

The impacts of the Angora rabbit housing system in KP, Pakistan

Muhammad Jamil^{1*}, Habibullah², Muhammad Mubeen², Muhammad Noman³, Muhammad Zeeshan², Muhammad Inamulla Malik², Ambrina Tariq⁴ Muhammad Fahimullah Khan², Ghulam Jelani⁵,

¹PARC Arid Zone Research Center, Dera Ismail Khan-29050-Pakistan

²Faculty of Veterinary and Animal Sciences, Gomal University, Dera Ismail Khan-29050-Pakistan

³Department of epidemiology and public health uvas lahore

⁴Civil Veterinary Hospital CVH, Dera Ismail Khan-29050-Pakistan

⁵Faculty of Veterinary and Animal sciences, University of Agriculture, Dera Ismail Khan-29050-Pakistan

⁶Department of Epidemiology and Public Health, University of Veterinary and Animal Sciences, Lahore, Pakistan

Abstract

Angora rabbits are small mammals belong to Leporidae family and Lagomorpha order. These mammals are distributed in many areas of the globe. Rabbits are reared in laboratories to perform various scientific researches, as a pet and for commercial purposes. The biological parameters are highly affected by different housing systems. For this purpose, the current study was performed to check the effect of different housing systems on biological parameters of Angora rabbits such as body weight gain (BWG), respiratory rate (RR), body temperature (BT) and heart rate (HR). The study resulted that mean heart rate in IO, IC and OC were 39.10 ± 6.32 , 35.30 ± 7.33 and 39.10 ± 6.19 , respectively. The mean values of heart beat rate on first and second week in IO were 40.33 ± 1.11 and 40.66 ± 1.16 beats per minute while 37.60 ± 0.25 beats per minute in 10th week of experiment. The mean values of respiratory rate were 139.00 ± 0.31 and 145.00 ± 1.00 beat per minute on 10th and 8th week of experiment, respectively. The mean values of respiratory rate in IO, IC and OC were 159.80 ± 19.20 , 128.50 ± 14.11 and 126.30 ± 21.00 beat per minute, respectively. The growth parameters such as body weight of rabbits were differed significantly ($p < 0.05$) when compared with different groups. BW was highly affected by housing system. The mean BW of Angora rabbits in OC, IO and IC groups was 1.44 ± 1.23 , 1.49 ± 0.23 , 1.59 ± 0.12 kg, respectively. The mean body temperature (BT) in IO, IC and OC was 39.26 ± 0.01 , 39.37 ± 1.34 and 38.77 ± 1.21 , respectively. The mean body weight and body temperature of Angora rabbits on first week of experiment were 1.50 ± 1.02 kg and 39.06 ± 1.11 °C, respectively while 1.56 ± 0.25 kg and 39.12 ± 1.45 °C, respectively on tenth week of experiment.

Keywords: Angora rabbits; Biological parameters; Physiological parameters; Climatic factors; Pakistan

Introduction

Rabbits belong to family Leporidae and order Lagomorpha. The family, Leporidae consists of eight genera classified as different rabbits such as cottontail rabbits, the European rabbit and Amami rabbit etc. Approximately 28 and 77 races and species, respectively have been reported by various researchers in the world. These small mammals are distributed in various countries of the globe (Rewatkar et al., 2013). Rabbits are not only reared on small as well as large scale level to obtain wool, meat and fur but also used in laboratories to perform various researches or experiments (Egbo et al., 2001; Herbert, 2011).

These are main source of meat, utilized as human food due to various characters such as short generation period, high prolificacy, small body size, short life cycle, rapid growth rate, small gestation period and genetic diversity (Arijeniwa et al., 2000; Marai et al, 2001; Bugti et al., 2016). The production of rabbits is decreasing due to effect of various biotic and abiotic factors throughout the world (Bhat et al., 1996; Sürsal et al., 2014; Elshahawy et al., 2016).

Rabbits are homoiothermic or warm-bloodedness mammal with fast metabolic rate, slow heat loss and no sweat glands. It has been reported that 15-25°C is the most favorable temperature for rabbit growth and development. The fertility (growth and development) of rabbits can affected above than 25°C temperature. Angora rabbits are not still found in Pakistan. These were imported from Germany to increase their population for meat production, wool production and research purposes. Government of Pakistan is highly interested in rabbit farming at small and large scale. Rabbits can prove fruitful for farmers and become the source of income as well as food for poor farmers. The products such as wool and skin can be used for making various products like caps, shawls and thermal underwear. Their rearing is not easy in Pakistan due to climatic variations. The purpose of current study was to rear and check the effect of different housing systems on rabbits under controlled conditions. For this purpose, the current study was conducted.

Material and methods

Study area

The current study was conducted in PARC Arid Zone Research Centre. Dera Ismail Khan, KP, Pakistan.

Study design and data recording

Angora rabbits were imported from NARC and thirty rabbits were selected to perform this study. The age and average weight of rabbits was 4-5 months and 1 kg, respectively. Rabbits were reared in PARC Arid Zone Research Centre, Dera Ismail Khan for ten weeks. These thirty rabbits were divided into three groups and each group consisted 10 rabbits. First group (G 1) is outdoor control (OC), reared outdoor in open environment (not in cages). The excess water, food, sunlight and air was provided to G 1 even space available for jumping, running and walking. Second group (G2) is an Indoor colony (IC) while third group was reared openly without cages (IO). No sunlight was given to G 2 and G 3. The ad libitum alfalfa hay was provided on daily basis for feeding. The health of Angora rabbits was checked three times on a day. The data of growth performance was recorded. To investigate the body weight gain (BWG), rabbits were individually weighted every week with the help of digital electric balance while rectal temperature (RT) was also measured using a clinical thermometer inserted into the rectum for 2 min at a depth of 4cm. The different parameters such as respiratory rate (RR), body temperature (BT) and heart rate (HR) by using a hand counter, thermometer and a stethoscope, respectively.

Statistical analysis

Data of growth performance, BWG, HR, BT and RR were analyzed by ANOVA using the SPSS statistics. The body weight and average weight gain was also determined in case of feed intake and feed conversion ratio and means with different letter with $p < 0.05$ were statistically significant to each other.

Results

The disease symptoms were seen in rabbits in indoor open (IO) while no disease sign was seen in control group. The growth parameters such as body weight of rabbits were differed significantly ($p<0.05$) when compared with different groups. BW was highly affected by housing system. The mean BW of angora rabbits in OC, IO and IC groups was 1.44 ± 1.23 , 1.49 ± 0.23 , 1.59 ± 0.12 kg, respectively. The mean body temperature (BT) in IO, IC and OC was 39.26 ± 0.01 , 39.37 ± 1.34 and 38.77 ± 1.21 , respectively.

The mean body weight and body temperature of angora rabbits on first week of experiment were 1.50 ± 1.02 kg and 39.06 ± 1.11 °C, respectively while 1.56 ± 0.25 kg and 39.12 ± 1.45 °C, respectively on tenth week of experiment. The body weight and body temperature of angora rabbits was given in table 1. The poor growth and development of rabbits is affected by different biotic and abiotic factors including housing system.

Table 1. Body weight (BW) (kg) and Body temperature (BT) (°C) of Angora rabbits under different conditions

Week	Parameters							
	Body weight (BW)				Body temperature (BT)			
	IO	IC	OC	Mean±S E	IO	IC	OC	Mean±SE
1	1.40	1.67	1.45	1.50 ± 1.02	39.33	37.87	40.00	39.06 ± 1.11
2	1.45	1.64	1.40	1.49 ± 1.20	40.12	38.43	39.34	39.29 ± 1.34
3	1.50	1.56	1.51	1.52 ± 1.11	39.10	40.11	38.39	39.20 ± 1.45
4	1.55	1.62	1.36	1.51 ± 0.12	37.78	41.02	37.32	38.70 ± 1.67
5	1.50	1.55	1.42	1.49 ± 1.33	34.56	37.54	40.45	37.51 ± 0.01
6	1.45	1.57	1.33	1.45 ± 1.23	39.01	39.98	37.54	38.84 ± 0.12
7	1.55	1.65	1.50	1.56 ± 0.01	41.45	40.81	39.33	40.53 ± 1.43
8	1.55	1.65	1.45	1.55 ± 1.13	40.35	40.00	40.03	40.12 ± 1.33
9	1.45	1.53	1.40	1.46 ± 1.21	41.40	38.67	36.87	38.98 ± 1.22
10	1.50	1.55	1.65	1.56 ± 0.25	39.50	39.34	38.52	39.12 ± 1.45
Mean ± SE	1.49 ± 0.23	1.59 ± 0.12	1.44 ± 1.23	-	39.26 ± 0.01	39.37 ± 1.34	38.77 ± 1.21	-

IO=Indoor open, IC=Indoor cages, OC=Outdoor control, SE=Standard error, BW=Body weight, BT=Body temperature

The mean heart rate in IO, IC and OC were 39.10 ± 6.32 , 35.30 ± 7.33 and 39.10 ± 6.19 , respectively. The mean values of heart beat rate on first and second week in IO were 40.33 ± 1.11 and 40.66 ± 1.16 beats per minute while 37.60 ± 0.25 beats per minute in 10th week of experiment. The mean values of respiratory rate were 139.00 ± 0.31 and 145.00 ± 1.00 beat per minute on 10th and 8th week of experiment, respectively. The mean values of respiratory rate in IO, IC and OC were 159.80 ± 19.20 , 128.50 ± 14.11 and 126.30 ± 21.00 beat per minute, respectively as given in Table 2.

Table 2. Heart beat and Respiratory rate (RR) beats per minutes of angora rabbits under different conditions

Week	Parameters							
	Heart Rate (HR)				Respiratory rate (RR)			
	IO	IC	OC	Mean \pm SE	IO	IC	OC	Mean \pm SE
1	40	37	44	40.33 ± 1.11	156	107	140	134.33 ± 1.00
2	45	34	43	40.66 ± 1.16	145	132	144	149.33 ± 1.23
3	48	36	51	45.00 ± 0.01	170	130	139	146.33 ± 0.34
4	30	32	46	36.00 ± 0.09	139	123	136	132.66 ± 1.32
5	33	40	32	35.00 ± 1.14	148	138	145	143.66 ± 1.03
6	44	33	43	40.00 ± 0.01	191	128	154	157.66 ± 0.03
7	39	34	31	34.66 ± 1.01	159	121	137	137.66 ± 1.10
8	37	36	32	35.00 ± 0.10	167	135	133	145.00 ± 1.00
9	39	33	30	34.00 ± 0.10	170	136	135	147.00 ± 0.34
10	36	38	39	37.60 ± 0.25	153	135	129	139.00 ± 0.31
Mean \pm SE	39.10 ± 6.32	35.30 ± 7.33	39.10 ± 6.19	-	159.80 ± 19.20	128.50 ± 14.11	126.30 ± 21.00	-

IO=Indoor open, IC=Indoor cages, OC=Outdoor control, HR=Heart rate, RR=Respiratory rate, SE=Standard deviation

Discussion

The rabbits are reared to obtain meat and wool production which full fil the meat and wool requirement of specific country. The proper housing system is economically an important trait in rearing the angora rabbits at small as well as large scale. The weight gain of angora rabbits can reduce due to various factors like biotic and abiotic. The most important abiotic factor is climatic conditions and housing systems. The growth and development of angora rabbits are highly influenced by these factors. The low weight gain has recorded under controlled conditions by various scientists (Dalle and Szendrő, 2011). They had reported that poor management system and poor welfare even lack of association between rabbits and environment can highly affect the rabbit's growth.

The current showed the similar findings that rabbits reared in outdoor control got maximum weight as compared to indoor open and indoor cages. It has been observed that rabbits in individual cages showed maximum fear as compared to collective cages. Many early researchers had reported the similar findings about fear and behavior of rabbits (Trocino et al. 2013; Verga, 2007). The less stress was seen in rabbits reared in collective cages than separate cages. Princz et al. (2008) had concluded the similar findings. The body health can highly associate with environmental conditions and management systems.

In the current study, no significant differences ($p < 0.05$) in the body temperature were recorded among all groups. The body temperature can increase with more stress. Due to high fear, the body temperature can increase which highly affect the body conditions, resulting low meat and wool production. The food consumption can decrease in fear and which decrease the growth rate and development. Zeferino et al. (2011) reported the similar results about rabbits health, behavior and body temperature. The biological parameters (reproduction) of angora rabbits can highly influenced due to heat stress. Bharathy et al. (2011) reported the similar findings about biological parameters. It was observed that body temperature of all groups was changed but no significant different noted between each other.

Funding

No funding was provided to perform such work.

Conflict of interest

Authors declare no conflict of interest.

Acknowledgment

All authors are highly thankful to concern institutes.

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