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EFFECT OF MATING TIME ON REPRODUCTIVE PARAMETERS OF REX RABBITS

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Abstract

The objective of the present investigation was to determine the effect of mating time of Rex rabbit does on the size of the litter born and reared, and on kit mortality rate. Data on productivity of 244 does were studied. In the first stage of the study, seasonality was found to affect the analysed parameters. The largest litters were born in summer (7.17±0.18) and autumn (6.86±0.45), and the smallest in winter (6.19±0.27) and spring (6.11±0.14). The average number of kits weaned was also the highest in summer. The highest mortality percentage among the analysed litters was observed in winter (22.59%). Rabbit does had a good rearing success in autumn, when kit mortality was the lowest (8.53%). In the second stage of the study, the influence of individual months on reproductive parameters was established. The most favourable time for the number of kits were the months from June to December, whereas the smallest litters were observed from February to May. The lowest mortality was found in October (3.63%) and the highest mortality rate was observed in December (26.61%). The third stage of the study determined whether the period between pregnancies influenced litter structure. The study revealed that the largest litters, both born and weaned, were observed for intervals of 31–60 days.

Key words: Rex rabbit, reproductive parameters, seasonality of reproduction

Rex rabbits are currently the most popular rabbit breed which provides skins for fur production. Their hair coat is characterized by shorter hair and better structure and density when compared to breeds with normal hair (Tao, 1994). The rabbits of this breed can also provide meat which is suitable for human consumption. Unfortunately, the quality of this meat is not as high as that of broiler rabbits slaughtered at 3–4 months of age. This is because Rex rabbits are raised far longer until 7–8 months when their fur reaches full maturity. The best skin is obtained from those animals which reach that age in winter (Barabasz and Bieniek, 2008).

Rabbits are polyoestrous animals, which enables them to breed all year long under optimal environmental conditions. In contrast to many other breeds of mammals, the onset of oestrus does not have to be preceded by ovulation. This is connected

with the onset of provoked ovulation, in which follicles are released as a result of hormonal processes elicited by the mating act; neuroendocrine reaction leads to a release of the luteinizing hormone (LH), which initiates the ovulation process (Lebas et al., 1997).

Because of irregular sexual cycle, the hormonal control of ovulation and insemination is used to preserve the continuity of production in meat rabbit farms. On the other hand, it is generally known that in both wild and domestic rabbits increasing photoperiod length in spring has a favourable effect on the reproductive process. Therefore, a proper lighting programme could be an alternative to using hormonal stimulation in rabbit breeding (Gerencsér et al., 2008), and the use of optimal mating date would help improve breeding parameters.

The fact that subsequent oestrus in females occurs the next day after kindling and pregnancy can possibly be overlapped by lactation allows obtaining even 7–8 litters during a year.

However, Rex rabbits are a sensitive breed and such intensive reproduction is not recommended. They should not breed more often than 4 times a year and the period between pregnancies should depend on litter rate (Barabasz and Bieniek, 2008).

The aims of the study were as follows: (1) to determine seasonal changes in reproductive parameters of Rex rabbits; (2) to establish influence of mating time (seasons of the year, months) on the size and survival rate of litters; and (3) to evaluate the effect of interpregnancy interval on reproductive parameters of these females.

Material and methods

The experiment was carried out in two commercial Rex rabbit farms using 244 does. A total of 570 litters were obtained and analysed. The living conditions in both farms were similar and uniform. The cages for females from the base herd were equipped with a run area and wooden nest boxes. They were situated in a confined space with stable temperature and light regime. The animals were fed complete pelleted diets with nutritive value suitable for breeding females. They also had free access to drinking water. Natural mating was used on the farms. Ovulation was stimulated by contact with a male rabbit.

The second mating was conducted 10–12 hours after the first. The experimental data obtained for date of parturition, number of litters born and weaned and kit survival rate were used to calculate the following parameters:

– The significance of the effect of seasons of the year and respective months in which females were mated on the number of kits born and weaned.

– The interpregnancy interval (IPI) – the period between birth and the next successful mating of a female. The results were divided into the following ranges: 1–30 days; 31–60 days; 61–90 days; over 90 days.

– The significance of the effect of interpregnancy interval on the number of kits born and weaned.

For statistical evaluation of the results, Statistica 8.0 (StatSoft Inc., 2007) and two-way analysis of variance (ANOVA) followed by Duncan's multiple range test were applied. The parameters evaluated were season of the year, month, and the interpregnancy interval.

Results

The preliminary results confirm the prevalence of seasonality in rabbit reproduction. Most litters came from the spring and summer seasons (45 and 34%, respectively) and a significant decline in reproductive activity was recorded in autumn and winter (10 and 11%, respectively).

The analysis of variance showed a significant influence of the season of the year on reproductive parameters of Rex rabbit does.

Statistically significant differences were established between the number of kits born in spring and those born in summer. The greatest number of weaned kits was observed in summer and autumn, and the lowest in winter. Highly significant differences were found between the number of kits weaned in summer and spring as well as between summer and winter.

Kit mortality rate varied widely according to season of the year. The highest mortality was recorded in winter and in the following seasons mortality percentage was low (Table 1).

Table 1. Mean number of kits born and weaned in individual seasons of the year (±SE) and mortality of kits (%)

Season of the year	Mean number of kits born ± SE	Mean number of weaned kits ± SE	Mortality of kits (%) ± SE
Winter	6.19±0.27	4.88 A±0.30	22.59 a±2.97
Spring	6.11 A±0.14	5.43 B±0.16	12.24±1.57
Summer	7.17 A±0.18	6.51 AB±0.20	10.77 a±1.94
Autumn	6.86±0.45	6.26±0.49	8.53±4.79

Means marked with the same small letter differ significantly ($P<0.05$).
Means marked with capital letter differ highly significantly ($P<0.01$).

The date of parturition (month) had a significant effect on litter size (Table 2). The largest litters were obtained from June to December and the smallest from May to October. There were no parturitions in January.

The analysis of variance proves that the mating time of females and the month of parturition had a significant effect on the number of kits born and weaned. Highly significant differences were found between the number of kits born in May and July, and significant differences were observed between March and July as well as between March and August. The greatest number of weaned kits was observed in August, July and November, and the lowest in December, February and March.

The highest kit mortality was noted in December and February (26.6 and 22.7%, respectively) and the lowest in October and September (3.6 and 5.7%, respectively).

Table 2. Mean number of kits born and weaned in individual months (±SE) and mortality of kits (%)

Month	Mean number of kits born ± SE	Mean number of weaned kits ± SE	Mortality of kits (%) ± SE
I	no parturitions	no parturitions	no parturitions
II	6.09±0.36	4.88 a±0.40	22.72±3.94
III	5.41 ab±0.42	4.35 bA±0.46	19.59±4.48
IV	6.23±0.24	5.48±0.27	14.82±2.65
V	5.92 A±0.21	5.36±0.24	9.06±2.34
VI	6.86±0.28	5.95±0.31	14.02±3.08
VII	7.37 aA±0.27	6.71 b±0.29	10.48±2.89
VIII	7.34 b±0.39	6.91 aA±0.44	8.01±4.24
IX	6.75±0.45	6.44±0.50	5.76±4.86
X	5.72±0.73	5.54±0.81	3.63±7.89
XI	7.68±0.61	6.68±0.67	13.49±6.54
XII	6.85±0.53	5.14±0.59	26.61±5.71

Means marked with the same small letter differ significantly ($P<0.05$).
Means marked with capital letter differ highly significantly ($P<0.01$).

In this study, the effect of the length of interpregnancy interval (IPI) on the number of litters born and weaned was also assessed. The most frequent interpregnancy interval lasted between 1 and 30 days (55.25%). The intervals of 31–60 and 61–90 days accounted for 14.92% and only 5.52%, respectively. The intervals exceeding 90 days were relatively frequent (24.31%). Such long intervals usually occurred in the autumn and winter months. The present study showed that the largest litters were born by the does which had an interval of 31–60 days between parturitions. There was a negative correlation between IPI length and the number of litters born and weaned. The longer the rest period, the lower were the numbers of litters born and weaned. The poorest results were obtained when the females were mated over 90 days after kindling.

Discussion

The results obtained in this study confirm the presence of seasonality in reproduction of Rex rabbits. Most litters were born in spring and summer like in wild populations. It is acknowledged that the main factor behind this is the change of photoperiod length, whereas under farm conditions the following factors play a similar role: (1) the temperature inside the farm, (2) the type of artificial light, or (3) the length of its use (Barabasz and Bieniek, 2008; Schlolaut, 2003).

Our study showed that the size of litters born varied according to month of the year. The most numerous were summer litters. In a similar study, Bieniek et al. (2005) obtained the largest litter size in the period between April and October (7.1–8.0 animals), followed by 6.33, 6.95 and 6.75 in December, February and March, respectively. No parturitions took place in the investigated farms in November.

In the present study, the highest kit mortality occurred in the winter months (December, February, March). However, Bieniek et al. (2005) reported kit mortality to range from 7.3% in the group of kits born in May to 18.6% in those born in October. Perinatal mortality of kits is unavoidable but should not exceed 10–15% (Barabasz and Bieniek, 2008; Tao, 1992).

From the viewpoint of breeding, a shorter interpregnancy interval appears to be more advantageous. This principle is adopted in farm practice, as confirmed by the fact that more than 50% of the intervals were shorter than 30 days. However, an interval of 31–60 days seems to be better for the body of the animal, which may give birth to large litters. An interpregnancy interval longer than 90 days reduces the reproductive capacity of the rabbits.

In conclusion, the Rex rabbits show clear seasonality of reproduction. It is manifested by diminished sexual drive of the does in the autumn and winter months. The present study also revealed that the dates of mating and parturition have a considerable effect on litter size. The length of the interpregnancy interval used in the farms significantly influenced the number of litters born and weaned; the most advantageous were the intervals between 31 and 60 days, whereas the smallest litters were born when the interval exceeded 90 days. Considering the results of the study and the time of hair cover maturation that falls in the winter months, it is assumed that the optimal time for the mating of Rex rabbit does is from April to July. Good knowledge of seasonal changes in the reproduction of Rex rabbits is essential for proper production control which complies with the processes of moulting and hair cover maturation.

References

Bieniek J., Maj D., Barabasz B. (2005). Characteristics of reproductive traits of castorex and chinchilla rex rabbit does. Rocz. Nauk. Zoot., Supl., 22: 43–46 (In Polish).

Gerencsér Z., Matics Z., Nagy I., Princz Z., Orova Z., Biró-Németh E., Radnai I., Szendrı Zs. (2008). Effect of a light stimulation on the reproductive performance of rabbit does. 9th World Rabbit Congress – 10–13.06.2008, Verona – Italy, pp. 371–374.

Lebas F., Coudert P., de Rochambeau H., Thibault R.G. (1997). The rabbit – husbandry, health and production. FAO Animal Production and Health Series, 21.

Schlolaut W. (2003). Das große Buch vom Kaninchen. DGL Verlag, 3. erweiterte Auflage, Frankfurt am Main.

Tao Y.R. (1992). A survey of Rex breeding in China. J. Applied Rabbit Res., 15: 1651–1657.

Tao Y.R. (1994). Studies on the quality of rex rabbit fur. World Rabbit Sci., 2 (1): 21–24.

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Wpływ terminu krycia na parametry reprodukcyjne królików reks

STRESZCZENIE

Celem pracy była ocena wpływu terminów krycia samic królików reksów na liczebność miotu urodzonego i odchowanego oraz na wskaźnik śmiertelności młodych. Do badań wykorzystano wyniki produkcyjności 244 samic. W pierwszym etapie wykazano wpływ sezonowości na badane parametry. Najliczniejsze mioty rodziły się w lecie (7,17±0,18) i jesienią (6,86±0,45), natomiast najmniej liczne zimą (6,19±0,27) i wiosną (6,11±0,14). Średnia liczebność młodych odchowanych była również najwyższa latem. Wśród badanych miotów najwyższy procent upadków występował zimą (22,59%). Z odchowem samice dobrze radziły sobie jesienią, notowano wtedy najmniej upadków młodych (8,53%). W drugim etapie badań wykazano wpływ poszczególnych miesięcy na parametry rozrodu. Najkorzystniejszym okresem dla liczby młodych były miesiące od czerwca do grudnia, natomiast najmniej liczne mioty obserwowano w okresie od lutego do maja. Najmniej upadków obserwowano w październiku (3,63%), natomiast najwyższy wskaźnik śmiertelności wystąpił w grudniu (26,61%). Trzecim etapem przeprowadzonych badań było sprawdzenie, czy długość odstępu międzyciążowego wpłynęła na strukturę miotów. Z badań wynika, że najliczniejsze mioty, zarówno urodzone, jak i odsadzone, wystąpiły przy stosowaniu przerw w granicach 31–60 dni.