

The hematological parameters in clinically normal Iraqi local breed goats**AL-dujaily A.H.¹ and AL-Hadithy H.AH.²**¹Department of Internal Medicine, College of Veterinary Medicine, Kufa University, Iraq.²Department of Internal and Preventive Medicine, College of Veterinary Medicine, Baghdad University, Iraq.E-mail: Harithal.hadithy@gmail.com

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Summary

The aim of the present work is to determine the hematological parameters in clinically normal local breed goats. The study was conducted on 130 goats (40 males of them 20 bucks and 20 buck kids and 90 females of them 20 doe kids, 20 dry does, 25 pregnant and 25 lactating does) aged 6 months-4 years in AL-Najaf province-Iraq. Blood samples were collected from the jugular vein into EDTA tubes during October 2013 until February 2014. Results showed that the ranges and means \pm SE of blood picture were as follows; packed cell volume (PCV) 26-40% and $31.8 \pm 0.32\%$, Hemoglobin (Hb) 8-14.3g/dL and 10.3 ± 0.13 g/dL, Red blood cell (RBC) $10.6-17 \times 10^6/\mu\text{L}$ and $13.3 \pm 0.14 \times 10^6/\mu\text{L}$, Mean cell volume (MCV) 18.4-32.5 fL and 23.9 ± 0.14 fL, Mean cell Hemoglobin (MCH) 5.5-8.8 and 7.7 ± 0.05 pg, Mean cell hemoglobin concentration (MCHC) 28.3-36.9 g/dL and 32.4 ± 0.15 g/dL, Erythrocyte sedimentation (ESR) 1-10 mm/ 24h and 4.1 ± 0.14 mm/ 24h, White blood cell count (WBC) 5500-15900/ μL and $10732 \pm 242/\mu\text{L}$, Lymphocyte (L) 2772-10172/ μL and 6080 ± 149 /Ml, neutrophils (N) 1863-8680/ μL and $4112 \pm 121/\mu\text{L}$, monocytes 57.0-622/ μL and $313 \pm 11/\mu\text{L}$, eosinophil's 0-918/ μL and $222 \pm 14/\mu\text{L}$, basophils $0 \pm 0/\mu\text{L}$ and $0 \pm 0/\mu\text{L}$, L/N ratio 0.4-3.8 and 1.5 ± 0.04 , respectively. There was a significant ($P < 0.05$) increase in PCV, Hb, RBC, MCV, MCH, MCHC and no difference in ESR, WBC, DLC and L/N ratio between males and females. However, significant ($P < 0.05$) differences in most hematological parameters of sub groups have been recorded. In conclusion the present data recorded the reference values of hematological parameters in clinically healthy local breed goats with a significant difference between males and females as well as in normal subgroups.

Keywords: Hematological parameters, Local breed goats, Bucks.**Introduction**

The Iraqi local breed goats have an essential role in providing meat, milk and hair (1). However, the reference hematological values are useful tools for diagnosis and prognosis of many diseases. Several authors have been recorded hematological parameters in goats (2 - 5). Also, main hematological parameters have been reported include PCV, Hb, RBC, MCV, MCH, MCHC, WBC and DLC (6 - 17). While, (14) studied hematological parameters including enumeration of WBC count. In Iraq, there are many studies of hematological values conducted on 79 local breed goats (18) and on 25 clinically healthy local breed goats (19). While, (20) studied hemogramon 58 (19 males and 39 females) in local breed goats, and (21) conducted study on 116 normal aged <1-6 years of both sex in Local native goats, (22) who studied blood parameters on 7 lactating native goats and (23), whom they reported hematological parameters in 50 local breed goats aged 1-5

years. Many of the above mentioned studies were conducted on smaller number or fewer hematological parameters; therefore, this investigation was carried out on a larger number of animals as well as a wide range of hematological parameters in Iraqi local breed goats.

Materials and Methods

Blood samples were collected into EDTA tubes from jugular vein of 130 clinically normal goats (40 males and 90 females) in AL- Najaf governorate- Iraq. Males were divided into two groups; 20 bucks aged 1.5-4 years and 20 buck kids aged 6-12 months, while normal females subdivided into 20 doe kids aged 6-12 months, 20 dry does aged 1.5-4 years, 25 pregnant aged 1-4 years and 25 lactating does aged 1.5-4 years. The blood used directly for complete blood picture (CBC). Packed cell volume (PCV) was measured using micro hematocrit centrifuge according to (24). The Hb was converted into

cyanmethaemoglobin by using drabkins reagent and measured by spectrophotometer (25). Red blood cells and white blood cells counts were evaluated by using the hemocytometer method according to (2). While, hematological indices; MCV, MCH and MCHC were calculated according to the following formulae: $MCV \text{ fl} = PCV/RBCs \times 10$, $MCH \text{ pg} = \text{Hemoglobin} /RBCs \times 10$, $MCHC \text{ (g/dL)} = \text{Hemoglobin} /PCV \times 100$ (2). Moreover, blood specimens were estimated for ESR using Westgren tubes, blood withdrawn to mark (0) and the tubes stand vertically on the rake (26). The ESR values were recorded in mm after 24 hrs. Blood films were made and stained using Giemsa stain according to (2). However, 100 leukocytes were used for the DLC. Data were analyzed using SPSS version 20. The least significant differences test (LSD) were used to determine differences among groups. Data were subjected to analysis of variance statistically using one-way ANOVA.

Results and Discussion

The hematological parameters in local breed goats independent of any subdivisions are presented in (Table, 1) and according to the subgroups (Table, 2). The ranges and means \pm SE of hematological parameters in total goats were as follows; PCV 26-40 % and $31.8 \pm 0.32\%$, Hb 8-14.3g/dL and 10.3 ± 0.13 g/dL, RBC $10.6-17 \times 10^6/\mu\text{L}$ and $13.3 \pm 0.14 \times 10^6/\mu\text{L}$, MCV 18.4-32.5 fL and 23.9 ± 0.14 fL, MCH 5.5-8.8 pg and 7.7 ± 0.05 pg, MCHC 28.3-36.9g/dL and 32.4 ± 0.15 g/dL, ESR 1-10mm/24h and 4.1 ± 0.14 mm/24h, WBC 5500-15900 / μL and 10732 ± 242 / μL , Lymphocytes 2772-10172/ μL and $6080 \pm 149/\mu\text{L}$, neutrophils 1863-8680/ μL and $4112 \pm 121/\mu\text{L}$, monocytes 57.0-622/ μL and $313 \pm 11/\mu\text{L}$, eosinophils 0-918/ μL and $222 \pm 14/\mu\text{L}$, basophils 0 \pm 0/ μL and 0 \pm 0/ μL , L/N ratio 0.4-3.8 and 1.5 ± 0.04 , respectively (Table 1).

The hematological values in males were significantly higher ($P < 0.05$) in PCV, Hb, RBC, MCH and MCHC compared to normal females. This may be due to the negative influence of estrogen on erythropoiesis of females and the positive influence of androgen in males (5).

Table, 1: The hematological parameters for normal local breed goats; ranges and means \pm SE.

Parameters	Groups		
	Total goats (n=130)	Males (n=40)	Females (n=90)
Pcv (%)	26-40	30-40	26-38
	31.8 ± 0.32	$34.9 \pm 0.49a$	$30.5 \pm 0.33b$
Hb (g/dL)	8-14.3	10-14.3	8-12.6
	10.3 ± 0.13	$11.9 \pm 0.19a$	$9.6 \pm 0.12b$
RBC $\times 10^6/\mu\text{L}$	10.6-17	11.9-17.0	10.6-17.0
	13.3 ± 0.14	$14.4 \pm 0.23a$	$12.8 \pm 0.14b$
MCV (fL)	18.4-32.5	20.5-32.5	18.4-26.7
	23.9 ± 0.14	24.3 ± 0.32	23.8 ± 0.15
MCH (pg)	5.5-8.8	6.8-8.8	5.5-8.7
	7.7 ± 0.05	$8.2 \pm 0.07a$	$7.5 \pm 0.06b$
MCHC (g/dL)	28.3-36.9	30.6-36.9	28.3-35.6
	32.4 ± 0.15	$34.0 \pm 0.19a$	$31.6 \pm 0.15b$
ESR mm/24h	1-10	1-10	1-10
	4.1 ± 0.14	$4.1 \pm 0.25a$	$4.2 \pm 0.18a$
WBC (/ μL)	5500-15900	5500-15500	6300-15900
	10732 ± 242	$11266 \pm 405 a$	$10495 \pm 298 a$
Lymphocytes	2772-10172	2915-9860	2772-10172
	6080 ± 149	$6525 \pm 291 a$	$5883 \pm 169 a$
Neutrophils	1863-8680	1863-8680	2015-7923
	4112 ± 121	$4123 \pm 209 a$	$4107 \pm 148 a$
Monocytes	57.0-622	57-612	78-622
	313 ± 11	$352 \pm 21 a$	$296 \pm 13 a$
Eosinophils	0-918	0-918	0-705
	222 ± 14	$257 \pm 34 a$	$206 \pm 13 a$
Basophil	0 \pm 0	0-0	0-0
L/N ratio	0.4-3.8	0.4-3.8	0.6-3
	1.5 ± 0.04	$1.6 \pm 0.11 a$	$1.4 \pm 0.04 a$

The differences in small letters horizontally refer to the presence of significant value at (< 0.05).

The ranges of the present study were higher in PCV, Hb, MCV, MCH, WBC and DLC While, RBC and ESR within the reference range of (5). However, (2) reference ranges of PCV, RBC, MCV, MCH and WBC were lower, Hb was almost similar and MCHC was within the range of the present findings. Moreover, the ranges of hematological parameters reported by (23) were within the ranges of this work. The PCV, Hb, RBC and MCV of the present observation were in agreement with the values reported (6, 7, 8, 13 and 15). Also, there was a significant difference between results of current study and the above mentioned researchers in some other studied parameters. However, there were no differences between values of the present study and other studies; Hb, RBC, MCH and WBC (27), PCV and MCHC (18), RBC, WBC and ESR, while other findings were significantly lower (22), Hb, RBC, MCV, MCH and DLC (21), RBC, MCH and MCHC,

and significantly different in PCV, Hb and WBC (17). The mean values of hematological parameters in this study were significantly ($P<0.05$) higher except more or less similar in Hb concentration (9). Also, a significant increase in means of the present work in comparison with (14 and 20). Moreover, many authors were studied males and females (9, 14, 17, 20 and 21). They reported some significant differences in studied parameters in comparison with these findings. There were significant ($P<0.05$) differences between subgroups in PCV, Hb, RBC, MCV, MCH, MCHC, ESR, lymphocyte, monocyte and L/N ratio. Lactating does were significantly lower in PCV, Hb and RBC, while, bucks showed significantly ($P<0.05$) higher in comparison

with other subgroups. Also, there were significant ($P<0.05$) differences between other subgroups. Doe kids revealed significantly ($P<0.05$) lower values in MCV, MCH and MCHC compared to those of other groups, as well as, significant differences ($P<0.05$) were present in MCH and MCHC of other groups. Lactating does showed significantly ($P<0.05$) higher ESR level compared to other groups. However, bucks showed significantly ($P<0.05$) higher Lymphocytes count compared to lactating does. While, monocytes count was significantly ($P<0.05$) higher in buck kids compared to that of pregnant and lactating does. Moreover, L/N ratio in bucks was significantly ($P<0.05$) higher compared to dry does (Table, 2).

Table, 2: The hematological values of normal local breed goats subgroups; range and mean+ SE.

Parameters	Groups					
	Bucks (n=20)	Buck Kids (n=20)	Doe Kids (n=20)	Dry Does (n=20)	Pregnant (n=25)	Lactating (n=25)
Pcv (%)	30-40 36.0±0.63a	30-40 33.9±0.70b	26-38 30.5±0.78c	32-38 34.3±0.46b	28-32 30.3±0.32c	26-30 27.7±0.26d
Hb (g/dL)	10.0-14.3 12.3±0.25a	10.0-14 11.5±0.28b	8.1-12 9.3±0.25c	10.0-12.6 11.3±0.14b	9.0-10.3 9.6±0.07c	8.0-9.3 8.6±0.07d
RBC×10 ⁶ /μ L	12.5-16.2 15.0±0.25a	11.9-17 13.9±0.36b	10.7-17 13.5±0.41b	12.2-14.9 13.9±0.20b	10.9-13.9 12.5±0.16c	10.6-12.5 11.6±0.11d
MCV (fL)	20.5-32.5 24.3±0.56a	22.3-26.6 24.3±0.31 a	18.4-24.9 22.6±0.44b	23.4-26 24.5±0.14a	21.5-25.6 24.1±0.23 a	21.3-26.7 23.8±0.26 a
MCH (pg)	6.8-8.8 8.1±0.12a	7.7-8.8 8.2±0.08a	5.5-7.9 6.9±0.16c	7.4-8.7 8.0±0.08a	6.7-8.5 7.6±0.09b	6.6-8.3 7.4±0.08b
MCHC (g/dL)	30.6-35.7 34.0±0.26 a	31.2-36.9 34±0.29 a	28.9-31.9 30.6±0.19d	31.1-35.6 32.9±0.24b	30.0-35 31.8±0.25c	28.3-35.0 31.2±0.33cd
ESR mm /24h	2.0-5.0 3.8±0.21ab	1.0-10.0 4.3±0.47ab	2.0-6.0 3.9±0.22ab	1.0-10.0 3.6±0.45b	1.0-8.0 4.1±0.3ab	2.5-8 4.9±0.31a
WBC (/ μ L)	5500-15500 11410±664	5700-15250 11122±480	6300-14300 10870±503	6500-15550 11027±711	6300-15900 10252±629	6400-14850 10014±533
Lymphocyte	2915-9860 6873±513a	6483-8512 6176±267ab	3542-9520 6101±318ab	3551-8721 6069±380ab	2772-10172 5819±366ab	3648-8761 5624±295b
Neutrophil	1863-8680 3970±345	1938-6514 4275±241	2331-5940 4229±253	2015-7777 4458±343	2064-7923 3997±317	2144-6624 3840±265
Monocytes	107-612 310±29.5ab	57-610 394±29.6a	126-436 313±20.0ab	114-622 315±36.9ab	78-520 271±25.2b	79-594 293±26.0b
Eosinophil	0-918 263±54	0-702 251±44	0-414 225±25	0-459 183±25	0-420 163±19	67-705 253±33
Basophils	0±0	0±0	0±0	0±0	0±0	0±0
L/N ratio	0.4-3.8 1.8±0.21 a	0.8-2.6 1.4±0.08ab	0.9-2.5 1.4±0.10ab	0.6-2.1 1.3±0.08 b	0.7-3 1.5±0.10ab	0.9-2.2 1.5±0.08ab

The differences in small letters horizontally refer to the presence of significant value at (<0.05).

However, some main hematological parameters have been reported with significant differences except in MCHC and WBC of buck kids, PCV and eosinophil's of doe kids

(9). Although, (10) have studied buck kids and doe kids, the result showed no significant differences in PCV, Hb, Lymphocytes, monocytes, eosinophils of doe kids compared

with our findings. In Nigeria, (27) have studied hematological parameters of buck kids and doe kids of sokoto red goats. There were significant differences except in Hb of buck kids and eosinophils of doe kids, in kano brown goats there were significant differences in mean values except in Hb and eosinophil's of buck kids and MCHC and neutrophils of doe kids and in borno white goats there were significant differences except in Hb of buck kids in comparison with the current observation. The differences in some hematological parameters of present study in comparison with other researches may be attributed to one or more of the following; health state, feeding program, age, sex, geographical, physiologic status, season or genetic factors (9, 28 and 29).

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المعايير الدمية في المعز المحلي السليم سريريا

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الخلاصة

هدفت الدراسة لتحديد معايير الدم للمعز المحلي السليم سريريا، أجريت الدراسة على 130 معز محلي، 40 ذكور: 20 بالغ و20 صغير، 90 إناث (20 جفيرة صغيرة و20 جفيرة جافة و25 جفيرة حامل و25 جفيرة مرضعة) تتراوح اعمارها بين 6 اشهر -4 سنوات في محافظة النجف-العراق. جُمعت عينات الدم من الوريد الوداجي أنابيب الحاوية على مانع التخثر (EDTA) في المدة من تشرين الأول 2013 لغاية شباط 2014. أظهرت النتائج ان المديات والمعدلات الطبيعية \pm الخطأ القياسي كما يأتي: حجم الخلايا المرصوص $40-26\%$ و $31.8 \pm 0.32\%$ ، خضاب الدم $14-8$ g/dl و 10.3 ± 0.13 g/dl، العد الكلي لكريات الدم الحمراء $17-10.6 \times 10^6 / \mu\text{L}$ و $13.3 \pm 0.14 \times 10^6 / \mu\text{L}$ ، معدل الحجم الكاريبي $32.5-18.4$ fL و 23.9 ± 0.14 fL، معدل خضاب الدم الكاريبي $5.5-8.8$ pg و 7.7 ± 0.05 pg، معدل تركيز خضاب الدم الكاريبي $36.9-28.3$ g/dl و 32.4 ± 0.15 g/dl، معدل تنقل كريات الدم الحمراء خلال 24 ساعة $10-1$ mm و 4.1 ± 0.14 mm، العد الكلي لخلايا الدم البيضاء $15900-5500 / \mu\text{L}$ و $10732 \pm 242 / \mu\text{L}$ ، الخلايا اللمفية $10172-2772 / \mu\text{L}$ و $6080 \pm 149 / \mu\text{L}$ ، العدلات $8680-1863 / \mu\text{L}$ و $4112 \pm 121 / \mu\text{L}$ ، الخلايا احادية النواة $57.0-622 / \mu\text{L}$ و $11 \pm 313 / \mu\text{L}$ ، الحمضات $0-0$ و $14 \pm 222 / \mu\text{L}$ ، القعدات $0-0$ و $0 \pm 0 / \mu\text{L}$ ، نسبة الخلايا اللمفية إلى العدلات $3.8-0.4$ و 1.5 ± 0.04 على التوالي. وجدت زيادة معنوية ($P < 0.05$) في حجم الخلايا المرصوص، خضاب الدم، العد الكلي لكريات الدم الحمراء، معدل الحجم الكاريبي، معدل تركيز خضاب الدم الكاريبي وعدم وجود اختلافات معنوية في معدل تنقل كريات الدم الحمراء، العد الكلي لخلايا الدم البيضاء، الخلايا اللمفية، العدلات، الخلايا احادية النواة، الحمضات، القعدات، نسبة الخلايا اللمفية إلى العدلات بين الذكور والإناث. وقد سجلت النتائج فروقات معنوية في اغلب معايير الدم للمجاميع الثانوية. استنتج من الدراسة تسجيل القيم الدمية في المعز المحلي السليم سريريا مع وجود فروقات معنوية بين الذكور والإناث وكذلك المجاميع الثانوية.

الكلمات المفتاحية: المعايير الدمية، المعز المحلي، ذكور المعز.