Journal of Rural Advancement
[ISSN 2347-2561 (P); 2583-6102 (E)]
Vol. 12, Issue 01, April 2024

Etho-nutritional response of female white New Zealand rabbits during different quarters of the day

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Received on: January 22, 2024 Accepted on: February, 28, 2024

Abstract

Twelve non-lactating female White New Zealand rabbits (3.25 ± 0.20 kg) were randomly selected and housed in separate cages without routine exercise and given 350 g of concentrates and alfalfa green food (ad-lib). An eight-day adaptation period was followed by a five-day behaviour experiment. The animals were observed for their general, specific, and excretion behaviors for 120 consecutive hours, divided into 24 slots of 5 hours each. The animals were observed at an interval of 15 minutes to fill up the behaviour inventory. The data was classified into four quarters of the day, i.e., morning (4–10 hours), noon (10–16 hours), evening (16–22 hours), and night (22-4 hours). For comparing the data, a two-way ANOVA with the replication technique was implemented. The highest sitting posture in the noon (85.69±1.66 m) and standing in the night (85.69±1.66 m); sleeping time in the noon (52.08±1.50 m), eating in the evening (20.00±1.94m), and resting in the night (70.97±2.08 m); and the highest frequency of faecal excretion in the morning (0.63±0.06 times per hour) and urine excretion in the night quarter (0.55+0.08 times per hour) were recorded. It can be concluded that one important component influencing the rabbit's behavior is the effect of different quarters of the day. In the quarter of the night, the rabbits were most active, followed by the morning and evening, whereas in the noon quarter of the day, they were least active.

Keywords: Behaviour, Excretion, Rabbits, Sitting, Standing.

Introduction

The rabbits have attracted the attention of the research worker because of low input and high output potential. The rabbits are kept of multiple production. Because the rabbits are nocturnal animals, therefore they are very sensitive towards the light

intensity humidity, temperature, and clock timings (Szendrő et al., 2016; Kishore and Goitom, 2021a). The domestic rabbit behaviour is still much like that of the wild rabbit (Lebas et al., 1986), since many of the behavioural events which have been reported for wild rabbits are observed in domestic rabbits (Stoufflet and Caillol, 1988).

General behaviour including sitting and standing, specific behaviour including sleeping eating and resting and excretion behaviour including faecal and urine excretion behaviour have been studied in the rabbits according to the clock timings (Kishore and Goitom, 2022). Thermal effect is one of the important factors which affects the behaviour of the rabbit (Kishore and Goitom, 2021b) and found most active at the time when the environmental temperature was low (minimum of 16.9°C during the experiment).

Seasonal variations in the length of the day lighting period have an impact on rabbit behavior, physiological parameters, reproductive health, and other productive functions. The seasons regulate the reproductive process of European wild rabbits, ensuring that the doe that is pregnant or nursing and her offspring have access to enough food (Boyd and Bray, 1989). The lighting schedules in rabbit houses and the natural photoperiod may play important roles in qualities like reproduction. There are still unanswered concerns about the impact of color and intensity. The sensitivity of rabbits to the colour of the light has also been documented (Pan et al., 2022).

Present investigation was conducted with objective to study the etho-nutritional response of Female White New Zealand rabbits during different quarters of the day.

Materials and methods

The field trial was conducted at Rabbit Farm, Hamelmalo Agricultural College (HAC), Hamelmalo, Keren, Zoba Anseba, Eritrea. The farm is located at an altitude of 1286 m above sea level. It has a semi-arid climate with an annual mean rainfall of 440 mm and an average annual temperature of 24 °C. The experiment was conducted in April and May 2018. The experimental animal for research work was a rabbit. From the HAC rabbit farm, 12 non-lactating female White New Zealand rabbits were randomly selected (3.25±0.20 kg) and housed in a separate cage. During the experiment, the animals were not allowed to do routine exercise. The experimental animals were given 350 g of concentrates produced from leftover HAC cafeteria food to suit their daily ME and DCP requirements (Cheeke, 1987; Maertens, 1992). The animal was given green food on an as-needed basis. Along with the concentrate, 3 g of regular salt were given to each animal. Table 1 displays the chemical makeup of feed ingredients (AOAC, 2000).

During the experiment, an eight-day adaptation period was followed by a five-day behaviour experiment. The animals were observed for their general, specific nutritional, excretion, and urination behaviours. The behaviour experiment continued for 120 consecutive hours, divided into 24 slots of 5 hours each. The animals were offered a measured amount of feed at the start of the slot. They had free access to drinking water around the clock. During each slot, the animals were observed at an interval of 15 minutes to fill up the behaviour inventory (Kishore, 1997), including various aspects related to general, specific, nutritional, excretion, and urination behaviour. The recorded data was

classified into four quarters of the day, i.e., morning (4–10 hours), noon (10–16 hours), evening (16–22 hours), and night (22-4 hours). For comparing the data, a two-way ANOVA with replication technique was implemented (Snedecor and Cochran, 1994). The data analysis pack of MS Office Excel 2016 was used for this purpose (UQ Library, 2016).

Table 1: Chemical composition of feed ingredients.

Nutrient	Concentrate	Alfalfa
CP (%)	12.0	18.8
CF (%)	0.9	28.1
EE (%)	0.6	0.6
NFE (%)	85.2	42.2
Ash (%)	1.8	10.4
OM (%)	98.2	89.6
TCHO (%)	85.6	70.3
NFE (%)	84.7	42.2
GE (K cal/g)	4.2	3.9

Results and discussion

During the experimental trial, observed behaviour data of rabbits under study, were classified with regard to the different quarters of the day viz. morning (4-10h), noon (10-16h), evening (16-4h). The quarterly effect of the day had been found to change rabbit behaviour. The results in detailed are presented in this chapter.

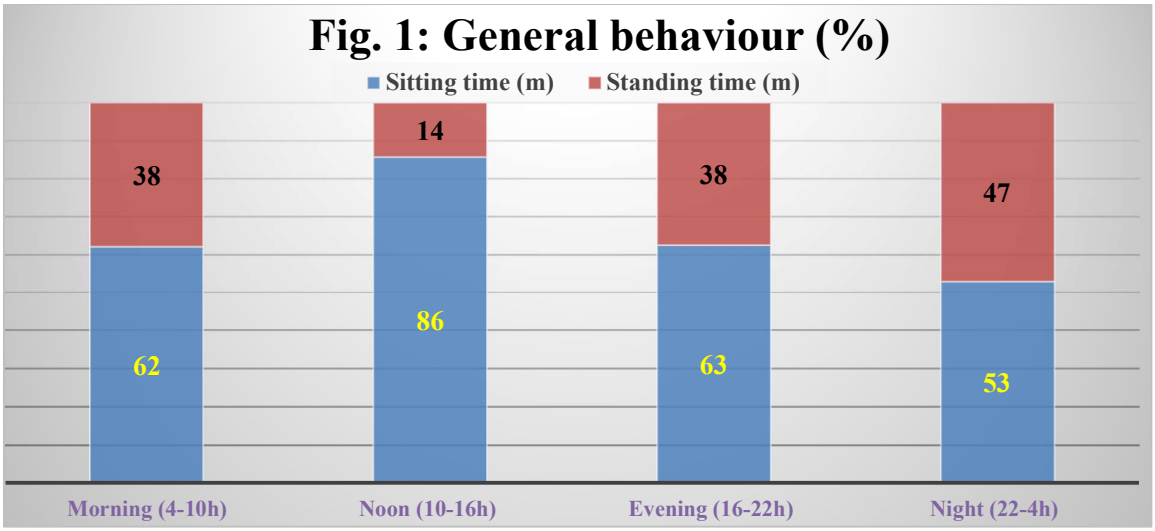
General behaviour: The quarterly effect of the day has been recorded as a key factor that had a significant role in changing the general behaviour of the female White New Zealand rabbits (table 1; Fig. 1). During noon, the animal remained in sitting posture for more time when they stayed for 85.69±1.66 minutes (m), followed by evening (62.50±3.07 m) and morning (62.08±3.09 m), whereas the lowest sitting was recorded during the night (52.92±2.62 m) quarts of the day ($P<0.01$). Just a reverse trend was observed for their standing posture, which was observed highest in the night when the animals stood for more time (85.69±1.66 m), followed by morning (62.50±3.07 m) and evening (62.08±3.09 m), whereas the lowest standing was recorded during the noon (52.92±2.62 m) quarts of the day ($P<0.01$). The results indicated that animals were most active during the night and less active during the noon sessions of the day. The findings indicate that the rabbits are nocturnal and active in dark hours (Lebas, 1997).

Specific behaviour: The specific behaviour of the female White New Zealand rabbits was shown to have significantly ($P<0.01$) changed with the change in the quarter of the day (table 1; Fig. 2). The animal spent the most time sleeping (52.08±1.50 m) during the noon, followed by the time spent during the morning (23.89±2.61 m) and evening (12.78±2.35 m), whereas it spent the least sleeping time at night (11.81±2.01 m). The animal ate the food for the longest time during the evening (20.00±1.94m),

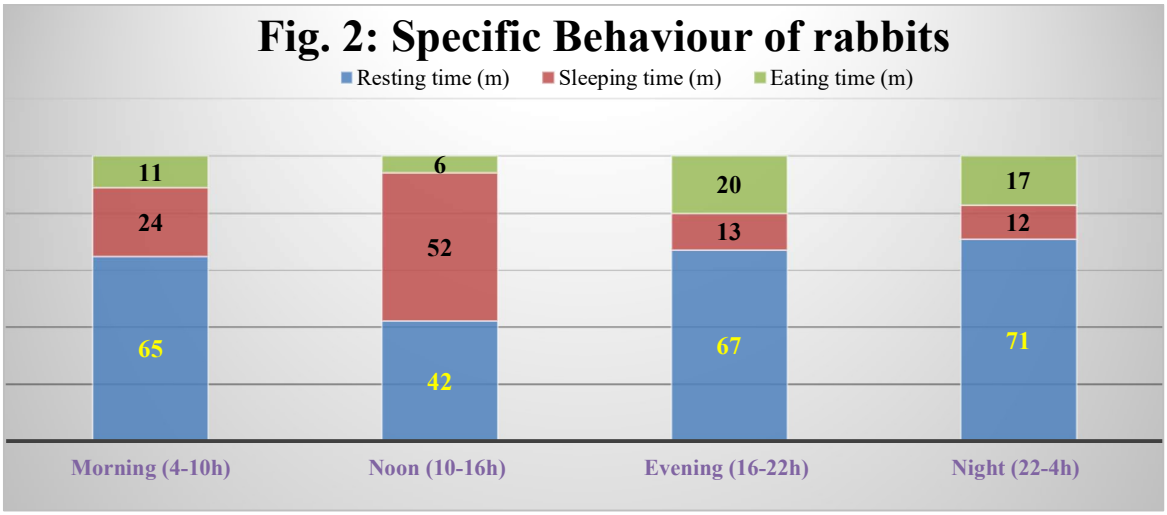
followed by that in the night (17.22±2.06m) and morning (11.11±0.41m), whereas it ate it for the least time at noon (5.83±1.14). The animal rested for the largest period of time in the night (70.97±2.08 m), followed by that in the evening (67.22±2.33 m) and morning (65.00±2.42 m), whereas it rested for the shortest period of time at noon (42.08±1.98 m). According to studies conducted on ruminants (Singh et al., 1997; Srivastava et al., 1997; Kishore, A., 1998; Chandra and Kishore, 2000), the results were contradictory. One possible explanation is that although rabbits were nocturnal, ruminants were not (Lebas et al., 1997). The current research supports the conclusions reached by Prud'hon (1975) and Eberhart (1980). The findings showed that the animals favored to eat in the evening and at night and to sleep in the midday hours of the day.

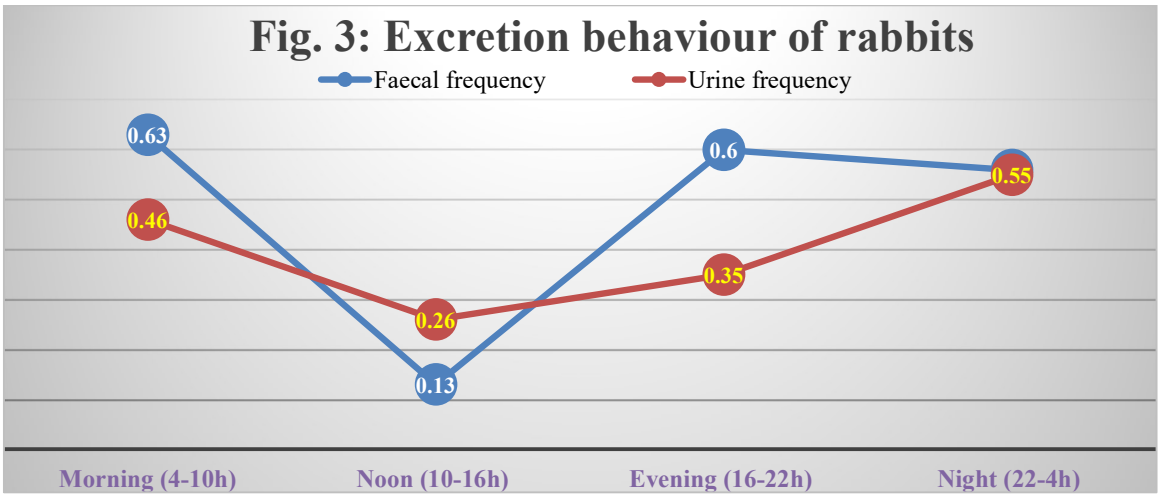
Table 1. Etho-nutitional details of female white New Zealand rabbits

Ethogram parameter		Morning (4-10h)	Noon (10-16h)	Evening (16-22h)	Night (22-4h)	P-value
General behaviour	Sitting time (m)	62.08±3.09	85.69±1.66	62.50±3.07	52.92±2.62	0.00
	Standing time (m)	37.92±3.09	14.31±1.66	37.50±3.07	47.08±2.62	0.00
Specific behaviour	Resting time (m)	65.00±2.42	42.08±1.98	67.22±2.33	70.97±2.08	0.00
	Sleeping time (m)	23.89±2.61	52.08±1.50	12.78±2.35	11.81±2.01	0.00
	Eating time (m)	11.11±0.41	5.83±1.14	20.00±1.94	17.22±2.06	0.00
excretion behaviour	Faecal frequency	0.63±0.06	0.13±0.03	0.60±0.11	0.56±0.08	0.00
	Urine frequency	0.46+0.07	0.26±0.06	0.35±0.08	0.55+0.08	0.00



Excretion behaviour: The day's quarterly effect had been noted, influencing the rabbits' excretion habits (table 1; Fig. 3). The morning quarter had the highest frequency of faecal excretion (0.63±0.06 times), followed by the evening (0.60±0.11 times) and night (0.56±0.08 times). The midday quarter had the lowest frequency of faecal excretion (0.13±0.03 times). The quarter with the highest frequency of urine excretion was the night quarter (0.55+0.08 times), followed by the morning (0.46+0.07 times) and evening (0.35±0.08 times). The quarter with the lowest frequency of urine excretion was the midday quarter (0.26±0.06 times). The findings on the same line with the ruminants (Singh et al., 1997; Srivastava et al., 1997; Kishore, 1998; Chandra and Kishore, 2000) were at odds with the results. One possible explanation is that although rabbits were nocturnal, ruminants were not (Lebas et al., 1997). The paucity of available literature made it impossible to verify the recorded figures.





Conclusion

Based on the results of this study, it can be concluded that one important component influencing the rabbit's behavior is the effect of different quarters of the day. In the quarter of the night, the rabbits were most active, followed by the morning and evening, whereas in the noon quarter of the day, they were least active. The time spent on eating was also high during the quarters of evening and night. Thus, a feeding plan can be recommended in order to plan the eating times of rabbits, particularly during the evening and night quarters.

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