

INFLUENCE OF FERTILIZATION IN CALIFORNIAN RABBIT DOES UNTIL 48-TH HOUR POST WEANING ON SOME PRODUCTIVE PARAMETERS

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Abstract

The aim of present research is the investigation on the fertilization until 48th hour post litter weaning in Californian rabbit does over litter size, litter weight and average individual weight in young rabbit in birth, on the 8th, 16th, 21st 35th day post partum, as well as the absolute gain and the average daily gain from birth until 8th day, from 8th until 16th day, from 16th until 21st day and from 21st day until 35th day. Californian rabbit does, fertilized until 48th hour post weaning, show higher values of litter size on the 8th and 16th day post partum in comparison with control group with 19.5% and 18.7%, respectively. This method decreases average individual weight of young rabbit on the 16th day with 18.6%. The absolute and average daily gain of a young rabbit in experimental group in the period from 8th until 16th day are 32.6% lower, and in the period from 16th until 21st day – 34% are higher than the control animals.

Key words: Californian rabbit, fertilization, weaning, productive parameters, biostimulation, reproduction

1. INTRODUCTION

As a multifetal animal, the reproductive parameters are essential for the effectiveness of rabbit breeding, so they have to be permanently controlled. By increasing those parameters, we could raise the rabbit productivity.

Most commonly, the intensive and the semi-intensive reproductive rhythm are used in professional rabbit farms all over the world. In Bulgaria, the majority of rabbits are bred in small rabbit farms (Dimitrova et al. 2008). Generally, the breeders use an extensive reproductive cycle and the does are mated few days post weaning of litter.

The specialists, who work in professional rabbit farms, use a hormonal synchronization of estrus in order to realize on the market large batches of rabbits. The benefits and disadvantages of using are well – known. The hormonal treatments with Pregnant mare serum gonadotropin (PMSG) increase sexual receptivity, fertility, prolificacy (+5-10%), but PMSG treatment does not improve reproductive performance in non-lactating and receptive does and decrease fertility after several usage, because of antigenic properties and increase mortality rate of newborn rabbits (Maertens et al. 1995). According to Rommers et al. (2001), there also seems to be evidence that females born in smaller litters showed better reproductive performance than those from larger litters.

The European member prefers to use an environmental meat for consumption. To meet these requirements, many scientists have been working on the problem of improving reproductive parameters of does without usage of any exogenous substances. They have examined many environmental methods (light stimulation, dam-litter separation, flushing, change of cages etc). Those methods were named biostimulations. Usually, they are applied in White New Zealand and Californian rabbit does (Theau-Clement et al. 2006), which breeds are used in Bulgaria (Grigorov 2005).

In our previous study, it was established, that the mating of White New Zealand rabbit does until 48th hour post weaning increased total born, number and weight of born alive rabbits (Velikov 2013). The fertilization of White New Zealand rabbit does until 48th hour post weaning increased only the values of litter size (Velikov & Dimitrova 2013).

The aim of present paper was to examine the influence of early fertilization (until 48th hour post weaning of litter) on some productive and reproductive parameters in the next reproductive cycle in does of Californian rabbit breed.

2. MATERIAL AND METHODS

The experiment was carried out between March 2012 and August 2012. It was conducted with 24 multiparous Californian rabbit does (7 does in a control group and 17 does in an experimental group) from Experimental Rabbit Farm in the Institute of Animal Science - Kostinbrod. Two does of the experimental group left experiments immediately after birth.

The does, their litters and bucks were bred in individual cages. The cage size was 800/600/350 mm. The rabbits had ad libitum access to water through nipple drinkers. The does were fed restrictively with commercial pellets for does. From mating to birth, the does were fed with 200 g, from birth to the day 16 post partum – 300 g, and from the day 17 post partum to the weaning of litters – 400 g pellets. The bucks were fed with 200 g commercial pellets for fattening. The litters were weaned between day 35 and day 40 post partum in forming of batches.

The does in the experimental group were placed in the buck's cage between the 4th and 6th, the 22nd and 24th and between the 46th and 48th hour post litter weaning until they were mated. The does, which were not mated until 48th hour, left the experiment. The does in the control group were placed in the buck's cage for mating at least 72 hours after litter weaning.

The following parameters were monitored: litter size, litter weight and individual weight of young rabbit on the 8th, on the 16th, on the 21st and on the 35th day post partum, as well as the absolute gain and daily gain for a period from birth to 8th day, from 8th to 16th day, from 16th to 21st day and from 21st to 35th day post partum.

Statistical evaluation of the results was done using MS Excel 2003 statistical package. The data was present as mean $\pm$ Standard Deviation ($\bar{x} \pm SD$).

3. RESULTS AND DISCUSSION

We undertook this study because, according to some authors, it is more appropriate that the fertilization takes place until 48 hours after weaning (Nicodemus et al. 2002; Boiti et al. 2006; Castellini 2007).

3.1. Litter parameters at birth. The data was collected by 7 litters as a control group and 17 litters as an experimental group. As litter parameters at birth we used these of born alive rabbits. The mean value of litter size at birth in the control group was 10.84% lower than experimental one. The difference between mean values of litter size at birth was not statistically significant.

As might be expected, the mean value of litter weight at birth of the experimental group was 28.84 g higher than those in the control one. The variance of litter weight in both groups did not discern at all. The difference between mean values of this parameter in control and experimental groups was not proved statistically, too. Mefti Korteby et al. (2013) received alive litter weight 335.31 ± 134.01 g, which is significant lower in comparison with our data.

The mean values of individual weight of newborn rabbit were similar. The difference was not statistically significant (Table 1, Fig 1-5). In a study of pure Californian rabbits other authors found individual weight of one born 56.36 ± 7.70 g (Mefti Korteby et al. 2013), that result is lower than obtained by us in the both groups.

Table 1. Litter parameters at birth ($\bar{x} \pm SD$).

Parameters	Groups		Sign.
	Control group n=7	Experimental group n=17	
Litter size at birth, number	8.86 $\pm$ 0.90	9.82 $\pm$ 2.35	NS
Litter weight at birth, g	520.57 $\pm$ 105.22	549.41 $\pm$ 128.56	NS

Individual rabbit weight at birth, g	58.48±8.18	56.58±8.86	NS
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NS-non significant ($P>0.05$)

3.2. Litter parameters on the 8th day post partum. As a control group were used 7 litters, and as an experimental one – 15 rabbit litters. The litters of two does were died between day 1 and day 8 post partum. The mean value of litter size in experimental group on the day 8 post partum were 19.5% higher than this of control group. The difference between mean values of this parameter was statistically significant ($P<0.01$) (Table 2, Fig 1-5). We observed similar values in White New Zealand rabbit does (Velikov & Dimitrova 2013).

Table 2: Litter parameters on the day 8 post partum ($\bar{x}\pm SD$)

Parameters	Groups		Sigh.
	Control group n=7	Experimental group n=17	
Litter size on the day 8 post partum, number	8.00±0.58	9.53±1.46	**
Litter weight on the day 8 post partum, g	1013.71±168.47	1110.24±244.40	NS
Individual rabbit weight on the day 8 post partum, g	126.31±15.64	116.60±21.00	NS
Absolute gain from birth to day 8 post partum, g	67.83±16.57	59.13±16.25	NS
Mean daily gain of young rabbit from birth to day 8 post partum.	8.48±2.07	7.39±2.03	NS

** - $P<0.01$; NS-non significant ($P>0.05$)

As regard litter weight, value of this parameter in experimental group was 96.53 g higher than control group. The mean value of individual weight of young rabbit in control group was 9.71 g higher than experimental group. The differences between mean values of litter weight and individual rabbit weight were not statistically significant, wherefore the earlier fertilization does not influence on this parameters. As seen, the litter size in the control group had lower value than the experimental group. Probably, this is the reason why the experimental group had lower value of individual rabbit weight. Such a decreasing of individual rabbit weight on the 8th day post partum we found in White New Zealand kittens (Velikov & Dimitrova 2013).

In terms of absolute and daily gains, higher mean values were observed in the control group than the experimental one (with 12.83%). The similar results we discovered in White New Zealand rabbit kittens (Velikov & Dimitrova 2013). The earlier fertilization (until 48th hour post weaning) increased statistically significant only the litter size on the day 8 post partum ($P<0.01$). It was observed a better surviving of young rabbits in experimental group compared control one. It is necessary to be done additional investigations in order to determine the reason of this.

3.3. Litter parameters on the 16 day post partum. The control group contained 7 litters, and the experimental group – 15 litters. The mean value of litter size on the day 16 post partum in the experimental group was 18.7% higher than the control group. The difference between values of this parameter was statistically significant, so

the examined method influenced on these parameter ($p < 0.05$). It was observed the similar tendency of better surviving of young rabbits as previous period (day 0–8 post partum)

The litter weight in the control group was 86.33 g lower, comparison in the experimental one. The difference between those values was not statistically significant.

As regard the individual weight, in the experimental group this parameter was 18.6% lower than control one. The difference between means was statistical significant ($P < 0.05$). Such reduction of individual weight we observed in White New Zealand rabbit kittens (Velikov & Dimitrova 2013).

The mean values of gain parameters (absolute gain and mean daily gain) in the control group were 32.6% higher than experimental group. The earlier fertilization decreased absolute gain and mean daily gain statistically significant ($P < 0.01$) (Table 3, Fig 1-5). In our previous study, the gain parameters of period from 8th to 16th day post partum in White New Zealand rabbit kittens were decreased, too (Velikov & Dimitrova 2013).

Table 3. Litter parameters on the 16th day post partum ($\bar{x} \pm SD$)

Parameters	Groups		Sign.
	Control group n=7	Experimental group n=15	
Litter size on the day 16 post partum, number	7,86 $\pm$ 0,90	9.33 $\pm$ 1,50	*
Litter weight on the day 16 post partum, g	1780,00 $\pm$ 434,16	1693.67 $\pm$ 332.48	NS
Individual rabbit weight on the day 16 post partum, g	223.96 $\pm$ 37.26	182.39 $\pm$ 30.04	*
Absolute gain from day 8 to day 16 post partum, g	97.62 $\pm$ 24.52	65.80 $\pm$ 22.01	**
Mean daily gain of young rabbit from day 8 to day 16 post partum.	12.21 $\pm$ 3.07	8.22 $\pm$ 2,75	**

** - $P < 0.01$; * - $P < 0.05$; NS-non significant ($P > 0.05$)

3.4. Litter parameters on the 21st day post partum. The control group contained 7 litters, and the experimental group – 15 rabbit litters.

The mean value of litter size on the day 21 post partum were 0.74 rabbits less in the control group than experimental one. The difference was not statistically significant ($P > 0.05$). In a study of Velikov & Dimitrova (2013) was found a statistical significance of this parameter in White New Zealand rabbit kittens.

The mean litter weight in the experimental group was 415.40 g higher than control group. The difference between means was not statistically significant ($p > 0.05$).

The difference in individual weight of rabbits was not statistically significant, too ($P > 0.05$). The value of this parameter in the control group was 11.69 g higher than experimental group. Velikov & Dimitrova (2013) reported a statistical significant difference between means as kittens of control group has had a higher mean value of individual weight than the experimental animals.

The values of gain parameters in the control group were lower than these in the experimental group and the differences between means were significant ($p < 0.05$). In the experimental group, the gain parameters are 34% higher than control group (Table 4, Fig 1-5).

Table 4. Litter parameters on the 21st day post partum ($\bar{x} \pm SD$)

Parameters	Groups		Sign.
	Control group n=7	Experimental group n=15	
Litter size on the day 21 post partum, number	7,86 $\pm$ 0,90	8.60 $\pm$ 1,55	NS
Litter weight on the day 21 post partum, g	2245.43 $\pm$ 554.78	2660.73 $\pm$ 673.58	NS
Individual rabbit weight on the day 21 post partum, g	282.40 $\pm$ 47.86	260.71 $\pm$ 56.32	NS
Absolute gain from day 16 to day 21 post partum, g	58.44 $\pm$ 12.17	78.32 $\pm$ 31.50	*
Mean daily gain of young rabbit from day 16 to day 21 post partum.	11.69 $\pm$ 2.43	15.66 $\pm$ 6.80	*

* - $P < 0.05$; NS-non significant ($P > 0.05$)

3.5. Litter parameters on the 35th day post partum. The date of the control group was collected by 7 rabbit litters, and of the experimental one – by 15 rabbit litters. The mean value of litter size in the experimental group was 10.63% higher than the control group. Our result in experimental group is higher than observed by Nicodemus et al. (2002) – 8.11 in White New Zealand x Californian does.

As regards litter weight on the day 35 post partum, the mean value in experimental group was 4.06% higher in the control one. The investigated method did not influence on these parameters, because the differences were not statistically significant. The weaning litter weight of the other investigation was 2.279.17 $\pm$ 1113.00 g (Mefti Korteby et al. 2013).

The individual weight of rabbits on the day 35 post partum in the experimental group was 641.42 $\pm$ 119.29 g, and in the control group - 674.57 $\pm$ 67.55 g. The difference between means was not statistically significant. Mefti Korteby et al. (2013) exploring the productive traits of pure breed Californian rabbits establish 502.94 $\pm$ 109.09 g individual weight of the rabbits at 35 days of age. While in semi intensive rearing system Ouyed, Rivest & Brun (2011) receive individual weight of 35 days old rabbit - 930 $\pm$ 24 g. Velikov & Dimitrova (2013) reported a statistical significant reduce of this parameter in usage of the fertilization until 48th hour post weaning in White New Zealand rabbit does.

The gain parameters in experimental group were lower than the control one. The absolute gain in the period between day 21 and day 35 post partum was similar in both groups. The differences between mean values of gain parameters were not statistically significant, so the fertilization of Californian rabbit does until 48th hour post weaning does not influence these parameters (Table 5, Fig 1-5). In White New Zealand rabbit kittens, Velikov & Dimitrova (2013) reported a statistical significant decreasing of gain parameters in usage of this method.

Table 5. Litter parameters on the 35th day post partum

Parameters	Groups		Sign.
	Control group n=7	Experimental group n=15	
Litter size on the day 35 post partum, number	7.71±0.95	8.53±1.51	NS
Litter weight on the day 35 post partum, g	5245.57±1078.93	5458.67±1343.86	NS
Individual rabbit weight on the day 35 post partum, g	674.57±67.55	641.42±119.29	NS
Absolute gain from day 21 to day 35 post partum, g	392.17±37.84	380.71±79.29	NS
Mean daily gain of young rabbit from day 21 to day 35 post partum.	28.01±2.70	27.19±5.66	NS

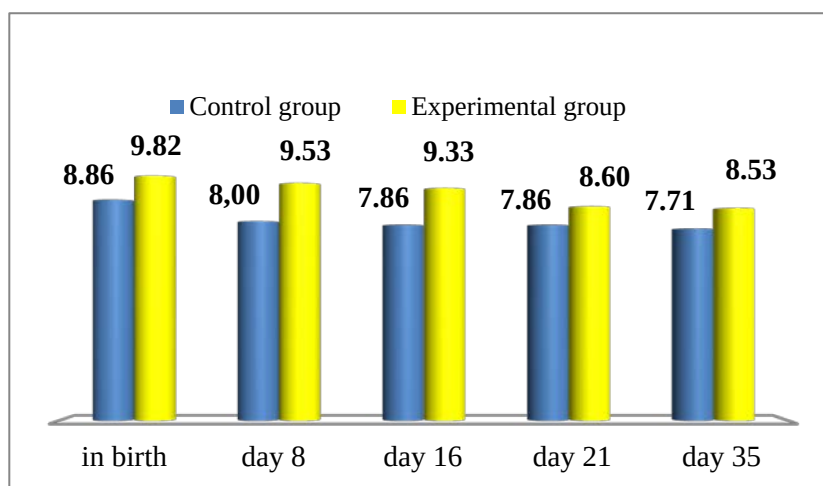
NS-non significant ($P>0.05$)

Fig. 1 Dynamic of litter size from birth to day 35 post partum

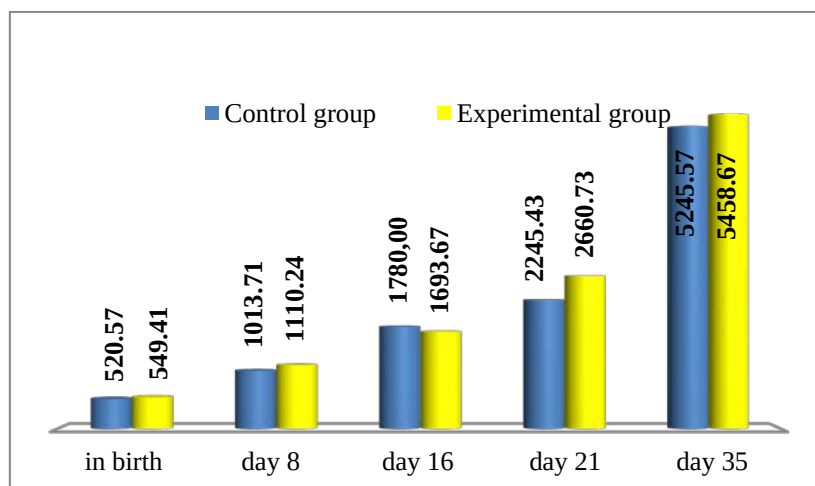


Fig.2. Dynamic of litter weight from birth to day 35 post partum

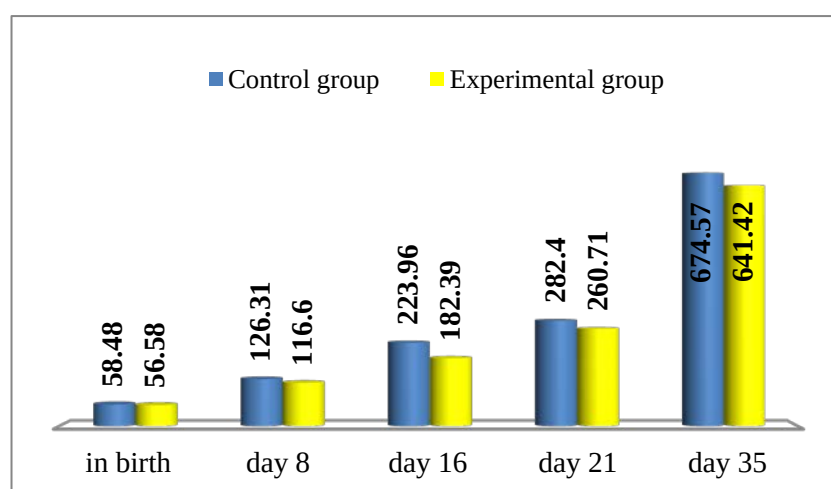


Fig.3. Dynamic of individual rabbit weight from birth to day 35 post partum

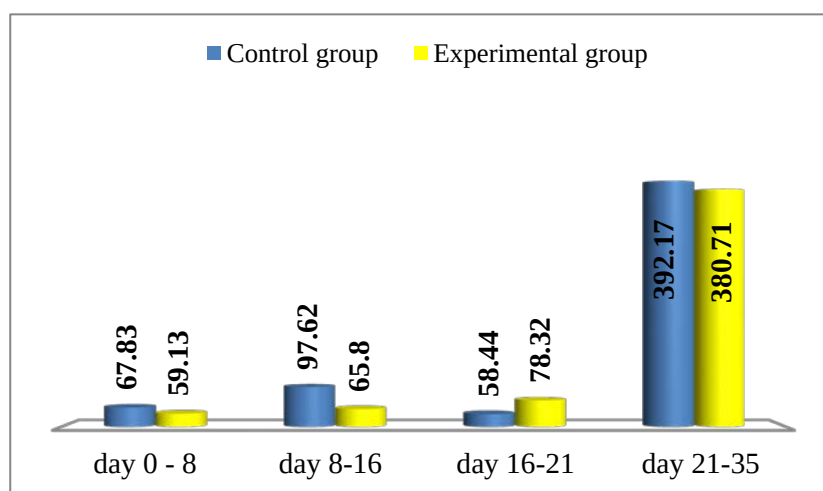


Fig.4. Dynamic of absolute gain from birth to day 35 post partum

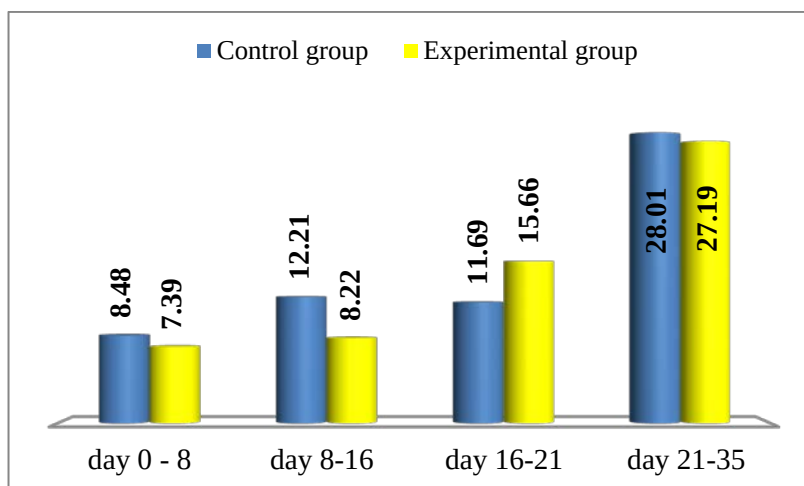


Fig.5. Dynamic of mean daily gain from birth to day 35 post partum

4. CONCLUSION

The fertilization of Californian rabbit does until 48th hour post weaning increased only the values of litter size on the day 8 and 16 post partum. The early fertilization (until 48th hour post weaning) does not influence on the litter weight, but decreases some traits as individual rabbit weight on the 16th day post partum, both absolute and daily gain in the period from 8th day to 16th day post partum, and increases absolute and daily gain in the period from 16th to 21st day post partum.

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