

## **EFFECT OF GROUP-HOUSING OF YOUNG DOES DURING REARING ON REPRODUCTION PERFORMANCE AND AGGRESSION: A PILOT STUDY**

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### **ABSTRACT**

An experiment was performed to investigate the effect of housing young does in small groups of two animals during the last three weeks before insemination on receptivity, reproduction performance and aggressive behavior. Seventeen litters of four sisters were used. Two sisters of a litter were housed individually and two sisters were housed together in cages during the last three weeks before first insemination. No influence of housing conditions was found on receptivity and kindling percentage. However, young does housed in groups produced smaller litters than young does that were single housed ( $9.0 \pm 0.6$  vs.  $7.2 \pm 0.5$ , respectively). At weaning no differences in number of kits weaned and weaning weights between treatments were found anymore. At the end of rearing, one animal in group-housing had small superficial bites at the head. Based on the results of this experiment, group-housing of sisters at the end of the rearing period does not affect receptivity or skin lesions, but decreased total litter size. Further research is needed to investigate the effect of group housing of young does in larger (non-related) groups on aggression.

**Key words:** rearing, rabbit does, welfare, reproduction, housing.

### **INTRODUCTION**

In commercial rabbit production young does are usually housed in groups until three weeks before their first insemination. From three weeks before first insemination onwards, they are housed individually.

From a welfare point of view it is preferable to house young does in groups. Rabbits are social animals and group-housing of rabbits would meet the natural need of the rabbits for full social interaction with each other (Vastrade, 1986; Stauffacher, 1992; Trocino and Xiccato, 2006). Interest in group-housing of rabbit does is growing in several countries such as Switzerland, Austria, Belgium and The Netherlands. Research is focussing on group-housing of rabbit does. However, to our knowledge little attention is given to the housing conditions of young rabbit does before their first insemination. Housing conditions during rearing might be beneficial for social behaviour during the reproductive period. Disadvantage of group housing of young does might be a reduced receptivity and fertility due to pseudo-pregnancy and skin injuries due to aggressiveness appearing with sexual development around 10-12 weeks of age.

Mugnai et al. (2009) studied the performances and behaviour of pair housed young does, but they started their experiment only five days before the first kindling. They reported that young does housed in colony cages showed a wider behavioural repertoire and social behaviours, as well as fewer stereotyped. However aggression between does was observed and reproductive performance and productivity was lower in pair housed does compared to single housed does.

The objective of our research was to investigate the effect of group housing of young does on reproduction performance and aggression.

## **MATERIALS AND METHODS**

The experiment was performed in two compartments in one of the experimental farms of in the former Centre for Applied Poultry Research in Beekbergen. The Animal Care and Use Committee of WUR approved all protocols.

### **Animals and husbandry**

Young does of a strain of New Zealand White rabbits, selected on reproduction performance, were used in the experiment. Litters of breeding does with four or more female kits were selected at weaning (30 days of age) and transferred to a deep-pit system compartment, used for rearing of young does at the farm. The female kits of the same litter were housed together in a wire cage of 50x60x30 cm (width x length x height). Three weeks before first insemination, out of one litter two sisters were put into individual cages with a dimension of 33x50x30 cm (w x l x h) (= individual housing) and two sisters were housed together in a cage of 60x50x30 cm (w x l x h) (= group-housing). The animals were randomly assigned to treatment. A total of 17 litters were raised. There were two groups. In the first group, four sisters of 12 litters were pair or single-housed at 13 ½ weeks of age (start of the experiment), transferred at 16 weeks to a deep-pit system compartment used for reproduction of does at the farm and inseminated for the first time at 16 ½ weeks of age. In the second group 4 sisters of 5 litters were pair or single housed at 11 ½ weeks of age (start of the experiment) transferred to the reproductive compartment at 14 weeks and inseminated at 14 ½ weeks of age, due to management changes at the farm.

Animals were housed under controlled illumination. During rearing a photoperiod of 12 hours was maintained. From 16 w (group 1) or 14 w (group 2) onwards, the photoperiod was set at 16 hours. During rearing and reproduction a minimum inside temperature of 16°C was maintained.

Animals were fed with a standard pelleted diet of 10.3 MJ metabolizable energy and 17% crude protein. From weaning to start of the experiment, animals had free access to a feeder. For animals of group 1, feed intake was restricted to 120 gram /day from start until four days before the first insemination. From four days before the first insemination onwards feed was given ad libitum (flushing). Animals of group 2 were not restricted in feed intake during rearing, because of their young age at first insemination. All animals had free access to a nipple-drinker throughout the experiment.

Animals were inseminated with fresh mixed semen of bucks selected for growth performance. Two weeks after insemination, pregnancy was detected by abdominal palpation. At the first day after kindling, litters were standardized at eight kits if possible. Does were inseminated for the second parity 10-12 days after kindling (semi-intensive breeding rhythm). At 21 days of age, nest boxes were removed and kits were put into the cage of the doe to stimulate solid feed intake. Litters were weaned at 30 days of age. The experiment ended after weaning of the first litter. Litter performance is presented of young does that were pregnant from first insemination.

### **Measurements**

1. Body weight was recorded at start, before transfer to the reproductive compartment, at first insemination and after kindling.
2. In group 1, feed intake during the last four days before first insemination (flushing) was determined. A full feeder was weighed four days before the first insemination and weighed again before insemination.
3. Receptivity was scored by the color and turgency of the vulva at start and before first insemination. Animals were considered receptive if the vulva was red/rose and swollen.
4. Reproduction performance. The numbers of kindling from first inseminations were scored. For the first litter, the number of kits born alive and stillborn, the average kit weight at 21 days and at average kit weight at weaning was recorded. The average kit weight at 21 days was used as an

estimate for milk production of the doe (Lebas et al., 1972). The kindling rate was determined on basis of the number of kindlings from first inseminations.

5. Skin lesions. Skin lesions were used as indicator of aggression. At start and at transfer to the reproductive compartment, the number of animals with skin lesions was determined. According to Kalle (1994), it was registered which part(s) of the animals was injured (head and/or ears, body and/or limbs, vulva and anus) and the extend of the injuries, according to the following classification:

- 1) minor injuries: superficial bites, area diameter < 1 cm.
- 2) moderate injuries: superficial bites, area > 1 cm.
- 3) severe injuries: severe bites, giving open wounds.

### **Statistical analysis**

Analyses of variance were carried out using the GLM procedure of the Statistical Analyses System (SAS, 9.2). Body weight and litter performance were analyzed with Group (1 or 2), group within mother (1 to 17), treatment (single or pair housing) and the interaction between group and treatment were put into the model. If the interaction was not significant, it was left out of the model. Kits still born and mortality before weaning were log transferred before analyzing.

Receptivity and kindling rate were analysed using the Proc logistic analysis from SAS with group and housing condition as factors.

## **RESULTS AND DISCUSSION**

### **Animals**

During the experiment six animals were removed (three vs. two for individual and group housed animals, respectively). During the rearing period, one animal (individual) died due to a digestive disorder. At the end of the gestation period, one doe (group housing) aborted. Two animals (individual) died during kindling and during the first lactation, two does (one of individual and one of group housing, respectively) were removed due to deformation of the teeth and digestive disorder.

### **Rearing period**

In Table 1 body weight of the animals during the experiment is presented together with the amount of feed consumed during the flushing period. Housing system did not influence body growth and feed intake. Because the animals of the ad libitum group were two weeks younger at start, their bodyweight was decreased (resp. 2599±49 vs. 2860±32g). The restricted fed animals consumed significantly more feed during the last four days before insemination (resp. 253±4 vs. 211±7g). Before insemination, no difference in bodyweight between the restricted and ad libitum fed animals was found anymore, which might be partly due to the higher feed consumption and compensatory growth of the restrictive fed animals. After first insemination, all animals were fed ad libitum and no difference in bodyweight was found anymore.

### **Receptivity and kindling rate**

In Table 2, the receptivity and kindling rate are presented for the different treatments. At start none of the restricted fed animals was observed receptive, whereas in the ad libitum feeding group 15% were scored receptive. Although young does were transferred four days before insemination from the rearing to the reproduction compartment to stimulate receptivity, receptivity was rather low for young does (78.8 vs. 67.7% for resp. individual and group-housing). Housing condition did not affect receptivity or kindling rate (resp. 63.6 vs. 73.5% for resp. the individual and group-housed animals). Feeding level seemed to influence kindling rate (60.8 vs. 80% for the animals from group 1 and 2, respectively). However, no significant differences were found.

**Table 1.** Bodyweight (g) at start, before flushing, at first insemination and after kindling and feed intake in the flushing period (g/d) for the individual and group-housed young does (LSM  $\pm$  s.e.).

Treatment	Housing system	
	Individual	Group
Number of animals	34	34
Body weight at start (g)	2732 $\pm$ 40	2727 $\pm$ 40
Body weight before flushing (g)	3477 $\pm$ 46	3482 $\pm$ 46
Body weight at 1 <sup>st</sup> insemination (g)	3670 $\pm$ 51	3729 $\pm$ 50
Feed intake during flushing (g/d)	227 $\pm$ 5	238 $\pm$ 5
Body weight at 1 <sup>st</sup> kindling (g)	3855 $\pm$ 67	3833 $\pm$ 55

**Table 2.** Effect of housing conditions (individual or group) during the last three weeks before first insemination of young does on receptivity and kindling rate of their first parity.

Treatment	Housing system	
	Individual	Group
Number of animals	33	34
Receptivity at start (%)	5.9	2.9
Receptivity before 1 <sup>st</sup> insemination (%)	78.8	67.7
Kindling (%)	63.6	73.5

### Production performance

In table 3, the production performances of does successfully inseminated at first insemination are presented. Young does housed individual produced more kits than young does reared in groups (9.0 $\pm$ 0.6 vs. 7.2 $\pm$ 0.5, respectively). Although, the number of kits born alive was 1.4 kits lower for group-housed than for individual housed young does, this difference was not significant. This might be due to the limited number of groups that was tested in this experiment. Mugnai et al. (2009) reported also a lower litter size in young does housed in groups, although does were housed in groups only five days before their first kindling.

**Table 3.** Effect of housing system (individual or group) during the last three weeks before first insemination of young does on the production performance of their first litter, for does successfully inseminated at first insemination (LSM  $\pm$  s.e.).

Treatment	Housing system	
	Individual	Group
Number of animals	20	24
Total litter size	9.0 <sup>a</sup> $\pm$ 0.6	7.2 <sup>b</sup> $\pm$ 0.5
Kits born alive	8.1 $\pm$ 0.7	6.7 $\pm$ 0.6
Kits stillborn (%)	9.5 $\pm$ 6	8.6 $\pm$ 5
Kits after standardization	7.4 $\pm$ 0.4	7.4 $\pm$ 0.3
Litter weight at 21 days (g)	2339 $\pm$ 117	2197 $\pm$ 91
Kits weaned	7.0 $\pm$ 0.5	7.0 $\pm$ 0.4
Kit weight at weaning (g)	689 $\pm$ 25	677 $\pm$ 20

<sup>ab</sup> Means with different letter in a row differ significantly (P<0.05)

### Skin lesions

At start of the experiment, no skin injuries were observed. Before transfer to the reproduction compartment only small superficial bites at the head and ears were observed in one animal in group-housing. In meat rabbits, aggression appears at the age when animals start to sexual mature (around 10-11 weeks of age) and skin injuries increase with age (Rommers and Meijerhof, 1998). However, in meat rabbits females and males are often housed together in groups. It might be that there is less

aggression among females, but the fact that in this experiment sisters were used and animals were housed in small groups of two, might have been of influence on the low appearance of aggression in this experiment.

## CONCLUSIONS

Group housing of young does until first mating does not affect receptivity and kindling rate. However, group housing affects total litter size. Young does housed in pairs produce less kits compared to single housed young does. However, no effects on litter weight at 21 d, number of weaned kits and weaning weights were found. Based on the results of this experiment it seems not likely that aggression will be of importance as in meat rabbits, at least when sisters are housed in small groups. Further research is needed to investigate the effect of group-housing of young does on aggression in larger and non-related groups.

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