

AGONISTIC BEHAVIOUR AND FEATHER PECKING IN RELATION TO GROUP STRUCTURES OF LAYERS

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ABSTRACT

The effects of the presence of males on females aggressiveness and feather picking were investigated in two groups, the first one was single-sexed group (140 females), the other group was mixed (10 males and 130 females), both groups were reared on deep litter system for layers of Leghorn breed.

The obtained results revealed that, aggressive behaviour (aggressive pecks, threats and fights) among females was significantly less frequent in groups that included males (mixed group). Agonistic behaviour among females was 62% more frequent in single-sexed group, than among layers in mixed group. The males were seldom seen to show aggressive behaviour towards female or towards each other. Regarding feather pecks, there were no significant differences between single-sexed and mixed groups.

From this study it could be concluded that the presence of males had a reducing effect on agonistic behaviour, but not on feather pecking among female laying hens housed in large groups at high stocking density.

Also the presence of males is very important for getting high fertility percentage in layers producing eggs used in hatching process. On opposite direction, the presence of males have no importance in layers producing eggs used for human consumption.

INTRODUCTION

Feather pecking is one of the most widespread serious problems of poultry production (**Les-sion and Morrison, 1978**). Specially under modern conditions of intensive husbandry when large numbers of birds are housed together under crowded conditions of intensively housed poultry (**Blokhuis and Arkes, 1984**). It is thought to be a form of anomalous behaviour prevalent in intensive housing system and often observed in light hybrids, which are hypersensitive to environmental stimuli (**Fraser and Broom, 1990**). It occurs in both rearing and laying period

of domestic fowl, this causes serious economic and welfare problems, as it may result in injuries and even death of birds (**Allen and Perry, 1975**). Feather pecking is still a major welfare problem in egg production (**Savory, 1995**). It is a welfare problem because the pulling out of feathers is painful by itself (**Gentle and Hunter, 1990**) and results in an increased risk of skin damage and even cannibalism (**Keeling and Wilhelmson, 1997**). It has also been found that fear is associated with feather damage in caged birds (**Hughes and Duncan, 1972**) and that in Red jungle fowl, feather pecking birds are more fearful than the non feather pecking birds (**Vestergaard et al., 1993**). Feather loss also has an economic impact on egg production because it increases the birds' food requirement (**Emmans and Charles, 1976; Tauson and Svensson, 1980 and Tullett et al., 1980**). There is no agreement among researchers to why feather pecking develops. Severe outbreaks of feather pecking and cannibalism have also been reported to increase with increased group size in litter pens (**Keeling, 1994**). Large groups at the commonly used stocking densities 600-1000 cm² per bird may increase problems with aggression. Therefore, there is a need to find solutions to these problems. Hens for large scale egg production are almost exclusively kept without cocks in the flock. One obvious method then, is to try to examine whether the social dominance exercised by males will have a beneficial effect also in such large groups. An individual hen recognizes probably about 80-100 other individual (**Guhl, 1953**) and strangers evoke aggression in hens as in many other species (**Craig et al., 1969**). It may be possible that male support the formation of subgroups in large flock which might lower the aggression as individuals then stay most of the time with a well acquainted birds and so do not have to fight strangers. However, studies of subgroups formation are contradictory, it has been shown to exist in large groups (**Hill, 1983 and Bolter, 1987**). In yet, another study subgroup formation could not be induced with 10 males to 50 females in a pen with several rooms, although there was clustering of females around the males (**Widoski and Duncan, 1995**) whether or not hens in large groups actually form subgroups and in that case if males enhance this formation, need to investigate further. A first step may be to study if males make females in large groups less aggressive. Positive effects on production, mortality and the number of mislaid eggs have been reported in groups of 300 laying hens with one male per 30 or 130 females (**Kathle et al., 1996**) as compared to groups without males. Plumage scores were recorded and not found to differ, a fact that made the authors uncertain as to whether the improvements could be attributable to the cock or not. Agonistic behaviour and feather pecking per females were not studied although this would be relevant from the point of welfare (**Vestergaard, 1994**).

The aim of the present investigation was to test the hypothesis that males in large groups of hens at high stocking density have a reducing effect on female agonistic behaviour and feather pecking or not.

MATERIALS AND METHODS

This study was carried out in Governmental layers farm in Sharkia Governorate in the period of January to April, 2002. Layers were allocated into the following groups, group one (single-sexed group) was consisted of 140 females reared on a pen of 4 x 2m with a stocking density of approximately 571.4 cm²/ layer or 17 layer / m² (high stocking density), group two (mixed group) consisted of 10 males and 130 females reared on a pen of the same area and the same stocking density. All birds came from the same breeder, each flock consisted of birds (males and females) from the same hatch brought up together. The birds were raised on deep litter system, litter used was wheat straw in a depth of 10 cm, the photoperiod or light duration was 14 hours light: 10 hours darkness with a light intensity of 10 lux/m² and the temperature was 24±3°C. A single-sexed group has an auditory contact with males from neighbouring pens on group one. All males and 20 randomly selected females per group were wing-tagged on both wings, with yellow tags for females and green tags for males.

Behavioural observation:

Using focal sample technique according to **Altmann, (1974)**, a five randomly selected laying birds out of 20 wing tagged females were observed during 21, 35, 45 and 55 weeks of age. Each bird was observed for 5 minutes through one hour observation. Aggressive and submissive behaviours performed were recorded as well as different forms of feather pecking.

The following behaviour patterns were observed (**Kruijt, 1964**):

Fighting: Two or more birds jumping towards and pecking each other and make wing flapping.

Aggressive peck: Severe and rapid peck towards the anterior parts of the recipient who show avoidance behaviour.

Stretching the neck: The neck is stretched with the tail pointing downwards the recipient, the body is held in upright position.

Ruffling the neck feathers: The neck feathers and sometimes the feathers covering the throat are raised.

Displacing the side: The position is at right angles to the recipient with spread tail and protruding chest, the head is partly or completely directed towards the recipient and the wings are held somewhat out from the body or pointed downwards.

Turning away the head: Turning away the head from another birds.

Withdrawing: Taking at least three steps away from another birds, tail lowered.

Freezing : Immobile in any posture for more than 5 seconds.

Squatting : The head is lowered between the wings and the whole fore part of the body is lowered towards the floors.

Crouching : Almost laying down on the floors with bent legs and head protruding or held downwards.

Fleeing : Taking at least 10 steps away from another bird.

Aggressive behaviour was the sum of fighting, aggressive pecks and threats with submission of the recipient.

Threats were included: stretching the neck, ruffling the neck feathers and displaying the side (sexual displays excluded).

Avoidances were the sum of submissive behaviours without obvious threats as turning away the head, withdrawing, freezing, squatting, crouching and fleeing.

Number and location on the body of gentle and severe feathers pecks were noted (**Vestergaard, 1994**).

Health status: The health condition of the layers was examined at 16 weeks of age and at 35 and 55 weeks of age. Each laying hen was weighed and scored for general condition.

The statistical analysis was carried out according to **Snedecor and Cochran (1982)**.

RESULTS AND DISCUSSION

Results in Table (1) showed that aggressive behaviour was significantly less frequent ($P < 0.002$) in mixed group compared to single sexed group. For avoidances there was a tendency towards lower frequencies in mixed group than in single-sexed group.

The total mean (\pm S.E) of agonistic behaviour (aggressions and avoidances) was for single sexed group 10.29 ± 1.25 and 6.4 ± 1.15 for mixed group and agonistic behaviour among females without males (single -sexed group) was 62% more frequent than among those in flocks with males (mixed group).

The results revealed that the presence of males reduces females aggressiveness in hens housed in large groups at high stocking density. This is in accordance with the earlier observations of domestic fowl in small groups. In this study the total agonistic behaviour of females was 62% higher in single-sexed groups as compared to mixed groups and this is agree with the findings of **Craig and Bhagwat (1974)**. They found that the incidence of agonistic behaviour among

females was 70% higher in groups without males (single sexed) as compared to mixed group of 2 males and 10 females.

There were no significant differences between single-sexed and mixed groups in the frequency of gentle or severe feather pecks. No feather pecks recorded were directed from males towards females. Males very seldom picked aggressively towards females and no aggressive peck was recorded during the observations. Such low aggressiveness towards females was also observed by **Craig and Bhagwat (1974)**, **Ylander and Craig (1980)** and **Bshary and Lamprecht (1994)**. It is a well-known fact that the two sexes have distinct peck orders that usually do not interfere with each other (**SchjelderupEbbe, 1992**). Males clearly exerted a social dominance over the hens. Males were often seen reacting to fights between females by approaching and their mere proximity appeared to stop the aggressive interactions. The dominance was passive in the sense of not involving physical contact. Probably both the body size and the size of the larger combs (**Guhl and Ortman, 1953**) of the males evoke submissive behaviour and help establish the males as dominants. Furthermore, **Ylander and Craig (1980)** have presented the hypothesis that a dominant third party-male or female hens when in close proximity. However, the effect of males found in their study seemed to be stronger and work at longer distances than the effect of dominant females.

The level of aggression in large groups of laying hens has been shown to increase probably due to increased competition for food as the feathering of the birds become scarce (**Gunnarson et al., 1995**).

Results in Table (2) showed that there were no significant differences between single-sexed and mixed groups, except for severe pecks on fluff feathers near the cloaca which were significantly less frequent in mixed group and gentle pecks on the wing tag which were significantly more frequent in mixed group.

From these results it is clear that, neither gentle nor severe feather pecks seemed to be affected by the presence of males, except for severe pecks on the fluff of the cloaca, which were significantly less frequent in mixed group. However, the overall incidence was quite lowered. There was no significant difference in lesions from pecks at the cloaca between single sexed and mixed groups. There were more pecks on wing tags in the mixed groups. This type of peck seemed to reflect a female interest in the males, as most of these pecks were recorded than the males had tags and were directed towards the opposite sex. The low pecking activity of the males is agreed with the findings of **Leonard et al. (1995)**. They studied groups of 23 females and 5 males between weeks 10-18 and found that males both delivered and received proportionally more allow pecks including, aggressive pecks.

Results in Table (3) revealed that, although the aggressive behaviour was significantly less frequent in mixed group compared with single-sexed group. There was no significant differences between the groups regarding the percentage of birds performing or receiving agonistic behaviour or feather pecks.

Results in Table (4) regarding the health status, revealed no significant differences between single sexed and mixed groups.

The overall lack of impact (directly or indirectly) by males on the feathering of the females was also shown by the similar feather scores for mixed and single-sexed groups at the clinical examination. As there was no significant differences regarding damage on the comb between single sexed and mixed groups which could have been expected from the differences in aggressive behaviour. It may be that the males contributed to the damage by biting the comb of the females while copulating.

CONCLUSION

The present study reveals that the presence of males (in mixed group) had a reducing effect on agonistic behaviour, but not on feather plucking among laying hens housed in large groups at high stocking density.

Also the presence of males is very important for getting high fertility percentage in layers producing eggs used in hatching process. On opposite direction, the presence of males have no importance in layers producing eggs used for human consumption.

Table (1): Effect of group formation on occurrence of aggressive behaviour, avoidances and feather pecking of laying hens.

Behaviour patterns	Single-sexed	Mixed group
Aggressive behaviour	12.6±1.3 ^a	7.2±1.2 ^b
Avoidances	9.2±1.2 ^a	5.2±1.1 ^a
Gentle feather pecking	22.3±4.0 ^a	19.8±2.1 ^a
Sever feather pecking	19.2±2.4 ^a	12.0±2.2 ^a

Means within the same raw, in each category with different superscripts are significantly different from each other (at $P \leq 0.002$).

Table (2): Effect of group formation on location of pecks (other than aggressive) directed at other individuals of laying hens.

Behaviour patterns	Single-sexed	Mixed group
Gentle on head	1.2±0.3 ^a	0.6±0.3 ^a
Sever on head	2.5±0.5 ^a	1.2±0.5 ^a
Gentle on body	10.8±1.7 ^a	9.6±1.4 ^a
Sever on body	10.6±2.3 ^a	7.5±2.2 ^a
Gentle on tail	11.3±3.2 ^a	9.2±2.0 ^a
Sever on tail	1.5±0.7 ^a	1.1±0.4 ^a
Gentle on wing	3.2±0.9 ^a	3.2±0.8 ^a
Sever on wing	3.4±1.3 ^a	3.0±1.4 ^a
Gentle on fluff cloaca	1.5±0.4 ^a	1.2±0.5 ^b
Sever on fluff cloaca	1.3±0.3 ^a	0.7±0.1 ^a
Gentle on foot/leg	0.3±0.2 ^a	0.1±0.1 ^a
Sever on foot/leg	0.8±0.6 ^a	0.1±0.02 ^a
Gentle on wing/tag	4±0.1 ^a	10.8±2.2 ^b
Sever on wing/tag	0.7±0.4 ^a	1.1±0.7 ^a
Gentle on beak	1.9±0.3 ^a	1.2±0.2 ^a

Means within the same raw in each category with different superscripts are significantly different from each other (at $P \leq 0.05$).

Table (3): Mean percentages \pm S.E of layers performing and receiving various behaviours per observation.

Behaviour patterns	Single-sexed	Mixed group
Aggressive behaviour	13.0 \pm 2.03 ^a	10.0 \pm 2.0 ^b
Avoidances	20.0 \pm 2.02 ^a	18.0 \pm 2.0 ^a
Gentle feather pecking	27.0 \pm 2.05 ^a	25 \pm 2.0 ^a
Sever feather pecking	11.0 \pm 2.5 ^a	10.0 \pm 2.3 ^a

Means within the same raw, in each category with different superscripts are significantly different from each other (at $P \leq 0.05$).

Table (4): Effect of group formations on mean percentages of health status of layers at 35 and 55 weeks of age.

Age condition	35 weeks		55 weeks	
	Single	Mixed	Single	Mixed
Nacked areas >5 em on back/wings	84 \pm 7 ^a	76 \pm 12 ^a	93 \pm 2 ^a	95 \pm 2 ^a
Nacked areas >5 cm on breast /belly	85 \pm 7 ^a	87 \pm 7 ^a	86 \pm 2 ^a	92 \pm 2 ^a
Pecks and scratches on comb.	9 \pm 8 ^a	15 \pm 14 ^a	21 \pm 5 ^a	18 \pm 3 ^a
Pecks at cloaca	10 \pm 6 ^a	4 \pm 5 ^a	2 \pm 1 ^a	2 \pm 1 ^a

Means within the same raw, in each category with different superscripts are significantly different from each other (at $P \leq 0.05$).

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المخلص المريني

السلوك العدائى ونزوح الريش وعلاقتها بتكوين المجموعات فى الدجاج البياض

نوار عبدالله خطاطب

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فى تجربة للدراسة تأثير وجود ذكر الدجاج البياض على السلوك العدائى ونزوح الريش فى الدجاج.

أجريت التجربة على ٢٨٠ من سلالة المجهورون قسمت إلى مجموعتين، إمتدت الأولى على ١٤٠ دجاجة - والثانية على ١٠٠ ذبوك، ١٣٠ دجاجة.

وهدت كلا المجموعتين على نظام الفرشة المعيقة المنخفضة للدجاج البياض.

أظهرت النتائج :

- وجود نقص معنى فى تكرار السلوك العدائى فى المجموعة التى تشتمل على الدجاج فقط عنها فى المجموعة الخليطة (التي تشتمل على الدجاج والذبوك).

وأبرزت النتائج :

- زيادة السلوك العدائى بين الدجاج بنسبة ٦٢٪ فى المجموعة التى تحتوى على دجاج فقط عنها فى المجموعة الخليطة.

- أن الذبوك لم تبد أى سلوك عدوائى تجاه الدجاج فقط أو تجاه بعضها البعض.

- فيما يخص نزوح الريش لم توجد أى اختلافات معنوية بين المجموعة التى تحتوى على الدجاج والمجموعة الخليطة.
من هذه المراسلة يمكن أن نستخلص :

أن وجود الذبوك فى قطع إنتاج البيض يمكن أن يؤدي إلى نقص السلوك العدائى ليس له تأثير على نزوح الريش بين الدجاج المرى فى مجموعات كبيرة على أقل مساحة من أرضية نظام الفرشة المسيقية، كما أن وجود الذبوك كان ضرورى جدا للمجموعول على نسبة إخصاب عالية فى قطعان إنتاج البيض المستخدم فى التفريخ وعلى المكس تماما لم يكن له ضرورة فى قطعان إنتاج البيض الذى يستخدم فى الاستهلاك الأدمى (لايستخدم فى التفريخ).