

STUDY ON THE AVERAGE HOURLY FREQUENCY OF DIFFERENT BEHAVIOR MANIFESTATIONS OF ADULT NEW ZEALAND WHITE AND CALIFORNIAN RABBITS DURING WINTER SEASON

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Abstract

Studies on rabbit behaviour as an indicator of their welfare are incomplete, contradictory and represented the concern of a small number of researchers, who, in general, did not take into account the production issues involved; therefore, an ethological research was conducted, considering the winter season circumstances, on 16 New Zealand White and Californian rabbits, for 20 days on month, under general raising conditions as provided by literature. The average temperature was of -2.40 ± 1.30 °C. They were monitored based on ethological records specific to rabbits, in 10 hourly intervals, between 8 a.m. and 6 p.m.

During the winter period, the New Zealand White females had an average hourly frequency of 1.20 ± 0.06 of feeding activities, whilst the Californian females had a frequency with 22.6% higher, of 1.55 ± 0.11 . The smelling and cage exploring behaviours had an average hourly frequency higher on Californian females (1.30 ± 0.12 and respectively of 1.44 ± 0.21 on Californian females and 0.92 ± 0.07 and 1.15 ± 0.11 manifestations per hour on New Zealand White females). Rest behaviours had a higher frequency on Californian females compared to the New Zealand White ones. New Zealand White females registered more abnormal behaviour activities than Californian females.

During the winter period, the New Zealand White males had an average frequency of 1.15 ± 0.12 feeding activities, similar to the one of Californian males which was 1.17 ± 0.14 . The smelling and cage exploring behaviours had a higher frequency on Californian males (1.80 ± 0.22 and respectively 1.52 ± 0.15 on Californian males and 1.33 ± 0.17 and respectively 1.21 ± 0.17 on New Zealand White males). Rest behaviours registered an average frequency higher on Californian males, whilst the New Zealand White males registered a higher frequency of abnormal behaviours.

In conclusion, we can confirm that during the winter period, Californian females manifest a significantly higher number of feeding rounds than the males from the same breed and both New Zealand White males and females. The smelling and cage exploring behaviours are more frequent on Californian males and females than on New Zealand White males and females. Californian females are generally more active than the same breed of males, both regarding to activities such as watering, defecation, urinating, hygiene behaviours and also rest.

Key words: behaviour, rabbits, winter season

INTRODUCTION

The house rabbit can meet the basic requirements of human existence, namely: food by its flesh and clothing by its fur and wool. The rabbit, due to its extraordinary capacity of production and reproduction, can make an important contribution to the worldwide struggle for increasing the production of animal protein [1]. It also produces agricultural

fertilizers and is particularly useful as a laboratory and scientific experiments animal. It is also the subject of sport hobbies and an acclaimed pet [3].

MATERIAL AND METHOD

Enhancing the production and usage of different methods in growing rabbits can have negative effects on their welfare, also requiring the development of appropriate specific management procedures to reduce these effects [2].

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The microclimate conditions from the shelter seasonally influences the behaviour and the productive characteristics of rabbits. Thus, the thermal stress can lead to the reduction or uneconomic increase of feed intake [5], increase of susceptibility to diseases or affect the efficiency of breeding [4].

The research was conducted in a specialized raising shelter on a total of 16 New Zealand White and Californian adult rabbits. In order to better determinate their behavioural manifestations they were followed by drawing individual daily observation record-sheets in the horary interval 08.00 - 18.00. The research was conducted for 20 days per month and the followed behavioural manifestations were grouped into three categories: activity

behaviours, behaviours of rest (sleep) in various positions and abnormal behaviour. Preliminary data was processed, achieving the average number of behavioural manifestations for each sex and race. The average temperature during the survey period was $-2.40 \pm 1.30^{\circ}\text{C}$. The other environmental conditions in which the research took place were within the limits set by the literature. The data was processed using Microsoft Excel 2007.

RESULTS AND DISCUSSIONS

1. Average hourly frequency of the behavioural manifestations analyzed on males and females from the two breeds

Table 1 Average hourly number of behavioural manifestations on New Zealand White and Californian females and males between the hours 08.00-18.00 during winter season

Nr. crt.	Breed and sex of the animal / Hourly observations	White New Zealand		Californian	
		Males	Females	Males	Females
		X \pm sx	X \pm sx	X \pm sx	X \pm sx
1	I Activity Feeding	1.15 \pm 0.12	1.20 \pm 0.06	1.17 \pm 0.14	1.55 \pm 0.11
2	Watering	0.93 \pm 0.10	1.15 \pm 0.12	0.97 \pm 0.009	1.21 \pm 0.14
3	Defecation	0.59 \pm 0.09	1.05 \pm 0.15	0.67 \pm 0.15	1.15 \pm 0.10
4	Urinating	0.78 \pm 0.15	0.97 \pm 0.08	0.80 \pm 0.23	1.20 \pm 0.08
5	Cage exploration	1.33 \pm 0.17	0.92 \pm 0.07	1.80 \pm 0.22	1.30 \pm 0.12
6	Smelling	1.21 \pm 0.12	1.15 \pm 0.11	1.52 \pm 0.15	1.44 \pm 0.21
7	Standing alert	0.36 \pm 0.05	0.67 \pm 0.07	-	1.04 \pm 0.05
8	Hygiene (comfort) behavior				
9	-cleaning its fur by licking	1.58 \pm 0.17	1.63 \pm 0.17	0.52 \pm 0.04	1.61 \pm 0.11
10	-scratching	1.40 \pm 0.13	1.51 \pm 0.12	0.55 \pm 0.02	1.74 \pm 0.14
11	Play	-	-	-	-
12	Fear	-	-	-	-
13	Aggressiveness	-	-	-	-
14	II Rest (sleep) in various positions - high sitting on the hindquarters position	0.83 \pm 0.08	1.20 \pm 0.23	1.03 \pm 0.11	1.20 \pm 0.15
15	- sitting hunched on the hindquarters position	1.28 \pm 0.26	1.33 \pm 0.18	1.15 \pm 0.12	1.20 \pm 0.14
16	-squat	1.52 \pm 0.23	1.61 \pm 0.14	1.87 \pm 0.25	1.49 \pm 0.22
17	-lying on its belly	1.25 \pm 0.08	1.23 \pm 0.15	1.27 \pm 0.13	1.96 \pm 0.25
18	-lying on one side	1.21 \pm 0.13	1.24 \pm 0.17	0.95 \pm 0.10	1.75 \pm 0.12
19	Social relations				
20	III Abnormal behaviours - biting cage bars	-	-	1.00 \pm 0.09	-
21	- walking in circle around the cage	1.12 \pm 0.12	-	0.67 \pm 0.07	-
22	-walking in circles	0.33 \pm 0.05	-	-	1.55 \pm 0.13
23	-different stereotypes	0.33 \pm 0.04	-	-	1.55 \pm 0.20
24	-scratching the floor	0.78 \pm 0.08	-	1.38 \pm 0.22	-

Activity Behaviour

During the period analyzed, the New Zealand White males had an average number of 0.93 ± 0.10 **feeding** behavioural manifestations, the New Zealand White females 1.20 ± 0.06 feeding activities per hour, the Californian males had 1.17 ± 0.15 feeding activities and the Californian females 1.55 ± 0.11 feeding activities per hour.

During the period analyzed, the New Zealand White males had an average number of 0.93 ± 0.10 **watering** behavioural manifestations, the New Zealand White females 1.15 ± 0.12 watering activities per hour, the Californian males had 0.97 ± 0.12 watering activities, and the Californian females 1.21 ± 0.14 watering activities per hour.

During the period analyzed, the New Zealand White males had an average number of 0.59 ± 0.09 **defecation** behavioural manifestations, the New Zealand White females 1.05 ± 0.15 , the Californian males had 0.67 ± 0.11 defecation activities, and the Californian females 1.15 ± 0.10 defecation activities per hour.

During the period analyzed, the New Zealand White males had an average number of 0.78 ± 0.15 **urinating** behavioural manifestations, the New Zealand White females of 0.97 ± 0.08 , the Californian males had 0.80 ± 0.14 urinating activities, and the Californian females 1.20 ± 0.8 urinating activities per hour.

During the period analyzed, the New Zealand White males had an average number of 1.33 ± 0.17 **cage exploration** behavioural manifestations, the New Zealand White females 0.92 ± 0.07 cage exploration activities, the Californian males had 1.80 ± 0.23 cage exploration activities, and the Californian females 1.30 ± 0.12 of such activities per hour.

During the period analyzed, the New Zealand White males had an average number of 1.21 ± 0.12 **smelling** behavioural manifestations, the New Zealand White females 1.15 ± 0.11 of such activities, the Californian males had 1.52 ± 0.18 smelling activities, and the Californian females 1.44 ± 0.21 smelling activities per hour.

During the period analyzed, the New Zealand White males had an average number

of 1.36 ± 0.05 **standing alert** behavioural manifestations, the New Zealand White females 0.67 ± 0.07 of such activities, the Californian males had no activities of standing alert, and the Californian females had 1.04 ± 0.05 standing alert activities per hour.

Hygiene Behaviour

During the period analyzed, the New Zealand White males had an average number of 1.58 ± 0.17 **cleaning its fur by licking** behavioural manifestations, the females from the same breed 1.63 ± 0.17 cleaning its fur by licking activities, the Californian males had 0.52 ± 0.10 cleaning its fur by licking and the Californian females had 1.61 ± 0.11 of such activities per hour.

During the period analyzed, the New Zealand White males had an average number of 1.40 ± 0.13 **scratching** behavioural manifestations, the New Zealand White females 1.51 ± 0.12 scratching activities, the Californian males had 0.55 ± 0.08 scratching activities, and the females from the same breed had 1.74 ± 0.14 scratching activities per hour.

Playful, Fear and Aggressiveness Behaviours

During the period studied both females and males from the two breed have not expressed play, fear or aggressiveness activities.

Rest Behaviours

During the period analyzed, the New Zealand White males had an average number of 0.83 ± 0.08 **high sitting on the hindquarters position** behavioural manifestations, the New Zealand White females had 1.20 ± 0.23 high sitting on the hindquarters position, the Californian males had 1.03 ± 0.32 of such activities, and the Californian females had 1.20 ± 0.15 high sitting on the hindquarters position activities per hours.

During the period analyzed, the New Zealand White males had an average number of 1.28 ± 0.27 **sitting hunched on the hindquarters position** behavioural manifestations, the New Zealand White females had 1.33 ± 0.18 of such activities, the Californian males presented 1.15 ± 0.14 times per hour of sitting hunched on the hindquarters position, and the Californian

females had 1.20 ± 0.14 of such position per hour.

During the period analyzed, the New Zealand White males had an average number of 1.52 ± 0.23 **squat** behavioural manifestations, the New Zealand White females had 1.61 ± 0.14 squat activities, the Californian males had 1.87 ± 0.26 squat activities, and the Californian females had 1.49 ± 0.22 of such activities per hour.

During the period analyzed, the New Zealand White males had an average number of 1.25 ± 0.08 **lying on its belly** behavioural manifestations, the New Zealand White females had 1.23 ± 0.15 of such activities, the Californian males had 1.27 ± 0.23 lying on its belly activities, and the Californian females had 1.96 ± 0.25 lying on its belly activities per hour.

During the period analyzed, the New Zealand White males had an average number of 1.21 ± 0.13 **lying on one side** behavioural manifestations, the New Zealand White females had 1.24 ± 0.17 lying on one side activities, Californian males had 0.95 ± 0.12 lying on one side activities, and the Californian females had 1.75 ± 0.12 of such activities per hour.

During the period analyzed the **social relations** activities were inexistent on the animals studied.

Abnormal behaviours

During the period analyzed, the New Zealand White males and females had no **biting cage bars** behavioural Californian males had 1.00 ± 0.15 biting cage bars activities, and the females had no such activities.

During the period analyzed, the New Zealand White males had an average number of 1.12 ± 0.12 **walking in circles around the cage** behavioural manifestations, the New Zealand White females had no such activities, Californian males had 0.67 ± 0.08 walking in circles around the cage and the Californian females had no waling in circles around the cage activities.

During the period analyzed, the New Zealand White males had an average number of 0.33 ± 0.05 **walking in circles** behavioural manifestations, the New Zealand White females had no walking in circle activities,

the Californian males had no walking in circle activities, and the Californian females had 1.55 ± 0.13 walking in circle activities per hour.

During the period analyzed, the New Zealand White males had an average number of 0.33 ± 0.04 **different stereotypes** behavioural manifestations, the New Zealand White females had no stereotype activities, the Californian males had no stereotype activities, and the Californian females had 1.55 ± 0.20 stereotype activities.

During the period analyzed, the New Zealand White males had an average number of 0.78 ± 0.08 **floor scratching** behavioural manifestations, the New Zealand White females had no floor biting, scratching activities, the Californian males had 1.38 ± 0.28 scratching activities per hour, and the Californian females had no such activities.

2. Average hourly frequency of the behavioural manifestations analyzed by groups of activity during the winter period on males and females from the two breeds

Hereinafter is presented the studied behavioural manifestations grouped into three categories: activity behaviours, behaviours of rest (sleep) in various positions and abnormal behaviour.

Average hourly behavioural manifestations per categories during the winter season on females from the two studied breeds

During the **winter** season in the studied period, on New Zealand White females we have registered an hourly average frequency of activity behaviours of 1.14 ± 0.03 , whilst the Californian females had an hourly average frequency of 1.36 ± 0.02 , with 16.18% more reduced on New Zealand White females compared to the one registered on Californian females.

The behaviours of rest (sleep) in various positions registered an hourly average frequency of 1.32 ± 0.02 on New Zealand White females, frequency which was with 26.52% more elevated than the one registered on Californian females (0.97 ± 0.02).

Abnormal behaviours were registered only on Californian females (0.78 ± 0.04 hourly average frequency).

Table 2 Average hourly number of behavioural manifestations by groups of activity during the winter season on males and females of the two breeds

Specification	White New Zealand		Californian	
	Females	Males	Females	Males
I Activity	1.14 ± 0.03	1.04 ± 0.05	1.36 ± 0.02	0.89 ± 0.10
II Rest (sleep) in various positions	1.32 ± 0.02	1.22 ± 0.03	0.97 ± 0.02	1.25 ± 0.06
III Abnormal behaviours	-	0.68 ± 0.07	0.78 ± 0.04	0.51 ± 0.12

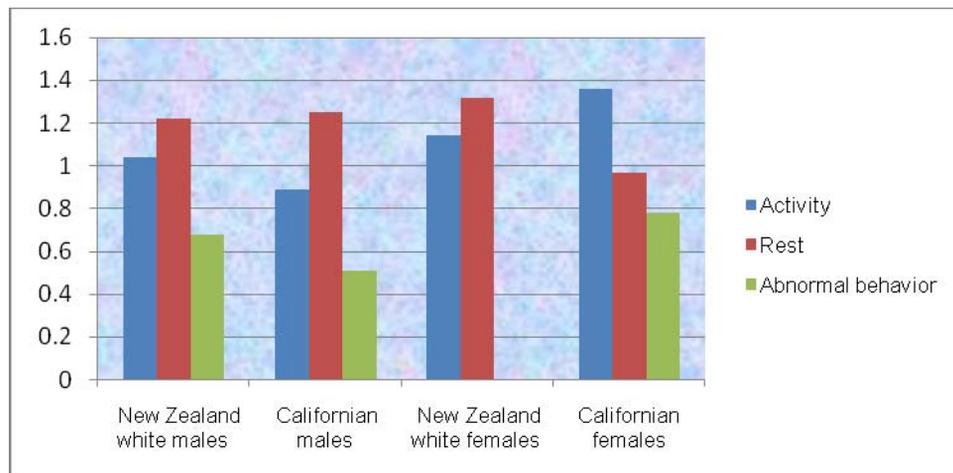


Fig. 1 Average hourly frequency of the behavioural manifestations analyzed by groups of activity during the winter period on males and females from the two breeds

Average hourly behavioural manifestations per categories during the winter season on males from the two studied breeds

During the winter season in the studied period, on New Zealand White males we have registered an hourly average frequency of activity behaviours of 1.04 ± 0.05, whilst the Californian males had an hourly average frequency of 0.89 ± 0.10, with 14.42% more reduced on Californian males compared to the one registered on New Zealand White males.

The behaviours of rest (sleep) in various positions registered an hourly average frequency of 1.22 ± 0.03 on New Zealand White males, frequency which was with 2.4% lower than the one registered on Californian males (1.25 ± 0.06).

The abnormal behaviours had an hourly average frequency higher with 25% on New

Zealand White males (0.68 ± 0.07) compared to the Californian males (0.51 ± 0.12).

Average hourly behavioural manifestations per categories on males and females from the two studied breeds

The New Zealand White females have manifested more frequently than the adult males both activity (by 8.77%), and rest behaviours (by 7.58%). The Californian females presented more often activity behaviours than the adult males (by 34.56%), but rested less frequently (by 22.4 %).

CONCLUSIONS

During the winter period, the Californian adult females manifest a significantly higher number of feeding rounds than the males from the same breed and so do both New Zealand White males and females. The smelling and cage exploitation behaviours are more frequent on Californian males and

females than on New Zealand White males and females. The Californian females are generally more active than the males from the same breed also regarding other activities such as watering, defecation, urinating, hygiene behaviours and rest.

The activity behaviours were 14.42% more reduced on Californian males compared to New Zealand White males. The behaviours of rest (sleep) in various positions have registered a similar hourly average frequency, by only 2.40%, more elevated on Californian males compared to the one registered on New Zealand White males. The abnormal behaviours had an hourly average frequency more elevated by 25% on New Zealand White males compared to Californian males.

The activity behaviours were 16.18% more reduced on New Zealand White females compared to Californian females. The behaviours of rest (sleep) in various positions have registered an hourly average frequency, by 26.52% more elevated on New Zealand White females compared to the one registered on Californian females. Abnormal behaviours were registered only on Californian females and on males from both breeds.

The females of the studied breeds, both White New Zealand and Californian, have manifested activity behaviours more frequently than the males.

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