

CLINICAL BLOOD BIOCHEMICAL CHANGES IN GOATS AFTER EXPERIMENTAL INFECTION WITH LICE.

FAWZIA ASSAD SAAD.

Division of Animal and Poultry Production.

Desert Research Center, Matarya, Cairo, Egypt.

SUMMARY

The present study covered the abundance of lice on goats, and their effects on animals health, liver as well as kidney functions. Three lice species infested goats, one species was that of biting lice *Bovicola caprae*(Gurlt) which belonged to order Mallophaga and the other two species were those of blood sucking *Linognathus africanus* (Kellogg and Paine) and *L.stenopsis* (Burmeister) of the order Anoplura. The experimental study was carried out on goats at Mariut experimental station of the Desert Research Center. Goats were divided into two groups, one (25) was free of lice and the other (27) was heavily infested.

A heavy degree of infestation resulted in a highly significant reduction of blood glucose. A highly significant increase occurred in plasma parameters Alkaline Phosphatase (ALK.Phs), total Bilirubin, Alanine aminotransferase (ALT) and Aspartate aminotransferase (AST). Also, in high infested goats a highly significant increase in serum urea and creatinine was reported.

From the results encountered highly infested

goats with lice it was suggested that some liver and kidney cellulars damage might have occurred. Heavily infestation levels were of considerable economic importance.

Key Words:, Lice , Liver and Kidney functions.

INTRODUCTION

Infestation of goats with lice is a major economic problem to the animal industry. Obasaju and Olufemic (1981), stated that extensive lice infestations can cause anemia in small ruminants in Nigeria. Also, well-fed adult cattle were infested and were in a poor condition, gained weight slowly, and had low vitality (Smith and Roberts, 1956). Prozeorska and Leja (1967) noted that lice infestation could lead to disturbances which might reduce hide value. Lice were responsible for serious disorders on host animals (Schillorn and Mohammed, 1975). Wide information was published on the control of these parasites, while little critical evidence is available concerning their effect on range goats in terms of productivity. However, few reference were found

in the literature demonstrating the effects of pediculosis on goats in Egypt.

The present work was carried out to study the effects of lice on goats, health and to examine changes in serum biochemical constituents for the liver and kidney functions of goats under desert conditions.

MATERIAL AND METHODS

The experimental study was carried out on non infested goats at Mariut experimental station of the Desert Research Center (35 k. south west of Alexandria). Adult female goats were divided randomly into two groups of similar age and weight. One group, 25 goats, was free from lice and the other, 27 goats, was artificially infested with a heavy infestation of lice. The infestation density according to Chamberlain (1978) where a number of 20 lice or more 3x5 cm² of animal body surface was considered as indicating of heavy infestation, those between 5-20 lice as indicating moderate infestation and numbers less than 5 as representing a probably low to non-infestation ratio. Three species were used one of the biting lice, *Bovicola caprae* belonging to order Mallophaga, and the other two of blood sucking *Linognathus africanus* and *L.stenopsis* to order Anoplura. The three species were collected from different localities in Western-North Coast, Oasis and Wadi Rayan regions.

The control groups was sprayed by the safe dose of Diazinon (0.1%) which was recommended by the manufacturing company, two weeks before the beginning of experiment. The two groups were

maintained in separate pens under the conditions. All goats were routinely treated to control internal parasites. Flocks at Mariut were under veterinary care and treatment. During the study, goats grazed on natural range plants grown pastures in winter, while in summer goats were fed concentrates and Egyptian hay. The experiment lasted for nine months (September to May), which included pregnancy and lactation periods.

Sampling:

Blood samples were collected from experimental animals by Jugular vein puncture in the morning before the ration was offered. Blood samples were collected monthly using heparin anticoagulant to obtain the required plasma. Heparinized whole samples were used for determination of glucose (Glu) (Nelson, 1944; Somogyi, 1945). Plasma separated from blood sample was used for the determination of aspartate aminotransferase (AST or GOT), alanine aminotransferase (ALT or GPT) (Retiman and Frankel, 1957), alkaline phosphatase (ALK, Phs) (Belfield and Goldstein, 1971), total biliubin (TBL) (Malloy and Evers, 1937), Creatinine, (Follin and Wu 1919) and urea (Patton and Crouch, 1977).

Statistical Analysis:

Analysis of variance was conducted by using a statistical program version (2.1) to study the effect of the lice infestation on biochemical parameters in all period of the experiment. Chisquare test was used for all parameters as significant.

by Snedecor and Cochran (1972)

RESULTS AND DISCUSSION

The mean values of blood biochemical data for infested and non-infested groups were shown in table (1) and the analysis of variance for different parameters presented in table (2) and illustrated in each month in Fig. (1).

Large differences were noted between the control goat and infested group. Lice infestation appeared to have induced lethargy in the infested goats which became less active than their louse-free counterparts. This behavioural change was similar to the behavior associated with pediculosis in humans which may cause pessimism, and depression, and tiredness (Harwood and James, 1979). Davis and Williams (1986) stated that the pigs infested with lice caused lethargy in infested pigs.

Liver Functions:

The goats did appear to respond physiologically to lice infestation. There was a highly significant decrease in blood glucose (hypoglycemia), in the infested goats. The decrease in blood glucose began after two months from infestation and continued to the end of experimental period (Fig.1). The observed changes in blood glucose might be attributed to stress induced by sucking lice feeding continuously on blood and producing severe discomfort because of their numerous bites and toxic secretions. The cause for these changes might have been due to the direct influence of the lice feeding activities on its hosts metabolism or a

depression in feed intake. Hypoglycemia might occur following severe exertion and in stages of starvation (Coles, 1986). The loss of blood due to lice feeding could cause anaemia as reported by several investigators. Abd El-Baky (1994) reported, on goats infested by the same lice species, significant reduction of red blood cells, increase of the mean corpuscular volume and the mean corpuscular haemoglobin, indicating a case of macrocytic normochromic anemia. In the meantime, he recorded a decrease in white blood cell counts, lymphocytes and monocytes in the infested goats, which indicated that this species of lice caused anaemia and weight reduction in heavily infested goats might be possible that toxic secretions from lice feeding had an effect on the bone marrow or other source of leukocyte manufacture, (Coles, 1974). Camels infested with *Haematopinus tuberculatus* appeared to develop microcytic oligochromic type of anaemia (Mehrotra and Singh, 1979). Peterson et al. (1953), Collins and Dewhirst (1965) and Harwood and James (1979) recorded that the heavy infestation of cattle with *H. eurysternus* showed severe anaemia. Also, Schillorn and Mohamed (1975) proved clinical anaemia in sheep infested sucking.

The plasma alkaline phosphatase (ALK, Phs) showed a highly significant increase in the infested goats (Tables 1 & 2). The results revealed an elevation and highly significant increase in total bilirubin (T.Bil.) and direct and indirect bilirubin in the infested goats during the experiment. The increase appeared to be due to increase in conjugated bilirubin as its trend closely resembled that of the total bilirubin

Table (1): The analysis of variance of some biochemical parameters as affected by lice infection.

Source of Variance	D.F.	MEAN SQUARES									
		Glucose	Alk, Phs	ASl	ALT	Creatinine	Urea	D.F.	T. Bil	D. Bil	I.N.D
Treatment	1	9376.3**	277182.9**	20410.1**	19388.9**	51.6**	9394.4**	1	1.475*	0.045**	1.14
Period	8	1928.0**	5641.9**	3790.2**	1221.2**	6.5**	417.4**	7	2.858**	0.077**	2.75
Tr. x Per.	8	542.5**	9680.7**	574.1**	570.2**	1.9**	344.7**	7	0.850**	0.042**	0.73
Error	454	3658.5	100125.9	7729.8	3517.3	12.6	3610.9	393	19.991	4.219	21.2

** p < 0.01

Treatment= the differences due to infestation with lice.

Period= The differences due to months.

Table 2: Mean values of biochemical parameters of nine consecutive periods as affected by lice infestation.

ITEM	CONTROL	± SE	INFESTED	± SE
No. of samples				
Glucose	62.75	0.19 A	53.81	0.18 B
ALK, Phs.	75.17	0.99 B	123.77	0.94 A
AST	31.19	0.28 B	44.38	0.26 A
ALT	15.01	0.19 B	27.86	0.18 A
Creatinine	1.04	0.01 B	1.69	0.01 A
Urea	37.51	0.19 B	46.45	0.18 A
T. Bil.	0.52	0.02 B	0.64	0.2 A
D. Bil.	0.14	0.007 B	0.16	0.007 A
IND. Bil	0.38	0.017 B	0.48	0.016 A

SE = Standard error.

Means within the same row followed by different letter differ significantly.

Fig 1: Means of biochemical parameters of infested and non-infested goats in blood.

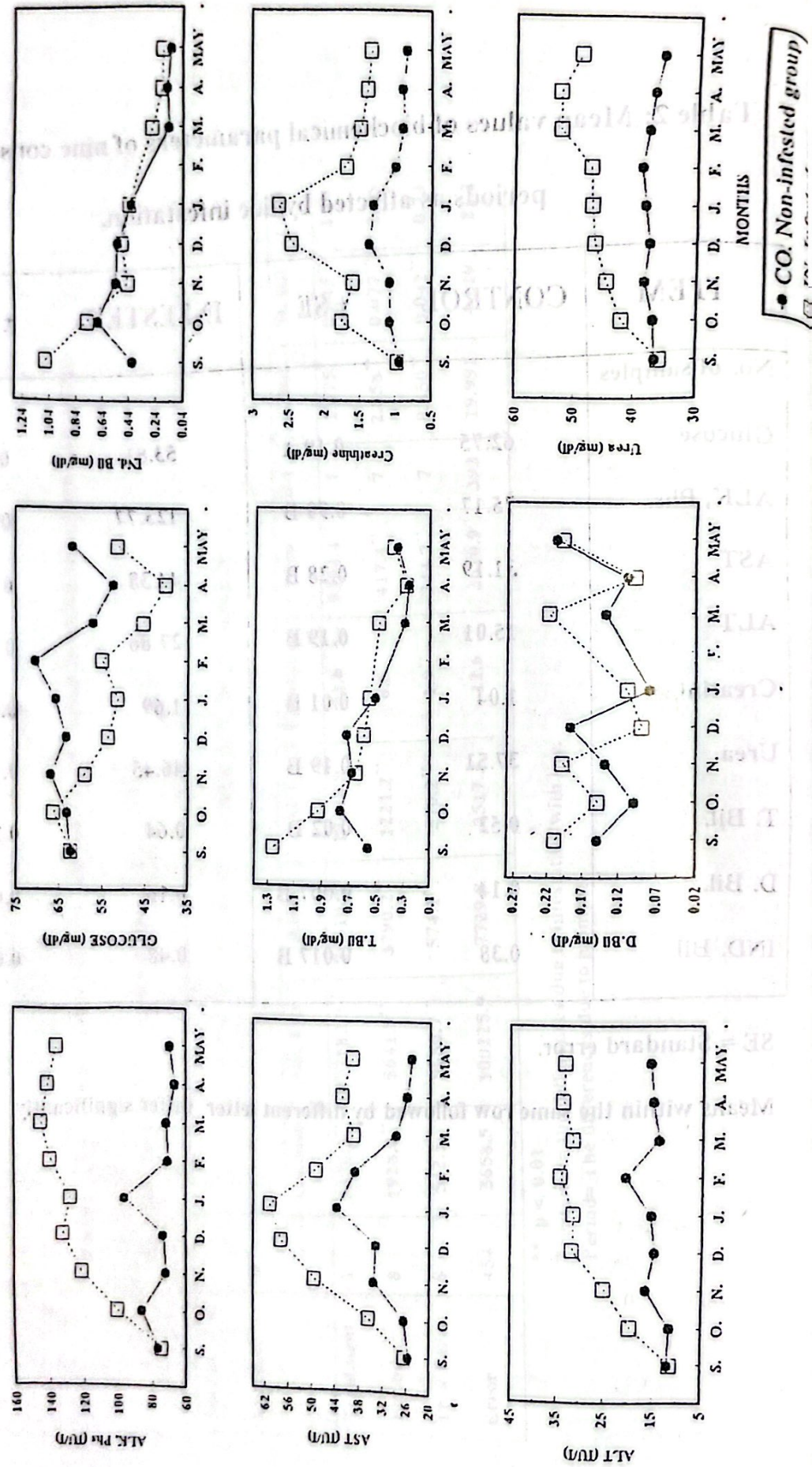
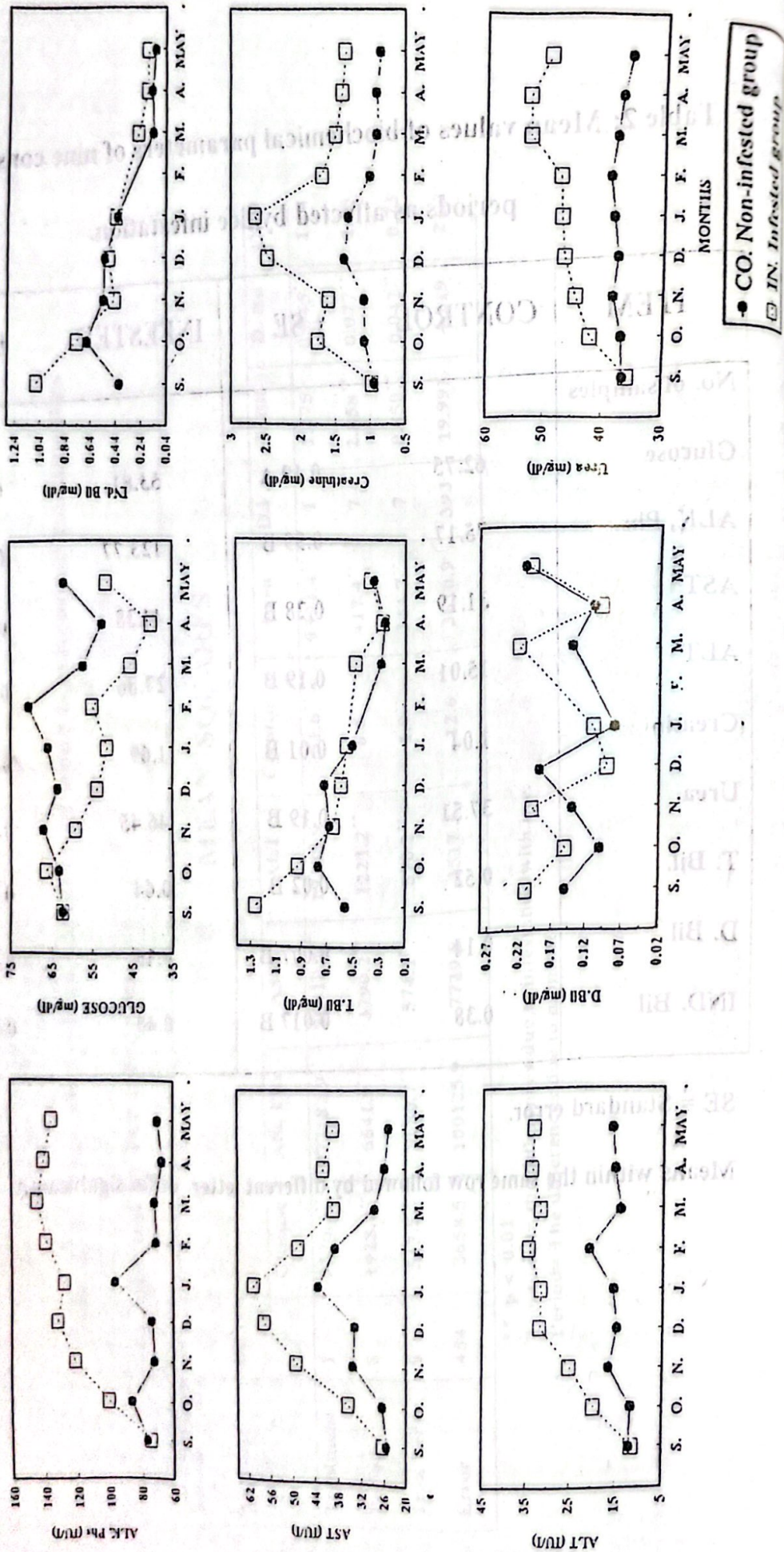


FIG. 1. EFFECTS OF PROLONGED PHOSPHORUS DEFICIENCY ON METABOLIC RATES



(Fig.1). The increased concentration of serum bilirubin conjugates might be indicative of either severe hepatic involvement or extrahepatic obstruction (Coles, 1974). In addition, AST and ALT revealed an elevation and highly significant increase in the infested goats during the experimental period, (Table 1 & 2).

In general, the activity of the three enzymes (ALK Phs, ALT and AST) showed consistent elevations above their normal values and had the same trend of increase along the experimental period (Fig.1). Although ALT enzyme alone in ruminants is a nonindicative enzyme for liver functions (Cornelius et al., 1959), yet its significant increase in addition to that of the ALK, Phs and bilirubin and AST, would probably indicate changes in liver cells. It is a fact that ALK, phs and AST enzymes are intracellularly bounded and that the increase in their circulating levels in plasma might be indicative of cellula destruction (Varly et al., 1980).

Kidney Function:

The present results revealed a highly significant increase in serum urea and creatinine of goats infested with lice (Tables 1 & 2). This increase began after one month from infestation till the end of the experimental period (Fig.1). Level of urea and creatinine in serum is known to reflect the state of glomerular filtration and kidney functions (Kaneko, 1989), and increased values indicate kidney disease (Coles, 1967). Thus elevation of urea and creatinine in serum of infested goats probably pointed out to renal impairment. As urea and creatinine are eventually

excreted by the kidneys, therefore, changes of their level in serum would reflect the insufficiency of kidney tubules or kidney malfunction, (Cornelius. and Kaneko, 1963)

Histological studies are needed on the organs of infested goats to confirm that organ damage actually occurred.

Conclusions:

It could be concluded that in heavily infested goats with biting lice, *Bovicola caprae*, and blood sucking *Linognathus africanus* Kellogg and Paine and *L.stenopsis*, anaemia occurred in the host which reduced productivity. Heavy infestation levels were of considerable economic importance. Thus, it necessary to control the lice to avoid anaemia and the consequent mortality.

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