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CHARACTERIZATION STUDY OF AGGRESSIVE BEHAVIOURS IN GROUP-HOUSED RABBIT DOES

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ABSTRACT

A total of 32 crossbred multiparous pregnant rabbit does were housed in individual modules (0.5 m²) which were put in communication to form 8 double and 4 quadruple pens and to house 2 and 4 does, respectively. The females were maintained in stable groups from the starting of the trial (8 d before kindling) until 2 d before kindling and from the 18th day of lactation until weaning (31th day). The aggressive interactions among does were controlled by video-recording for 24 consecutive hours during the initial group formation at 8 d before kindling (-8 d), during the re-introduction in the groups at 18 d of lactation (+18 d) and at 21 and 30 d of lactation. At -8 d and +18 d group formations, the most observed aggressions were biting and attacking, followed by threatening, boxing and carousel fights, and finally chasing. There was a higher number of biting, threatening and total aggressions at -8 d than at +18 d ($P < 0.05$). The effect of the observation hour was significant for all types of aggressive interactions ($P < 0.05$) at both observation days, although with a different pattern for each day: at -8 d aggressions took place essentially during the first two hours after the group formation and thereafter they were reduced; at +18 d, the aggressions were concentrated on the first 30 minutes after the group formation and thereafter they were rather null. At 21 and 30 d of lactation, few and null aggressive interactions were observed, respectively. In conclusions, more aggressions and, likely, longer periods for establishing hierarchy were observed on the first group formation and with does close to the kindling, while lower aggressions and shorter periods for stabilisation were measured at the re-introduction in group and at the end of the lactation period.

Key words: Aggressive behaviours, Grouping period, Group size, Reproducing does.

INTRODUCTION

Group-housing for rabbit does is claimed to be preferable over individual housing because it allows higher available space for social interactions and movement. However, it produces chronic stress, aggressiveness and injuries among does and towards litters, high risk of diseases and mortality, a decrease in doe reproductive performance and finally an increase of production costs (Szendrő and Mcnitt, 2012; Andrist et al., 2013). In spite of this, the increasing demand of welfare-friendly rearing systems by the society and the plans of some northern European Countries of banning individual cages has pushed towards the study of alternative solutions that consider the possibility of collectively housing reproducing does in certain periods (Rommers et al., 2014). The present study aimed at characterizing the occurrence of aggressive behaviours among does kept in group during some periods of the reproductive cycle and at studying how some factors in group housing (grouping period, group size, number of access points within modules in a pen) may influence the aggressive behaviours.

MATERIALS AND METHODS

Animals and experimental design

At the 22nd day of gestation, 32 crossbred multiparous rabbit does were moved from a commercial farm to the experimental farm of the University of Padova. Groups were balanced according to the does weight

and the number of parities. The does were housed in individual pens (0.5 m²; 64 cm length × 78 cm width × 110 cm height) equipped with manual feeders, automatic drinkers and nests. The contiguous pens were put in communication among them by means of one or two access holes on the wire-net wall (20 cm length × 30 cm height). Thus, the day after the arrival of the does, 8 double (G2) and 4 quadruple (G4) pens were formed which housed 2 or 4 does, respectively, and their litters when present, from 8 d before kindling until 2 d before kindling and from the 18th day of lactation until weaning (31 d after kindling). Since 2 d before kindling until the 18th day of lactation, the females were maintained in the same individual pens separated each other by closing the holes. The groups were maintained stable in the two periods before and after kindling.

Behavioural observations

All pens were submitted to video-recording with colour infrared cameras for 24 consecutive hours in four moments: at 8 d before kindling (–8 d), after the first formation of the groups; at 18 d of lactation, after the group reconstitution (+18 d); at 21 d of lactation; at 30 d of lactation. Aggressive interactions among does were scored according to Andrist et al. (2012) controlling the number and duration of chasing, ripping, carousel fights and mount attempts, and the number of biting, boxing, threatening and attacking. The behaviour was controlled for 15 min at 0, 15, 30, 45 min after the access holes opening and then for 15 min each hour for the 24 following hours. The number of interactions among does was recorded at pen level. The Playback Software (Playback Software. Ink, version 2.3.0.4) was used for the analysis of video-recordings.

Statistical Analysis

The aggressions measured at 21 d and 30 d of lactation were not considered in the analysis because they were scarce and null, respectively. Data were analysed using SAS 9.4 software (SAS Institute, Cary, USA). The number and duration of the aggressive interactions in the collective pens were analysed applying a mixed model and by the PROC GLIMMIX. Data were analysed together including observation day (–8 d and +18 d), group size, observation hour and number of holes as fixed effects, and pen as random effect (data given in Table 1). Then, the data of each observation day were analysed separately with the same model without the observation day effect. A Poisson distribution was assumed for all data.

RESULTS AND DISCUSSION

The most observed aggressive interactions were biting and attacking, with raw means for the number of observations of 0.56 and 0.51 in the 15 min (data not reported in tables), respectively. Then, the next types were threatening, boxing and carousel fights (with means of 0.27, 0.17 and 0.12, respectively). Finally, the least observed interaction was chasing, with a mean of 0.07. Ripping and mount attempts were also recorded, but they were not submitted to statistical analysis because their frequency was very low (means of 0.03 and 0.02, respectively).

There was a significant effect of the observation day on the number and duration of the most aggressive interactions (Table 1). The number of biting, threatening and the total number of aggressions were higher at the first group formation than at 18 d of lactation. Boxing and chasing were also higher at –8 d than at +18 d but the estimated least square means (LSM) were very low (with the first significant digit at the sixth decimal) and thus they were considered not relevant in absolute terms (values not showed in the table). The durations of carousel fights and chasing were lower at –8 d than at +18 d, however. Likely, the stability of the group could have accounted for the aggressiveness reduction from the first to the second group formation. In fact, Andrist et al. (2012) described a reduction of the number of agonistic interactions by keeping does in stable groups instead of mixing them.

The group size in the pen did not affect the duration of the aggressive interactions. Nevertheless, the number of boxing, carousel fights and chasing was higher in G4 than in G2 pens, but, as indicated above, the estimated LSM were not considered relevant in absolute terms and the corresponding values are not given. Finally, the number of holes on the wire walls of the modules constituting a pen influenced the incidence and duration of chasing, with higher values when the pens had two access points than only one (Table 1).

Table 1: Least square means of the number (n) and duration (sec) of the aggressive interactions among does kept in group at two observation days (8 d before kindling or 18 d of lactation), two group sizes (2 or 4 does) and two holes in the pen for the passage of the rabbits (1 or 2).

	Observation day		Group size		Holes on the wire walls		RSD
	-8 d	+18 d	2 does	4 does	1	2	
Biting (n)	0.15 ^a	0.12 ^b	0.09	0.19	0.12	0.14	0.22
Attacking (n)	0.19	0.21	0.16	0.26	0.15	0.27	1.14
Threatening (n)	0.06 ^a	0.03 ^b	0.03	0.06	0.04	0.04	0.18
Carousel fights (sec)	9.20 ^β	13.20 ^α	9.30	13.06	9.38	12.94	0.38
Chasing (sec)	8.80 ^b	16.33 ^a	11.07	12.98	8.81 ^b	16.31 ^a	0.04
Total aggressions (n)	0.93 ^a	0.78 ^b	0.61	1.20	0.67	1.08	0.20

^{a, b}Means with different superscript letters within the same row and for the same main factor differ significantly at $P < 0.05$.

^{α, β}Means with different superscript letters within the same row and under the column differ significantly at $P < 0.10$.

Figure 1 depicts the number of aggressive interactions over 24 hours at -8 d and at +18 d. The effect of the observation hour was significant ($P < 0.05$) for all types of aggressive interactions and at both observation days, with a higher number of interactions during the first hours followed by a quick decline.

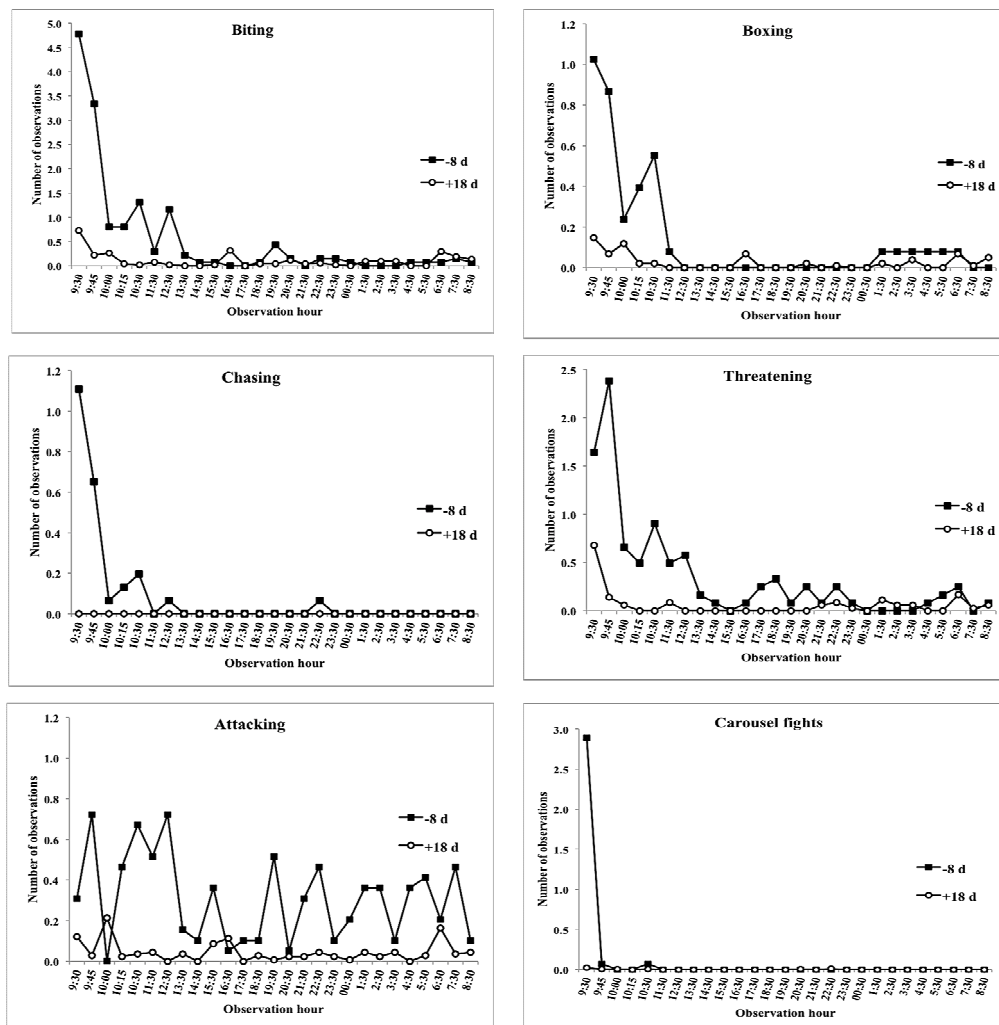


Figure 1: Least square means of the number of aggressive interactions detected in a period of 15 min among rabbit does housed in group at two observation days: 8 d before kindling (-8 d) and 18 d of lactation (+18 d). (P, Probability of the effect of the observation hour: $P < 0.05$ for all of the aggressive interactions at both -8 d and +18 d).

A different evolution was observed for each day of observation. At -8 d, aggressions took place essentially during the first two hours after the group formation (9:30 to 11:30), and from that time they were reduced despite some picks of activity, which could be related to a general activity increase of the does (mainly for eating). At +18 d, the aggressions were concentrated on the first 30 minutes after the group formation (9:30 to 10:00), and from then the aggressive activity could be considered practically null. There were some behaviours with a different pattern: i.e. attacking, which occurred episodically and did not stabilize during the 24 hours neither at -8 d nor at +18 d; and carousel fights, which were observed only during the first observation (9:30) at -8 d. A different pattern for establishing the social hierarchy among does could be hypothesized according the group formation time. During the first group formation, the hierarchy establishment required a longer period of time, which can last up the first 24 hours, but it was likely established mainly during the first two hours. After an isolation period (-2 d before kindling to +18 d after kindling), the time for the hierarchy re-establishment in a stable group was shorter (30 min). To our knowledge, there are no recent studies on the times for hierarchy formation and maintenance in farmed rabbit does which could sustain the present results. Only Vervaecke et al. (2010) investigated the hierarchy development and quality in growing rabbits (4 to 12 weeks of age) looking for some factors that could influence them (sex, weight).

CONCLUSIONS

The results of this study indicate the importance of the familiarity among the does when establishing the groups and of the doe reproductive period for the aggression occurrence. These factors also lead to a different pattern for establishing the social hierarchy among does, with higher aggression rates and longer periods in the case of the first group formation and with does close to the kindling, and lower aggressiveness and shorter periods for the re-introduction in groups and at the end of the lactation period.

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