NS)
Weaned rabbits	5.71	6.76	5	7.40	6.26	0.38(NS)
Weight at slaughter	2025,2	2104,7	2005,6	2057,4	2057,3	0.37(NS)

NS=Not significant.

The age of the female rabbits is related to the parity of the female rabbits, so younger female rabbits, whose age is between puberty and 10 months are generally considered as primiparous and those older than 10 months are multiparous. In the present study, the best performances were recorded in multiparous rabbits aged 18 months for the number of total born rabbits, with an average of 9.25, and in multiparous rabbits aged 24 months for the number of rabbits born alive and weaned (7.80 and 7.40 respectively). In terms of the weight of rabbits at the age of slaughter at 77 days, the best performances were rabbits from multiparous rabbits aged 12 months, with an average weight of at slaughter 2104.7 g. Our results presented in table 2, are similar to those published by Dekkiche et al (2024), who found that the female had no effect on the zootechnical parameters. Fertility, number of total born rabbits and rabbits born alive. But our results differ from those reported by Belabbas et al (2023), who found a high rate of dead rabbits, in multiparous females more than nulliparous females and in lactating females more than non-lactating females.

Conclusion

In the light of the results obtained in our study, which was carried out to determine the impact of certain factors (insemination method, age of the female, parity) on the productive and reproductive performances, we can conclude that the reproduction method in rabbits had a non-significant effect on the reproductive performances (number of total born rabbits and number of live born rabbits) as well as the productive performances (weight at slaughter) of the rabbits. On the other hand, the method of reproduction had a significant effect on the number of rabbits weaned ($P < 0.05$), with a remarkable superiority for the lot managed by artificial insemination compared with the lot managed by natural reproduction. In particular, we noted that the best performances were recorded in the 18-month-old multiparous female rabbits in terms of the number of total offspring born and in terms of the weight of the offspring at the age of slaughter at 77 days, while the best performances were recorded in the 12-month-old multiparous female rabbits. As a result, the parity of the mothers is considered to be one of the

most crucial factors in the success of artificial or natural insemination. The results obtained clearly show that the choice of breeding mothers and the reproduction mode used on these farms are the key to the success of breeding local strain rabbits in Algeria.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPHELS journal belongs to the author.

Acknowledgements or Notes

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