

COMPARISON OF TWO REPRODUCTIVE RHYTHMS OF RABBIT DOES

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ABSTRACT

The objective of the experiment was to compare the reproductive rhythm of 42 with that of 56 days. One hundred twenty two does were randomly halved and the two groups (42D and 56D) were inseminated 11 and 25 days after parturition, respectively. During the last 3 days prior to the insemination controlled nursing was applied (instead of free nursing) in group 42D and kits were weaned at the age of 35 days. In group 56D rabbits were weaned at the age of 23 days, two days prior to the dams' insemination. Does' production was monitored for 336 days. During this period the maximum parity was 8 and 6 in 42D and 56D groups, respectively. Nearly significant differences were found between groups 42D and 56D for the number of inseminations per kindling (1.22 vs. 1.12), does' body weight at parturition (4188 vs. 4474 g), kindling interval (46.6 vs. 59.5 days), E-value of TOBEC measurements at 4th and 5th parturitions (2770 vs. 2434) and survival rate at 336 days (13 vs. 26%; P=0.07). No significant differences were found in litter size (total and alive) and in individual and litter weight at day 23. From the viewpoint of animal welfare inseminating does 25 days after parturition is favourable because their survival and condition was superior although the performance of group 56D was poorer compared to the 42D group for number of annual parturitions (7.8 vs. 6.1) and for the number of kits born alive (69.2 vs. 51.9) which makes efficient production impossible.

Key words: Rabbit does, Reproductive rhythm, Reproductive performance.

INTRODUCTION

With the general use of artificial insemination (AI) and of cycled production, insemination of does occurs 11 days post partum (Theau-Clement, 2007). The European Wild rabbits mate immediately after kindling but because of the relatively small litter size and the several months long resting period during winter this practice has no any negative influence on their production. On the other hand less intensive reproductive rhythms are suggested for domesticated rabbits from the viewpoint of animal welfare (Castellini, 2007). Less intensive reproductive rhythm results better condition of rabbit does with more pronounced oestrus, higher pregnancy rate and lower mortality.

The objective of the experiment was to evaluate the rabbit does' production, condition and survival rate inseminating them 25 days after kindling instead of the conventional 11 days. Thus, the characteristics of extensive reproductive rhythm can be evaluated.

MATERIALS AND METHODS

The experiment was carried out at the Kaposvár University using Pannon White rabbit does. Rabbits were housed in two rooms. Daily lighting was 16 hours with the intensity of 30-70 Lux (measured in the middle of the rooms) regardless of the light colour. Does were fed a commercial pellet (11 MJ DE/kg, 17.0% crude protein, 15.5% crude fibre), water was available *ad libitum* from nipple drinkers. Does were first mated at the age of 16.5 weeks. Only those rabbit does were used in the experiment that became pregnant after the first insemination.

Does were randomly halved in both rooms. One half of them were inseminated 11 days after kindling (using a reproductive rhythm of 42 days: 42D group, n = 61). In this group does could nurse their kits freely but 3 days prior to insemination controlled nursing was applied as a biostimulation method. Kits were weaned at the age of 35 days. In the other group does were inseminated 25 days post partum (using a reproductive rhythm of 56 days: 56D group, n = 61) weaning the kits 2 days before (at the age of 23 days: biostimulation). After the first kindling every doe nursed 8 kits. Cross fostering was applied in each kindling according to the average number of kits born alive. TOBEC measurements were made at the first insemination (at the age of 16.5 weeks, n = 26 and 27) then at the age of 44-45 weeks (n = 22 and 17).

Production data (fix effect of reproductive rhythm and room, and random effect of age of does) were evaluated by means of multi-factor analysis of variance using SPSS 10.0 software package (SPSS for Windows, 1999). The body weight of does was involved into the model as covariant. Three groups were formed based on the age of does: first parturition and two successive 168-day long periods. Simultaneous kindling of 42D and 56D does was performed at days 168 and 336 (Figure 1). During 336 days the highest parity number was 8 and 6 in groups 42D and 56D, respectively.

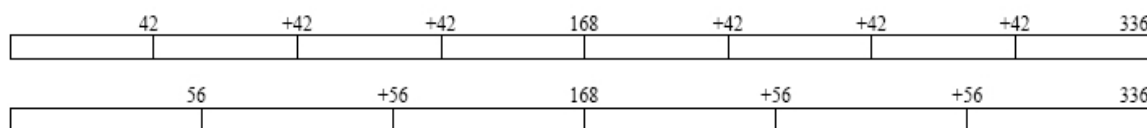


Figure 1: Kindling intervals of does inseminated 11 (upper line) or 25 (lower line) days post partum.

RESULTS AND DISCUSSION

Experimental results are summarized in Table 1.

Significant differences were found in the number of inseminations needed for a successful kindling to the favour of 56D group. These values correspond to pregnancy rates of 89.3 and 82.0%. Differences between groups was much smaller than reported in the literature (Feugier and Fortun-Lamothe, 2006; Xiccato *et al.*, 2005; Castellini *et al.*, 2006) because does in that experiments were not synchronized by hormonal treatment or biostimulation before the 11-day AI. Inseminating does two days after weaning (at the age of 23 days) in 56D group had a positive effect on receptivity. This is why to improve receptivity in 42D group nursing method was modified prior to insemination as to be a biostimulation method. Based on our previous findings this method was efficient in improving conception rate (Matics *et al.*, 2004; Szendrő *et al.*, 2005); pregnancy rates of 80.3 and 80.6% were achieved in these experiments. Good conception rate could also be the result of calculation method. When calculating the number of insemination per kindling the final performance of does is the parturition, on the other hand in case of conception does that are not pregnant could be dead or culled. The reason of culling of the does however was not necessarily the treatment (in our case the reproductive rhythm). As the way of calculation was similar in both groups the difference between groups could not change.

At parturition the does' body weight was higher in 56D than in 42D group, but at the 23rd day of lactation body weight of groups did not differ. Similarly to our results Feugier and Fortun-Lamothe (2006) reported differences between the R11W35 and R25W23 groups. Castellini *et al.* (2006) recorded larger body weight in groups inseminated at the 27th day. Authors considered this result as the consequence of the better condition (larger fat depots) of does inseminated later. The E-value measured with TOBEC method was in accordance with the difference found in body weight. Smaller E-value is connected with higher body fat content (Lévai and Milisits, 2002)

Table 1: Production of the rabbit doe in the reproductive rhythm of 42 and 56 days

Traits	Reproductive rhythm		MSE	Prob.
	42 days	56 days		
Number of inseminations per kindling	1.22	1.12	0.017	0.005
Rabbit does' body weight (g):				
at parturition	4188	4474	18	<0.001
23 days after parturition	4747	4715	16	0.319
Litter size:				
total	9.11	8.75	0.11	0.138
alive	8.87	8.51	0.11	0.283
reared/nursed	8.45	8.46	0.03	0.646
at day 23 of lactation	8.09	8.04	0.05	0.815
Litter weight (g):				
at parturition (alive)	564	528	6.4	0.006
at day 23 of lactation	3598	3513	25	0.055
Individual weight (g):				
at parturition (alive)	65.6	64.2	0.46	0.117
at day 23 of lactation	447	439	2.5	0.057
Kindling interval (days)	46.6	59.5	0.5	<0.001
TOBEC (E-value):				
at first insemination	1646	1712	21	0.489
at 4-5th parturition	2770	2434	39	<0.001
Survival (%):				
at day 168	57	72		0.089
at day 336	13	26		0.070

In the litter size total ($P=0.138$), litter size alive ($P=0.283$), individual ($P=0.006$ and 0.055 , respectively) and litter weight ($P=0.117$ and 0.057 , respectively) at parturition and day 23 of lactation significant difference was found only in one case while in other cases the differences were justified at the level of $P<0.10$. In similar trials of other authors (Xiccato *et al.*, 2005; Feugier *et al.*, 2006; Castellini *et al.*, 2006) no similar tendencies were found and the differences were not significant.

Kindling interval was 13 days shorter in 42D group than in 56D group. Castellini *et al.* (2006) also found significant differences but because of the poor pregnancy rate of inseminating 11 days post partum the difference between the two groups was only 8 days.

Higher survival (%) was observed at day 168 and 336 in 56D group ($P=0.089$ and 0.07). Castellini *et al.* (2006) found similar results: inseminating at day 27 the proportion of does' replacement was more advantageous (80 and 60%). Higher survival (longevity) was caused by the higher amount of fat depots resulted in better condition (Castellini, 2007). Inseminating does 11 days post partum and weaning kits at day 35 pregnancy and lactation often take place simultaneously which could result severe energy deficit (Xiccato, 1996). In 56D group pregnancy and lactation did not take place simultaneously. The longer dry period is also favourable from the viewpoint of animal welfare (Castellini, 2007).

Based on the results it can be calculated that in 42D and 56D groups the annual number of parturition was 7.8 vs. 6.1, respectively, the number of kits born total and alive was 71.1 vs. 53.4.; and 69.2 vs. 51.9, respectively. The found differences were higher than in the experiment of Castellini *et al.* (2006). Since in our study small differences were found in pregnancy rate, reinseminating 14 days later substantially influences the traits indicating the annual production.

Early weaning did not affect the kits' growth (data not shown). Although daily weight gain in 56D group was lower between 3-5 weeks of age (38.6 and 41.1 g/d, $P<0.001$), opposite tendency was found between 5-7 weeks (46.1 and 42.9 g/d, $P<0.001$). At 11 weeks of age kits of 56D group had higher body weight compared to 42D group (2.69 vs. 2.63 kg, $P<0.01$)

CONCLUSIONS

The 56- day long reproductive rhythm was favourable from the viewpoint of animal welfare as does had better condition (larger fat depots) and showed higher survival rate. In the meanwhile it does not require any specific treatment for oestrus synchronization and thus save manpower. On the contrary, the differences in production (number of parturitions per year, number of kits born per year) were too high (22 and 25%, respectively) to make breeders apply the method of insemination 25 days post partum.

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