

بستگی تغییرات خونی با سن، جنس و نژاد در گوسفندان دنبه‌دار

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تعداد ۵۱۳ نمونه خون از ورید و داج گوسفندان به ظاهر سالم از هر دو جنس، نژادهای مختلف (قزل، مهربان و مخلوط) در سنین متفاوت (۱، ۲، ۳، ۴ هفته، ۲، ۳، ۴، ۵، ۶، ۷، ۸، ۹، ۱۰، ۱۱، ۱۲ ماه، ۲، ۳، ۴ و ۵ سال) تهیه و برای بررسی پارامترهای RBC، Hb، PCV، MCV، MCH، MCHC، WBC، شمارش تقریبی گلبولهای سفید و ترمبوسیت‌ها مورد آزمایش قرار گرفتند.

شمارش کل اریتروسیتها، PCV و میزان Hb بعد از تولد، در طول چند هفته اول، کاهش و سپس افزایش یافت و در سن ۲ ماهگی به نزدیکترین میزان طبیعی خود در گوسفندان بالغ رسید. میزان MCV و MCH بهمین طریق کاهش یافت، ولی در سن ۲ ماهگی افزایشی از خود نشان نداد. هر دو پارامتر در سن ۷ ماهگی افزایش یافت و در سن ۱۰ ماهگی به میزان طبیعی در گوسفندان بالغ رسید. میزان MCHC در زمان تولد پائین بود ولی بطور کم و بیش به موازات سن افزایش یافت. در هر صورت، شمارش کلی اریتروسیتها، PCV، Hb، MCV و MCH تغییرات مهمی را در زمان بلوغ از خود نشان نداد که در مقاله مورد بحث قرار گرفته است.

بطور کلی، تعداد اریتروسیتهای گوسفندان تحت بررسی در حدود ۲ برابر تعداد اریتروسیتهای انسان و سگ بوده ولی این یافته‌ها از نظر اندازه کوچکتر و بالطبع، میزان PCV کمتری را از خود نشان می‌دادند. نتیجتاً "پیشنهاد می‌شود برای احتساب تعداد کل اریتروسیتها گوسفند از روی PCV، بایستی فرمول $(X 10^3) = RBC \frac{PCV}{3}$ را جایگزین فرمول $(X 10^3) = RBC \frac{PCV}{6}$ نمود که جهت انسان و سگ بکار می‌رود. تغییرات کل شمارش لوکوسیتها، دقیقاً "تغییرات شمارش کل اریتروسیتها را از زمان تولد تا ۵ سالگی تعقیب می‌کرد. میزان شمارش لنفوسیتها در زمان تولد خیلی پائین بود ولی در چند هفته اول به سرعت افزایش یافت و به حداکثر میزان خود در ۷ ماهگی رسید.

در چند هفته اول زندگی، نوتروفیل‌های نابالغ، نوتروفیل‌های باندمتامیلوسیتها مشاهده شدند ولی همچنین که سن حیوان افزایش می‌یافت، تعداد آنها کاهش می‌یافت. در هر صورت، نوتروفیل‌ها باندمتامیلوسیت‌ها بعد از سن ۸ ماهگی مشاهده نگردیدند. شمارش اعوزینوفیلها در زمان تولد خیلی پایین بود و بتدریج افزایش یافت که به بالاترین میزان خود در سن ۵ سالگی رسید. شمارش مونوسیت‌ها از تولد تا ۵ سالگی تغییراتی را در جهت مخالف تغییرات اعوزینوفیلها از خود نشان می‌دادند. تعداد متوسط ترمبوسیتها یا پلاکت‌ها در زمان تولد کم بود، ولی در سن ۲ هفتگی افزایش یافته و در سن ۴ هفتگی کاهش یافت، سپس تا سن ۷ ماهگی ثابت ماند و در سن بلوغ تغییرات مهمی را از خود نشان داد.

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sed in more or less parallel pattern with age increase.

The total erythrocyte, PCV, Hb., MCV, MCH, MCHC values showed very important changes at the time of puberty that is fully discussed in the text.

Generally, number of erythrocytes in fat tailed sheep is about two times more than the number of erythrocytes in human and dogs. The erythrocytes are also smaller, consequently sheep showed smaller PCV value than in two species mentioned. Then for calculating the number of erythrocyte from PCV the $\frac{PCV}{3} = RBC (x 10^6)$ formula should be used in place of $\frac{PCV}{6} = RBC (x 10^6)$ which is used for human and other species.

The total leukocyte counts changes followed erythrocyte count pattern changes from birth to 5 years. Lymphocyte count value was very low at birth, but rose very sharply in first few weeks and then continued to highest value at 7 months. Lymphocyte count showed significant changes inversely related to changes in neutrophil changes. Immature neutrophils, band neutrophils, and metamyelocyte were observed in first few weeks of life, but the number decreased as the age of animals advanced. Band neutrophils and metamyelocytes were not observed after 8 months. Eosinophil count was low at birth and gradually increased with highest value at five years. Monocyte count was high at birth, but decreased as age of animals advanced.

The mean value of platelets was low at birth, but sharply increased in 2 weeks and then decreased at 4th week of life. It then stabilized up to 7 months, but showed significant changes at puberty.

The lymphocytes changes (lymphocytosis) in this study were inversely related to the observed changes in neutrophils. This could be due to development of active immune system (4).

Changes in neutrophils and lymphocytes which occurred between 7 to 12 months could be due to the puberty in sheep at this age.

The changes observed in eosinophil count is very similar to what reported by other investigators (12), (2). The increase in eosinophils parallels with age, lowest at birth and highest in 5 years (6).

Increased Platelet count in first two weeks of life could be due to the exposure of embryo to external uterine atmosphere or separation of umbilical cord (10).

SUMMARY

Five hundred thirteen blood samples taken from jugular veins of healthy fat tailed sheep of both sexes, different breeds (Ghezel, Mehraban and Mixed) at different ages (at birth; 1,2,3,4 weeks; 2,3,4,5,6,7,8,9,10,11,12 months; 2,3,4,5 years) were examined for RBC, Hb., PCV, MCV, MCH, MCHC, WBC, differential counts and platelets values.

The total erythrocyte count, PCV and Hb. level decreased after birth during first few weeks, but rose and reached to near normal adult values at 2 months. Mean corpuscular volume and MCH decreased in similar way, but did not rise at 2 months. Both increased at 7 months and reached to adult level at 10 months. Mean corpuscular hemoglobin concentration was low at birth, but increa-

may be a physiological erythropoietic response that is very similar to that observed in calves following experimental removal of circulating erythrocytes(9). The increase in PCV and Hb. with higher value at 2-10 months could be attributed to erythrocyte increase and kinds of food intake, which contains higher concentration of iron than milk, respectively.

The decrease in RBC at 11 months, PCV and Hb. decrease at the age of 12 months in comparison with 7,8,9,10 months of age could be attributed to decrease in physiological erythropoietic response in mature sheep.

The sharp decrease in MCV after birth could be due to replacement of Hb.F by Hb.A. After 7 months, the changes observed in MCV were inversely related to RBC changes.

The MCH changes which were observed in first few weeks of life is similar with those observed by Ullery et al.(11) and Becker et al(1). The decrease may be due to RBC size and Hb. concentration. Thereafter, changes were similar to changes in MCV which were observed. MCHC changes is similar to the changes which occurred in Hb. concentration.

The low value of leukocyte and high values in mature neutrophils, band neutrophils, metamyelocytes and lymphopenia observed in this study at birth could be attributed to normal hematological response towards high concentration of corticosteroids hormones at the time of delivery in sheep, (10). The presence of immature neutrophils in new lambs could be also explained by inability of bone marrow to produce mature neutrophils which is necessary at this age.

Sex and Breed

Blood pattern changes in both sexes are summarized in table 2. The changes in blood parameters observed in male and female were not statistically significant, but slight changes observed which clinically were not important.

Blood parameter changes observed in different breeds were not also statistically significant (Tab. 3).

Discussion

Significant hematological changes were observed during neonatal and puberty period in sheep. The decrease in RBC, Hb. and PCV occurred during the first few weeks of life could be due to expansion of plasma volume following ingestion of colostrum (6) or could be attributed to iron deficiency, since iron intake, from milk that forms the main food intake at this age, is not adequate to prevent the physiological anemia observed and could be due to the inability of the sheep to produce erythrocytes at a rate equal to removal from the circulation. However, Ullery and his colleagues (11) by injecting 375 mg. of iron as iron dextran prevented the Hb. and PCV decrease in new born sheep.

The fall in PCV after birth could be also attributed to the decrease in MCV that itself could be the result of decrease in erythrocyte size, since Ullery et al. (11), Littleton et al. (3) and Upcott et al. (12) showed that erythrocytes become smaller in size in first few weeks of life.

The increase in RBC with higher values at 2-9 months

Normal Blood Values in Fat tailed sheep of Different Ages

Age	No. of obser. [†]	RBC (x10 ⁶)	Hb (g/dl)	PCV (%)	MCV (fl)	MCH (pg)	MCHC (g/dl)	platelet (x10 ³)	WBC (x10 ³)	Differential Leukocyte Count (absolute number)						
										Meta	Band	Neutr.	Lymph.	Mono.	Basin.	Baso.
N.B. +	31	10.25* ±1.81*	13.33 ±1.20	41.83 ±4.42	41.42 ±5.22	13.21 ±1.57	32.00 ±2.18	236.45 ±52.69	11.66 ±3.01	13.99 ±14.74	55.96 ±31.90	8341.56 ±310.33	3091.06 ±329.59	093.28 ±37.32	052.47 ±26.48	06.99 ±07.22
1 week	31	8.56 ±1.86	11.02 ±1.43	33.32 ±4.14	39.93 ±6.41	13.21 ±1.57	33.07 ±1.26	293.87 ±72.69	10.45 ±2.81	09.40 ±13.76	12.54 ±19.95	5844.68 ±404.35	4405.72 ±417.00	160.93 ±44.96	030.30 ±97.10	00.00 ±00.00
2 weeks	29	8.19 ±1.60	9.72 ±1.18	30.96 ±3.56	38.84 ±7.20	12.16 ±2.19	31.43 ±2.05	308.27 ±73.09	9.39 ±2.11	12.20 ±10.76	00.00 ±00.00	4425.50 ±244.54	4726.92 ±247.29	138.97 ±28.48	083.57 ±41.56	00.00 ±00.00
3 weeks	30	8.63 ±1.65	9.79 ±1.39	30.46 ±4.09	36.23 ±6.49	11.66 ±2.32	32.13 ±1.44	279.33 ±64.91	10.91 ±2.87	14.18 ±14.35	00.00 ±00.00	5444.09 ±359.03	5076.42 ±349.85	213.83 ±56.53	101.46 ±39.60	21.82 ±31.28
4 weeks	32	8.56 ±1.81	10.30 ±1.35	31.12 ±3.47	37.67 ±7.42	12.46 ±2.56	33.06 ±1.85	267.81 ±53.80	11.55 ±3.20	00.00 ±00.00	13.86 ±15.68	4832.52 ±534.08	6388.30 ±496.32	173.25 ±48.00	122.43 ±58.88	00.00 ±00.00
2 months	30	11.33 ±2.53	11.81 ±1.37	34.56 ±3.10	31.99 ±7.60	10.91 ±2.61	34.12 ±2.09	263.66 ±66.46	13.24 ±2.88	03.97 ±05.18	00.00 ±00.00	6107.61 ±441.50	6884.80 ±434.59	172.12 ±54.43	113.86 ±50.97	00.00 ±00.00
3 months	30	11.56 ±1.62	12.06 ±1.28	34.76 ±3.80	30.20 ±3.60	10.60 ±1.43	34.61 ±1.51	272.00 ±45.13	11.90 ±2.72	00.00 ±00.00	00.00 ±00.00	4779.04 ±376.72	6941.27 ±369.64	107.10 ±34.27	71.40 ±31.55	00.00 ±00.00
4 months	30	10.68 ±1.94	11.39 ±1.18	33.03 ±3.39	31.59 ±4.70	10.93 ±1.57	34.99 ±2.70	269.66 ±46.86	12.66 ±3.10	07.59 ±11.16	07.59 ±11.16	5583.06 ±451.36	6843.99 ±447.33	151.92 ±47.74	54.43 ±22.33	07.59 ±07.75
5 months	30	11.95 ±1.55	11.75 ±1.22	33.83 ±2.85	28.69 ±4.12	9.96 ±1.48	34.70 ±1.58	262.66 ±51.52	12.60 ±3.14	03.78 ±05.65	00.00 ±00.00	5211.36 ±487.01	7139.16 ±491.72	041.58 ±23.55	192.78 ±78.50	07.56 ±11.30
6 months	22	12.86 ±2.05	11.54 ±0.95	33.36 ±2.95	26.48 ±2.80	9.10 ±0.99	34.61 ±1.02	252.27 ±55.28	11.59 ±2.90	00.00 ±00.00	00.00 ±00.00	4751.90 ±468.06	6442.88 ±450.37	000.00 ±66.12	336.11 ±27.84	57.95 ±27.84
7 months	20	13.45 ±1.26	11.43 ±0.81	33.40 ±1.98	24.07 ±2.13	8.54 ±0.76	34.25 ±1.76	260.50 ±45.24	11.69 ±2.37	00.00 ±00.00	00.00 ±00.00	4085.65 ±271.36	7019.84 ±289.37	046.76 ±24.64	490.98 ±54.03	46.76 ±19.43
8 months	23	13.21 ±2.13	12.36 ±1.08	36.17 ±2.83	27.96 ±4.47	9.54 ±1.37	34.18 ±1.29	216.52 ±32.83	12.67 ±3.35	05.06 ±06.70	10.13 ±13.73	5833.26 ±415.73	6494.64 ±394.96	034.07 ±23.78	225.52 ±72.02	54.48 ±29.81
9 months	16	13.20 ±1.44	12.52 ±0.51	35.87 ±1.45	27.60 ±2.88	9.56 ±0.91	34.92 ±1.08	201.25 ±35.00	9.87 ±2.92	00.00 ±00.00	00.00 ±00.00	5298.21 ±302.80	4107.89 ±351.27	049.35 ±25.98	351.37 ±95.77	00.00 ±00.00
10 months	17	12.38 ±1.32	12.45 ±1.01	35.64 ±1.96	28.98 ±2.13	10.22 ±0.78	34.97 ±1.66	305.88 ±34.83	9.29 ±1.18	00.00 ±00.00	00.00 ±00.00	3251.50 ±131.92	5688.26 ±124.49	157.93 ±18.29	212.74 ±23.12	00.00 ±00.00
11 months	15	9.12 ±1.77	11.00 ±0.79	33.00 ±2.90	37.12 ±5.59	12.35 ±2.06	33.41 ±1.75	267.33 ±37.50	9.92 ±1.61	00.00 ±00.00	00.00 ±00.00	2916.48 ±089.03	6572.99 ±097.24	059.52 ±18.99	370.01 ±48.46	00.00 ±00.00
12 months	30	10.83 ±1.62	10.74 ±1.16	29.16 ±3.09	27.20 ±2.87	10.03 ±0.96	36.87 ±1.99	235.00 ±45.76	12.62 ±2.70	00.00 ±00.00	00.00 ±00.00	5451.84 ±320.49	6726.46 ±312.12	037.86 ±18.90	357.14 ±63.72	00.00 ±00.00
2 years	27	10.47 ±2.47	11.20 ±1.35	31.48 ±3.96	31.36 ±7.61	11.15 ±2.60	35.59 ±1.05	271.11 ±46.60	12.11 ±2.79	00.00 ±00.00	00.00 ±00.00	5740.14 ±327.26	5821.27 ±304.38	000.00 ±00.00	506.19 ±106.85	39.96 ±24.27
3 years	29	10.06 ±2.09	10.88 ±1.74	30.62 ±5.07	31.06 ±5.88	11.03 ±1.97	35.63 ±2.12	252.75 ±41.22	10.35 ±2.03	00.00 ±00.00	00.00 ±00.00	4554.00 ±145.14	5316.79 ±147.37	013.45 ±08.93	385.02 ±72.06	06.21 ±05.07
4 years	29	10.33 ±2.63	10.96 ±1.72	31.06 ±5.12	31.23 ±6.76	11.02 ±2.31	35.35 ±1.42	254.13 ±44.60	11.54 ±2.66	00.00 ±00.00	00.00 ±00.00	5116.83 ±299.51	5841.54 ±288.34	047.31 ±35.91	484.68 ±90.70	06.92 ±06.65
5 years	12	11.17 ±2.73	11.81 ±0.61	34.00 ±1.85	32.58 ±9.85	11.32 ±3.49	34.78 ±1.47	252.50 ±59.56	13.06 ±2.18	00.00 ±00.00	00.00 ±00.00	5865.24 ±239.80	6334.10 ±332.82	043.09 ±14.17	804.49 ±114.01	10.44 ±06.10

† = Number of observation * = Mean and ±1 Standard deviation

Table 1. Shows normal blood values in fat tailed sheep of different ages.

Normal Blood Values in Fat tailed sheep of Different Ages in relation to Sex

Age	Sex	No. of Obser.	RBC (x10 ⁶)	Hb (g/dl)	PCV (%)	MCV (Fl)	MCH (Pg)	MCHC (g/dl)	Platelet (x10 ³)	WBC (x10 ³)	Differential Leukocyte count (absolute number)						
											Meta	Band	Neutr.	Lymph.	Mono.	Eosin.	Baso.
N.B ^y	M ⁺	15	10.06*	13.00	41.00	41.52	13.16	31.78	232.66	11.01	00.00	49.68	8161.71	2590.68	116.70	028.62	14.31
	F ⁺	16	10.43	13.65	42.62	41.32	13.26	32.20	240.00	12.28	30.70	14.73	8487.93	3599.26	068.76	076.13	00.00
1 Week	M	19	8.34	10.86	32.94	40.58	13.34	32.93	293.68	10.04	00.00	21.08	5696.67	4168.60	173.69	010.04	00.00
	F	12	8.91	11.27	33.91	38.89	12.95	33.30	294.16	11.10	27.75	00.00	6077.25	4790.76	138.75	064.38	00.00
2 Weeks	M	17	8.02	9.54	30.58	39.08	12.17	31.28	312.94	9.39	10.32	00.00	7207.76	4821.76	121.13	044.13	00.00
	F	17	8.43	9.96	31.50	38.51	12.15	31.65	301.66	9.39	15.02	00.00	4475.27	4592.64	164.32	140.85	00.00
3 Weeks	M	18	8.41	9.58	29.44	36.28	11.85	32.54	272.77	11.55	25.41	00.00	5908.98	5273.73	153.61	083.16	38.11
	F	12	8.95	10.10	32.00	36.15	11.39	31.52	289.16	9.95	00.00	00.00	4776.00	4714.31	289.54	124.37	00.00
4 Weeks	M	17	8.47	10.11	30.70	38.12	12.54	32.87	290.58	11.13	00.00	12.24	5529.91	6278.43	202.56	130.22	00.00
	F	15	8.66	10.51	31.60	37.15	12.36	33.27	242.00	12.02	00.00	15.62	5256.34	6498.01	135.82	111.78	00.00
2 Months	M	22	11.20	11.36	33.71	31.48	10.67	33.98	276.36	13.05	05.22	00.00	6091.74	6725.97	177.48	105.70	00.00
	F	8	11.68	13.02	37.75	33.37	11.54	34.49	228.75	13.78	00.00	00.00	6148.63	7337.85	166.73	137.80	00.00
3 Months	M	18	11.13	11.68	33.61	30.32	10.67	34.73	277.77	11.78	00.00	00.00	4794.46	6773.50	136.64	064.79	00.00
	F	12	12.20	12.62	36.50	30.02	10.49	34.63	263.33	12.08	00.00	00.00	4741.40	7197.26	060.40	079.72	00.00
4 Months	M	16	10.18	11.22	32.81	33.01	11.31	34.25	267.50	11.18	13.41	13.41	4702.30	6232.85	195.65	020.12	00.00
	F	14	11.25	11.60	33.28	29.96	10.49	35.84	272.14	14.00	00.00	00.00	6498.80	7299.60	079.80	099.40	19.60
5 Months	M	14	11.75	11.31	33.07	28.56	9.76	34.14	260.00	12.31	00.00	00.00	4659.33	7420.46	087.40	140.33	00.00
	F	16	12.13	12.13	34.50	28.81	10.13	35.18	265.30	12.85	07.71	00.00	5709.25	6874.75	000.00	240.29	15.42
6 Months	M	9	11.83	11.17	32.22	27.55	9.50	34.69	274.44	11.66	00.00	00.00	5130.40	6152.98	000.00	362.62	12.82
	F	13	13.57	11.79	34.15	25.75	8.81	34.55	253.84	11.53	00.00	00.00	4487.47	6633.20	000.00	318.22	87.62

+F=Female. +M = Male. + = Number of observation. N.B = New born. * = Mean and ± Standard deviation.

Continued...

Age	Sex	No. of obser. ⁺	RBC (x10 ⁶)	Hb (g/dl)	PCV (%)	MCV (fl)	MCH (pg)	MCHC (g/dl)	Platelet (x10 ³)	WBC (x10 ³)	Differential Leukocyte Count (absolute number)						
											Meta	Band	Neutr.	Lymph.	Mono.	Eosin.	Baso.
7 Months	M ⁺	12	13.33* ±1.52	11.23 ±0.78	33.16 ±1.94	25.10 ±2.69	8.50 ±0.93	33.90 ±2.17	260.00 ±52.39	11.52 ±2.48	00.00 ±00.00	00.00 ±00.00	04136.83 ±0306.52	06930.43 ±0304.79	038.01 ±19.09	0354.81 ±045.38	57.60 ±22.32
	F ⁺	8	13.62 ±0.79	11.73 ±0.81	33.75 ±2.12	24.78 ±0.96	8.61 ±0.47	34.77 ±0.74	261.25 ±35.22	11.93 ±2.34	00.00 ±00.00	00.00 ±00.00	04235.15 ±0247.80	07142.79 ±0302.79	059.65 ±32.99	0700.29 ±043.99	29.82 ±16.38
8 Months	M	5	13.50 ±2.29	12.52 ±0.92	36.60 ±2.19	27.66 ±4.16	9.49 ±1.72	34.21 ±1.67	222.00 ±22.80	13.22 ±1.90	26.44 ±08.36	52.88 ±16.91	07058.92 ±0368.41	5737.48 ±0372.21	079.32 ±16.91	211.52 ±028.69	26.44 ±08.36
	F	18	13.13 ±2.15	12.32 ±1.15	36.05 ±3.03	28.04 ±4.66	9.55 ±1.31	34.17 ±1.22	215.00 ±35.52	12.52 ±3.96	00.00 ±00.00	00.00 ±00.00	05501.28 ±0374.61	06690.68 ±0322.74	033.80 ±26.13	0229.11 ±092.26	62.60 ±38.80
9 Months	M	2	11.95 ±0.07	12.10 ±0.14	34.50 ±2.12	28.86 ±1.60	10.12 ±0.05	35.12 ±1.75	190.00 ±14.14	12.60 ±5.5	00.00 ±00.00	00.00 ±00.00	06048.00 ±1244.40	05670.00 ±1632.95	252.00 ±77.55	0630.00 ±310.75	00.00 ±00.00
	F	14	13.38 ±1.46	12.58 ±0.51	36.07 ±1.32	27.42 ±3.01	9.48 ±0.96	34.89 ±1.05	202.85 ±37.09	9.48 ±2.48	00.00 ±00.00	00.00 ±00.00	05166.50 ±0224.14	03900.07 ±0244.76	026.54 ±17.89	0385.83 ±079.27	00.00 ±00.00
10 months	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	F	17	12.38 ±1.32	12.45 ±1.01	35.74 ±1.96	28.98 ±2.12	10.22 ±0.78	34.97 ±1.66	305.88 ±34.83	9.29 ±1.18	00.00 ±00.00	00.00 ±00.00	03251.50 ±0413.00	05688.26 ±0124.79	092.90 ±18.24	0212.74 ±023.12	00.00 ±00.00
11 Months	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	F	15	9.12 ±1.77	11.00 ±0.79	33.00 ±2.90	37.12 ±5.59	12.35 ±2.06	33.41 ±1.75	267.33 ±37.50	9.92 ±1.61	00.00 ±00.00	00.00 ±00.00	02916.48 ±0088.87	06572.99 ±0097.24	059.52 ±18.99	0370.01 ±048.46	00.00 ±00.00
12 Months	M	7	9.42 ±1.30	9.74 ±1.06	27.85 ±2.11	29.74 ±1.84	10.38 ±0.81	34.93 ±2.29	267.14 ±56.18	14.78 ±3.58	00.00 ±00.00	00.00 ±00.00	06755.93 ±0597.50	07494.93 ±0593.92	000.00 ±00.00	0527.64 ±123.51	00.00 ±00.00
	F	23	11.52 ±1.87	11.25 ±1.24	30.52 ±4.06	26.78 ±2.87	9.91 ±1.04	37.01 ±1.74	236.52 ±40.74	11.76 ±1.95	00.00 ±00.00	00.00 ±00.00	04954.48 ±0206.31	06283.36 ±0195.00	45.89 ±15.21	0459.81 ±069.54	09.40 ±07.99
2 Years	M	10	9.40 ±1.25	10.83 ±1.50	31.00 ±4.18	33.04 ±3.64	11.54 ±1.06	34.92 ±0.76	276.00 ±41.68	13.17 ±3.78	00.00 ±00.00	00.00 ±00.00	07124.97 ±0465.31	05663.10 ±0446.04	000.00 ±00.00	0355.59 ±075.60	26.34 ±15.87
	F	17	11.58 ±1.93	11.50 ±1.42	31.76 ±4.47	27.46 ±1.64	10.00 ±0.77	36.22 ±0.95	271.76 ±55.81	10.68 ±2.15	00.00 ±00.00	00.00 ±00.00	04566.76 ±0209.19	05496.99 ±0215.21	000.00 ±00.00	0458.17 ±093.31	30.97 ±21.07
3 Years	M	14	9.42 ±1.90	11.17 ±1.50	31.64 ±4.44	34.45 ±6.95	12.12 ±2.20	35.39 ±2.06	250.00 ±36.79	10.30 ±1.71	00.00 ±00.00	00.00 ±00.00	04686.50 ±0112.68	05392.05 ±0109.26	028.84 ±10.43	0190.55 ±032.66	00.00 ±00.00
	F	15	10.80 ±2.01	10.60 ±1.85	29.86 ±5.22	27.74 ±1.62	9.88 ±1.06	35.56 ±2.34	258.66 ±53.03	10.64 ±1.75	00.00 ±00.00	00.00 ±00.00	04830.56 ±0150.50	05156.14 ±0139.82	013.83 ±08.92	0617.12 ±063.35	21.26 ±07.17
4 Years	M	7	9.12 ±1.84	11.17 ±1.80	31.14 ±5.69	35.19 ±9.32	12.56 ±2.95	35.95 ±1.63	260.00 ±44.34	10.62 ±2.13	00.00 ±00.00	00.00 ±00.00	04414.73 ±0164.86	05673.20 ±0234.72	000.00 ±00.00	0515.07 ±086.26	43.54 ±07.88
	F	22	10.80 ±2.91	10.76 ±1.54	30.77 ±4.76	29.67 ±5.85	10.39 ±2.03	35.06 ±1.45	253.18 ±42.13	12.80 ±3.05	00.00 ±00.00	00.00 ±00.00	05724.16 ±0355.32	06528.00 ±0316.28	069.12 ±46.66	0418.56 ±086.62	00.00 ±00.00
5 Years	M	4	10.25 ±1.75	12.17 ±0.61	35.00 ±2.44	34.17 ±4.25	12.06 ±1.46	34.81 ±0.76	232.50 ±71.82	11.77 ±0.83	00.00 ±00.00	00.00 ±00.00	06032.12 ±0100.59	04737.42 ±0894.70	029.42 ±04.15	0941.60 ±058.26	29.42 ±04.15
	F	8	12.12 ±0.64	12.16 ±0.73	35.50 ±1.41	29.30 ±0.97	10.29 ±0.98	34.37 ±1.48	308.75 ±44.54	9.72 ±1.80	00.00 ±00.00	00.00 ±00.00	03049.16 ±0152.28	06281.06 ±0185.76	133.16 ±30.24	0351.86 ±076.32	00.00 ±00.00

+ = Female. + = M = Male. + = Number of observation. * = Mean and ±1 standard deviation.

Table 2. Shows normal blood values in fat tailed sheep of different ages in relation to sex.

Normal Blood Values in Fat tailed Sheep of Different Ages in relation to Breed

Age	Breed	No. of obser. [†]	RBC (x10 ⁶)	HB (g/dl)	PCV (%)	MCV (fl)	MCH (pg)	MCHC (g/dl)	Platelet (x10 ³)	WBC (x10 ³)	Differential Leukocyte Count (absolute number)							
											Meta	Band	Neutr.	Lymph.	Mono.	Eosin.	Baso.	
N.B. +	Me. ♀	9	10.55* ±0.80*	13.54 ±0.89	41.77 ±2.90	39.72 ±3.38	12.86 ±0.93	32.43 ±0.90	250.00 ±55.90	13.04 ±2.20	00.00 ±00.00	43.03 ±22.00	8895.88 ±262.02	3953.72 ±291.72	146.04 ±34.32	00.00 ±00.00	00.00 ±00.00	
	Gh. ♀	7	10.64 ±1.21	13.50 ±1.41	42.71 ±6.01	40.20 ±4.09	12.74 ±1.23	31.75 ±1.78	271.42 ±48.79	11.97 ±3.33	00.00 ±00.00	33.51 ±24.97	7994.76 ±172.49	3780.12 ±174.49	68.22 ±50.28	68.22 ±32.30	00.00 ±00.00	00.00 ±00.00
1 Week	Me.	8	8.81 ±1.19	11.10 ±0.87	32.75 ±2.54	37.51 ±3.63	12.75 ±1.65	33.92 ±1.58	305.00 ±45.03	10.21 ±2.47	00.00 ±00.00	00.00 ±00.00	7548.55 ±319.12	5736.89 ±297.38	185.49 ±34.47	67.70 ±22.72	00.00 ±00.00	00.00 ±00.00
	Gh.	8	8.14 ±1.18	10.67 ±1.44	32.14 ±3.89	39.69 ±3.35	13.15 ±1.01	33.17 ±1.29	320.00 ±100.49	10.28 ±2.76	00.00 ±00.00	00.00 ±00.00	5418.58 ±234.87	4669.17 ±227.42	234.38 ±56.58	234.38 ±20.70	00.00 ±00.00	00.00 ±00.00
2 Weeks	Me.	3	10.60 ±1.41	11.03 ±0.66	34.00 ±2.00	32.31 ±2.80	10.48 ±0.93	32.46 ±1.52	290.00 ±96.43	9.86 ±2.30	00.00 ±00.00	00.00 ±00.00	4469.53 ±106.03	4478.41 ±092.92	224.80 ±39.79	27.60 ±26.45	00.00 ±00.00	00.00 ±00.00
	Gh.	6	9.03 ±0.98	9.23 ±1.25	29.16 ±3.37	32.34 ±2.91	10.22 ±0.99	31.60 ±1.64	308.33 ±39.20	8.66 ±1.19	28.57 ±09.63	00.00 ±00.00	3940.30 ±102.22	4560.35 ±117.92	100.45 ±15.70	28.57 ±09.63	00.00 ±00.00	00.00 ±00.00
3 Weeks	Me.	6	9.25 ±0.41	10.73 ±0.29	33.16 ±0.75	35.89 ±1.39	11.61 ±0.38	32.36 ±0.65	275.00 ±55.76	11.38 ±3.32	00.00 ±00.00	00.00 ±00.00	5025.40 ±378.14	6125.84 ±420.97	150.21 ±80.34	99.14 ±33.86	00.00 ±00.00	00.00 ±00.00
	Gh.	9	8.44 ±1.58	9.72 ±1.60	30.44 ±4.36	36.54 ±4.27	11.65 ±1.50	31.89 ±1.87	272.22 ±53.56	9.90 ±3.25	21.78 ±21.45	00.00 ±00.00	4872.78 ±461.82	4641.12 ±435.82	186.12 ±57.20	65.34 ±32.50	00.00 ±00.00	00.00 ±00.00
4 Weeks	Me.	12	8.37 ±1.47	11.18 ±0.87	32.83 ±2.24	39.62 ±4.25	13.50 ±1.57	34.05 ±1.19	237.50 ±33.87	10.69 ±1.25	00.00 ±00.00	00.00 ±00.00	3714.77 ±049.00	6716.52 ±051.81	177.45 ±15.06	53.45 ±15.19	00.00 ±00.00	00.00 ±00.00
	Gh.	4	8.00 ±1.47	10.37 ±1.15	30.75 ±3.59	39.02 ±5.20	13.17 ±1.79	33.75 ±0.69	215.00 ±26.45	10.62 ±1.79	00.00 ±00.00	00.00 ±00.00	4035.60 ±158.05	6398.55 ±157.52	132.75 ±17.00	53.10 ±17.90	00.00 ±00.00	00.00 ±00.00
2 Months	Me.	9	11.61 ±2.28	12.16 ±1.09	34.44 ±2.65	30.65 ±6.38	10.84 ±2.42	35.29 ±1.07	263.33 ±66.70	13.01 ±3.03	00.00 ±00.00	00.00 ±00.00	5651.54 ±339.66	7054.02 ±302.69	130.10 ±47.87	173.03 ±79.99	00.00 ±00.00	00.00 ±00.00
	Gh.	6	12.41 ±2.35	12.20 ±0.99	34.66 ±2.80	28.56 ±4.34	10.05 ±1.53	35.19 ±0.62	263.33 ±49.66	12.83 ±3.59	00.00 ±00.00	00.00 ±00.00	4126.12 ±440.85	8616.62 ±479.98	00.00 ±00.00	84.67 ±58.51	00.00 ±00.00	00.00 ±00.00
3 Months	Me.	9	10.38 ±1.11	12.02 ±0.54	33.66 ±1.50	31.89 ±2.27	11.64 ±0.84	35.59 ±1.06	275.55 ±41.86	9.64 ±1.34	00.00 ±00.00	00.00 ±00.00	3577.40 ±130.38	6019.21 ±126.36	42.41 ±11.79	00.00 ±00.00	00.00 ±00.00	00.00 ±00.00
	Gh.	8	10.75 ±1.28	11.73 ±0.77	33.50 ±1.19	31.44 ±2.89	11.13 ±1.03	35.02 ±1.75	286.25 ±40.68	11.78 ±2.95	00.00 ±00.00	00.00 ±00.00	4034.65 ±210.04	7641.68 ±174.34	88.35 ±14.16	14.13 ±10.62	00.00 ±00.00	00.00 ±00.00
4 Months	Me.	7	11.64 ±1.77	11.28 ±1.39	32.00 ±3.46	27.77 ±3.28	9.78 ±1.20	35.76 ±2.43	288.57 ±21.93	11.38 ±2.04	00.00 ±00.00	00.00 ±00.00	4470.06 ±183.39	6794.99 ±184.21	31.86 ±09.79	13.65 ±15.30	00.00 ±00.00	00.00 ±00.00
	Gh.	8	10.75 ±1.22	11.42 ±0.65	32.00 ±1.60	30.06 ±3.38	10.85 ±1.22	36.78 ±2.80	300.00 ±39.27	13.60 ±4.00	00.00 ±00.00	00.00 ±00.00	6850.32 ±254.44	6630.00 ±290.80	00.00 ±00.00	84.32 ±36.40	34.00 ±18.40	00.00 ±00.00
5 Months	Me.	13	11.96 ±1.52	11.39 ±0.98	33.15 ±1.81	28.04 ±2.96	9.62 ±1.09	34.34 ±2.17	285.38 ±32.04	10.38 ±1.54	00.00 ±00.00	00.00 ±00.00	3289.42 ±115.96	6946.29 ±111.58	15.57 ±08.47	127.67 ±29.56	00.00 ±00.00	00.00 ±00.00
	Gh.	3	12.66 ±1.04	11.63 ±0.73	33.33 ±2.08	26.34 ±0.54	9.19 ±0.33	34.90 ±0.94	246.66 ±50.33	11.96 ±1.10	00.00 ±00.00	00.00 ±00.00	3547.33 ±115.96	8052.66 ±111.95	00.00 ±00.00	358.80 ±66.99	00.00 ±00.00	00.00 ±00.00
6 Months	Me.	10	13.15 ±1.29	11.72 ±0.45	33.50 ±1.58	25.78 ±2.27	8.98 ±0.88	35.00 ±1.24	247.00 ±39.17	10.10 ±2.65	00.00 ±00.00	00.00 ±00.00	3535.00 ±326.21	6090.30 ±300.24	00.00 ±00.00	393.90 ±61.74	80.80 ±32.33	00.00 ±00.00
	Gh.	7	13.71 ±2.41	11.82 ±0.94	34.42 ±3.20	25.85 ±2.45	8.76 ±0.98	34.39 ±0.76	257.14 ±51.22	11.85 ±2.09	00.00 ±00.00	00.00 ±00.00	4671.27 ±248.71	6855.22 ±270.86	00.00 ±00.00	270.18 ±42.84	49.77 ±16.30	00.00 ±00.00

† = Number of Observation. * = Mean and † Standard deviation. ♀ = Me. = Mehraban. ♀ = Gh. = Ghazal.

+ = New-Born.

Continued...

Age	Breed	No. of observ. †	RBC ($\times 10^6$)	HB (g/dl)	PCV (%)	MCV (fl)	MCH (Pg)	MCHC (g/dl)	Platelet ($\times 10^3$)	WBC ($\times 10^3$)	Differential Leukocyte Count (absolute number)						
											Meta	Sand	Neutr.	Lymph.	Mono.	Eosin.	Baso.
7 Months	Me. †	12	13.41*	11.26	32.75	24.51	8.44	34.41	267.50	10.90	00.00	00.00	3542.50	6839.75	000.00	444.72	71.94
	Gh. †	5	11.34*	10.83	11.81	11.32	10.73	12.00	150.11	12.32	00.00	00.00	1193.72	1219.93	± 00.00	± 46.86	± 22.73
8 Months	Me. †	11	13.27	12.40	36.72	28.60	9.60	33.73	225.45	11.52	00.00	00.00	4757.30	6461.56	041.47	135.93	51.84
	Gh. †	5	12.48	11.18	22.64	15.95	11.66	11.23	140.33	12.67	00.00	00.00	1266.46	1230.95	± 21.36	± 62.74	± 24.83
9 Months	Me. †	7	13.27	12.37	35.66	26.95	9.36	34.72	203.33	13.73	00.00	00.00	6223.80	7123.12	015.10	289.70	75.51
	Gh. †	9	11.62	11.10	23.31	11.09	10.51	11.06	121.21	14.12	00.00	00.00	1390.16	1344.02	± 13.59	± 90.64	± 41.61
10 Months	Me. †	6	13.00	12.44	35.57	27.88	9.60	35.00	198.57	9.48	00.00	00.00	4888.83	4156.98	091.95	379.20	00.00
	Gh. †	11	11.14	10.50	11.61	12.05	10.54	11.41	140.17	12.42	00.00	00.00	1272.97	1296.45	± 23.47	± 62.43	± 00.00
11 Months	Me. †	7	13.53	12.63	36.12	27.05	9.45	34.98	203.75	9.38	00.00	00.00	5088.65	3927.40	023.45	339.55	00.00
	Gh. †	8	11.72	10.55	11.45	13.59	11.23	10.81	135.02	12.56	00.00	00.00	1263.42	1294.14	± 17.92	± 100.35	± 00.00
12 Months	Me. †	6	9.75	11.35	33.00	35.28	12.09	34.34	281.66	10.28	00.00	00.00	3786.12	6184.44	085.32	222.04	00.00
	Gh. †	11	11.86	12.38	22.96	16.95	12.39	11.66	127.86	11.72	00.00	00.00	1165.46	1165.12	± 16.85	± 31.47	± 00.00
2 Years	Me. †	6	11.87	11.01	11.90	14.68	11.17	12.60	289.09	9.49	00.00	00.00	3200.02	5857.22	068.32	318.86	00.00
	Gh. †	11	9.85	10.77	30.57	32.11	10.98	34.84	250.00	10.50	00.00	00.00	4724.84	7622.80	036.17	534.88	00.00
3 Years	Me. †	7	11.88	10.77	11.80	17.05	11.95	12.40	145.46	11.58	00.00	00.00	1151.20	1177.27	± 11.85	± 65.41	± 00.00
	Gh. †	8	10.97	11.27	31.87	30.52	10.84	35.74	228.75	11.56	00.00	00.00	3857.57	7167.20	057.80	331.77	00.00
4 Years	Me. †	5	13.00	12.08	32.80	25.31	9.34	36.88	238.00	11.96	00.00	00.00	4903.60	6314.88	119.60	621.92	00.00
	Gh. †	11	11.83	11.11	22.63	10.83	10.57	11.20	141.47	10.50	00.00	00.00	1053.15	1053.65	± 119.60	± 18.15	± 00.00
5 Years	Me. †	6	11.68	11.21	30.81	26.58	9.71	36.46	233.63	12.42	00.00	00.00	5227.57	6593.77	160.20	519.15	22.35
	Gh. †	11	11.16	10.87	22.85	11.82	10.64	11.55	142.72	11.78	00.00	00.00	1166.07	1163.22	± 14.24	± 68.70	± 10.68
6 Years	Me. †	6	10.50	11.65	32.66	32.34	11.48	35.67	260.00	11.38	00.00	00.00	5613.75	5064.10	000.00	270.84	00.00
	Gh. †	9	12.00	10.45	11.50	17.92	12.53	11.00	133.46	12.69	00.00	00.00	1307.46	1280.83	± 00.00	± 99.79	± 00.00
7 Years	Me. †	9	11.14	12.57	35.44	34.41	12.20	35.51	281.00	11.25	00.00	00.00	5161.50	5486.62	000.00	524.25	74.25
	Gh. †	11	13.36	11.15	11.57	10.59	13.69	10.84	166.41	12.52	00.00	00.00	1292.82	1251.49	± 00.00	± 88.20	± 33.26
8 Years	Me. †	11	11.90	12.10	34.00	29.28	10.42	35.60	255.45	10.13	00.00	00.00	4640.55	4917.10	027.35	533.85	09.11
	Gh. †	5	11.99	10.96	22.23	15.33	11.93	11.61	159.05	10.98	00.00	00.00	1096.62	1089.27	± 06.27	± 29.98	± 02.94
9 Years	Me. †	5	9.10	12.24	35.60	39.65	13.65	34.38	268.00	11.40	00.00	00.00	4491.16	6657.60	068.40	182.40	00.00
	Gh. †	11	11.14	12.04	22.40	15.93	12.17	10.74	136.33	11.94	00.00	00.00	1119.89	1101.26	± 17.26	± 50.44	± 00.00
10 Years	Me. †	11	11.96	12.04	34.81	30.24	10.47	34.61	237.27	12.44	00.00	00.00	4901.36	6875.58	111.96	440.27	11.19
	Gh. †	5	12.14	10.70	22.04	17.93	12.81	11.21	129.35	12.47	00.00	00.00	1201.55	1167.46	± 51.12	± 71.87	± 07.41
11 Years	Me. †	5	12.56	11.88	34.00	28.35	9.87	35.00	272.00	13.68	00.00	00.00	6402.24	5693.76	054.72	629.28	00.00
	Gh. †	5	12.58	10.54	11.87	18.01	12.64	12.12	160.99	13.40	00.00	00.00	1328.78	1334.22	± 30.26	± 100.64	± 00.00
12 Years	Me. †	5	9.92	12.10	35.20	37.36	12.91	34.57	230.00	11.74	00.00	00.00	5329.96	5541.28	046.96	540.04	23.48
	Gh. †	7	12.48	10.84	22.49	19.67	13.68	11.09	153.85	12.03	00.00	00.00	1333.73	1348.95	± 10.96	± 176.92	± 08.93
13 Years	Me. †	7	11.42	12.21	35.42	32.10	11.36	34.48	321.42	9.45	00.00	00.00	2983.36	5966.73	134.19	363.82	00.00
	Gh. †	7	12.05	10.57	11.13	17.33	12.61	11.46	138.48	10.84	00.00	00.00	1074.00	1094.16	± 15.20	± 44.26	± 00.00

† = Number of observation. * = Mean and † standard deviation. † = Me. = Mehraban. † = Gh. = Ghezel.

Table 3. Shows normal blood values in fat tailed sheep of different ages in relation to breed.

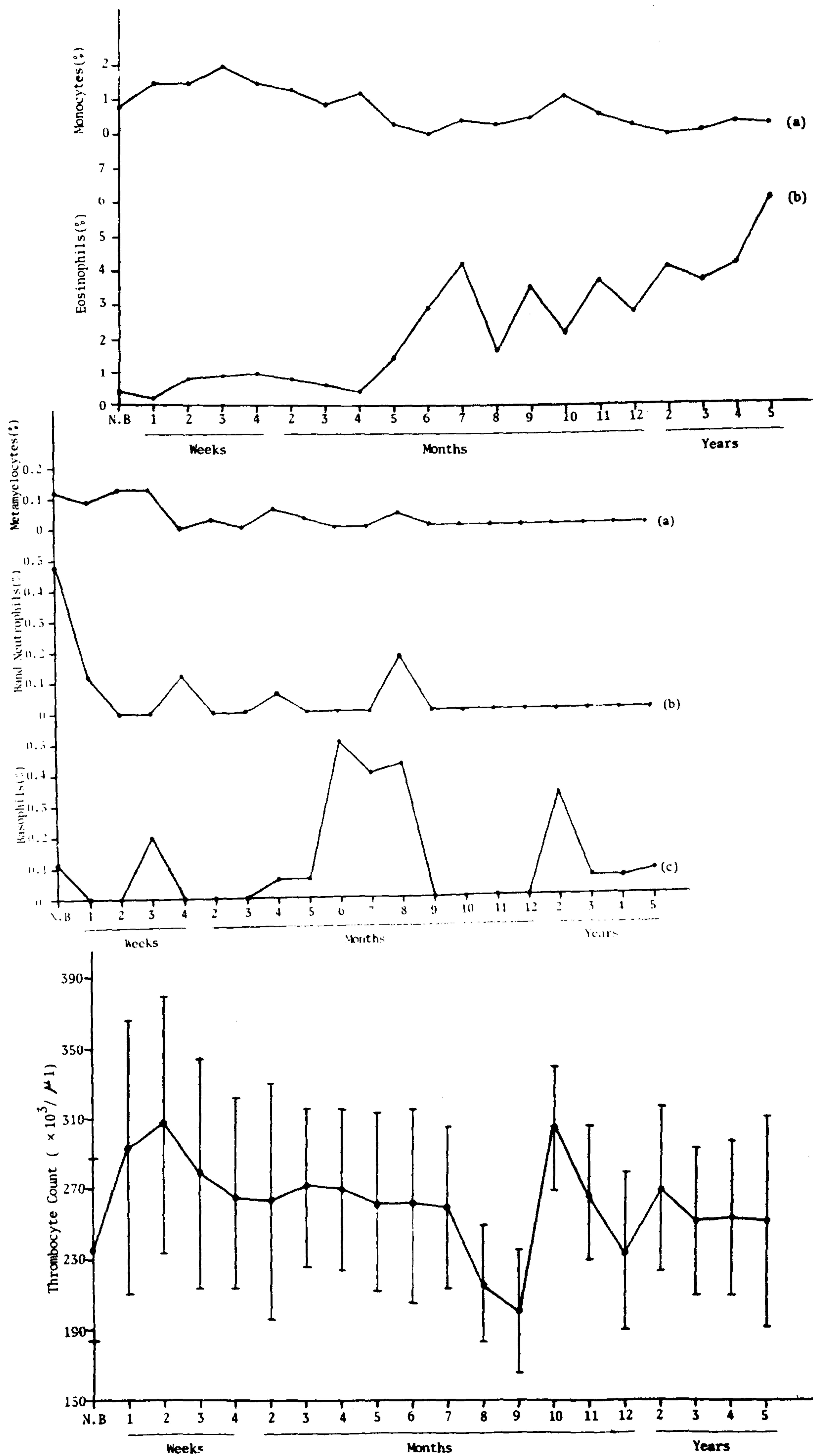


Fig.4. Shows monocyte, eosinophil, basophil, band neutrophil, metamyelocyte and thrombocyte counts changes of fat tailed sheep from birth to 5 years of age. Solid lines represent mean values and vertical lines represent standard deviation.

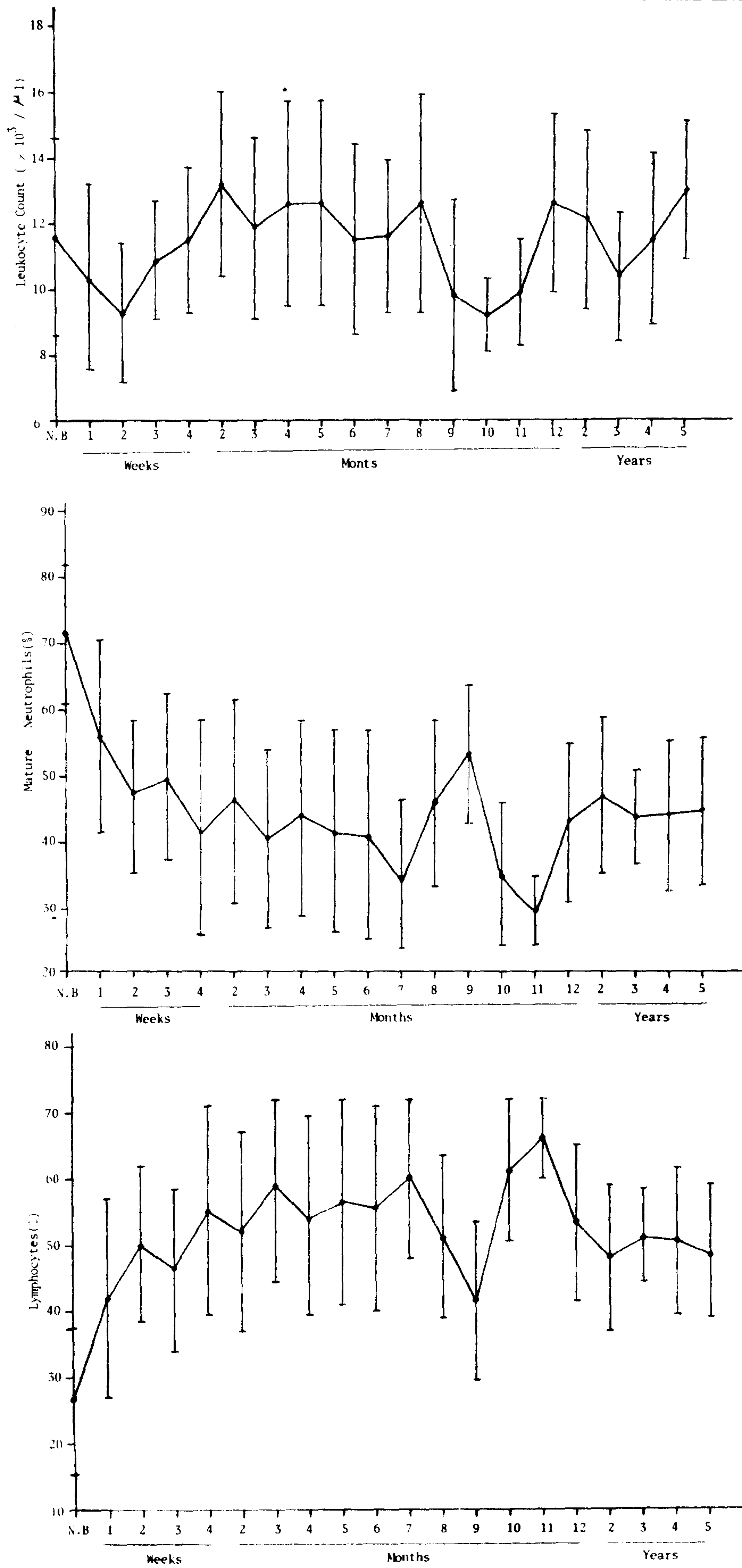


Fig.3. Shows mean leukocyte, neutrophil and lymphocyte counts changes of fat tailed sheep from birth to 5 years of age. solid lines represent mean values and vertical lines represent the standard deviation.

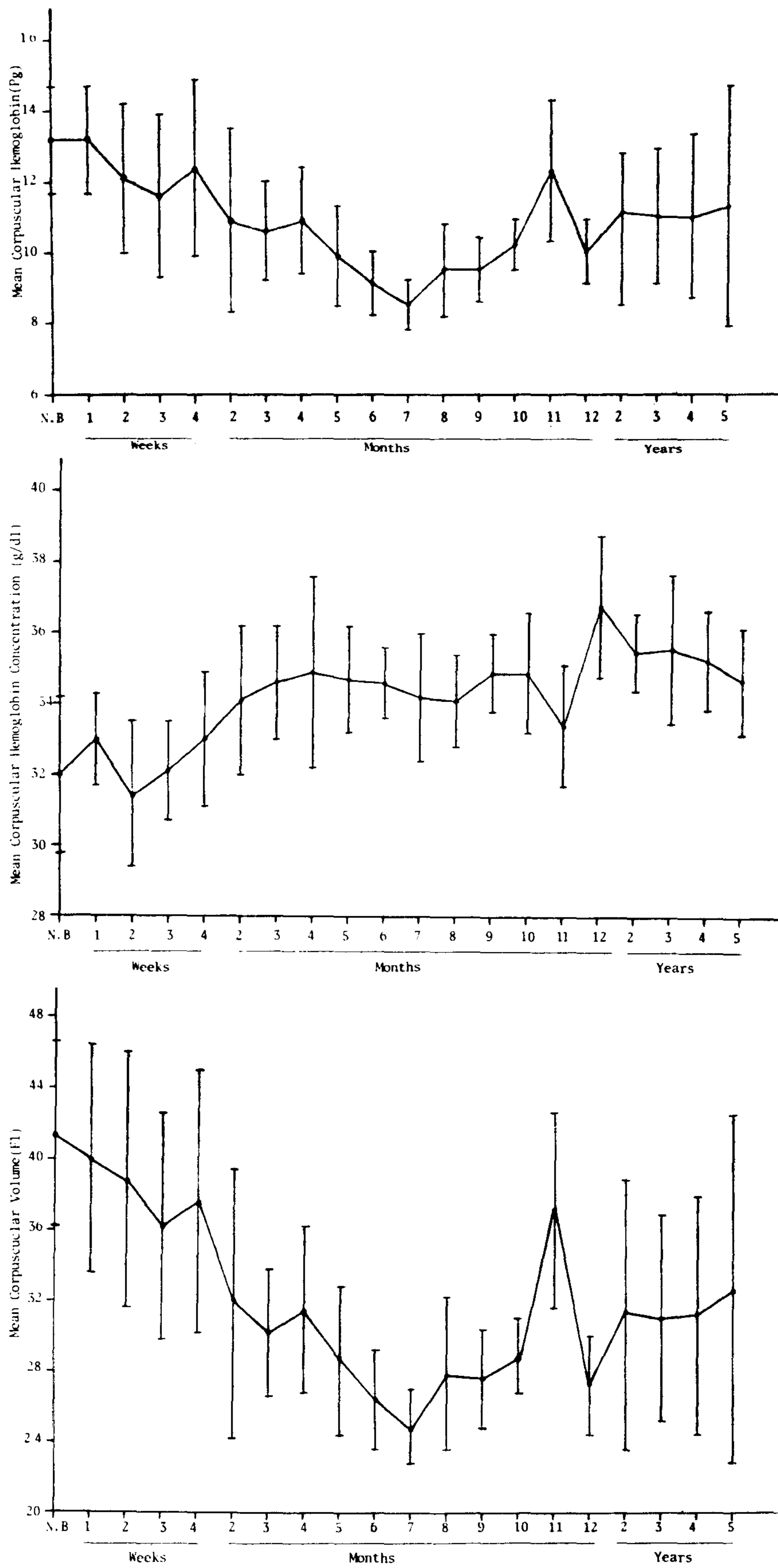


Fig.2. Shows corpuscular volume, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration changes of fat tailed sheep from birth to 5 years. solid lines represent mean values and vertical lines represent the standard deviation

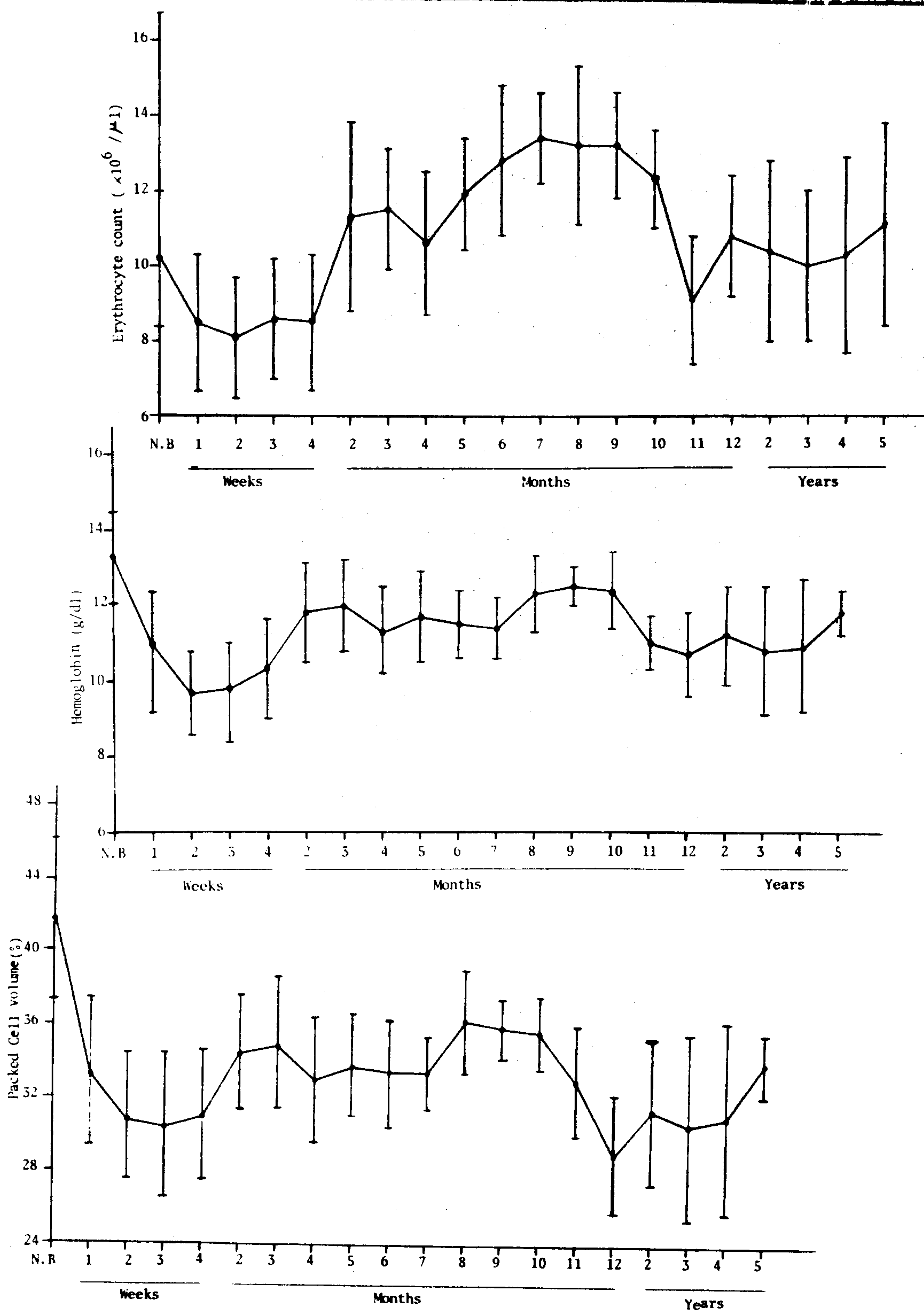


Fig. 1. Shows erythrocyte count, hemoglobin concentration and packed cell volume changes of fat tailed sheep from birth to 5 years of age. solid lines represent mean values and vertical lines represent the standard deviation.

Monocytes, Eosinophils, Basophils

The mean value of monocyte was 93.28 ± 37.32 at birth (Fig. 4 and Tab. 1). This value gradually increased significantly ($P < 0.01$) at 6 months. The decrease was in such a way that at this age monocyte was not observed. Thereafter slight changes were observed which was not statistically significant.

Mean value of eosinophil was 52.47 ± 26.48 at birth. The value significantly ($P < 0.01$) increased to 490.98 ± 54.03 at seven months, and then continued to 804.49 ± 114.01 up to 5 years (Fig. 4 and Tab. 1).

The mean values of basophil, band neutrophil and metamyelocyte were the lowest percentage of total WBC, in such a way that the mean values of basophil at 6 months, band neutrophils at birth and metamyelocyte at the age of 2-3 weeks were 57.95 ± 27.48 , 55.96 ± 31.90 and 13.99 ± 14.74 respectively. No metamyelocyte and band neutrophil were observed after age of 8 months (Fig. 4 and Tab. 1).

Thrombocytes

Mean value of platelet was 236.45 at birth (Fig. 4 and Tab. 1). The value increased significantly ($P < 0.01$) at first week of life and reached to highest value (308.27) at second week. Then, number of platelets decreased significantly ($P < 0.01$) to the lowest value (201.15) at 9 months. This value increased significantly again to 305.88 at 10 months of age. At the age of 11 months this value reached to its value before puberty. Thereafter, no significant changes were observed up to 5 years.

and 12 months respectively. Thereafter they remained constant.

Mean value of MCHC was 32.00 ± 2.18 at birth (Fig. 2 and Tab. 1). The value increased significantly ($P < 0.01$) at 2 months, and reached to its highest value at four months. and stabilized Thereafter.

Leukocytes, Neutrophils and Lymphocytes

The mean total leukocyte count was 11.66 ± 3.01 at birth (Fig. 3 and Tab. 1). After significant ($P < 0.01$) decrease during first two weeks of life, there was an increase which reached a peak (13.24 ± 2.88) at two months and then continued up to 8 months. The increase was followed by a significant ($P < 0.01$) decrease at ten months. It then increased again to previous value. Thereafter, it remained more or less constant.

Mean value of neutrophil count was highest 8341.56 ± 310.33 at birth (Fig. 3 and Tab. 1). It sharply decreased significantly ($P < 0.01$) to the value of 5444.09 ± 359.03 at 4 weeks of age and then fluctuated to lowest value. Thereafter followed by sudden decrease. Significant increase, decrease and increase were observed at 9 and 11 months and 2 years respectively, Then stabilized.

In contrast, the mean value of lymphocyte count was lowest at birth (Fig. 3 and Tab. 1) then increased sharply during 2 weeks of life, stabilized for seven months and then decreased significantly ($P < 0.01$) at 9 months, followed by significant increase and decrease at 11 months and 2 years respectively.

to rise to its maximum (13.45 ± 1.26) at seven months of age. Then a gradual decrease was observed which was not statistically significant up to 10 months, but it became significant at 11 months; and stabilized thereafter.

The mean value of PCV was at highest (41.83 ± 4.42) at birth (Fig. 1 and Tab. 1). The value significantly decreased to its lowest (30.46 ± 4.09) at the age of 3 weeks. Then, the decrease was followed by a significant ($P < 0.01$) increase at 2 months of age. The increase continued up to 8 months. It decreased significantly ($P < 0.01$) again at 12 months of age, after which stabilized up to 5 years with slight changes.

The mean value of Hb. concentration was highest (13.33 ± 1.20) at birth (Fig. 1 and Tab. 1). The value significantly ($P < 0.01$) decreased to its lowest value (9.72 ± 1.18) at the second week of age, followed by a significant ($P < 0.01$) increase at the age of 2 months, the increase continued up to 10 months and then fell significantly at 11 months. Thereafter's no statistically significant changes were observed.

Mean Corpuscular Volume, Mean Corpuscular Hemoglobin and Mean Corpuscular Hemoglobin Concentration

The mean values of MCV and MCH were at highest (41.42 ± 5.22 and 13.21 ± 1.57) respectively at birth (Fig. 2 and Tab. 1). The values significantly ($P < 0.01$) decreased at 2 months. Then they reached their lowest values (24.07 ± 2.13 and 8.54 ± 0.76) respectively at seven months. Both values followed by gradual increase up to 10 months and then showed a transient increase and decrease at 11

ages (at birth, 1, 2, 3, 4 weeks; 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 months; 2, 3, 4, 5 years). All animals were kept in ranch grazing condition supplemented by dry hay and water ad libitum. After bleeding, samples were transferred to small bottles containing ethylen-diaminetetra-acetic acid (EDTA) for analysis.

The Following analytical methods were used; red blood cell (RBC) and total white blood cell (WBC) counts were determined by hemocytometer, hemoglobin concentration spectrophotometrically (450 A.), packed cell volume (PCV) by microhematocrit centrifugation (5 min. at 10000 rpm), platelet count by method of Rees and Ecker. Mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) were calculated by appropriate formulae. Differential white blood cells were carried out from Wright's stained blood smear.

The significance of changes in blood parameters were assessed using the Analysis of variance, Duncan's test and student's test.

Results

Erythrocytes, Packed cell Volume and Hemoglobin concentration

The mean value of RBC (10.25 ± 1.81) at birth fell significantly during the first week of life and remained low (8.56 ± 1.81) for the first month (Fig. 1 and Tab.1). At the second month of life there was a sudden significant ($P < 0.01$) increase in erythrocytes, and the value continued

BLOOD PATTERN CHANGES IN RELATION TO
AGE, SEX AND BREED IN FAT TAILED SHEEP.

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Introduction

Not only the domesticated small ruminants, specially sheep, are being used increasingly as an experimental model both in physiological and pharmacological investigations but clinical and pathological studies also require detail informations concerning the normal hematological values in relation to age, sex and breed in these animals. To the best of our knowledge, unfortunately, no research has ever been reported in detail, to clarify the above mentioned factors in Ghezel, Mehraban and mixed fat tailed sheep before. The following investigations were undertaken to study the RBC, Hb, PCV, MCV, MCH, MCHC, WBC, differential counts and platelets values and their changes from birth to five years in both sexes and different breeds of sheep.

Materials and Methods

Blood samples were taken from jugular veins of 513 apparently healthy animals of both sexes, different breeds (Ghezel, Mehraban and mixed) and different

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