

# Study of Hematological Changes in Local Goats (*Capra Aegagrus*) at Al-Najaf Province, Iraq

Mujeeb Towfik Shamsa

*Associated Professor, Department: Health Science, Middle Euphrates Technical University,  
Technical Institute Najaf, Najaf- Iraq*

## Abstract

Goat is among widespread small ruminants in the Iraq and important animal provides nutrient resources for as well as economical source. The blood values and hematological parameters can be greatly affected by environmental factors such as stress, low grassland pasture, parturition and climate. Thus, it can be reflected by blood analysis and reliable medium for health and illness status of individual animals.

200 of normal and healthy goats (90 males and 110 Females) were selected depending on clinical examination in Al-Najaf slaughterhouse (Al-Najaf, Iraq). The study was conducted during the summer season. The goats were divided into subgroups according to sex and age. Then, Blood samples were collected from the jugular vein for the determination of hemoglobin, packed cell volume, red blood cells count, and white blood cells count and sub determination of white blood cell was included neutrophils, small and large lymphocytes, monocyte, eosinophil, basophil and band-cell. Result showed there are nonsignificant different between male and female hematological parameters in all age period except small lymphocytes in goat larger than 1 year old and Neutrophils for less than 6-month age. In Conclusion: This study includes values that are considered to be the first to be published for the difference in local goats' breeds (*Capra Aegagrus*) At Al-Najaf Province, Iraq. Such data is considered as preliminary data which can be used as a reference for further studies.

**Aim of Study:** The aim of the study was to measure hematological parameters in order to monitor the health status of goat breeding with different age in males and female goat.

**Keywords:** *Hematological, hematological parameters, Capra Aegagrus.*

## Introduction

Goat is among widespread small ruminants in the middle east, as well as is considered one of the domestic animals which an important animal provides nutrient resources for humans (Addass *et al.* 2010)<sup>1</sup>. Additionally, is an important economic source in several countries such as Iraq, Jourdan, Oman and other contraries (Kozuh, 2010; Al-Bulushi *et al.* 2017)<sup>2</sup>. Goat meat is well known to be unique meat. In addition, goat meat is not interchangeable with meat from other species that have the same –approximately- maturity and fatness levels (Ivanović *et al.* 2016)<sup>3</sup>, as well as goats can be reared under traditional husbandry system in the open atmosphere and breeding under modern husbandry (Gebreyowhens *et al.* 2018)<sup>4</sup>; which are believed as

perfect animals to be reared, firstly because they are able to survive severe conditions and secondly because they are able to produce high-quality and milk and milk derivatives (Darcan *et al.* 2018)<sup>5</sup>. The blood values and hematological parameters can greatly be affected by factors like low nutritional grassland pasture, parturition, climatic factors and stress (Mohammed *et al.* 2016; Mahmoud *et al.* 2016)<sup>6</sup>. Besides being one of the useful and reliable parameters to use in order to assess health and illness status of individual animals (Al-Bulushi *et al.* 2017)<sup>7</sup>, blood is a guide for several metabolic processes and represents the healthy state of the organ functions and productions of the animal and a realistic measure to evaluate the management practices, nutrition progress and diagnosis in farms (Farooq *et al.* 2011; Momenah, 2014; Panadi *et al.* 2018)<sup>8</sup>.

Thus, the aim of the study was to investigate and monitor the health status of goat breeding through the measurement hematological parameters of different age in males and female goat and knowledge different between male and female blood parameter value.

### Material and Method

**Animals:** Two hundred (90 males and 110 Female) of goats which were selected normally healthygoat depending on clinical examination in Al-Najaf slaughterhouse (Al-Najaf, Iraq). The gouts were divided into subgroups according to sex and age. However, four age group of two sex goats were study, its included 0 - 6 months, 6 - 12 months, 1–2 years, and above the 2 year, as showed in table-1.

**Table 1: The numbers and ages of goat according to sex**

Sex	Number	Age
Males (90)	15	0 – 6 months
	25	6 – 12 months
	19	1 – 2 year
	30	Above 2 year
Female (110)	14	0 – 6 months
	31	6 – 12 months
	35	1 – 2 year
	31	Above 2 year

**Blood Sampling:** Blood collection was performed from the jugular vein followed by placing blood into a tube containing ethylenediaminetetraacetic acid, placed on ice and transferred immediately to the laboratory to be used for the assessment of blood hematological parameters.

**Hematology Analyzer:** It is an automated hematology analyzer that is used for analyzing feline blood including the determination of hemoglobin (Hb), packed cell volume (PCV), red blood cells count (RBC), and white blood cells count (WBC) within 2 hours

after sample collection. Sub determination of white blood cell was included neutrophils (N), small and large lymphocytes (L), monocyte (M), eosinophil (E), basophil (B) and band-cell (BC).

**Statistical Analysis:** All data were presented as mean  $\pm$  standard error of mean (SEM). Graph Pad PRISM8 software was used to analyze data. Shapiro–Wilk normality test was used to test whether our data are normally distributed followed by 2-way ANOVA to determine any significant difference. Those data with p value( $p < 0.05$ ) was considered significantly different.

### Result

The result in table-2 showed compared between blood hematology in goat in age 0-6 months, however showed no significant different between parameters except in neutrophils since female neutrophils higher than male neutrophil significantly at ( $P=0.0003$ ). While in table-3 result showed no significant different between hematological parameters of 55 goats (24 males and 31 female)at age 6-12 months.

Additionally, result in table-4 explained compare between hematological parameters of 54 goats (19 males and 35 female) at age between 1-2 years which fond no significant different between male and female except in term of large lymphocyte which higher significantly at ( $P= 0.0046$ )in female.

Result showed comparehematological parameters between male and female at age above 2 year in table-5 showed only significant different at ( $P=0.0025$ ) in smalllymphocyte which higher in males' goat than females, while no significant different in others parameters.

In general, from tables-6 observed in compared hematological parameters between all age of 200 goat (90 males and 110 females) showed no significant different in parameters except in small lymphocyte parameter which was higher significantly at ( $P= 0.0161$ ) in males' goats than females as showed in table-6.

**Table 2: 0–6 months**

Parameters	Male	Female	P Value
Age	3.8±0.5	2.76±0.45	0.9960
Hb	6.70±0.1	6.76±0.11	>0.9999
PCV	27.13±0.2	26.6±0.26	>0.9999
RBC	12.42±0.3	12.6±0.14	>0.9999
WBC	7.73±0.1	6.75±0.32	0.9975
S.lymph	41.66±1.3	42.84±1.97	0.9870
L.lymph	26±1.3	24.07±1.78	0.6936
Neutrophils	26.4±1.1 <sup>a</sup>	31.30±1.45 <sup>b</sup>	0.0003
Band-cell	3.26±0.5	2.76±0.28	>0.9999
Eosinophils	0.8±0.2	0.69±0.17	>0.9999
Basophil	0.13±0.09	0.07±0.07	>0.9999
Monocyte	1.46±0.3	1.92±0.30	>0.9999

Values as means ± stander error of 28 Goats (15 males and 13 females)

- <sup>ab</sup>refer to significant differences between groups (P < 0.05)

**Table 3: - 6 – 12 months**

Parameters	Male	Female	P Value
Age	8.19 ± 0.35	8.82 ± 0.34	0.8593
Hb	8.35 ± 0.17	8.17 ± 0.12	>0.9999
PCV	27.75 ± 0.30	27.10 ± 0.35	0.8351
RBC	12.00 ± 0.13	11.91 ± 0.12	>0.9999
WBC	8.46 ± 0.16	8.51 ± 0.16	>0.9999
S.lymph	29.92 ± 0.35	29.84 ± 0.23	>0.9999
L.lymph	29.96 ± 0.49	29.65 ± 0.27	0.9996
Neutrophils	34.46 ± 0.66	35.13 ± 0.61	0.8098
Band-cell	0.21 ± 0.12	0.58 ± 0.23	0.9978
Eosinophils	1.92 ± 0.25	1.58 ± 0.30	0.9992
Basophil	1.33 ± 0.24	1.10 ± 0.25	>0.9999
Monocyte	2.25 ± 0.29	1.90 ± 0.20	0.9989

Values as means ± stander error of 55 Goats (24 males and 31 females)

- <sup>ab</sup>refer to significant differences between groups (P < 0.05)

**Table 4: 1 – 2 years**

Parameters	Male	Female	P Value
Age	1.53 ± 0.08	1.44 ± 0.07	>0.9999
Hp	8.57 ± 0.11	8.13 ± 0.08	0.9999
PCV	25.65 ± 0.28	24.94 ± 0.21	0.9893
RBC	9.15 ± 0.17	9.27 ± 0.16	>0.9999
WBC	8.99 ± 0.17	9.15 ± 0.13	>0.9999
S.lymph	22.32 ± 0.71	20.66 ± 0.78	0.2027

Parameters	Male	Female	P Value
L.lymph	25.32 ± 0.82 a	27.83 ± 1.23 b	0.0046
Neutrophils	47.74 ± 0.57	48.06 ± 0.46	>0.9999
Band-cell	0.00 ± 0.00	0.00 ± 0.00	>0.9999
Eosinophils	1.63 ± 0.22	1.80 ± 0.22	>0.9999
Basophil	0.53 ± 0.16	0.54 ± 0.13	>0.9999
Monocyte	2.26 ± 0.56	2.46 ± 0.32	>0.9999

Values as means ± stander error of 28 Goats (19 males and 35 females)

- <sup>ab</sup> Means values between groups with different superscripts are significantly different at (P < 0.05)

**Table 5: Above 2 years**

Parameters	Male	Female	P Value
Age	2.65 ± 0.07	3.29 ± 0.12	0.9607
Hp	10.43 ± 0.13	10.08 ± 0.17	0.9998
PCV	26.65 ± 0.35	26.03 ± 0.42	0.9725
RBC	10.62 ± 0.14	9.85 ± 0.14	0.8721
WBC	9.71 ± 0.19	9.61 ± 0.16	>0.9999
S.lymph	22.39 ± 1.06a	20.37 ± 0.72b	0.0025
L.lymph	26.77 ± 0.81	27.90 ± 0.60	0.3712
Neutrophils	47.74 ± 0.28	47.30 ± 0.24	0.9984
Band-cell	0.00 ± 0.00	0.00 ± 0.00	>0.9999
Eosinophils	1.29 ± 0.21	1.47 ± 0.25	>0.9999
Basophil	0.65 ± 0.15	0.67 ± 0.15	>0.9999
Monocyte	2.03 ± 0.20	2.57 ± 0.22	0.9909

Values as means ± stander error of 28 Goats (15 males and 13 females)

- <sup>ab</sup> Means values between groups with different superscripts are significantly different at (P < 0.05)

**Table 6: Between male and female**

Parameters	Male	Female	P Value
Age	4.10 ± 0.31	4.21 ± 0.31	>0.9999
Hp	8.84 ± 0.16	8.52 ± 0.12	>0.9999
PCV	26.81 ± 0.18	26.06 ± 0.19	0.9154
RBC	10.98 ± 0.15	10.59 ± 0.15	0.9997
WBC	8.84 ± 0.12	8.81 ± 0.12	>0.9999
S.lymph	27.65 ± 0.89a	25.83 ± 0.82b	0.0161
L.lymph	27.19 ± 0.46	27.92 ± 0.50	0.9309
Neutrophils	40.56 ± 0.96	42.17 ± 0.72	0.0520
Band-cell	0.61 ± 0.16	0.50 ± 0.11	>0.9999
Eosinophils	1.45 ± 0.12	1.51 ± 0.13	>0.9999
Basophil	0.72 ± 0.10	0.68 ± 0.10	>0.9999
Monocyte	2.04 ± 0.17	2.27 ± 0.14	>0.9999

Values as means ± stander error of 28 Goats (15 males and 13 females)

- <sup>ab</sup>refer to significant differences between groups (P < 0.05)

## Discussion

This study reported a wide range of hematological values such as RBC, PCV, Hb, WBC in addition to white blood differential count in Local Goats (*Capra Aegagrus*) at Al-Najaf Province, Iraq. Findings reported in this study are generally consistent with previous studies which discussed healthy goats. As shown in tables (2, 3, 4, 5), the levels of hemoglobin were within the normal range for male and female and at different age which results are agreed with (Al-Rukibat and Ismail, 2019) which detection of hematologic variables in Shami goats and (Khan *et al.* 2016) since analyzed the blood sample of Maraz male and female goats. On other hand, Polat *et al.*(2018)<sup>9</sup> found changes in levels of Hb during month and seasons, which result is contrary to that of Polat *et al.*(2018)<sup>10</sup> them found significant increase in Hb levels of male than female in all age of Angoragout.

Comparison of the findings with those of other studies table (2, 3, 4, 5) confirms theno significant different in the levels of RBC are generally found higher in males than female in the all age but not significantly as reported that values of hematological parameters in most animal species (Yaqub *et al.* 2013)<sup>11</sup>, while Polat *et al.*(2018)<sup>20</sup> found significant higher in values RBC of male than female<sup>12</sup>.

The levels of white blood cells count for the examined does were within the normal range as showing in tables (2, 3, 4, 5,6) for goats in all age as reported in varied studies values of WBCin different sex goat and age (Fadare *et al.* 2012; Pehlivan *et al.* 2017)<sup>13</sup> but not agreed the Polat *et al.*(2018)<sup>14</sup> which found WBC higher in values of female goats than males. In addition, similar values of WBC were reported in this study to those reported in other studies (Jarić *et al.* 2015, Nayak and Acharya, 2020)<sup>15</sup> which there are no significant different between gander in WBC value. In organisms<sup>16</sup>, WBC are cells of the immune system that represent the integrity of bone marrow to produce cells important for peripheral circulation and storage in different organs or pools (Yaqub *et al.* 2013)<sup>17</sup>. In this result showed small lymph are higher significantly in male than female as showed in result of (Mohammed *et al.* 2016)<sup>18</sup>.

In general, the tables showed there are not significant different in PCV levels between genders in all age period as showed in other studies (Jarić *et al.* 2015, Nayak and Acharya, 2020)<sup>19</sup>.

## Conclusion

Findings obtained in this study are the first to be published regarding the difference in local goats' breeds (*Capra Aegagrus*) At Al-Najaf Province, Iraq. In addition, it can be concluded that such data is considered as preliminary values that can be used as a reference for further. Furthermore, it can help veterinarians in terms interpretation of laboratory data, selection of an appropriate treatment and diagnosis in *capra aegagrus* in zoological studies.

**Ethical Clearance:** No ethical approval is needed.

**Source of Funding:** Self

**Conflict of Interest:** Nil

## References

1. Addass PA, MA, & BDM(. Haemato-biochemical findings of indigenous goats in Mubi Adamawa State, Nigeria. *J. Agric. Soc. Sci.* 2016; 6(1): p. 14-16.
2. Al-Bulushi S, ST, & AHA. Some hematological and biochemical parameters of different goat breeds in Sultanate of Oman "A preliminary study". *Veterinary World.* 2017; 10(4): p. 461.
3. Darcan NK, & SN. The advantages of goats for future adaptation to climate change: A conceptual overview. *Small Ruminant Research.* 2018; 163: p. 34-38.
4. Farooq U, Samad HA, Khurshid AaSS. Normal reference hematological values of one-humped camels (*Camelus dromedarius*) kept in cholistan desert.*J. Anim. Plan. Sci.* 2011; 21(2): p. 157-160.
5. Gebreyowhens W, & KR. Management and Breeding Objectives of Maefur goat breed type in Erob district eastern Zone of Tigray, Northern Ethiopia. *International Journal of Livestock Production.* 2018; 9(3): p. 50-66.
6. Ivanović S, PI, & PB. The quality of goat meat and it's impact on human health. *Biotechnology in Animal Husbandry.* 2016; 32(2): p. 111-122.
7. Kozuh M. Lamb, mutton, and goat in the Babylonian temple economy. *Journal of the Economic and Social History of the Orient.* 2010; 53(4): p. 531-578.
8. Maltz E, & SA. Milk production in the desert: lactation and water economy in the black Bedouin goat. *Physiological Zoology.* 1980; 53(1): p. 12-18.

9. Mohammed SA, RMA, OAE, AS, & AGWM. Biochemical and hematological profile of different breeds of goat maintained under intensive production system. *African Journal of Biotechnology*. 2016; 15(24): p. 1253-1257.
10. Momenah MA. Some blood parameters of one humped she-camels (*Camelus dromedaries*) in response to parasitic infection. *Life Sci. J*. 2014; 1(5): p. 118-123.
11. Panadi M, MWZ, RND, & MK. Effects of medicated and non-medicated multi-nutrient block supplementation on gastrointestinal parasite infestation and blood hematological parameters of lactating saanen goats. *Sains Malaysiana*. 2018; 47(7): p. 1447-1453.
12. Al-Rukibat R, & IZ. Breed-specific reference intervals of hematologic variables in Shami goats (*Capra aegagrus hircus*) with the possible effects of age and sex. *Veterinary Clinical Pathology*. 2019; 48(4): p. 762-767.
13. Khan KMH, AMK, AMM, & ASAH. Reference values for haemato-biochemical parameters in the Maraz goats. *Research Opinions in Animal and Veterinary Sciences*. 2016; 6(2): p. 74-77.
14. Polat H, PE, & DG. Annual change of haematological parameters in Angora goats. *Biological Rhythm Research*. 2018;: p. 1-11.
15. Yaqub LS, KMU, & AJO. Influence of reproductive cycle, sex, age and season on haematologic parameters in domestic animals: a review. *Journal of Cell and Animal Biology*. 2013; 7(4): p. 37-43.
16. Pehlivan E, & DG. Annual changes of thyroid stimulating hormone, thyroxine, triiodothyronine and cortisol hormones in angora goats. *J Anim Plant Sci*. 2017; 27(3): p. 819-824.
17. Fadare AO, PSO, YA, SAO, AMA, OMO, & IIG. Physiological and haematological indices suggest superior heat tolerance of white-coloured West African Dwarf sheep in the hot humid tropics. *Tropical animal health and production*. 2012; 45(1): p. 157-165.
18. Jarić S, MJM, DL, MM, KO, KB, & PP. An ethnobotanical survey of traditionally used plants on Suva planina mountain (south-eastern Serbia). *Journal of ethnopharmacology*. 2015; 175: p. 93-108.
19. Nayak A, & AG. A study on haematological parameters of indigenous goat. *Capra aegagrus hircus Linnaeus*. 2020.
20. Mahmoud MHS, adAMB, & adAH. study of hematological and biochemical changes in sheep and goats infected with theileriosis at al-najaf province, iraq. 2019.