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COMPARATIVE STUDY OF LOCAL SHEEP REARED IN DIFFERENT ENVIRONMENTAL AND FEEDING CONDITIONS ON SOME HEMATOLOGICAL AND BIOCHEMICAL TRAITS

K. D. Ahmed[1], Saad T. Alrawi[2]* and A. A. Omar[2]

[1]Upper Euphrates Basin Developing Center, University of Anbar, Iraq.
[2]Department of Public Health, College of Veterinary Medicine, University of Fallujah, Iraq.
*e-mail : saadalrawe50@gmail.com

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ABSTRACT : This study was conducted to study the effect of rearing area and feeding regime on the concentration of some trace elements (copper, zinc) and some biochemical and hematological characteristics of local sheep. Eighty-eight blood samples (44 samples from Haditha city and 44 samples from rural areas of Haditha district) were collected during the study period (from 2/10/2018 to 3/1/2019). The results showed that there were significant differences (P≤ 0.05) in the concentration of zinc of animals that rearing in the rural area compared with city area. While the result of the number of white blood cells, the volume of packed blood cells and hemoglobin concentration showed significant increasing (P≤ 0.05) in animals that reared in the city area compared with rural area. From other hand, non-significant differences were observed in ALT and AST activity and protein, albumin and globulin concentration in serum between the two-rearingarea during the study period, from results can be concluded that the area of rearing can be affect the animal health.

Key words : Sheep, nutrition, environmental, hematological and biochemical.

INTRODUCTION

The livestock is important parts for its role in providing local food security. The main source of meat that provide protein and minerals for human that has high biological value. The importance of meat production through the balancing between actual production and consumer consumption. The meat production in Iraq suffers from a continuous deficit in providing the required quantities. The animals feeding is one of the important causes of direct influence on the productive efficiency of animals' production, especially Iraqi sheep because of the low quantity and quality of feed available. In addition of Inaccuracies in the provision of some nutrients, especially those related to roughages and pastures. Furthermore the lower animal feeding has a direct effect on the productivity of animals and therefore should be diversified and improved by non-traditional additions to the diets in order to improve their nutritional value so that they show an important role in improve the growth, reproduction and immunity of animals (Steen *et al*, 2008; Khan *et al*, 2010). Through the experience of the deteriorating reality of sheep breeding from the deterioration of production (fertility, milk, wool production) and poor growth in animals and their births and the emergence of signs of disease related to the deficiency ofminerals, the most important retardingof growth and falling wool and weak immunity and other matters related to the deficiency of some minerals. From other hand, the copper and zinc has effectiveness rolean improvement production and supportimmunity system (Abdulrazzaq *et al*, 2019; Wuehler *et al*, 2005). The current study was conducted to investigate the concentration of copper and zinc blood of sheep in different areas in Haditha district and their relationship with some blood characteristics.

MATERIALS AND METHODS

This study was conducted to investigate the concentration of copper, zinc and study the some physical, biochemical and immunological characteristics of blood of different ages local sheep from different area of Haditha district, Al-Anbar province, Iraq. Eighty-eight blood samples (44 samples from Haditha city (reared as intensive) that sheep were fed by concentrate ration with alfalfa and 44 samples from rural areas for Haditha district city that sheep were fed by grazing on natural pasture with concentrate ration) were collected during the study

period (from 2/10/2018 to 3/1/2019). The concentration of trace elements (copper and manganese) was measured, the number of white blood cells and the packed blood cells were measured. ALT, AST, Total protein, albumin and globulin were assay by colorimetric methods by using spectrometer kit according to Tietz (1999). The results were analyzed statistically using SAS (2004) Statistical Analysis System in the statistical analysis of data to study the effect of the area on the studied characteristics and compared the significant differences between the averages T-test.

RESULTS AND DISCUSSION

The results showed the effect of the environmental condition on the serum zinc concentration, it was found that the concentration of zinc in serum of sheep raised in the rural environment was higher than serum of sheep that reared in the city and this result indicates a statistical difference at (P≤0.05) (Table 1). The high concentration of zinc in the serum of desert breeding sheep compared to the sheep that reared in the city under study may be due to many reasons, the most important of which are the desert conditions that necessitate the decrease of drinking water by sheep and thus an increase in blood viscosity, hence the high concentration of blood components. The increase of ambient temperature lead to increases of the viscosity blood, blood cell numbers and cholesterol. Or may be due to the high concentration of mineral elements in the desert soil where sheep are grazed, causing an increase in the concentration of this element in blood serum. These results were disagreed with Abid (2012) indicated that the normal concentration of copper in sheep serum was slightly higher than 50 ug / 100 ml serum (equivalent to 0.5 ppm) and that a decrease in this limit would cause symptoms of copper deficiency in sheep. From other hand, US National Research Council (Council *et al*, 1989) recommended the normal concentration of copper in the serum of sheep 580-1600 ppp. Therefore the concentration of copper considered low in the serum of sheep of current study, in both area. This may be due to the role of antagonism between copper and manganese. The elevation of manganese concentration in the serum of cattle and sheep lead to decrease of copper concentration (Hesketh *et al*, 2007). While causes of the elevation of copper in the serum of sheep that reared in the rural area due to increase of viscosity of blood because the elevation of environmental temperature, this result agreed with Kargin *et al* (2004).

The results recorded a significant increased (p≤0.05) of the hematological parameters (WBC, PCV and Hb) in the sheep that reared in the city with concentrated ration compare with sheep that reared in the rural environment with grazing feeding. This results were agree with Sivakumar *et al* (2010), whom observed decrease of PCV, Hb in the serum of sheep that exposure to the thermal stress during the summer, and attribute the reason to effect of imbalance of acid-base, in addition to increase of free radicals that caused to damage of cellsmembrane the lead to decrease the RBC. From other hand, a stressful condition caused increased cortisol and changes in some blood biochemical (total proteins, cholesterol and glucose) (Abdel-Fattah *et al*, 2014). Furthermore, the feeding condition and kind of ration has a main role to determine the animal health status especially the component of blood, similarity of current results indicted by Njidda *et al* (2014), who found the decrease of hematological parameters of sheep that reared in the semi-arid area due to the role of nutritional and environment.

Table 1 : showed the effect of different rearing area (Rural and city) on some physiological parameters of sheep.

Parameters	Rural area	City area
Zinc (ppm)	117.5±5.26A	100.8±4.08B
Copper (ppm)	91.08±2.49	91.96±4.60
PCV %	27.5±0.71B	30.5±0.53A
WBC $*10^3$	6.01±0.19B	7.2±0.23A
Hb (g/dl)	8.81±0.19B	9.83±0.22A
ALT (IU/L)	10.68±1.75	9.18±1.48
AST (IU/L)	16.56±1.5	14.12±2.13
Total protein (g/dl)	5.11±0.17	5.37±0.14
Albumin (g/dl)	3.86±0.12	4.21±0.11
Globulin (g/dl)	1.25±0.15	1.16±0.11

The different capital letters indicate significant differences between the groups within at P≤0.05.

The results also agreed with Babe (2011), who found the concentration of hemoglobin, RBC, WBC and percentage of PCV were decrease in the blood sheep in the Basra province that sheep were exposure to high ambient temperature. Pennisi *et al* (2004) observed a reduction in hematocrit levels and total proteins concentrations in ewes that reared in the unshaded area compare with ewes that reared in the shaded area.

This study shows the effect of local sheep breeding site on the activity of enzyme ALT and AST. While the results showed non-significant difference in the level of liver enzyme activity in both study areas, from other hand the rural area recorded higher value. that the enzyme transporting enzymes (ALT and AST) increased in the summer, due to that the metabolic processes is high during summer,induce metabolic modifications including increased effectiveness of liver enzymes, especially ALT, in addition to that sex hormones rises in summer that stimulate the gluconeogenesis process in the liver and therefore need to increase the effectiveness of those

enzymes. Sheep liver enzymes, particularly ALT are strongly influenced by seasonal temperature variations, with activity higher in summer than in winter (Yokus *et al*, 2006). The results of total protein, albumin and globulin showed non-significant differences between different rearing area, but the city area recorded higher value compare with rural rearing area. The total protein in the blood serum consists of a group of proteins and serum proteins are present in constant proportions in normal physiological cases, but the exposure of the animal to change in environmental and health conditions caused to alteration in the proportions of these proteins. Albumin is the main protein, which constitutes more than 50% of the total serum proteins and has a major role in processing the body with amino acids in the form of a storage and maintaining the balance of blood osmotic as well as the transfer of a large number of nutrients through the bloodstream. Heat stress impactthe ruminant health by Al-Dawood (2017). These changes in the proteins concentrations may be due to the fluid alteration (Piccione *et al*, 2008). High ambient temperature has a direct impact onruminant health and production (Seixas *et al*, 2017). However, in extreme environmental conditions, sheep and goat perform better heat stress additivity than other ruminant animals (Al-Dawood, 2017, Berihulay *et al*, 2019). Animals such as sheepand goat adapt to heat-stressed weather conditions via a combination of behavioral, morphological, physiological (Berihulay *et al*, 2019).

From the current study can be concluded that the hematological and biochemical traitsdecrease. These detected changes may be due to feeding levels and environmental conditions.

REFERENCES

Abdel-Fattah M S *et al* (2014) Effect of summer shearing on some blood constituents, thyroid gland and cortisol responses of Balady and Damascus goats in desert of Sinai, Egypt. *World Appl. Sci. J.* **30**(5), 543–555.

Abdulrazzaq A H, Saad Thabit Jassim Alrawi and Alkubaisi Bedawi A (2019) The effect of different concentrations of copper sulfate on the some physiological and immunological parameters of local male rabbits. *Drug Invention Today* **12**(11), 2654–2657.

Abid D H (2012) Effect of concentrations on some rare mineral elements in the local blood of Al-Znam in some rural and desert areas of Anbar province, Al-Anbar.

Al-Dawood A (2017) Towards heat stress management in small ruminants—a review. *Ann. Anim. Sci.* **17**(1), 59–88.

Babe A A (2011) Effect of vitamin C on haematology and serum biochemistry in heat-stressed sheep. *Res. Opinions in Animal & Vet. Sci.* **11**, 731–733.

Berihulay H (2019) Adaptation mechanisms of small ruminants to environmental heat stress. *Animals* **9**(3), 75.

Council N R *et al* (1989) *Recommended dietary allowances*. National Academies Press.

Hesketh S *et al* (2007) Elevated manganese levels in blood and central nervous system occur before onset of clinical signs in scrapie and bovine spongiform encephalopathy. *J. Anim. Sci.* **85**(6), 1596–1609.

Kargin F *et al* (2004) Determination of the Levels of Zinc, Copper, Calcium, Phosphorus and Magnesium of Chios Ewes in the Ayd{\i}n Region. *Turkish J. Vet. Animal Sci.* **28**(3), 609–612.

Khan Z I *et al* (2010) Seasonal assessment of selenium as a hazardous element in pasture and animal system: A case study of Kajli sheep in Sargodha, Pakistan. *J. Hazardous Materials* **179**, 1111–1114.

Njidda A A, Shuai'Bu A A and Isidahomen C E (2014) Haematological and serum biochemical indices of sheep in semi-arid environment of Northern Nigeria. *J. Sci. Front. Res.* **14**(2), 49–56.

Pennisi P *et al* (2004) Influence of the fleece on thermal homeostasis and on body condition in Comisana ewe lambs. *Animal Res.* **53**(1), 13–19.

Piccione G *et al* (2008) Effect of shearing on some haematochemical parameters in ewes. *Czech J. Animal Science* **53**(3), 106.

Seixas L *et al* (2017) Heat tolerance in Brazilian hair sheep. *Asian-Australasian J. Animal Sci.* **30**(4), 593.

Sivakumar A V N, Singh G and Varshney V P (2010) Antioxidants supplementation on acid base balance during heat stress in goats. *Asian-Australasian J. Animal Sci.* **23**(11), 1462–1468.

Steen A, Strøm T and Bernhoft A (2008) Organic selenium supplementation increased selenium concentrations in ewe and newborn lamb blood and in slaughter lamb meat compared to inorganic selenium supplementation. *Acta Veterinaria Scandinavica* **50**(1), 7.

Tietz N W (1999) *Clinical guide to laboratory test*. in **3**rd ed, pp. 1096–1099.

Wuehler S E, Peerson J M and Brown K H (2005) Use of national food balance data to estimate the adequacy of zinc in national food supplies: methodology and regional estimates. *Public Health Nutrition* **8**(7), 812–819.

Yokus B *et al* (2006) Effects of seasonal and physiological variations on the serum chemistry, vitamins and thyroid hormone concentrations in sheep. *J. Vet. Med. Series A* **53**(6), 271–276.