Resting Territory of Fantai's Released in a Park[1)2)]

By

Hiroyuki Masatomi

Zoological Institute, Hokkaido University, Sapporo

(*With 3 Text-figures*)

Many observations on the social structure of various birds have been brought out since the publication of two basic works on the occurrence of hierarchical social order (Schjelderup-Ebbe 1922, 1924), and territoriality (Howard 1920). Both systems are known in the common pigeon, *Columba livia* Gmelin. Masure and Allee (1934) demonstrated that the social order was based upon peck-dominance among individuals housed in a pen. On the other hand, several writers (Taylor 1932, Diebschlag 1941, Ritchey 1951, Castoro and Guhl 1958) reported that definite parts in the cage, such as nest board, perch, roost and floor, were defended by each member of the caged flock, suggesting the establishment of territoriality in confinement.

In a previous paper (Masatomi 1961), the diurnal activities were reported of a flock of fantails freely released in the Central Avenue Park, Sapporo. The aim of the present paper is to detect whether or not any territories were established by this highly selected race outside of the pen, not within it.

Material and Methods

The habitat and the rearing conditions of the observed fantails are already described in the previous paper (Masatomi 1961). The observations were mainly carried out in a flock on the southern side, which consisted at first of 14 males and 17 females. But in the course of this observation one male died, one male and one female were separated from the flock and two females were replenished. A long ⊐ shaped nest was placed horizontally about 1 meter above ground level in a cage measuring 1.8 (l)×2.6 (w)×1.8 (h) meters. The nest box was partitioned into 14 compartments, each provided with one round nest hole. From July to late October various type of antagonistic and related behaviour were noted. The records were made separately according to the places where such behaviour was observed: a tree, the roof of the cage, the ground, and also inside the cage.

---

1) Contribution No. 605 from the Zoological Institute, Faculty of Science, Hokkaido University, Sapporo, Japan.

2) This paper is dedicated to Professor Atsuhiko Ichikawa, Zoological Institute, Hokkaido University, Sapporo, in honor of his sixtieth birthday, May 20, 1964.

Jour. Fac. Sci. Hokkaido Univ. Ser. VI 15, 1963.

Observations

The fantails showed various degrees of antagonistic behaviour, from gentle to severe, such as approaching, cooing, threatening (indirect encounter), pecking, wing-flapping and vigorous struggling (direct encounter). Through these hostile acts between two particular fantails, one was deemed to be dominant and the other submissive. The dominance-subordination relationship between two individuals was usually, but not always, a peck-dominance type. For instance, outside the cage, individuals FM, FO and FY showed no resistance to aggressors, but fled from them throughout the observation period, i.e. relationship was peck-right type.

Table 1. Relative social ranks of some fantails. Individuals are arranged in the descending order of their social rank. The initial M and F in the individual mark means male and female, and consort relation is inidicated by the same letter of the alphabet (for instance: MG and FG).

Indiv. Mark	Frequency of Dominance (a)	Frequency of Subordination (b)	b/a	Number of Subm. Individuals	Number of Dom. Individuals
MK	85	14	0.16	20	1
MH	75	19	0.25	14	3
MO	61	31	0.50	12	4
MI	49	33	0.67	10	4
MG	32	27	0.84	8	2
MP	43	34	0.79	8	4
MX	39	34	0.87	4	2
MF	14	10	0.71	2	3
MW	14	29	2.07	3	4
MN	11	15	1.36	2	5
FB	11	19	1.72	3	5
FG	9	16	1.77	1	4
MS	5	19	3.80	1	6
FA	4	14	3.50	2	7
FT	4	21	5.20	1	10
MM	6	36	6.00	—	8
FE	1	9	9.00	1	6
FX	1	9	9.00	1	5
FO	1	15	15.00	1	9
FK	1	17	17.00	—	7
FF	1	11	11.00	—	7
FM	—	16	—	—	7

Some males and females, whose social ranks were relatively distinct because of their frequent reactions to others, are presented in Table 1, together with the frequencies of dominant and submissive reactions at each encounter, and the number of individuals dominant or submissive to them. But this order was neither simple nor stable. There were many triangular, quadrangular or other combinations among the members, and the social rank of some individuals occasionally changed during the observation period. Such intricate inter-

individual relations are mostly caused by one of the following conditions.

1) Lack of frequent encounters among members: The birds were not in a situation where the rank of an individual to every other flock member was determined. Consequently, some individuals seldom had a chance of encountering the others, by which their dominancy outside the cage would plainly be demonstrated. 2) Heterosexual composition of the flock and the unstable mating relation: The majority of males had already mated at the beginning of the observation. Two particular males each consorted with two females during the last weeks in July and August. But some males did not couple during the observation period. Moreover, a few others changed their partners at the death or desertion of their first mates. Homosexual mounting was also occasionally recorded in both sexes. 3) Development of their site attachment: This was considered one of the most effective factors in the appearance of intricate social relations. Therefore antagonistic and maintenance behaviour were registered separately at three different sites.

I) *Ground*: No individual continuously stayed on the ground in the daytime. Threatened by dogs and some careless spectators, they often flew up to the perches in trees or on the roof of the cage. They rarely came down to the ground in a group to beg or look for food, and moved about within the restricted area of the park (cf. Masatomi 1961).

The home range of the flock as a whole was recognizable, but no individual possessed definite territory or even home range on the ground, which was regarded merely as a common, neutral area. In addition to foraging, the fantails bathed in the rain, basked, or courted one another on the ground, but never vigorously defended any particular place, though various mild forms of aggression were observed to happen there over the scramble for food, the approaching to near of other individuals, or the attempt to court unwilling individuals.

II) *Roof of the cage*: Most fantails spent their resting time on the level roof of the cage, but the length of time spent there differed among individuals. They rested peacefully or slept on it in a crouching posture, or sometimes preened themselves during most of the daytime. However, at irregular intervals, there were conflicts. Their frequency was higher here than at the other two sites. Correspondingly, aggressive behaviour was in general more severe on the roof than at the other two sites, though vigorous fights with mutual bill-fencing, wing-flapping and struggling, common in the cage, scarcely occurred here.

Unlike on the ground, it was recognized that each individual tended to rest within a definite area. To determine the extent of such areas, the roof was arbitrarily divided into six sections and the positions of all fantails were checked every half hour, for a period of five days from their release in the morning to confinement at night (Fig. 1). Then the actual ranges of each fantail for resting or walking were approximately estimated by connecting the outermost points of the area in which each individual used to walk or rest. As seen in Figure 2 most of the ranges over-

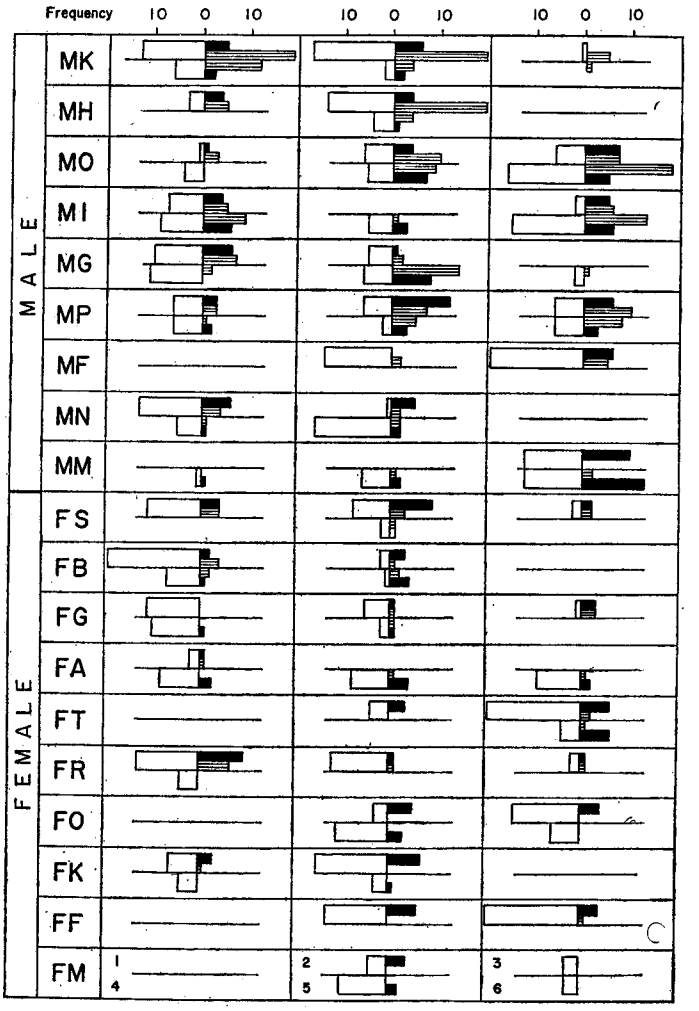

Figure 1. Residence and encounter of each individual in six sections (1–6. see at bottom) on the roof. White histograms show the frequency of residence. Black and striped ones show respectively the frequency of passive and active encounters during a period of five days in early September.

lapped one another. Therefore, the actual position at a given time of each resident was arranged in connection with its neighbours.

Next, the frequency of aggression of each member was counted at six sections separately in order to determine whether or not the resting places were actively defended by their residents. Figure 1 shows the distinct correlation between

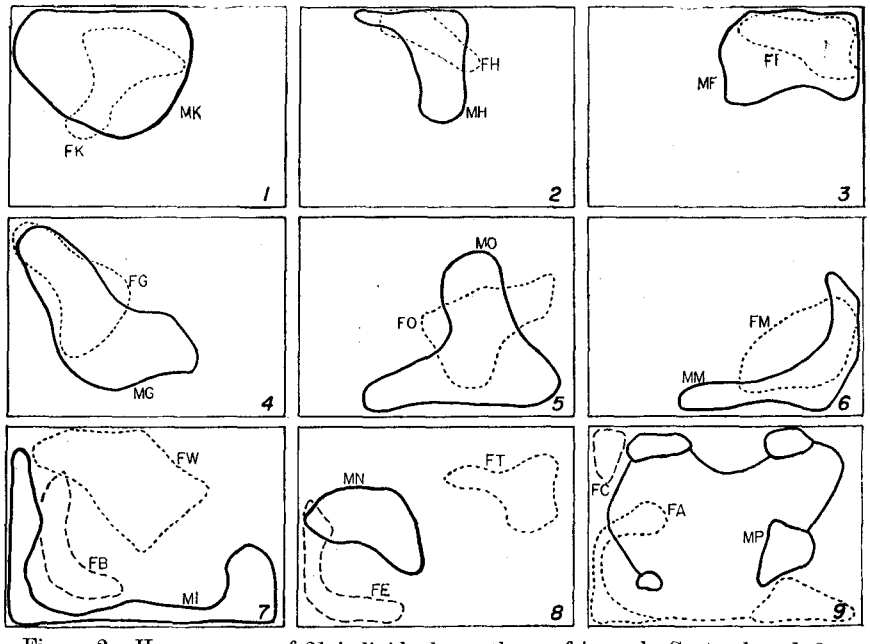

Figure 2. Home ranges of 21 individuals on the roof in early September. 1–6: ranges of different couples. 7–9: ranges of some unmated individuals. Smooth line: male. Dotted line: female.

resting places and outbreak of aggression in some individuals who usually made their attackes on intruders only within or around their resting places. On the other hand, socially lower ranked individuals, such as FO and FM, were constantly soon driven away by pecking or chasing outside their resting areas. But they could show resistance even to high-ranked intruders, as long as they stayed within their proper resting places.

The pattern and intensity of aggression in defending the resting place varied considerably with each fantail and case. Many females did not always claim their resting places with definite hostility. It was noticeable that the percentage of direct encounters on the roof—mainly pecking—was quite low compared with those in the cage. Such a tendency of mild defense for the resting place might also clearly be characterized by the low proportion of mutual aggression in the total frequency of direct encounters compared with the case in the cage (Fig. 3). As a result of having contiguous resting places, it might be that a fantail should have more chances of encounters with particular neighbours. The resting places of mated birds were always contiguous and in general largely overlapped those of their consorts.

Two regular couples had frequent encounters with each other because of

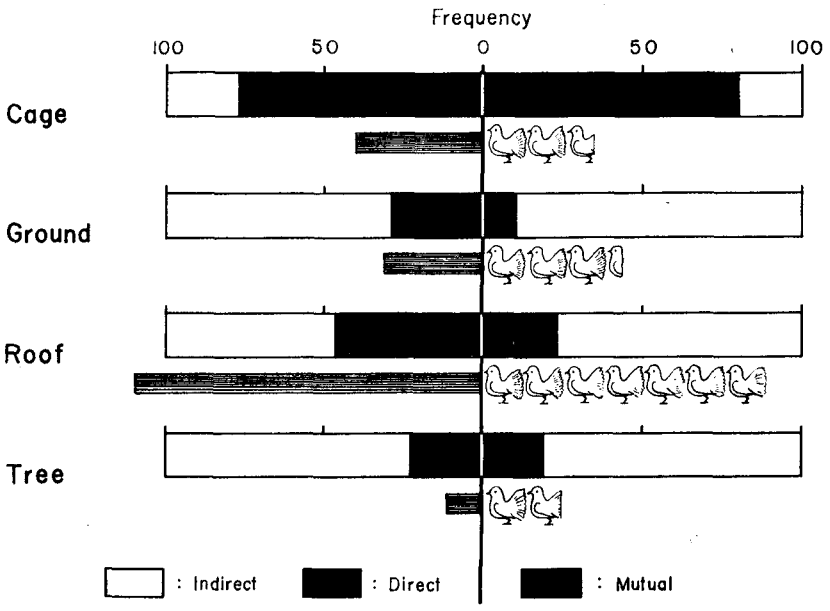

Figure 3. The bold histograms on the left show the proportion (%) of direct and indirect aggression in the total frequency of encounter, and those on the right show the proportion of mutual aggression in the toal direct encounters in each place. Frequency of encounter in different places was counted from 8: 30 to 18: 00 on 13th September and is shown by the finely striped histograms. Figures of fantails indicate the average numbers of individuals encountered.

their adjacent ranges. Sometimes it was observed that one mate of a couple, usually the male, made a counter against an aggressor who was chasing or attacking his partner close at hand. However, the conflict was inclined to be ignored when it arose outside his resting place even if within that of his mate. Judging from these facts, the counter of the male could be interpreted as mainly the defence of his own place overlapping that of his mate, rather than of the place of his mate, or his mate herself.

III) *Tree*: The majority of the members of the flock rested at first on perches in a maple standing near the cage, but in the middle of July most of them came to stay on the roof leaving only a few regular members still retaining their perches (cf. Masatomi 1961). Such individuals remaining in the tree also tended to spend their resting time in some definite positions. Beside resting, sleeping or preening, sometimes mild antagonistic and sexual acts were observed in the tree.

Occasionally two fantails, not mates, perched together peacefully, approaching to within about 20 cm of one another. Under confinement, on the perch in

front of the nest, furious attacks might break out within this distance. Although many fantails perched gregariously, they never actually came in contact with others, except for their pair mates, by repelling mutually with peck or threat.

Discussion

Woodpigeons, *Columba palumbus* Linnaeus, include in their territory not only trees but also the adjacent ground (Cramp 1958). Common pigeons confined in a small cage settle definite areas, including the ground, which are defended by each owner (Ritchey 1951, Castoro and Guhl 1958). But common pigeons forming a free large flock seem to have no particular ground areas defended by each individual, other than the regular feeding stations of flocks (Gompertz 1957, Goodwin 1960). All fantails observed in the present work also moved around indiscriminately within a regular ground area which was the home range of the flock as a whole. Most aggression except for the sake of food and sex, seems to be caused by the attempt to maintain individual distance rather than a definite area. Then one's success in a series of conflict on the ground may generally show its dominance over the another in their social hierarchy for the lack of direct interference of territoriality by which the social rank is often secondarily affected.

Establishment of precise territory seems to be a rule in common pigeons in a pen (Taylor 1932, Diebschlag 1941, Ritchey 1951, Hukuda and Kameoka 1957, Castoro and Guhl 1958). But the present work reveals that fantails had possession of places on the roof corresponding to the "topographically localized defended areas " (Hinde 1956). In this case they may be called resting or day-roosting territory, being different from night-roosting and breeding territories formed within the cage.

In the present case, relatively aggressive owners were inclined to keep rather large areas, and less aggressive individuals smaller ones. Females were in general less aggressive than males and more indifferent about guarding their resting territories. These two facts correspond to observations in caged pigeons by Masure and Allee (1934), Diebschlag (1941), Ritchey (1951), Castoro and Guhl (1958) and others. But the reactions to defened the territory on the roof were not so vigorous as those in the pen and mostly consisted of indirect aggression.

The boundaries between territories were in general very loosely upheld, and the territories of certain less aggressive individuals tended to shift according to their locomotion (*non-topographic*). Several other individuals were habitually found at regular positions on the roof, but they seemed to have no defended area. In these individuals ownership may be maintained only by silent and undemonstrative persistence at the places. The actual position chosen by each individual at a given time, together with the extent and rigidity of its resting territory, might be decided in correlation to the appearance of particular neighbours and their movements on all sides.

Diebschlag (1941) refers to the double constitution of resting ranges: the true small resting place defended vigorously, and the larger influence sphere, including the former, defended loosely. The distinction between them was obscure in the present case, probably on account of the high population density and the restricted extent of the roof. High concentration on the roof might be considered due to the tameness of fantails (Masatomi 1961), and natural roosting habits of *C. livia* (Goodwin 1960).

Although some resting territories were established on the roof and the perches, their features and the coexistence of many fantails without any territorial behaviour suggest that such territories principally originated from *individual distance*, a small defended area around the bird transferred when it moved (Hediger 1950, Conder 1949). Hukuda and Kameoka (1957) suggested that the average individual distance was about 30 cm in carrier pigeons in a pen. This distance is more or less comparable to the general size of the resting territory in the present work.

In the fantails observed, such individual distance seems to be retained in some individuals still in its original type, while it appears to be modified into a definite resting "territory" in other individuals, though still retaining its primitive feature. Such a relationship between individual distance and territory has been discussed in some other birds (e.g. Conder 1949, Marler 1956, 1956a).

Acknowledgements: The author's gratitude is due to Messrs. M. Nakamata and H. Takahashi, who afforded him the opportunity to observe the fantails, and to the following gentlemen for their courtesy shown during the course of the observation: the late Mr. K. Takano and Messrs. N. Jurakuji, S. Nakagawa, and Y. Omachi.

Further, the author wishes to express his particular thanks to Professor M. Yamada and Dr. S.F. Sakagami who read through and improved the manuscript.

Summary

The present observations were carried out from summer to fall on the social behaviour of fantails freely released during the daytime in a park and regularly accommodated at night in a cage.

Besides the roosting or breeding territories in the cage, some of them established small resting territories on the roof of the cage or on perches in a maple. But these resting territories were less clear in their demarcation and less intensively defended in comparison with the territories established within the cage. Further, several individuals tended to rest in regular areas but not defend them.

From such peculiarities it was considered that the resting territory was derived from *individual distance*, and still more or less retained its primitive nature.

References

Castoro, P.L. and A.M. Guhl 1958. Pairing behavior of pigeons related to aggressiveness and territory. Wilson Bull. **70**: 57–69.

Conder, P.J. 1949. Individual distance. Ibis **90**: 649–655.
Cramp, S. 1958. Territorial and other behaviour of the woodpigeon. Bird Study **5**: 55–66.
Diebschlag, E. 1941. Psychologische Beobachtungen über die Rangordnung bie der Haustaube. Zeitschr. f. Tierpsychol. **4**: 173–187.
Gompertz, T. 1957. Some observations on the feral pigeon in London. Bird Study **4**: 2–13.
Goodwin, D. 1960. Comparative ecology of pigeons in inner London. Brit. Bds. **53**: 201–212.
Hediger, H. 1950. Wild animals in captivity. London.
Hinde, R.A. 1956. The biological significance of the territories of birds. Ibis **98**: 340–369.
Howard, H.E. 1920. Territory in bird life. London.
Hukuda, H. and T. Kameoka 1957. Studies on the social structure in the group life of carrier pigeon. II. Pecking-relations and space-utilization of individual brids in the pigeon-pen. Jap. J. Ecol. **7**: 34–39.
Marler, P. 1956. Studies of fighting in chaffinches. (3) Proximity as a cause of aggression. Brit. J. Anim. Behav. **4**: 23–30.
——— 1956a. Territory and individual distance in the chaffinch *Fringilla coelebs*. Ibis **98**: 496–501.
Masatomi, H. 1961. An observation on diurnal activity of fantails released in a park. J. Fac. Sci. Hokkaido Univ., Ser. VI, Zool. **14**: 614–628.
Masure, R.H. and W.C. Allee 1934. The social order in flocks of the common chicken and the pigeon. Auk **51**: 306–327.
Ritchey, F. 1951. Dominance-subordination and territorial relationships in the common pigeon. Physiol. Zool. **24**: 167–176.
Schjelderup-Ebbe, T. 1922. Beiträge zur Sozialpsychologie des Haushuhns. Zeitschr. f. Psychol. **88**: 225–252.
——— 1924. Zur Sozialpsychologie der Vögel. Zeitschr. f. Psychol. **95**: 38–84.
Taylor, W.S. 1932. The gregariousness of pigeons. J. comp. Psychol. **13**: 127–131.