MONITORING OF HEMATOLOGICAL AND BIOCHEMICAL PARAMETERS IN SHEEP REARING IN NEW RECLAIMED LANDS IN EGYPT.

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Over 200 clinically normal desert Egyptians baladi sheep from multiple geographic areas were sampled. The goals of this study were to develop comprehensive reference intervals for hematologic and biochemical analytes. Because of the large sample size, wide geographic range, and uniform sample and handling protocoling this study, these reference intervals should be robust and applicable to other sheep populations.

Introduction:
Measurement of key hematological and biochemical values can provide objective information about the condition of an animal at the moment of sampling, revealing its nutritional status, disease conditions or stress it has been subjected to (Perez et al., 2003).

Serum biochemical and haematological references constitute important panels in the diagnosis, prognosis and treatment of livestock diseases via the investigations of myriads of parameters influencing blood and serum biochemical indices among which are packed cell volume (PCV), total blood (TBC), total protein (TP), urea, creatinine, uric acid, alanine transaminase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), concentration in livestock animals (Yokus et al. 2006).

Materials and Methods:
Blood samples of 200 sheep (150 females and 50 males) were collected from randomly selected clinically healthy herds. The sheep were bled through jugular vein and 10 ml of blood was collected from each animal, 4 ml of the blood was collected into plastic tube containing 0.5 M Ethylene Diamine Tetra acetic Acid (EDTA) for haematological studies and the remaining 6 ml of blood samples was deposited in clot activating tubes for biochemical studies and allowed to clot at room temperature within 3 hours of collection. The samples were stored at –20 °C for analysis by Hitachi U-1800 spectrophotometer (using Egyptian Biochemical diagnostic kits).
Statistical Analysis:-
SPSS statistical package was used for statistical analysis. All the values were expressed as mean± Standard Deviation (SD). One way ANOVA was applied to compare various hematological) and serum biochemical parameters. All the measurements were analyzed by generalized linear model results.

Results:-
The hematological values were: erythrocytes for Male sheep 9.8±1.5%10⁶ cm³ and Female sheep 9.18±0.22%10⁶ cm³. Haemoglobin for Male sheep 8.9±19.1g/dL and Female sheep 9.09±0.22; leukocytes for Male sheep 8.1±1.8%10⁶ cm³ and Female sheep 9.11±0.61%10⁶ cm³; and Packed cell volume (PCV) % for Male sheep 37.08±0.1 and Female sheep 35.82 ± 0.88. Neutrophils (%) 31.04 ± 0.85 for Male sheep and Female sheep 41.43 ± 0.84. Lymphocyte (%) 4.06±0.38 for Male sheep and Female sheep 3.93±0.27. Monocytes (%) for Male sheep 2.05±0.15 and Female sheep 2.78 ± 0.16. Eosinophils (%) for Male sheep 0.23±0.07 and Female sheep 0.30±0.05. Basophiles (%) for Male sheep 0.20 ± 0.05 and Female sheep 0.36 ± 0.05.

The values of biochemical parameters were: total protein for Male sheep 6.5±1.2and Female sheep 6.7±1.5.76.4±6.1g/L; glucose for male sheep 2.87±0.60mmol/L; total cholesterol 1.65±0.33mmol/L; aspartate aminotransferase (AST) for male sheep 155.5±6.4 and female sheep 155.4±9.2U/L; alanine aminotransferase (ALT) for male sheep and female sheep 9.36 ± 0.05. creatinine for male sheep 9.2 ± 0.05 and female sheep 102.0±2.1μmol/L; total calcium for male sheep and female sheep 2.53±0.25mmol/L; phosphorus for male sheep 2.39 ± 0.2 and female sheep 2.29 ± 0.21mmol/L; magnesium for male sheep 36.08±0.88mmol/L; sodium for male sheep 140.04 ± 0.85 and female sheep 141.43 ± 0.84 mmol/L; potassium for male sheep 5.20± 0.22 and female sheep 5.70± 0.75; iron for male sheep 138.50±0.15 and female sheep 140.50± 0.16. copper for male sheep 10.39± 0.36 and female sheep 11.78 ± 0.37.

Table 1: Haematological values of male and female baladi sheep

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Male sheep (mean ± SD)</th>
<th>Female sheep (mean ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total erythrocyte count (TEC) 10⁶/μl</td>
<td>8.19±0.41</td>
<td>9.18±0.22*</td>
</tr>
<tr>
<td>Haemoglobin (Hb) g/dl</td>
<td>8.79±0.41</td>
<td>9.09±0.22</td>
</tr>
<tr>
<td>Packed cell volume (PCV) %</td>
<td>35.08±0.1</td>
<td>37.82 ± 0.88*</td>
</tr>
<tr>
<td>Total leukocyte count (TLC) 10⁶/μl</td>
<td>8.13±0.59</td>
<td>9.11±0.61</td>
</tr>
<tr>
<td>Neutrophils (%)</td>
<td>31.04 ± 0.85</td>
<td>41.43 ± 0.84</td>
</tr>
<tr>
<td>Lymphocyte (%)</td>
<td>4.06±0.38</td>
<td>3.93±0.27*</td>
</tr>
<tr>
<td>Monocytes (%)</td>
<td>2.05±0.15</td>
<td>2.78 ± 0.16</td>
</tr>
<tr>
<td>Eosinophils (%)</td>
<td>0.23±0.07</td>
<td>0.30±0.05</td>
</tr>
<tr>
<td>Basophiles (%)</td>
<td>0.20 ± 0.05</td>
<td>0.36 ± 0.05</td>
</tr>
</tbody>
</table>

Values were expressed as mean ± S.E.
* Means were highly significant at < 0.005

Table 2: Biochemical values of male and female baladi sheep

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Male sheep (mean ± SD)</th>
<th>Female sheep (mean ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium mg/dl</td>
<td>9.11 ± 0.2</td>
<td>9.15 ± 0.19</td>
</tr>
<tr>
<td>phosphorus(mEq/l)</td>
<td>2.39±0.20</td>
<td>2.29 ± 0.21</td>
</tr>
<tr>
<td>MagnesiummEq/l</td>
<td>36.08±0.1</td>
<td>35.82 ± 0.88</td>
</tr>
<tr>
<td>coppermEq/l</td>
<td>10.39±0.36</td>
<td>11.78 ± 0.37</td>
</tr>
<tr>
<td>Glucosemmol/L )</td>
<td>3.0± 0.48</td>
<td>2.7± 0.07</td>
</tr>
<tr>
<td>Sodium(mEq/l)</td>
<td>140.04 ± 0.85</td>
<td>141.43 ± 0.84</td>
</tr>
<tr>
<td>chloride(mEq/l)</td>
<td>99.66 ± 0.70</td>
<td>99.59 ± 0.75</td>
</tr>
<tr>
<td>iron</td>
<td>138.50±0.15</td>
<td>140.50± 0.16</td>
</tr>
<tr>
<td>Potassium(mEq/l)</td>
<td>5.20±0.22</td>
<td>5.70± 0.26</td>
</tr>
<tr>
<td>ALT/IU</td>
<td>9.36 ± 0.05</td>
<td>9.2 ± 0.05</td>
</tr>
<tr>
<td>AST/IU</td>
<td>115.5±6.4</td>
<td>116.3±6.5</td>
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</table>
### Discussion:

#### Hematological parameters:

The RBC values were observed to be higher in the males than in the females. The difference due to age and sex is a signal of the health status of the various age groups and sex among the sheep breed studied which is in agreement with the findings of Schalm et al. (1975) and Addas et al. (2010).

The values of leucocyte count (WBC) was higher in adult female sheep than the values obtained for male sheep. The WBC values of the adults are comparable to the young sheep. This finding is similar to the report of Egbe-Nwiyi et al. (2000) and Addas et al. (2010). The higher leucocyte count (WBC) is due to infections or toxic substances in the organism, and a low count indicates an indication of pathogenic infection or presence of antigens in the organism (Bradbury et al., 1999). The lymphocytes constitute a high percentage of the cells in male and female sheep, and neutrophils levels are high in male sheep compared to the breed, age, and sex groups of animals. A significant influence of age, sex, and breed on lymphocyte count is observed. The lymphocytes are mostly increased with age in early life in both sexes of sheep and goats. These findings are similar to the report of Egbe-Nwiyi et al., 1975. The lymphocytes constitute the majority of the WBC counts, and the cells increase with age in early life in both sexes of sheep and goats. These results were consistent with those obtained by Schalm et al. (1975).

Results present in Table (1) showing the effect of sex on hematological parameters. The PCV in adult female sheep were generally higher than in adult males. The increase in PCV might be attributed to high environmental temperature. These results were consistent with those obtained by Khan (2013) and Tibbo et al. (2004). On the other hand, there were no significant sex differences in HB, PCV, and ESR. These results were in agreement with the findings of Khan et al. (2013). In contrast, Egbe-Nwiyi et al. (2000) showed a higher value in male than female sheep. The packed cell volume (PCV) obtained in the present study was higher in male than the female sheep (Baneejee, 2007). The packed cell volume might be attributed to high environmental temperature. These results were consistent with those obtained by Khan (2013) and Tibbo et al. (2004).

#### Biochemical parameters:

Results present in Table (2)

### Protein:

In the present study variations in physiologic values due to gender were assessed. Total protein is an important factor for blood viscosity, acid-base balance, and supplying necessary enzymes (Keresan Bilal, 2008).

The mean total protein values obtained from sheep males and females used in this study were within. The plasma protein level was slightly higher in male lambs than ewe lambs but the difference was not statistically significant. This finding is in agreement with the results obtained by Khan et al. (2013) who also reported higher total protein values in ram lambs.

### Creatinine:

Plasma creatinine concentration was slightly higher in males than females but the difference was not statistically significant. The amount of creatinine secreted daily is a function of the muscle mass and is not affected by diet, age, sex. Female excrete less creatinine than males because of their smaller muscle mass (Gray and Howarra, 1980).
and Laverne, 1983). The creatinine values in the present study were within normal range and no differ among male and females (Gray and Howarra, 1980).

AST and ALT:-
The results of the present study showed that the effect of gender on both plasma enzymes and electrolytes is not significant. Enzymes are protein catalysts synthesized by all living organisms. They are constantly and rapidly degraded but the supply is renewed by new synthesis (Coles, 1986). ALT is an enzyme found in the highest amount in liver and typically used to detect liver injury (Shumaila et al., 2012). ALT values were slightly higher in males than females AST is found in practically every tissue of the body, the measurement of the AST levels is helpful for the diagnosis and following case of myocardial infarction, hepatocellular disease and skeletal muscle disorders (Njidda et al., 2013). AST values for males were lower (129.6±47.8) than those of females (140.8±31.9). Higher metabolism and functional status for males compared with females (Rumosa Gwaze et al. 2012) found that higher plasma AST and female lambs, in male than in female.

Minerals:-
Concentrations in the blood of the animal were not influenced (p>0.05) by sex whereas season has significant effect on blood minerals of sheep and goats. Mean mineral concentrations in the blood of the animals are within the normal range (mmol/l) of Ca, P, and K, respectively this agree with (Meyer and Harvey, 1998). (Ramprabhu et al. 2010), (Perez et al. 2003), (Devendran et al., 2008), (Pratt, 2010), but the magnesium of high values in male than females in the present study, this may be due to the increase of magnesium concentration in underwater the iron values in females is higher than males this agree with with (Devendran et al., 2008), (Ramprabhu et al. 2010), (Jawasreh K et al. 2010), (Pratt D S 2010), (Piccione et al. 2010).

Electrolytes:-
Maintaining electrolytes in appropriate amounts is essential for normal biochemical and physiological functions of the body. Electrolytes are distributed in body fluids and play a key role in all parts of animal life (Kaneko et al., 2008). (Latimer et al., 2004).

The plasma potassium level was higher in females than males and sodium level was also higher in females (136.7±9) than males (132.8±5.5), While the values for chloride were higher in males (118.4±5.8) than females (115.1±1.6) but the difference for all three electrolytes between both genders was not statistically significant. (AL-Hadithy et al. 2012) (Sowande et al. 2008), The results also showed that main effect of sex and interaction between sex and season had no significant effect (p>0.05) on blood plasma mineral concentration of sheep and goats (Sowande et al. 2008).

Glucose:-
Also no the results indicated there were significant differences for sex on glucose. The last effects were in agreement with values reported by (Shumaila et al., 2012) whose shows that the age and gender had no significant effects on serum glucose and cholesterol of sheep.

Urea:-
Plasma urea level was significantly higher in males than females Similar observation was reported by (Borjesson et al. 2000), (Oduye and Adeyewo 1976).

Conclusion: -
Haematological and biochemical parameters the and its knowledge can be used to assess the health as well as physiological status of farm animals under consideration. Changes of these parameters have been studied in sheep. There is great variation in the haematological parameters as observed between sex. Moreover, it is important to establish a baseline indices for haematological parameters on the basis of the factors studied and also carry out further studies to determine the effects of other factors on these indices like breed, age and management systems.
References:-


