

HEMATOLOGIC PROFILE OF ALGERIAN LOCAL POPULATION RABBITS: EFFECT OF SEASON

KHELIL SOFIANE RAOUF¹, MELIANI SAMIA^{2*}, SELMANI MOULKHEIR¹
AND BERROUAGUIA KARIM¹

¹Faculty of Nature and Life Sciences, University of Tiaret, Tiaret (14000), Algeria.

²Institute of Veterinary Sciences, University of Tiaret, Tiaret (14000), Algeria.

Email: mselmani@outlook.fr

Received: 25 October 2020

Accepted: 30 December 2020

Published: 30 January 2021

Original Research Article

ABSTRACT

The current study was planned to establish reference blood biochemical values for local rabbit does in Tiaret during two successive seasons, on hot and cold season kept under semi-arid environment of Tiaret, Algeria. Seventy nine does, from the local population rabbits, multiparous mature female rabbits were used in this experiment (54 on hot season and 25 on cold season). The rabbits were raised in the experimental farm of the University of Tiaret in suitable conditions. About 3 ml of blood samples were collected and analyzed for the number of red blood corpuscles (RBC), hemoglobin concentration (Hb), hematocrit (Ht), average volume of red blood corpuscles (MCV) and total numbers of leukocytes (WBC), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC) and platelets number using an automatic cell counter. Statistical analysis was carried out on data, significant variations were found in biochemical parameters. In conclusion, most parameters were influenced by the season.

Keywords: Rabbits does; local population; hematological parameters; season; Tiaret; Algeria.

INTRODUCTION

The Algerian local population has been the subject of several studies that has focused on reproductive and growth performance [1,2,3]. So far no study was done to determine blood parameters. A lot of studies were made to determine the blood parameters of various domestic animals and livestock [4].

Hematological values are widely used to define the physiological and pathological status and the adaptation to the environmental conditions and diagnosis of animal diseases [5]. In addition to assess the metabolic condition of animals, hematological and biochemical parameters

could be affected by many factors including: sex, age, reproductive status and seasonal variations [6,7,8,9,10,11].

Thus, the aim of our study was to determine the effect of season on blood parameters of Algerian local population rabbits.

MATERIALS AND METHODS

The study was conducted at the experimental farm of Ibn Khaldoun University in Tiaret (northwestern Algeria). The climate here is classified as semi-arid climate (Csa) by the Köppen-Geiger system. The average annual temperature is 14.7°C (58.5°F) in Tiaret. Seventy nine female (54 on hot season and 25 on cold season) of the

Algerian local population rabbit. The does used were 4 to 24 months of age weight between 2 ± 0.10 to 5 ± 0.10 kg, were used for blood draw, the animals were housed in single rabbit cages in suitable conditions. Automatic nipple drinker were used, and the rabbits were fed *ad libitum* with granulated commercial feed. All does were kept under the same hygienic and managerial conditions in each season.

To recover a quantity of 3 ml of blood we used the following material: Towel for the restraint of animals (Rabbit burrito), shaving machine, alcohol 70° for asepsis and for vasodilatation, blood collection set, sponges, vacuum EDTA tests tubes and a bag with ice blocks for storage and transport of samples.

Blood with (EDTA) was collected from the long saphenous vein. The samples were brought to the biochemical laboratory for analysis within two hours. In the whole blood samples; the number of red blood corpuscles (RBC), hemoglobin concentration (Hb), hematocrit (Ht), average volume of red blood corpuscles in the blood (MCV) and total number of leukocytes (WBC), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) and platelets number were determined using an automatic cellcounter (COBAS INTEGRA® 400 Roche, France).

For each parameter, mean and standard deviation values were determined and a statistical analysis using SPSS IMB20 And the ANOVA test was made to determine the influence of the season on the variation of the parameters.

RESULTS AND DISCUSSION

The mean values obtained from all rabbits used in this work are reported in Table 1. The effect of season on hematological parameters were recorded in Table 2.

In this study a significant ($p < 0.05$) difference has been found between cold and hot season for all parameters tested unless for WBC and MCV. All the values obtained in this study are in the range values reported by [12], except for the average hemoglobin content that was below to this norms, according to [13] genotype was an important source in variation for MCV, WBC and TGMH. Ht value under 30% and the decrease in Ht parallel to Hb are evaluated as anemia [14].

However, it has been noted that WBC count rise in rabbits rarely indicates an infection; it generally varies due to various stress factors and blood collection methods [15,14,16].

Table 1. General values of the parameters measured for all rabbits

Parameters	N	Means	SD	Minimum	Maximum
WBC (/mm ³)	79	5625,32	4485,20	220,00	36100,00
RBCs (x10 ⁶ /mm ³)	79	5,44	0,94	2,10	7,39
Hb (g/dl)	79	11,22	1,94	4,70	14,80
Ht (%)	79	37,08	5,63071	16,90	47,00
MCV(fl)	79	67,91	5,91	56,60	82,90
MCH(pg)	79	26,46	6,17	14,40	42,86
MCHC (g/dl)	79	24,57	4,29	17,30	33,70
Platelettes (x10 ³ /mm ³)	79	348,95	198,83	39,00	940,00

Table 2. Mean±SD of the different parameters measured in hot and cold season

Parameters	Hot season (N=54)	Cold season (N=25)
	Mean±SD	Mean±SD
WBC (/mm ³)	5669,63 ±5324,75	5529,60±1659,33
RBCs (×10 ⁶ /mm ³)	5,14 ±0,89*	6,10±0,68
Hb (g/dl)	10,41 ±1,71*	12,95±1,11
Ht (%)	35,25 ±5,48*	41,04±3,59
MCV (fl)	68,15 ±6,64	67,38±3,96
MCH (pg)	24,03±6,05*	31,72±0,84
MCHC (g/dl)	26,09±4,36*	21,29±1,18
Platelettes (×10 ³ /mm ³)	379,48±222,18*	283,00±114,65

*Significantly differences between the two groups ($p<0.05$)

The cold season results an increase of GR, HB, HT and TGMH means. While; platelets and CCMH decreased compared to average values reported in Table 1 given that the average temperature recorded inside the building during the cold season was 8,7°C.

Exposure of does rabbits to heat stress under the semi-arid environmental conditions of Tiaret, affected negatively most of biochemical parameters. According to [17,18], during the summer rabbits suffer from heat stress, which leads to deterioration of some hematological constituents and biochemical parameters, these changes may affect the activities, and fetus of pregnant rabbits in warm environmental conditions. In another study [19] reported that RBCs and WBC and Hb were significantly higher ($P<0,05$) in rabbits raised in winter than in those in summer season. This indicates the negative effects of heat stress on hematological parameters reported by many authors [20,21,17]. It has been reported that red corpuscles blood count and Ht values are influenced by stress, age, gender, season and genus in rabbits [15].

CONCLUSION

In this investigation, we concluded that pregnancy and season influence the

biochemical parameters in rabbits studied under the semi-arid climate of Tiaret. The heat stress in hot season negatively reflected on the biochemical parameters, indicating that the better season for reproducing local rabbit in the fresh season, this is confirmed in the present work. The current study established the reference values for selected biochemical constituents in the plasma in the local rabbits. Further more studies are needed on the region of Tiaret.

ETHICAL APPROVAL

Animal Ethic committee approval has been taken to carry out this study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Berchiche M, Cherfaoui D, Lounaoui G, Kadi SA. Utilisation de lapins de population locale en élevage rationnel: Aperçu des performances de reproduction et de croissance en Algérie, 3^{ème} Congrès Franco-Maghrébin de Zoologie et

- d'Ichtyologie. 2012;6(10) : Novembre 2012 Marrakech, Maroc, 42.
2. Moumen S, Melizi M, Zerrouki-Daoudi N. Etude de la croissance, la qualité et du rendement en carcasse de lapins locaux de la région des Aurès, Algérie. 2016;2(5):2-5.
 3. Zerrouki N, Bolet G, Berchiche M, Lebas F. Evaluation of breeding performance of a local Algerian rabbit population raised in the Tizi-Ouzou area (Kabylia), World Rabbit Sci. 2005a;13(1):29–37.
 4. Ahamefule F, Edouk G, Usman A, Amaefule K, Oguike S. Blood biochemistry and haematology of weaned rabbits fed sundried, ensiled and fermented cassava peel based diets. Pakistan J Nutr. 2006;5:248-253.
 5. Shah MK, Khan A, Rizvi F, Siddique M, Sadeeq-Ur-Rehman. Effect of Cypermethrin on clinic-hematological parameters in rabbits. Pak Vet, J. 2007;27:171-175.
 6. Al-Eissa M, Al-Hamidi A, Kandeal S. Assessment of reproductive efficiency of the Arabian sand gazelle mâles (*Gazelle Subgutturosa marica*), Saudi J Biological Sci. 2008;15:85-95.
 7. Wells Y, Decobecq P, Decouvelaere M, Justice C, Guittin P. Changes in clinical pathology parameters during gestation in the New Zealand white rabbit. Toxicol. Pathol. 1999;27:370-379.
 8. Gill J, Wanska E. Seasonal changes in erythrocyte, hemoglobin and leukocyte indices in barren mares of thoroughbred horses. Bull. Acad. Pol. Sci. 1978;26:347-353.
 9. Mira A, Mathias M. Seasonal effects on the hematology and blood plasma proteins of two species of *Mus musculus domesticus* and *M. spretus* (Rodentia: Muridae) from Portugal. Hystrix. 1994;5:63-72.
 10. Cetin N, Bekyurek T, Cetin E. Effects of sex, pregnancy and season on some hematological and biochemical blood parameters in angora rabbits. Scand. J. Lab. Anim. Sci. 2009;36: 155-162.
 11. Moulkheir S, Samia M, Mokhtaria K, Karim B, Raouf KS, Meriem C. Serum macro-minerals variation upon pregnancy in rabbits raised in Tiaret region. Bionature. 2020;40(3):1-5.
 12. Fiorello CV, Divers SJ. Rabbits. In CARPENTER J.W., Exotic Animal Formulary Saint Louis: Elsevier Saunders. Fourth edition. 2012;517–559.
 13. Chineke C, Ologun A, Ikeobi C. Haematological parameters in rabbit breeds and crosses in humid tropics. Pak J Biological, Sci. 2006;9:2102–2106.
 14. Jenkins JR. Rabbit diagnostic testing. J Exot Pet Med. 2008;17:4-15.
 15. Melillo A. Rabbit clinical pathology. J. Exot, Pet Med. 2007;16:135-145.
 16. Silva TDO, Kreutz LC, Barcellos LJG, Borella J, Soso AB, Souza C. Reference values for chinchilla (*Chinchilla lanigera*) blood cells and serum biochemical parameters. Cienc Rural. 2005;35:602-606.
 17. Al-Eissa MS. Effect of gestation and season on the haematological and biochemical parameters in domestic rabbit (*Oryctolagus cuniculus*). British Biotechnol. J. 2011;1:10-17.
 18. Selmani M, Meliani S, Kouidri M, Berrouaguia K, Khelil S, Chafaa M. Effect of season and pregnancy on minerals serums variations of local rabbits in Tiaret, Algeria. Journal ASN. 2020;7(3):72–80.
 19. El-Sawy MA, Ali KA, Hassanein MNF, El-Kholy KH. Effect of interaction

- between season and arak (*Salvadora persica*) supplementation on rabbits: 1-productive and some physiological performance of growing rabbits. J. Agric. Sci. Mansoura Univ. 2014;7(5): 249-267.
20. Marai IFM, Habeeb AAM, Gad AE. Reproductive traits of male rabbits as affected by climatic conditions, in the subtropical environment of Egypt. Anim. Sci. 2002;75:451-458.
21. Okab AB, El-Banna SG, Koriem AA. Influence of environmental temperatures on some physiological and biochemical parameters of New-Zealand rabbit males. Slovak J. Anim. Sci. 2008;41:12–19.