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Short communication

## A brief report on aggressive interactions within and between groups of domestic turkeys (*Meleagris gallopavo*)

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### Abstract

Aggressive encounters and injuries due to head pecking seriously threaten the welfare of domestic turkeys and also result in economic waste within the turkey industry. The aim of this study was to investigate whether domestic turkey toms distinguish group members from non-group members and if they preferably attack the latter. Two unfamiliar groups of four domestic turkey toms were brought into an experimental pen and the subsequent incidence of aggressive interactions and the spatial distribution of the birds were recorded for the duration of 1 h. There were significantly more fights towards non-group members than towards group members. The average duration of fights between group members and non-group members was the same, but showed large variances. Aggressive pecking was significantly more frequent between non-group members than between group members and turkey toms tended to leap more frequently at non-group members than at group members. The distance between the birds tended to be greater amongst non-group members than amongst group members. From our study, it may be concluded, that not only wild turkeys but also domesticated broad-breasted fattening turkeys do distinguish between conspecifics of the own group and conspecifics of another group, and that they antagonise non-group members markedly more than group members. The results are discussed with respect to animal welfare and economic problems caused by the aggressive behaviour of domestic turkeys in commercial husbandry.

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## 1. Introduction

Wild turkeys live in flocks and have a highly competitive social system in which fights and other aggressive interactions between males are common (Buchholz, 1997). Half a year after hatching, young males of a brood flock will break away as a sibling group. Sibling groups generally reject external males and form a closed unit for life. There is a very strict hierarchy established by rank fights both within and between sibling groups (Watts and Stockes, 1971). Fights between wild turkeys are usually brief and result very rarely in serious injuries (Healy, 1992). Like wild turkeys, domestic turkeys also show aggressive behaviour and perform aggressive head pecking (Moinard et al., 2001). Amongst broad breasted turkeys, fattened in commercial rearing units, aggressive encounters and injuries due to head pecking may become so severe that death occurs or culling is mandatory (Hester et al., 1987; Classen et al., 1994; Sherwin and Kelland, 1998; Moinard et al., 2001). Assuming that individual recognition enables stable hierarchies to be established, it has been suggested that birds in large flocks continually attempt to establish dominance, leading to high levels of aggression, but fail (Guhl, 1953; Banks and Allee, 1957; Al-Rawi and Craig, 1975; Wiley, 1990; Wiley et al., 1999) because individual recognition of such large numbers of conspecifics is no longer possible (also see Hughes et al., 1997). While it is true, that domestic turkeys are kept in much larger groups than those in which their ancestors lived, it is not known whether they distinguish familiar from unfamiliar individuals and if they preferably attack the latter. We therefore examined the effect of bringing together two small and unfamiliar groups of domestic turkeys on the subsequent incidence of aggressive interactions and the spatial distribution of the birds. Based on what is known about the social system of wild turkeys (Watts and Stockes, 1971) we hypothesised that there will occur more aggressive interactions between non-group members than between group members. Despite the proximity, which aggressions cause, we expect larger distances among non-group members than among group members, since fights are relatively short and turkeys stay in closed groups in the remaining time.

## 2. Methods

### 2.1. *Subjects and housing*

The birds used in this experiment were turkeys of the breeding line Big 6 from British United Turkeys (BUT). At the age of 6 weeks, 32 non-beak trimmed poults of unknown sex were bought from a commercial breeder. They were divided randomly into groups of eight, in four identical pens (home pens) arranged  $2 \times 2$  on each side of a central passageway in an outhouse. Walls made of plywood separated the pens. The front walls to the central passageway were made of wire mesh and reinforced with plywood up to a height of 1 m. In this way, there was auditory but no visual contact between the pens. Each pen had a floor area of  $4.9 \text{ m}^2$ , was littered with wood shavings and long-cut straw, contained a suspended bell-drinker and feeder, a bale of straw and a perch (180 cm, height 60 cm). Average daily temperature was  $15\text{--}20^\circ\text{C}$ . Artificial light was provided with a light intensity of 60–90 lx (measured at the height of the animals). Lights were on from 6 a.m. to 8 p.m. with a 15 min

twilight phase at the beginning and end of each day. Some additional daylight reached the pens between 7.30 a.m. and 5.30 p.m. The animals were kept beyond the experiment until the end of the fattening period (week 16) and then slaughtered at a conventional slaughterhouse.

## 2.2. Procedures

The experiment started when the turkeys were 13 weeks old. The experimental pen measured 3.1 m × 3.7 m and was littered with wood shavings. Except from size and lack of facilities (feeder, drinker, bale of straw and perch) the experimental pen was identical to the home pens and was located in the same room. As it turned out, there were at least four male birds in each group and we randomly selected four males from each pen. For the experiments, we moved the males from two groups from their home pen to the experimental pen. In order to be able to distinguish between animals of different groups, they were marked with black hair spray on the back and then put in the experimental pen one by one, alternately from the two groups. The whole procedure when all eight toms had been put in the experimental pen took 2 min.

Birds were then observed for 60 min before they were returned to their home pens. There were six runs so that each possible dyadic combination of the four groups were tested, and this took 3 days to be completed, with two runs a day. The order of runs was randomised with the restriction that groups were only tested once a day. We defined the occurrence of injuries larger than 4 mm<sup>2</sup> as criteria to immediately stop a run but this was never necessary.

## 2.3. Behavioural observations

Observations of social behaviour were made directly from a chair in the central passageway in front of the experimental pen and recorded using the ‘observer’ program (a Noldus Information Technology software, NL). “All occurrences” sampling (Altmann, 1974) was used to record aggressive interactions, subdivided into fights (amount and time spent), pecks and leaps. Fighting begins when two males with raised heads face each other and begin vocally to give ‘fighting purrs’ (Healy, 1992). Fights end when one bird turns away from the opponent. ‘Pecks’ are aggressive pecks to the head, neck or snood of the opponent, a ‘leap’ is defined as leaping at the opponent’s breast, extending the feet forward with the toes spread.

Runs were videotaped in order to record distances between the individuals later on. The camera was installed vertically over the test pen (3 m above ground). Every 4 min, i.e. 15 times in one run of 60 min, the distances between all birds were measured directly on the video screen.

## 2.4. Statistical analysis

The number and duration of aggressive interactions between group members and non-group members and the mean distances between group members and non-group members were compared using Wilcoxon signed ranks test for matched pairs (Siegel and Castellan, 1988). As an animal had the possibility of interacting with three birds of his own group, but four birds from the other group, the probability of interacting with an animal of the other group was higher. Therefore, the number of aggressive interactions observed had to

be weighted by dividing data from within the groups by three and data from between groups by four. Weighted data were used in the analyses, but in the text non-weighted values are given. Fights between group members occurred in only two of the six runs and the duration of fights between group members and non-group members was therefore not compared statistically.

Time based effects were analysed by linear regression and *t*-test of significance. When residuals were not normal distributed, data was transformed accordingly. If transformation failed, Spearman rank correlation was used instead.

The six runs were taken as observational units. Alpha level was set to 5% and according to the hypothesis tests are one sided.

### 3. Results

Fights, pecks and leaps occurred between group members only in the first two runs. A total of 61 fights were observed during the six runs: turkey males fought significantly more often (56 fights) towards non-group members than towards group members (five fights; Wilcoxon signed ranks test for matched pairs,  $N = 6$ ;  $T = 0$ ,  $P = 0.01$ , Fig. 1). The average duration of fights between group members and non-group members was not different, but showed large variances (group members:  $37.0 \pm 34.3$  s,  $N = 5$ ; non-group members:  $37.0 \pm 22.8$  s,  $N = 56$ ). Aggressive pecking was significantly more frequent between non-group members (157 pecks) than between group members (15 pecks; Wilcoxon signed ranks test for matched pairs,  $N = 6$ ;  $T = 0$ ,  $P = 0.01$ ) and turkey males tended to leap more frequently at non-group members (58 leaps) than at group members (13 leaps; Wilcoxon signed ranks test for matched pairs,  $N = 6$ ;  $T = 4$ ,  $P = 0.08$ ). The distance among the birds tended

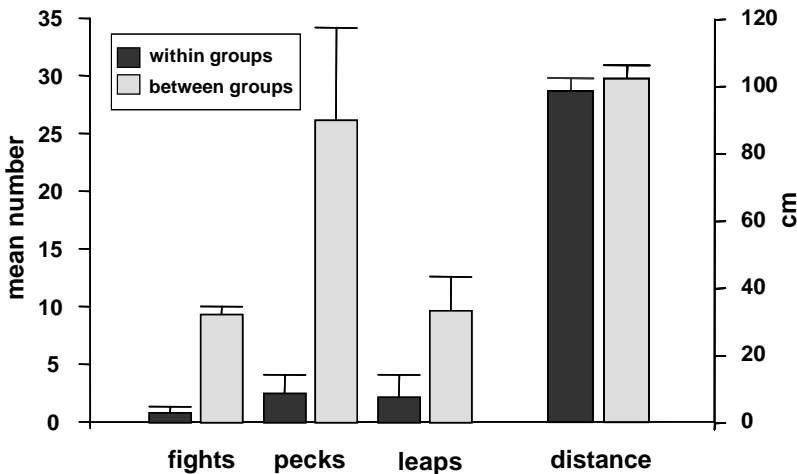


Fig. 1. Mean number of fights, aggressive pecks, leaps and mean distances within and between groups during six 60 min runs.

to be greater between non-group members than between group members (Wilcoxon signed ranks test for matched pairs,  $N = 6$ ;  $T = 4$ ,  $P = 0.06$ ).

There was a significant decline of number of fights and leaps during the 60 min test duration (fights: linear regression,  $r = -0.36$ ;  $t = -2.24$ ;  $P = 0.03$ ; leaps: Spearman rank correlation,  $r = -0.34$ ,  $t = -2.11$ ,  $P < 0.05$ ). Regarding number of pecks and distances within and between group members no time based effects were found (pecks: Spearman rank correlation,  $r = -0.14$ ,  $t = -0.82$ ,  $P > 0.05$ ; distances within groups: Spearman rank correlation,  $r = -0.04$ ,  $t = 0.23$ ,  $P > 0.05$ ; distances between groups: linear regression,  $r = 0.10$ ,  $t = 0.59$ ,  $P > 0.05$ ).

#### 4. Discussion

Thirteen weeks old turkeys were significantly more often involved in aggressive interactions with non-group members than with group members, as we had hypothesised. Group members also tended to stay closer together than non-group members. Taking into account the small floor area of the experimental pen, restricting to a certain extent the possibility of dissociating clearly from conspecifics, it was noted that this difference might have been significant when using a larger pen.

From our results, it cannot be determined if turkeys discriminate between group members and non-group members due to a group characteristic or if they recognise each other individually. [Douglass \(1948\)](#) found that laying hens could recognise and react towards at least to 27 other individual hens. There are no data available for domestic turkeys, but in groups of wild turkeys of between 2 and 20 birds, fighting as a group and rejecting of non-group members was observed ([Watts and Stockes, 1971](#); [Lowett and Williams, 1981](#)). With respect to the animal welfare and economic problems caused by the aggressive behaviour of domestic turkeys in commercial husbandry, the question is raised as to the maximum group size in which male turkeys are still able to detect their conspecifics as group members. From our study, it may be concluded, that not only wild turkeys, but also domesticated broad-breasted fattening turkeys do distinguish between group members and non-group members, and that they antagonise non-group members markedly more than group members, at least when in groups of four. However, it should not be concluded that they do this on the basis of individual recognition. Recognition of some 'group characteristic' would be sufficient. This could be one of the causes for high aggression levels in domestic turkeys fattened in commercial rearing systems.

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