

## STUDY ON THE HOURLY FREQUENCY OF EXPLORING AND SOCIAL BEHAVIORAL MANIFESTATIONS IN DOGS HOUSED IN A SPECIALIZED SHELTER IN RELATIONSHIP WITH THE SEX PROPORTION AND ANIMALS AGE IN THE GROUP

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### Abstract

*The purpose of present investigations was to determine the hourly frequency of paddock exploring and social behavioral manifestations in dogs housed in a specialized shelter in relationship with the male-female proportion and animals mean age in the group, to improve the latter structure. Findings indicate that a lesser male number and a lower female mean age in the group significantly influence female paddock exploring behavior, in that where more females and fewer males were accommodated showed the highest hourly frequency of female paddock exploring behavioral manifestations (with an hourly average of  $1.58 \pm 0.19$  of behavioral manifestations). Hourly frequencies of play and aggressive social behavioral manifestations of females were also affected, recording a female play behavior higher in the case of keeping them with fewer males, but also for a lower female mean age in the group (with an hourly average of  $0.98 \pm 0.12$  behavioral manifestations). Also, a higher male number and a lesser female number in the group increase the hourly frequency of female aggressive behavioral manifestations towards others (with an hourly average of  $1.10 \pm 0.10$  of behavioral manifestations). Also, it has been registered a higher hourly frequency of female food theft in groups where the male number was lower than female number, correlated with lower female mean age. Regarding the influence of female number on male paddock exploring and social behavioral manifestations, it is obvious that a higher female number in the group, also correlated with a higher male mean age, reduces male aggressive behavioral manifestations towards themselves but increases the hourly frequency of male aggressive behavioral manifestations towards others (with an hourly average of  $1.50 \pm 0.24$  of behavioral manifestations).*

**Key words:** age, behavior, dogs, sex ratio.

### INTRODUCTION

The domestic dog, *Canis familiaris*, is considered one of the first domesticated species (Thorne, 1992). In general, when there is possible dogs live in groups of 2 ÷ 6 individuals (Boitani et al., 1995) and usually have a male in the top of the hierarchy.

The role of dogs in today human society is complex. S.C. Tătărucă (2011) from the Sibiu Canine Center affirms that dog is the only animal with special skills to protect humans, to find, identify and search for various objects or substances that are illegally consumed and sold (drugs) or different explosives and other odors emanating from different bodies (such as corpses). The same author states that dog can be used to search and identify criminal law breakers, to save people, to prevent potential attacks and to discourage them.

Animal protection strategy in our country, involving matters of preparation, planning and

proper implementation must start from thorough knowledge of animal welfare requirements, based on correct scientific study of behavior in different species to whom this refers. One of the species utmostly found in the attention of public opinion regarding necessity and opportunity for protection is represented by dogs (Elena Popescu-Micloșanu, Carmena Șerbănoiu, 2009).

Setup and running a dog shelter must take into account several aspects, namely: health, age, sex and aggressiveness level [2]. Design, construction and use of specialized shelters also assume knowledge of diverse behavioral aspects of dog biology (feeding, drinking, urinating, defecating, resting in different postures (standing, sitting, lying, squatting, etc.), the manner how social hierarchy is established in these shelters (aggression and affection behavior) and which are the various aspects of abnormal behavior of these dogs (walking in circles around the paddock, turning

around, different stereotypes). Also, these shelters must allow animals observation and health determining, but also easily perform of various veterinary treatments (Carmena Șerbănoiu, 2009).

## MATERIAL AND METHOD

The study was conducted in a private shelter for stray dogs belonging to the Association Pro Animals in Târgu-Jiu, on a total of 15 dogs, 6 males and 9 females, housed in three different groups, as follows: *Group a* (2 M + 3 F) in paddock no. 7, *Group b* (3 M + 2 F) in paddock no. 11 and *Group c* (1 M + 4 F) in paddock no. 23.

Females mean age (Fma) in *Group a* was 9.7 years, in *Group b* was 4.5 years and in *Group c* was 4.8 years.

Males mean age (Mma) in *Group a* was 9.5 years, in *Group b* was 6.5 years and the single male in *Group c* was 13 years old.

Animals were observed 10 days, 10 hours a day in the time interval 8:00 ÷ 18:00. The amount of behavioral manifestations for each dog was recorded at every hour. The hourly observations were classified in 3 types, namely:

**1** - activity behavioral manifestations (feeding, drinking, defecation, urination, cleaning their own fur, scratching, exploring paddock and social behavior as play, aggression, fear, affection and theft of food),

**2** - sleep behavioral manifestations (standing up, sitting back, lying down on abdomen and on one side and squat) and

**3** - abnormal behavioral manifestations (walking around inside the paddock, turning around in circle and various stereotypes).

Data were processed using Microsoft Excell 2003, and the significance of differences between the averages of 3 groups of behavioral manifestations was *t*-tested using Student test.

## RESULTS AND DISCUSSIONS

### 1. Hourly frequency of female paddock exploring and social behavioral manifestations in relationship with the male-female proportion and females mean age in the group

#### 1.1 Hourly frequency of female paddock exploring behavior in relationship with the male-female proportion and females mean age in the group

In paddock no. 23, where a group of 1 M + 4 F with an adult Fma of 4.8 years was housed, females showed the highest hourly frequency of paddock exploring events (with an hourly average of  $1.58 \pm 0.19$  behavioral

manifestations), compared with females of paddock no. 11 (with an hourly average of  $1.12 \pm 0.14$  behavioral manifestations)

Table 1. Hourly frequency and daily average total number of female behavioral manifestations in the 3 groups (paddocks) during the studied period

Specification	Group a Paddock no. 7 (2 M + 3 F)		Group b Paddock no. 11 (3 M + 2 F)		Group c Paddock no. 23 (1 M + 4 F)	
	Daily observation time interval 8:00 ÷ 18:00					
	$\bar{X} \pm s$	Total	$\bar{X} \pm s$	Total	$\bar{X} \pm s$	Total
Paddock exploring	$0.95 \pm$ <i>ans</i> <i>c</i> 0.16	9.5	$1.12 \pm$ <i>ans</i> <i>bns</i> 0.14	11.2	$1.58 \pm$ <i>bns</i> <i>c</i> 0.19	15.8
Social behavior						
Play	$0.6 \pm$ <i>ans</i> <i>c</i> 0.06	6	$0.66 \pm$ <i>ans</i> <i>b</i> 0.06	6.6	$0.98 \pm$ <i>b</i> <i>c</i> 0.12	9.8
Aggression						
- towards itself	$0.6 \pm$ <i>a</i> <i>c</i> 0.13	6	$0.68 \pm$ <i>a</i> <i>b</i> 0.05	6.8	$0.96 \pm$ <i>b</i> <i>c</i> 0.13	9.6
- towards others	$0.15 \pm$ <i>a</i> <i>c</i> 0.17	1.5	$1.1 \pm$ <i>a</i> <i>b</i> 0.10	1.1	$0.55 \pm$ <i>b</i> <i>c</i> 0.08	5.5
-towards the environment	0	0	$0.75 \pm$ <i>b</i> 0.10	7.5	$0.4 \pm$ <i>b</i> 0.08	4
Fear	$0.48 \pm$ <i>ans</i> <i>c</i> 0.13	4.8	$0.53 \pm$ <i>ans</i> <i>b</i> 0.10	5.3	$0.74 \pm$ <i>b</i> <i>c</i> 0.12	7.4
Affection						
- muzzle contact	$1.1 \pm$ <i>ans</i> <i>cns</i> 0.12	11	$0.9 \pm$ <i>ans</i> <i>bns</i> 0.08	9	$1.1 \pm$ <i>bns</i> <i>cns</i> 0.12	11
- congener fur grooming	$0.43 \pm$ <i>ans</i> <i>cns</i> 0.09	4.3	$0.65 \pm$ <i>ans</i> <i>bns</i> 0.15	6.5	$0.48 \pm$ <i>bns</i> <i>cns</i> 0.06	4.8
Food theft	$0.07 \pm$ <i>ans</i> <i>c</i> 0.06	0.7	$0.17 \pm$ <i>ans</i> <i>bns</i> 0.10	1.7	$0.24 \pm$ <i>bns</i> <i>c</i> 0.15	2.4

Note: significant difference between averages are accompanied by the same letter and the insignificant ones by the notation "ns"

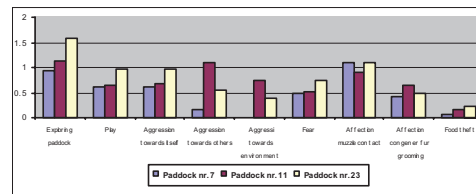


Fig. 1: Hourly frequency of female paddock exploring and social behavioral manifestations in the 3 groups (paddocks) during the studied period

where a group of 3 M + 2 F with similar adult Fma of 4.5 years was housed, and females of paddock no. 7 (with an hourly average of  $0.95 \pm 0.16$  behavioral manifestations), where a

group of 2 M + 3 F with the oldest Fma of 9.7 years was housed.

The difference is significant only between the hourly averages of behavioral manifestations of females of paddocks no. 23 and no. 7.

*1.2 Hourly frequency of female social behavior in relationship with the male-female proportion and females mean age in the group*

*1.2.1 Hourly frequency of female play behavior in relationship with the male-female proportion and the females mean age in the group*

In paddock no. 23, where a group of 1 M + 4 F with an adult Fma of 4.8 years was housed, females showed the highest frequency of play events (with an hourly average of  $0.98 \pm 0.12$  behavioral manifestations), compared with females of paddock no. 11 (with an hourly average of  $0.66 \pm 0.06$  behavioral manifestations), where a group of 3 M + 2 F with similar adult Fma of 4.5 years was housed, and females of paddock no. 7 (with an hourly average of  $0.60 \pm 0.06$  behavioral manifestations), where a group of 2 M + 3 F with the oldest Fma of 9.7 years was housed.

There are significant differences only between the hourly averages of behavioral manifestations of females of paddock no. 23 and females of paddocks no. 7 and no. 11.

*1.3 Hourly frequency of female aggressive behavior in relationship with male-female proportion and females mean age in the group*

*1.3.1 Hourly frequency of female aggressive behavior towards itself in relationship with the male-female proportion and females mean age in the group*

In paddock no. 23, where a group of 1 M + 4 F with an adult Fma of 4.8 years was housed, females showed the highest hourly frequency of behavioral manifestations of aggression towards themselves (with an hourly average of  $0.96 \pm 0.13$  behavioral manifestations), compared with females of paddock no. 11 (with an hourly average of  $0.68 \pm 0.05$  behavioral manifestations), where a group of 3 M + 2 F with similar adult Fma of 4.5 years was housed, and females of paddock no. 7 (with an hourly average of  $0.60 \pm 0.13$  behavioral manifestations), where a group of 2 M + 3 F with the oldest Fma of 9.7 years was housed.

There are significant differences between the hourly averages of behavioral manifestations of the females in all 3 groups.

*1.3.2 Hourly frequency of female aggressive behavior towards others in relationship with male-female proportion and females mean age in the group*

In the paddock no. 11, where a group of 3 M + 2 F with an adult Fma of 4.5 years was housed, females showed the highest hourly frequency of

aggression towards others (with an hourly average of  $1.10 \pm 0.10$  behavioral manifestations), compared with females of paddock no. 23 (with an hourly average of  $0.55 \pm 0.08$  behavioral manifestations), where a group of 1 M + 4 F with an adult Fma of 4.8 years was housed, and females of paddock no. 7 (with an hourly average of  $0.15 \pm 0.10$  behavioral manifestations), where a group of 2 M + 3 F with the oldest Fma of 9.7 years was housed.

There are significant differences between the hourly averages of behavioral manifestations of the females in all 3 groups.

*1.3.3 Hourly frequency of female aggressive behavior towards environment in relationship with male-female proportion and females mean age in the group*

Females of paddock no. 7, where a group of 2 M + 3 F with the oldest Fma of 9.7 years was housed, did not show aggressive behavior towards the environment, while females of paddock no. 11, where a group of 3 M + 2 F with an adult Fma of 4.5 years was housed, showed the highest hourly frequency of aggressive events towards the environment (with an hourly average of  $0.75 \pm 0.10$  behavioral manifestations). Females in paddock no. 23, where a group of 1 M + 4 F with an adult Fma of 4.8 years was housed, recorded the lowest hourly frequency of aggressive events towards the environment (with an hourly average of  $0.40 \pm 0.08$  behavioral manifestations).

There is a significant difference only between the hourly averages of behavioral manifestations of females of paddocks no. 11 and no. 23.

*1.4 Hourly frequency of female fear behavior in relationship with the male-female proportion and the females mean age in the group*

In the paddock no. 23, where a group of 1 M + 4 F with an adult Fma of 4.8 years was housed, females showed the highest hourly frequency of fear events (with an hourly average of  $0.74 \pm 0.12$  behavioral manifestations), compared with females of paddock no. 11 (with an hourly average of  $0.53 \pm 0.10$  behavioral manifestations), where a group of 3 M + 2 F with similar adult Fma of 4.5 years was housed, and females of paddock no. 7 (with an hourly average of  $0.48 \pm 0.13$  behavioral manifestations), where a group of 2 M + 3 F with the oldest Fma of 9.7 years was housed.

There are significant differences between the hourly averages of behavioral manifestations of females of paddock no. 23 and females of paddocks no. 7 and no. 11.

*1.5 Hourly frequency of female affection behavior in relationship with the male-female proportion and the females mean age in the group*

*1.5.1 Hourly frequency of female affection behavior by muzzle contact in relationship with the male-female proportion and the females mean age in the group*

Females of all 3 groups showed approximately the same hourly frequency of affection behavior by muzzle contact ( $1.10 \pm 0.12$  the females of paddock no. 7,  $0.90 \pm 0.08$  the females of paddock no. 11 and  $1.10 \pm 0.12$  the females of paddock no. 23).

There are no significant differences between the hourly averages of behavioral manifestations of females in all 3 groups.

*1.5.2 Hourly frequency of female affection behavior by congener fur grooming in relationship with male-female proportion and females mean age in the group*

Females of all 3 groups showed approximately the same hourly frequency of affection behavior by cleaning fur congeners ( $0.43 \pm 0.10$  the females of paddock no. 7,  $0.65 \pm 0.15$  the females of paddock no. 11 and  $0.48 \pm 0.06$  the females of paddock no.23).

There are no significant differences between the hourly averages of behavioral manifestations of females in all 3 groups.

*1.6 Hourly frequency of female food theft behavior in relationship with the male-female proportion and the females mean age in the group*

In the paddock no. 23, where a group of 1 M + 4 F with an adult Fma of 4.8 years was housed, females showed the highest hourly frequency of food theft events (with an hourly average of  $0.24 \pm 0.15$  behavioral manifestations), compared with females of paddock no. 11 (with an hourly average of  $0.17 \pm 0.1$  behavioral manifestations), where a group of 3 M + 2 F with similar adult Fma of 4.5 years was housed, and females of paddock no. 7 (with an hourly average of  $0.07 \pm 0.06$  behavioral manifestations), where a group of 2 M + 3 F with the oldest Fma of 9.7 years was housed.

There is a significant difference only between the hourly averages of behavioral manifestations of females of paddocks no. 23 and no. 7.

**2. Hourly frequency of male paddock exploring and social behavioral manifestations in relationship with the male-female proportion and the males mean age in the group**

*2.1 Hourly frequency of male paddock exploring behavior in relationship with the*

*male-female proportion and males mean age in the group*

The male paddock exploring behavior was affected by the male-female proportion in the group. The frequency of paddock exploring events recorded in males from paddocks no. 7 was of  $0.94 \pm 0.22$  and  $1.16 \pm 0.14$  in paddock no. 11). The single male in paddock no. 23 showed the highest frequency of paddock exploring events ( $1.43 \pm 0.19$ ), than males in other 2 paddocks.

There are significant differences between the hourly averages of behavioral manifestations of the males in all 3 groups.

*2.2 Hourly frequency of male social behavior in relationship with the male-female proportion and males mean age in the group*

*2.2.1 Hourly frequency of male play behavior in relationship with the male-female proportion and the males mean age in the group*

The highest hourly frequency of male play events ( $0.71 \pm 0.22$ ) occurred in males from paddock no. 7, where a group of 2 M + 3 F with the oldest Mma of 9.5 years was housed, compared with males in the paddock no. 11 ( $0.37 \pm 0.08$ ), where a group of 3 M + 2 F with an adult Mma of 6.5 years was housed. The single, 13 years old dog in paddock no. 23 showed no play event.

The difference is significant only between the hourly averages of behavioral manifestations of males of paddocks no. 7 and no. 11.

Table 2. Hourly frequency and daily average total number of male behavioral manifestations in the 3 groups (paddocks) during the studied period

Specification	Group a Paddock no. 7 (2 M + 3 F)		Group b Paddock no. 11 (3 M + 2 F)		Group c Paddock no. 23 (1 M + 4 F)	
	Daily observation time interval 8:00 ± 18:00					
	X ± s X	Total	X ± s X	Total	X ± s X	Total
Paddock exploring	$0.94 \pm 0.22$ <i>a</i> <i>c</i>	9.4	$1.16 \pm 0.14$ <i>a</i> <i>b</i>	11.6	$1.43 \pm 0.19$ <i>b</i> <i>c</i>	14.3
Social behavior						
Play	$0.71 \pm 0.22$ <i>a</i>	7.1	$0.37 \pm 0.08$ <i>a</i>	3.7	0	0
Aggression						
- towards itself	$0.55 \pm 0.13$ <i>ans</i> <i>c</i>	5.5	$0.4 \pm 0.05$ <i>ans</i> <i>cbns</i>	4	$0.2 \pm 0.13$ <i>bns</i> <i>c</i>	2
- towards others	$0.78 \pm 0.24$ <i>a</i> <i>c</i>	7.8	$1 \pm 0.08$ <i>a</i> <i>b</i>	1	$1.5 \pm 0.24$ <i>b</i> <i>c</i>	15
-towards the environment	$0.5 \pm 0.05$ <i>ans</i> <i>cns</i>	0.5	$0.35 \pm 0.10$ <i>ans</i> <i>bns</i>	3.5	$0.5 \pm 0.04$ <i>bns</i> <i>cns</i>	5
Fear	0	0	$0.25 \pm 0.03$	2.5	0	0
Affection						

- muzzle contact	1.3 ± <i>ans</i> 0.1 <i>cns</i>	13	0.95 ± <i>ans</i> 0.10 <i>bns</i>	9.5	1.1 ± <i>bns</i> 0.12 <i>cns</i>	11
- congener fur grooming	0.49 ± <i>ans</i> 0.15 <i>cns</i>	4.9	0.45 ± <i>ans</i> 0.11 <i>bns</i>	4.5	0.3 ± <i>bns</i> 0.06 <i>cns</i>	3
Food theft	0.48 ± <i>ans</i> 0.16 <i>cns</i>	4.8	0.23 ± <i>ans</i> 0.10 <i>bns</i>	2.3	0.3 ± <i>bns</i> 0.07 <i>cns</i>	3

Note: significant differences between averages are accompanied by the same letter and the insignificant ones by the notation "ns"

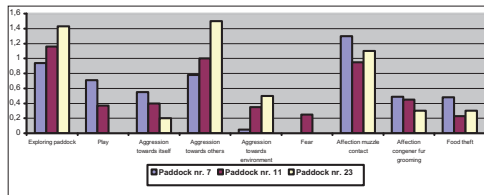


Fig. 2: Hourly frequency of male paddock exploring and social behavioral manifestations in the 3 groups (paddocks) during the studied period

### 2.3 Hourly frequency of male aggressive behavior in relationship with male-female proportion and males mean age in the group

#### 2.3.1 Hourly frequency of male aggressive behavior towards itself in relationship with the male-female proportion and males mean age in the group

Males in paddock no. 7, where a group of 2 M + 3 F with the oldest Mma of 9.5 years was housed, showed the highest hourly frequency of behavioral manifestations of aggression towards themselves ( $0.55 \pm 0.15$ ) than males in paddock no. 11 ( $0.40 \pm 0.05$ ) with an adult Mma of 6.5 years and the single 13 years old male in the paddock no. 23 ( $0.20 \pm 0.13$ ).

There is a significant difference only between the hourly averages of behavioral manifestations of males of paddocks no. 7 and no. 23.

#### 2.3.2 Hourly frequency of male aggressive behavior towards others in relationship with male-female proportion and males mean age in the group

The single, 13 years old male in paddock no. 23, housed with 4 F, showed the highest hourly frequency of aggressive behavior towards others ( $1.50 \pm 0.24$ ) than males in paddock no. 11 ( $1.00 \pm 0.08$ ) with a Mma of 6.5 years and housed with 2 F and males in paddock no. 7 ( $0.7 \pm 0.24$ ), with a Mma of 9.5 years and housed with 3 F.

There are significant differences between the hourly averages of behavioral manifestations of the males in all 3 groups.

#### 2.3.3 Hourly frequency of male aggressive behavior towards environment in relationship with male-female proportion and males mean age in the group

The single, 13 years old male in paddock no. 23, housed with 4 F, showed the highest hourly frequency of aggressive behavior towards environment ( $0.5 \pm 0.04$ ) than males in paddock no. 11 ( $0.35 \pm 0.10$ ) with a Mma of 6.5 years and housed with 3 F and males in paddock no. 7 (0.05), with a Mma of 9.5 years.

There are no significant differences between the hourly averages of behavioral manifestations of the males in all 3 groups.

#### 2.4 Hourly frequency of male fear behavior in relationship with the male-female proportion and the males mean age in the group

Male fear was manifested only in the paddock no. 11 (2.5 daily average manifestations) where there was the highest number of males (3 M) with an Mma of 6.5 years. In other 2 paddocks, with less number of males than females, males did not expressed fear.

#### 2.5 Hourly frequency of male affection behavior in relationship with the male-female proportion and the males mean age in the group

##### 2.5.1 Hourly frequency of male affection behavior by muzzle contact in relationship with the male-female proportion and the males mean age in the group

Males of the 3 groups showed approximately the same hourly frequency of affection behavior by muzzle contact ( $1.30 \pm 0.10$  paddock no. 7,  $0.95 \pm 0.10$  paddock no. 11 and  $1.10 \pm 0.12$  paddock no. 23).

There are no significant differences between the hourly averages of behavioral manifestations of the males in all 3 groups.

##### 2.5.2 Hourly frequency of male affection behavior by congener fur grooming in relationship with male-female proportion and males mean age in the group

Males of the 3 groups showed approximately the same hourly frequency of affection behavior by congener fur grooming ( $0.49 \pm 0.15$  paddock no. 7,  $0.45 \pm 0.11$  paddock no. 11 and  $0.30 \pm 0.06$  paddock no. 23).

There are no significant differences between the hourly averages of behavioral manifestations of the males in all 3 groups.

#### 2.6 Hourly frequency of male food theft behavior in relationship with the male-female proportion and the males mean age in the group

Male food theft was manifested in all 3 groups but there are no significant differences between the hourly averages of behavioral manifestations of males in all 3 groups.

## CONCLUSIONS

A lesser number of males housed with females in the group favored an increased frequency of paddock exploring behavior manifestations in females (paddock no. 23, 1M + 4F). Regarding the mean age of females housed in the 3 paddocks, findings show that paddock exploring behavior manifestations in younger females (4.5 ÷ 4.8 years old) occurred at a higher frequency comparatively to the older ones (9.7 years old).

Play behavior manifestations frequency in females was higher both in the case of females housed with a lesser number of males (paddock no. 23 with 1M + 4F) and in the case of a lower mean age of females (4.8 years old, paddock no. 23).

A lesser number of males housed with females in group, and a lower female mean age led to a higher frequency of male aggressive manifestations towards themselves (paddock no. 23, 1M + 4F, 4.8 years mean age of females).

In paddocks where male number was relatively lesser than that of females findings show a higher frequency of food theft events, also correlated with lower female mean age (paddock no. 23).

The frequency of paddock exploring, affection and food theft events was not significant affected neither by the male-female proportion nor by the male mean age in the 3 groups (paddocks).

A higher female number housed with males in the group, correlated with an older male mean age led also to a reduced frequency of female aggressive events towards others and to an increased frequency of male aggressive events towards others (paddock no. 23).

A lower number of males housed with females in the group favoured a higher frequency of behavior manifestations of paddock exploring, play, aggression of females towards themselves, fear and food theft of females and a higher frequency of behavior manifestations of paddock exploring and aggression towards other of males. No influence has been reported on the affection behavior neither of males nor of females and on fear and food theft behavior manifestations of males.

For an exact establishment of the relatedness of social behavior manifestations in dogs housed in specialized shelters and their underlying causes, in order to ensure them a better boarding, it is necessary to fulfil further studies in this respect.

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