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Effect of Age, Sex and Altitude on the Normal Physiological and Biochemical Parameters in Apparently Healthy Local Breed Sheep in Shebedino District in Sidam Zone, Ethiopia

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Abstract

A cross sectional study was conducted from September 2009 to June 2010 in sheep in Shebedino district Sidama zone in order to obtain base line information concerning the normal physiological and serum biochemical parameters, to identify the influences of age, sex and altitude on clinical and serum biochemical parameters in apparently healthy local breed sheep. In veterinary medicine, physiological and biochemical examinations present an effective tool in monitoring the health and nutritional status of animals. Very little has been done to establish reference values and there is luck of information in this regard for local sheep breeds present in Sidama zone, Ethiopia. The physiological and biochemical parameters of local breed's sheep were determined consisting of males (n=140) and females (n=260) with different age groups (1 to 3 yrs and above 3 to 6 yrs age) from two different altitudes (high and midland). A study was conducted to establish reference values of clinical and serum biochemical parameters in 400 apparently healthy indigenous Shebedino sheep breed. Clinical parameters such as temperature, respiratory and heart rates were routinely recorded. Blood samples were collected in plain vaccutainer and the serum was analyzed to determine total protein, urea, glucose, creatinine, serum enzymes and electrolytes. The study showed that the mean of physiological values of temperature in age categories (1 to 3 yrs age and above 3 yrs age) was significantly affected (P<0.05) whereas respiratory and pulse rate were not significance (P>0.05). Significant variation (P<0.05) was observed respiration rate for the two sex groups whereas rectal temperature and pulse rate were highly significance (P<0.05). The rectal temperature was highly significant (P<0.05) in the two altitudes whereas the plus rate was significant (P<0.05) in the two altitudes but the respiratory rate in to two altitude were not significant (P>0.05). In the serum biochemical value only urea was a significant difference (P<0.05) between the two age groups in the study area but the rest of biochemical parameters such as ALT, AST, ALP, protein, glucose, Na^{+1}, K^{+1} and creatinine were not significant difference (P>0.05). Even though, no significant associations (p>0.05) were observed in biochemical parameters in the two sex groups where as

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significant difference only the mean value of ALT, ALP and urea were higher in female than male. For the two different altitudes effects (highland and midland) in serum biochemical parameters only ALP and Na^{+1} were highly significant associated ($P<0.05$) whereas the level of K^{+1} was significant ($p<0.05$) in the two altitudes. The study was performed to evaluate the effect of age, sex and altitude on the normal physiological and blood biochemical values in apparently healthy local breed's sheep. Therefore, this study has indicated physiological and serum biochemical values and could serve as a baseline information for comparison in conditions of nutrient deficiency, physiological and health status of sheep kept under native husbandry system in Sidama zone of Southern Nations, Nationalities and Peoples Region (SNNPRs) of Ethiopia.

Keywords: Sheep; Age; Sex; Altitude; Physiological; Serum biochemical; Parameters

Introduction

Ethiopia's economy is based on agriculture that accounts for 85% of the total employment and 75% of export. In 2003, agriculture accounted for 42% of the GDP and the livestock sub sector contributed 12%-16% of the total and the 30%-35% of agricultural GDP respectively. Livestock is second major source of foreign currency through export of live animals, skins and hides [1-20].

Ethiopia has huge population of small ruminants with an estimated 23.6 million sheep and 33.3 million goats [11]. The highlands support about 75% of sheep and 27% of goats, while the lowlands (mostly pastoral areas) are inhabited by about 25% of sheep and 73% of goats.

Goat and sheep are play a significant role in Ethiopia's agricultural economy particularly in lowlands, where most are kept by pastoral, agro-pastorals and smallholder production systems. There are important protein sources in the deities of the poor of help to provide extra income and support survival for many farmers in the tropics of sub tropics [14]. In Ethiopia sheep and goat provide 25% of the domestic meat consumption with production surplus, which is exported mainly as live animal about three quarters of the sheep inhabit the cool highland require of Ethiopia. Thought a recent report [1] sheep provides skins, manure and wool sheep production in Ethiopia is based on indigenous breeds except for less than 1% exotic sheep group of mainly Awassi Menz cross breed the livestock sub sector accounts for about 40% of the agricultural GDP of 20% of the total GDP [2] without consideration the contribution of livestock in terms of draught power, manure and transport service [20-41].

Small ruminants are major sources of food protein, income saving, skin and manure. The full exploitation of this huge resource is hindered in the tropical environment and particularly in Africa due to a combination of factors such as drought, poor genetic potential of the animal, traditional husbandry system and the presence of numerous diseases [38]. The diseases that affect small ruminants imposes sever economic impact on sheep and goats production; they cause production losses that are manifested by reduced weight gain, lowered meat and milk production and even death especially in the young [17]. Diagnosis of these diseases and assessment of the normal status of the animal mainly relay on understanding the physiological, clinical and serum biochemical parameters based on the established reference values.

Considerable information is available on the normal blood parameter values of domestic animal. But these values are that of exotic breeds which are somehow different from that of local breeds and there are quantifiable variation in blood parameters particularly in hemoglobin concentration and PCV values. Meanwhile these normal values of exotic breeds are not available for our indigenous animals' breeds. Variations of blood parameters value in animals have been reported due to several external and internal factors such as altitude, management system, feeding level, age, sex, breed, health status, method of blood collection, laboratory techniques used, diurnal and seasonal variation, ambient temperature and physiological status of the animal [31]. Blood biochemical parameters including total protein and urea are important indicators of the metabolic activity in lactating animals [25]. During pregnancy, maternal tissues are involved in providing energy for reproduction processes, which may affect blood serum chemistry values and also affected by several other factors such as breed, age, malnutrition, fetal growth, or season [33,40].

Moreover, information is lacking about the effect of physiological and environmental factors on the normal physiological and biochemical values [7,16,39]. As a result it is necessary and worth to establish the physiological and serum biochemical value of our indigenous breeds of animals has enables to use them as a reference in clinical diagnosis.

Blood is an important and reliable medium for assessing the health status of individual animal [29]. Variations in blood parameters of animals are due to several factors such as altitude, feeding level, age, sex, breed, diurnal and seasonal variation, temperature and physiological status of animals [28]. Hematological and serum biochemical tests are widely used for the diagnosis of serious animal diseases which can lead to economic losses in animals like reduced fur, wool and milk production [4].

Blood biochemical tests have been widely used for the diagnosis of various animal diseases [3]. The information gained from blood parameters value would substantiate the physical examination and coupled with clinical history provide excellent basis for medical interventions [19,18,27]. Information regarding the normal clinical and blood biochemical values were lacking in the studied indigenous sheep breed in Ethiopia. The information gained from physiological and blood serum biochemical parameters would substantiate the physical examination and coupled with medical history provide excellent basis for medical interventions. Therefore, the objectives of the present study were to evaluate the effect of age, sex and altitude on normal physiological and blood biochemical values in apparently healthy, non-pregnant indigenous sheep breed from the Sidama zone Shebedino district and to report the effect of age, gender and altitude, if any, on clinical as well as serum biochemical parameters of apparent healthy Shebedino local sheep breed. This paper reports the observations made on clinical, physiological and biochemical parameters of sheep in selected district of Sidama zone, Southern Nations Nationalities and Peoples Regions State of Ethiopia. Therefore, the objectives of the current study were to investigate the effect of sex, age and altitude factors on the physiological and serum biochemical parameters of apparently healthy sheep on natural grazing land in highland (Telamo) and midland (Morocho Negasha) of shebedino, Sidama zone, Southern Ethiopia.

Material and Methods

Study area

This study was carried out in the Sidama zone of Southern Nations, Nationalities and Peoples Region (SNNPRs). The zone is located in the northern part of SNNPRs, with its capital town at Hawassa, which lies about 275 km south of Addis Ababa. Geographically, the study area located between between 6010'-7012' North latitude and 380'-39011' East longitude 302 km from Addis Ababa (Sidama Zone Planning and Economic Development Department (SZPEDD, 2004). It consists of 19 districts of which Shebedino district is one of the Sidama Region district. Shebedino is a district with a total land area of 26, 990 hectare. Out of this, 5, 229 hectare is covered by annual crop such as maize, wheat, pea, beans, potatoes and 16, 497 hectar is covered by perennial crops such as 'inset', 'chat', coffee, the remaining 5, 264 ha of land is covered with bushes, hillside and un productive land. The Altitude range is from 1500-2500 meter above sea level and the annual rain fall range is from 900 m-1500 m per year. The average daily ranges of maximum and minimum temperature are 16 and 25 OC, respectively (SZPEDD, 2004). The study area comprises of two Peasant Associations (PAs) representing highland (Telamo) and midland (Morocho Negasha). Telamo one of the PAs 10 Km far away from Shebedino that located an altitude 2000 meter above sea level and Morocho Negash also one of the Peasant Associations 4 Km far away from Shebedino that located an altitude 1500 meter above sea level. The dry season from November to February while the rainfall occurring between March and April and from late May to October (FIG. 1).

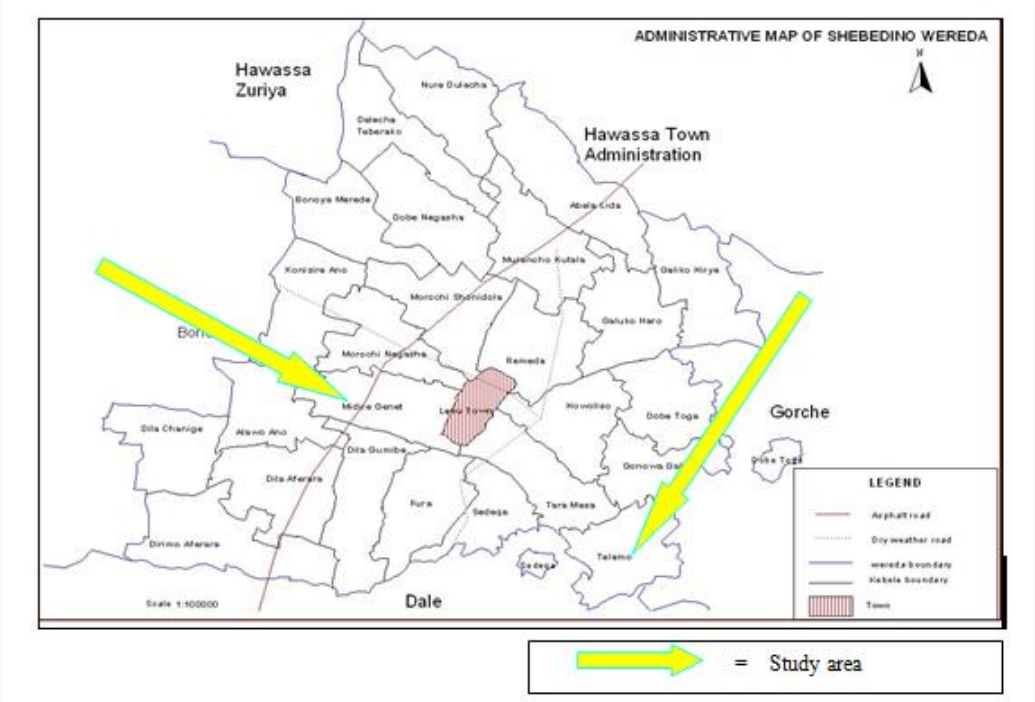

FIG. 1. **The Map of the study area.**

Study animals

Apparently healthy sheep owned by the farmers were considered from two ecological zones of highland (Telamo), midland (Morocho Negasha) and their surroundings of Sidama zone.

All sheep were reared in extensive farming system (free to graze on pasture with rare provision of other supplements like straw and grains mostly after work). The criteria considered being animals apparently healthy the following conditions were included: study animal is normal physiological parameters (temperature, pulse rate respiratory rate), normal body condition and normal feeding habit ate. It should stand on all of its feet. The blood samples were screened for the presence of haemoparasites using standard laboratory techniques [30,10]. Faecal sample from each animal was collected and examined for the presence of helminth ova using floatation method [6,37]. All sheep are routinely vaccinated for FMD, PPR and Anthrax. Animals with lesions, gastrointestinal or haemoparasites were excluded from the study. The study animals were grouped into males and females group, different age groups (1 to 3 yrs and above 3 yrs age) and based on altitude (highland and midland). All sampling units were tagged and sampling carried on after two weeks of deworming with broad spectrum Albendazole 300 mg (Ashish Life Science Ltd, Mumbai, India) at a dose of 7.5 mg/kg of body weight. Physiological parameters of 400 local breeds of sheep were recorded (rectal temperature, heart rate, respiratory and pulse rate). From the 400 sheep clinically considered 7 ml blood samples were taken from 140 male and 260 females' sheep from jugular vein into plain tubes for serum biochemistry analyses.

Sample size determination

Local breeds of sheep in the study area were used as a sampling population 400 apparently healthy sheep were selected using purposive sampling method.

Study design and methodology

A cross sectional study has been conducted from September 2009 to June 2010 to obtain base line information concerning the normal physiological and serum biochemical parameters in apparently healthy local breeds sheep of Shebedino.

Collection of blood samples

Blood samples 10 ml were collected from jugular vein without EDTA for serum separation.

Assessment of physiology parameters

Assessment of important physiological parameters like body temperature, respiratory rate, heart and pulse rate were taken two times per day (morning 8.30 am and afternoon 5.00 pm) to observe and check the variations in the bodies of the study animals. For proper measurement and to minimize errors in sampling a well recording format and animal identification with temporary paints was used. Body temperature was taken by digital thermometer and is achieved by first lubricating the bulb end of the thermometer to being gently inserted with a rotatory action through the anal sphincter into the rectum and held there until keeping sound is heard. Care has been taken to ensure that the bulb of the thermometer makes contact with the mucous membrane of the rectum. After each reading the thermometer has been cleaned with gauze and placed into its cover. Pulse rate has been taken at the external maxillary artery on the medial aspect of the ventral border of the mandible by counting the number of pulses per minute according to [26]. Respiratory rate was taken by placing stethoscope on the trachea for one minute to get the number of breaths per minute. Similarly heart rate was taken with stethoscope under the animal's

forelimb in the heart area on the left side of the animal and beats within one minute were counted and recorded. Gut sounds were measured using stethoscope.

Serum biochemical profiles

In the current study blood samples were collect from the study sheep while they are at rest and under conditions of least excitement. Blood samples were obtained by jugular vein puncture in vacuum tubes without anti-clotting agent for biochemical analyses. Samples were transported using icebox with icepack. The levels of plasma alanine aminotransferase (ALT), aspartate aminotansferase (AST), alkaline phosphatase (ALP), creatinine, total protein and glucose were analyzed using photometer 5010 (Robert Riele GmbH and Co KG, Germany, 2002) and commercially available kits. The level of plasma enzymes was expressed in U/L. The level of plasma AST (GOT) and ALP was determined using kits (Biocon Diagnostik, Germany), whereas the level of plasma ALT (GPT) was obtained using commercial (Human, Germany) kits. Kinetic method was employed for the determination of the level of AST, ALP and ALT. The absorbance of ALP was read at 400 nm wavelength, while that of AST and ALT were read at 340 nm wavelengths. Plasma creatinine concentration (mg/dl) was determined by kinetic colorimetric assay using a kit (Biocon Diagnostik, Germany). The absorbance was read at 492 nm wavelength. The level of total protein (g/dl) in the plasma read at wavelength of 546 nm was determined by colorimetric assay using commercially available kit (Biocon Diagnostik, Germany). Serum from the sampled blood in plain vacationer tube is kept by centrifugation (3000 rpm for 10 minutes) and then only the serum part was decanted into another plain tube. Since the serum sample is analyzed at Addis Ababa University, college of Veterinary Medicine and agriculture, Physiology laboratory it was stored at -20°C until transporting and also even until analyses [24,5,23,32,12].

While transporting the serum samples were kept in icebox with icepack. Serum electrolytes like sodium and potassium were analyzed using Roche AVL 9180 Snap Pack Electrolyte Analyzer (Roche Diagnostic Corporation 9115 Hague road, USA, 2002). To ensure the accuracy of the test results biochemical analyzers and reagents were checked daily with quality control kits of known values for the different parameters. The accuracy and reliability of the procedures, instruments were ensured by quality controls. The quality controls were performed before analyzing the samples, after replacement of reagents, at maintenance and whether there is any doubt about the accuracy of the analyses.

Questionnaire survey

Based on physiological assessment and serum biochemical profiles to establish and compare the parameters in sheep with different age, sex and altitude under healthy condition. Before the commencement of sampling work, a pilot survey was done with the collaboration of PAs elders and district agricultural officers to know the distributions and conditions of sheep within the district of the study area. The target community was selected from 100 household's level. Fifty of the households were included in the questioner survey. A questionnaire survey was conducted in order to gain problem solving information about the production and the management, disease type, feedings and economic contribution of sheep.

Data analysis

Data were entered in to Microsoft excel spread sheet from which dependent variables of the clinically important physiological and serum biochemical values; whereas the independent ones were age, sex and altitude. Before applying a statistical analysis, data were checked for normality.

The statistical analysis was performed using the SPSS 15.0 for windows package (2003). Descriptive statistic and Independent sample T-test was applied to determine the means (± sd) range and the 95% confidence interval. Comparisons (CI) of sex, age and altitude differences were analyzed after setting the level of significance using independent t-test and one-way ANOVA. Level of significance was taken at $p<0.05$.

Results

The results of physiological and serum biochemical parameters were expressed as means ± standard deviations, 95% confidence interval and range (minimum-maximum values).

Analysis of physiological parameters

The rectal temperature in two age categories was significant ($P<0.05$) whereas respiratory and pulse rate were not significance ($P>0.05$) (TABLE 1).

TABLE 1. **Value of physiological parameters in sheep affected by age.**

Parameters	Age	N	Mean ± SD	95% Confidence interval of the mean	Range	P-value
Temperature °C	1-3	300	39.21 ± 0.55	39.15-39.28	37-40	0.036*
	>3	100	39.35 ± 0.61	39.23-39.48	35-40	0.048*
Respiration (br/m)	1-3	300	25.66 ± 5.69	25.01-26.30	16-36	0.195
	>3	100	26.49 ± 5.11	25.48-27.50	16-38	0.172
Pulse (beat/m)	1-3	300	73.74 ± 3.28	73.37-74.11	69-80	0.916
	>3	100	73.70 ± 3.28	73.05-74.35	68-80	0.916

Significant variation ($P<0.05$) were observed rectal temperature, respiration and pulse rate for the two sex groups whereas Temperature and pulse rate were highly significance ($P<0.05$) (TABLE 2).

TABLE 2. **Value of physiological parameters in sheep affected by sex.**

Parameters	Sex	N	Mean ± SD	95% Confidence interval of the mean	Range	P-value
Temperature °C	male	114	38.96 ± 0.66	38.84-39.08	35-40	0.000***
	female	286	39.36 ± 0.48	39.31-39.42	37-40	0.000***
Respiration (br/m)	male	114	24.55 ± 5.4	23.55-25.56	16-34	0.003*
	female	286	26.39 ± 5.54	25.74-27.03	16-38	0.003*
Pulse (beat/m)	male	114	72.83 ± 2.93	72.29-73.38	68-80	0.001*
	Female	286	74.09 ± 3.34	73.70-74.80	69-80	0.000 ***
* ** highly Significance difference at P<0.05 * Significance difference at P<0.05						

The rectal temperature were highly significant (P<0.05) in the two altitudes whereas the respiratory rate also significant (P<0.05) in the two altitudes whereas the plus rate in to two altitude were not significant (P>0.05) (TABLE 3).

TABLE 3. **Value of physiological parameters in sheep affected by altitude.**

Parameters	Altitude	N	Mean ± SD	95% Confidence interval of the mean	Range	P-value
Temperature (°C)	Highland	199	39.48 ± 0.43	39.42-39.54	37-35	0. 000***
	Midland	201	39.02 ± 0.59	38.94-39.54	37-40	0. 000***
Respiration (br/m)	Highland	199	25.86 ± 5.87	25.04-26.68	16-34	0.984
	Midland	201	25.87 ± 5.25	25.14-26.60	16-38	0.984
Pulse (beat/m)	Highland	199	74.13 ± 3.51	73.63-74.62	68-80	0.016*
	Midland	201	73.34 ± 2.99	72.92-73.75	69-80	0.016*
*** Highly Significance difference at P<0.05 * Significance difference at P<0.05						

Analysis of serum biochemical parameters

TABLES 4, 5 and 6 show the result of biochemical parameters of sheep affecting by age, sex and altitude respectably.

In the serum biochemical profile, only urea was a significant difference (P<0.05) between the two age groups in the study area but the rest of biochemical parameters were not significant difference (p>0.05) (TABLE 4).

TABLE 4. **Serum biochemical result in sheep affected by age.**

Parameters	**Age**	**N**	**Mean ± SD**	**95% Confidence interval for mean**	**Range**	**P-value**
AST/GOT (U/l)	1-3	300	68.23 ± 28.40	65.00-71.45	11-301	0.814
	>3	100	67.48 ± 24.20	62.68-72.28	10-186	0.799
ALT/GPT (U/l)	1-3	300	16.52 ± 8.44	15.56-17.48	6-75	0.516
	>3	100	15.91 ± 7.11	14.50-17.32	7-56	0.480
ALP (U/l)	1-3	300	356.20 ± 295.98	322.57-389.83	19-1993	0.437
	>3	100	382.52 ± 282.59	326.45-438.59	28-1236	0.427
Protein (g/dl)	1-3	300	4.92 ± 10.27	4.78-5.06	1-8	0.447
	>3	100	5.03 ± 10.17	4.80-5.26	2-8	0.429
Glucose (mg/dl)	1-3	300	27.69 ± 12.30	26.29-29.08	7-75	0.114
	>3	100	29.92 ± 11.99	27.54-32.30	10-76	0.111
Sodium (mmol/l)	1-3	300	144.96 ± 7.69	144.09-145.84	82-180	0.126
	>3	100	146.31 ± 7.31	144.86-147.76	135-180	0.118
Potassium (mmol/l)	1-3	300	5.602 ± 0.82	5.508-5.695	3.0-9.3	0.184
	>3	100	5.479 ± 0.71	5.338-5.620	3.0-7.3	0.154
Cereatinin (mg/dl)	1-3	300	0.981 ± 0.28	0.949-1.014	.1-2.4	0.936
	>3	100	0.978 ± 0.51	0.876-1.080	.1-5.5	0.951
Urea (mg/dl)	1-3	187	52.54 ± 44.57	46.13-58.96	2-321	0.010*
	>3	79	38.24 ± 31.58	31.17-45.32	1-206	0.003*
* Significance difference at P<0.05						

TABLE 5. **Value of serum biochemical result in sheep affected by sex.**

Parameters	**Sex**	**N**	**Mean ± SD**	**95%Confidence interval for mean**	**Range**	**P-value**
AST (U/l)	Male	114	67.61 ± 25.92	62.195-73.38	10-216	0.906
	Female	286	67.97 ± 28.16	65.006-72.036	11-301	0.902
ALT (U/l)	Male	114	13.51 ± 7.28	11.548-14.735	7-56	0.093
	Female	286	15.08 ± 8.85	13.901-396.23	6-75	0.068
ALP (U/l)	Male	114	338.10 ± 259.83	287.782-396.23	19-1401	0.287
	Female	286	372.62 ± 304.50	339.148-407.32	22-1993	0.255
Protein (g/dl)	Male	114	5.04 ± 1.18	4.8045.267-5.26	1-7	0.377
	Female	286	4.91 ± 1.27	4.767-5.058	1-8	0.363
Glucose (mg/dl)	Male	114	28.39 ± 12.31	25.144-29.90	7-76	0.878
Sodium (mmol/l)	Female	286	28.19 ± 12.24	25.900-28.89	8-75	0.878
	Male	114	144.28 ± 9.82	142.858-145.67	82-180	0.091
	Female	286	145.71 ± 6.51	144.822-146.59	129-180	0.155
Potassium (mmol/l)	Male	114	5.592 ± 0.81	5.432-5.72	3.0-8.1	0.739
	Female	286	5.563 ± 0.79	5.470-5.65	3.0-9.3	0.743
Cereatinin (mg/dl)	Male	114	0.976 ± 0.27	0.912-0.4	0.1-1.8	0.883
	Female	286	0.954 ± 0.25	0.911-0.3	1-1.6	0.823
Urea (mg/dl)	Male	58	46.07 ± 37.21	35.645-57.58	8-206	0.628
	Female	208	49.07 ± 42.88	47.121-59.26	2-321	0.601

For the two different altitudes effects (highland and midland) in serum biochemical parameters, ALP and sodium were highly significant associated ($p<0.05$). And the level of potassium was significant in the two altitudes (TABLE 6).

TABLE 6. **Serum biochemical results in sheep affected by altitude.**

Parameters	**Altitude**	**N**	**Mean ± SD**	**95% Confidence interval of mean**	**Range**	**P-value**
AST (U/l)	Highland	199	69.62 ± 30.42	65.357-73.779	11-301	0.209
	Midland	201	66.13 ± 24.71	62.865-71.265	10-187	0.209
ALT (U/l)	Highland	199	14.42 ± 8.09	12.915-15.326	Aug-75	0.617
	Midland	201	14.85 ± 8.80	13.483-15.887	Jun-64	0.617
ALP (U/l)	Highland	199	299.21 ± 248.79	258.938-338.69	19-1993	0.000***
	Midland	201	425.72 ± 318.55	389.863-469.41	54-1631	0.000***
Protein (g/dl)	Highland	199	4.83 ± 1.40	4.655-5.00	01-Aug	0.060*
	Midland	201	5.06 ± 1.06	4.892-5.23	02-Jul	0.060*
Glucose (mg/dl)	Highland	199	28.31 ± 12.73	25.309-28.89	Sep-76	0.914
	Midland	201	28.18 ± 11.77	25.973-148.21	Jul-68	0.914
Sodium (mmol/l)	Highland	199	147.18 ± 7.13	146.149-148.21	133-180	0.000***
	Midland	201	143.44 ± 7.64	142.396-144.45	82180	0.000***
Potassium	Highland	199	5.460 ± 0.80	5.350-5.57	3.0-8.0	0.006*
(mmol/l)	Midland	201	5.681 ± 0.77	5.564-5.78	3.8-9.3	0.006*
Cereatinin	Highland	199	0.976 ± 0.46	0.926-1.02	1-5.5	0.797
(mg/dl)	Midland	201	0.985 ± 35.34	0.935-1.03	1-1.6	0.798
Urea (mg/dl)	Highland	198	48.99 ± 35.34	45.804-58.14	2-206	0.703
	midland	68	46.75 ± 56.4	40.170-61.24	3-321	0.760

Discussion

The present study showed that the reference range of clinical and serum biochemical parameters of sheep in Shebedino district of Sidama Zone. The overall result indicated that most of the parameters are within the normal reference values.

This study shown that in physiological parameters the value of temperature was highly significance ($p<0.05$) in to altitude (highland and midland) and pulse rate was significance. The value of respiratory in the altitude was not significance ($p>0.05$). The reason could be in midland the animal may developed an adaptation mechanism that can dissipate heat from the body and highland the humid air can affect transpiration and loss of heat through sweating and increased respiratory rate [9,21]. It was also reported that respiratory rate increase in response to CNS depression to meet the body's requirement of oxygen [22]. Physiological results affected by sex highly significance temperature and pulse rate were as respiratory was significance ($p<0.05$). The value of temperature affected by age was significance ($p<0.05$) whereas pulse and respiratory rate were not significance ($p>0.05$).

In some of biochemical analyses the study has shown that there are some variations. The values of urea by age was significance ($P<0.05$) whereas AST, ALT, T. protein, ALP, creatinine, sodium and potassium were not significance difference ($P>0.05$) Age was also observed to have a significant effect on ALP in this study similar to Red Sokoto oats [34]. Even though, no significant associations ($p>0.05$) were observed in biochemical parameter.
In the altitude the value of ALP and Sodium highly significance ($P<0.05$) the Potassium was significance whereas the other biochemical values total protein, Glucose, creatinin, urea, ALT AST were not significance ($P>0.05$). Although an increase of ALP level can be influenced by pregnancy. An increased the ALP could be possible to attributed to different seasons, feed conditions and local environment [13,35,20,36].

AST, ALP and Urea were higher than the range value whereas the level of Glucose was lower than the range values and then the others biochemical parameters were in normal range (ALT, Protein, Glucose, creatinin, Sodium and Potassium). The increase in urea level in three factors age, sex and altitude might be due to the feed type and protein metabolism. Comparison of the present result with mean value and reference ranges for sheep not shows big variations may be described to differences in laboratory equipment [42].

To compare the result of sheep parameters there were no previously published works. These parameters are usually affected by the level of nutrition and closely associated with metabolic activities of individual animals. Sheep were within the normal range reported for the ovine specie [15].

Although, there were significant differences in some of the physiological and blood biochemical values in this study, the data were within the normal ranges for apparently healthy sheep. Difference in clinical, biochemical parameters in sheep of different age groups altitude and sex were conducted previously from these results clear that factor play key role in conditioning normal values for a diagnostic purpose in sheep.

The questioner survey Indicated that sheep is the dominant species owned by farmers for different reasons. All animals were kept in extensive management system and all owners were mixed farmers. A questionnaire survey was conducted in order to gain information about the production and the management of sheep. Sixty 60% of the owners indicated that among the family members woman's were more responsible for the management of sheep and males were more concerned to make a decision when there is a need to sale the animal or to use it for other purposes. Sixty (60%) were said that reason for keeping

of sheep was to sale and gain income, 28% sheep were kept as a capital and to use it when an emergency case was faced. The remaining group said for consumption. Almost all sheep owners had others animals and they were ranked according to their importance, sheep was the second 40% next to cattle 44%,and the rest of 20% are others animals. As it was mentioned about all sheep's were in extensive system and for about 80% feeding was by grazing system.

Conclusion and Recommendations

In the present study physiological and biochemical values determined for sheep were slightly different from previously known reference values. Most of the clinical parameters there was a limited influence by age, sex and altitude. The serum biochemical values were also affected by age, sex and altitude. Generally from all the factors considered for their effects on the physiological parameters in these studies, altitude showed prominent effect more than sex and age. In the result should be given attention in utilizing the values of these parameters for assessing the clinical status and biochemical parameters of animals for diagnostic purpose. Based on the results of this study the following points are recommended:

- ❖ Reference values establishment for indigenous sheep for mandatory for diagnosis a disease conditions. Therefore, further studies should be carried out to establish the clinically important physiological and serum biochemical values of the indigenous sheep species in different regions of Ethiopia.
- ❖ The results obtained in the present study likely represent most of healthy sheep in Ethiopia and constitute potential reference values that can be used for clinical purposes against the previous known values. Because of the possible individual or combined influence of different factors other than age, sex and altitude and the subsequent interpretation of normal ranges in sheep for pathological condition should be carefully considered.
- ❖ The findings of the study may serve as references for clinical use in which alterations in the physiology and healthy status of animals.

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Competing Interests

There is no any conflict of interests among the authors.

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