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Effects of group stability on aggression, stress and injuries in breeding rabbits

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ABSTRACT

On Swiss rabbit breeding farms, group-housed does are usually kept singly for 12 days around parturition to avoid pseudogravidity, double litters and deleterious fighting for nests. After this isolation phase there is usually an integration of new group members. Here we studied whether keeping the group composition stable would reduce agonistic interactions, stress levels and injuries when regrouping after the isolation phase.

Does were kept in 12 pens containing 8 rabbits each. In two trials, with a total of 24 groups, the group composition before and after the 12 days isolation period remained the same (treatment: stable, S) in 12 groups. In the other 12 groups two or three does were replaced after the isolation phase by unfamiliar does (treatment: mixed, M). Does of S-groups had been housed together for one reproduction cycle. One day before and on days 2, 4 and 6 after regrouping, data on lesions, stress levels (faecal corticosterone metabolites, FCM) and agonistic interactions were collected and statistically analysed using mixed effects models.

Lesion scores and the frequency of agonistic interactions were highest on day 2 after regrouping and thereafter decrease in both groups. There was a trend towards more lesions in M-groups compared to S-groups. After regrouping FCM levels were increased in M-groups, but not in S-groups. Furthermore, there was a significant interaction of treatment and experimental day on agonistic interactions. Thus, the frequency of biting and boxing increased more in M-groups than in S-groups. These findings indicate that group stability had an effect on agonistic interactions, stress and lesions.

1. Introduction

1.1. Group housing

In Switzerland and the Netherlands (Rommers et al., 2006), group housing of rabbit breeding does (*Oryctolagus cuniculus*) is a promising and upcoming alternative to single housing, which is still common.

On most Swiss rabbit breeding farms with group housing, the does are regularly regrouped with unfamiliar does. With a mean conception rate of 60% (Andrist et al., in press), not all of the does are normally gravid on each reproduction cycle. Does that are not gravid are put into smaller pens without nests or are removed when no longer reproductive, whereas the pens with nests are complemented with gravid does. These pens are bigger, making it less economic to keep non gravid does in them.

1.2. Artificial insemination management and isolation

Swiss rabbit breeders employing group housing increasingly apply artificial insemination (AI) with either a 33 or 42-days reproduction cycle. The 42-days reproduction

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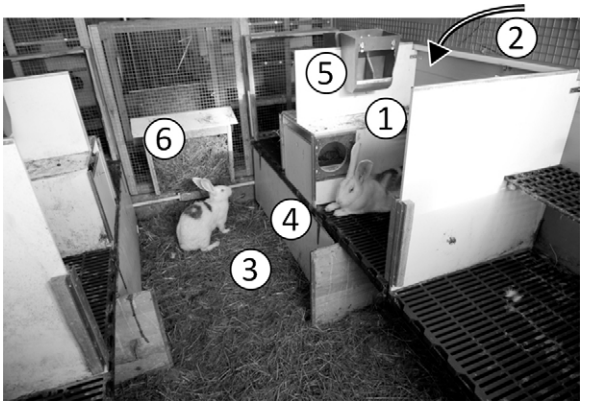

Fig. 1. Pen design. Separate compartment with nest (1) and grid to isolate (2). Dividable pup area (3) with hiding places (4). Individual feeder (5) and hay rack for the group (6).

cycle is more common and allows the does more time to recover before the next parturition. In the AI management with a 42-days reproduction cycle the does are kept singly from the 30th day of pregnancy, just before the expected parturition date, until 12 days after birth. During isolation the does are kept in a separated compartment with a nest, within their group pen (Fig. 1). Olfactory, acoustic and visual contact with pen mates and new group members are still possible, but direct social interactions are prevented during this phase. New group members (gravid does from another pen) are usually introduced at the beginning of this isolation phase. They are put directly in the separated compartments without them having the possibility to interact with other group members. Isolating the does inhibits mounting by other does after parturition, at a time when they are sexually receptive (Schlolaut et al., 2003), which may lead to pseudogravidity (secretion of hormones which translate into physical changes similar to those during gravidity) and thus reduce reproduction rate. Isolation also prevents fights for nests and double litters. Double litters occur when two does kindle in the same nest, sometimes resulting in the crushing of pups. Furthermore, routine controls of the animals can be conducted more easily and accurately when the does are isolated.

1.3. Problems of group housing in rabbits and other species

As in many farm, companion and laboratory animals, e.g. pigs (Stukenborg et al., 2011), horses (Vervaecke et al., 2006) and mice (Van Loo et al., 2002), group housing in rabbits can lead to aggression, stress and injury. In rabbits, separate dominance hierarchies are maintained amongst males and females, reflecting competition for mates amongst males and for the best nest sites amongst females (Cowan and Bell, 1986). Rödel et al. (2008) found that infanticide is higher in groups where the hierarchy is unstable. Swiss rabbit breeders observe a high incidence of agonistic interactions when the does are regrouped with unfamiliar individuals and establish a new hierarchy (Andrist et al., submitted for publication). In the same epidemiologic study involving 28 commercial rabbit farms employing group housing, 33% of the does showed lesions. Severe lesions were counted on 9% of the animals. However, more lesions were found on farms where the does were isolated for the first 12 days after parturition than on farms without isolation.

1.4. Hypothesis

In this study we tested whether keeping breeding does in stable groups attenuates agonistic interactions, stress and injuries when breeding groups are reunited after the isolation phase. We hypothesised that does in stable groups would have fewer lesions and lower stress levels and show less agonistic interactions than does in unstable groups.

2. Animals, materials and methods

2.1. Animals and housing

The experiment was conducted on a commercial rabbit breeding farm in Elfingen, Switzerland, using a herd of 96 does of the Hycole hybrid that were in their second parity and eight months of age at the start of the experiment. The does were housed in 12 groups of eight. They were kept according to a Swiss label programme for animal-friendly housing, which requires group housing and a separate nest for each litter. Each pen covered a floor area of 5.7 m^2 (0.7 m^2 per doe) and was bedded with straw and furnished with elevated areas, hiding places, eight compartments with nest boxes, nipple drinkers and automatic feeders (Fig. 1). The pens were open at the top and the floor was divided into a central area for the does and a smaller area for the pups. The does had ad libitum access to commercial rabbit pellets (UFA 857, UFA AG, Herzogenbuchsee, Switzerland), water and hay.

2.2. General procedure and treatments

The same herd of does was used twice with a break of about three months between the two trials. On each trial, all does were isolated thirty days after AI, and six of the 12 groups remained the same (treatment: stable, S) whilst the other six groups were regrouped with unfamiliar does by the farmer (treatment: mixed, M), whereby two or three non-gravid does per group were replaced by either gravid or non-gravid does from other groups of that treatment. Normally, non-gravid does are replaced by gravid does. However, because we could not avoid non-gravid does among S-groups ($n = 26$ over the two trials), a similar number of non-gravid does ($n = 24$) were kept in the M-groups in order to avoid a confounding effect of gravidity on the treatment. Does of S-groups had previously been housed together for one reproduction cycle. Most of the does kindled later on that day, the others on the following day. Ten days later they were artificially inseminated. After another two days, the animals were reunited (Fig. 2).

On both trials, assignment of groups to treatments was randomised. Due to $n = 35$ replacements of poor breeders and losses during the interval of three months between the two trials, the composition of the groups was completely different on the second trial, with 66 of the 96 does being