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Evaluation of the Haematologic Values of Bitches in Northern Nigeria for the Staging of Pregnancy

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Abstract: The heamatologic parameters of bitches in Northern Nigeria were investigated to evaluate their values for the staging of pregnancy. The values for Red Blood Cells (RBC), White Blood Cells (WBC), Packed Cell Volume (PCV) and Hemoglobin Concentration (Hb) were determined in the different stages of the reproductive cycle. RBC values were highest during proestrus with a mean of (14.86±0.79) x 10^6 μL^{-1}, while the lowest values were recorded during pregnancy (3.86±0.35) x 10^6 μL^{-1}. WBC, PCV and Hb values showed an increasing pattern from anoestrus to proestrus and then decrease with transition from proestrus to estrus, with the lowest WBC value of (7.99±0.65) x 10^3 μL^{-1} recorded during pregnancy. Total WBC count was highest during dioestrus (non-pregnant), with value almost twice that recorded during pregnancy. This suggests that WBC values can be used for pregnancy diagnosis in the Nigerian Local bitch.

Key words: Haematologic values, bitches, pregnancy

INTRODUCTION

The number of various circulating blood cells varies with normal physiological stages as well as with pathological conditions. Considerable variations do exist normally among individuals in a given population that are attributable to sex, age, nutrition, sexual cycle, etc. (Bobade *et al.,* 1985; Fraser, 1986).

During pregnancy, PCV becomes gradually reduced from a mean of 53-32% at term and then increase to 42% during the next few weeks. In a normal bitch, both the total and differential leucocytes count are influenced by age.

Blood cell numbers do change in disease states, WBC rise in acute bacterial infections, neoplastic leukaemais, tissues necrosis, trauma and chemical or metabolic toxication, but extreme stages of the same pathological conditions are associated with decreased values (Fraser, 1986).

A study was carried out with eleven German shepherd bitches that were monitored from anoestrous phase through pregnancy to weaning and the hematologic analysis showed a significant decrease ($p<0.05$) in the erythrogram values observed from the third week of pregnancy to parturition, with partial recovery at the end of lactation. On the other hand there was a significant rise ($p>0.05$) in the reticulocyte values, which returned to normal during lactation (Carneiro *et al.,* 2000).

In a study, Gandotra *et al.* (1994), showed an increase in WBC count (with a range of 17,000-38,000 cells μL^{-1} and neutrophilia of up to 90% from 24 cases of pyometra (close in 4), with no significant changes in Hb concentration. In a review of *Brucella canis* infection, Wright and Parry (1989) reported that a complete blood count may reveal an inflammatory leucogram and hyper-protienaemia (hyperglobulinaemia) possibly with a mild non-regenerative anaemia. In another case report of canine Transmissible Veneral Tumour (TVT), Booth (1994) showed a WBC count of 12.9 x 10^3 μL^{-1} with other parameters within normal range. There is significant increase in erythrocyte numbers in dehydration and other similar derangement of tissue fluid balance (Kelly, 1979).

The need for an easy and applicable tool for the staging of pregnancy in the Nigerian local Bitch necessitates this study. The research also seeks to generate data on some heamatologic parameters during the different stages of the reproductive cycle. The findings of this study will contribute to the understanding of the changes in blood parameters in the peri pregnant stage of the reproductive cycle in the Nigeria local bitch.

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MATERIALS AND METHODS

A total of 39 Nigerian Mongrel bitches of varying ages were obtained within the Maiduguri Metropolis. Blood samples were collected one-off during the different stages of the reproductive cycle from January to December 2000. Stages of the reproductive cycle were determined based on behavioural signs, physical examination and vaginal cytology as earlier described (Olson *et al.*, 1984; Concannon and Lein, 1986; Mshelia and Amin, 2000; Mshelia *et al.*, 2001).

With the dogs properly restrained, 5 mL of blood was collected through cephalic venopuncture and transferred into properly labeled commercially available EDTA coated blood sample bottles for immediate processing.

Total Red Blood Cells (RBC), White Blood Cells WBC), Parked Cell Volume (PCV) and Heamoglobin concentration (Hb) were determined according to standard procedure (Hewitt, 1994). Blood films were made on clean grease free microscopic slides as described by Fraser (1986) and stained with Giemsa. Total RBC and WBC were determined using the heamocytometer (Gelman-Hawsky Ltd, England) by a process described by Hewitt (1994). The PCV was determined using the microheamatocrit method, while Hb values was determined using the cyanbometheglobin method as described by Hewitt (1994). Spectronic-20 (Milton Roy Company) was used. The colorimeter reading obtained was compared against a standard curve and the corresponding Hb values were obtained and recorded.

RESULTS AND DISCUSSION

RBC values were significantly ($p>0.05$) elevated in proestrous bitches. The lowest values in normally healthy bitches were recorded during pregnancy. WBC value increase significantly ($p>0.05$) in transition from anoestrus to proestrus with the lowest value recorded in pregnant bitches and highest value recorded in (non-pregnant) dioestrous bitches (Table 1).

The pattern of change in PCV and Hb were the same in transition from anoestrus, through proestrus, oestrus and pregnancy. However, PCV values were elevated above oestrus values in non-pregnant dioestrous bitches, while Hb values were found to drop significantly ($p>0.05$) below the oestrus values in the same bitches (Table 1).

The result of this study showed that RBC is elevated during anoestrus and drop gradually during proestrus and oestrus to the lowest value recorded during pregnancy. This low value during pregnancy may be due to aneamia associated with the pregnancy (Concannon and Lein, 1986) and may also reflect the poor nutritional status (Meda *et al.*, 1999). In the non-pregnant dioestrus bitches, RBC value was increased above the oestrus mean. However, with all these variation, there is no significant difference observed throughout the cycle.

WBC, PCV and Hb values all increase from anoestrus to proestrus and then decreased with transition from proestrus to oestrus. Lowest values were also recorded during pregnancy. A significant difference ($p>0.05$) has been shown in the WBC count of the bitches with transition from oestrus to dioestrus in non-pregnant bitches. The value almost double that recorded in pregnant bitches. This shows that WBC count may be useful in pregnancy diagnosis in the Nigerian local bitches.

PCV was lowest during pregnancy, although this did not vary significantly with the anoestrus values. Concannon and Lein (1986), reported that during pregnancy, maternal haematocrit declines after implantation with PCV normally reaching 40% by day 35 and falls below 35% at term. This may be due to the haemodilution effects of increase plasma volume, because total blood volume increase along with body weight increase of 20 to 55% over the course of gestation (Cancannon, 1986). Hb concentration was also found to be low during dioestrus. This is in agreement with the report of Concannon and Lein (1986).

Bobade *et al.* (1985), showed a significant variation in the means value of these parameters between the local and the exotic breeds; and a higher PCV and Hb values in female than male local dogs. This difference may be due to breed specificity as earlier reported (Steiss, 2000).

This study has shown that WBC counts in dioestrus are almost two fold the value in pregnancy. This may be due to the immunosuppression involving serum immunoglobulin G (IgG) associated with pregnancy in bitches (Concannon and Lein, 1986). Therefore, WBC count may be employed in the evaluation of pregnancy in these bitches.

Table 1: Blood parameters of bitches in northern Nigeria at different stages of the reproductive cycle

Cycle stage	No. of dogs	RBC ($9x10^6$ µL)	WBC ($x10^3$ $µL^{-1}$)	PCV (%)	Hb (g dL^{-1})
Immature	8	4.89±0.95	11.67±1.66	40.25±6.36	13.23±2.49
Anoestrus	5	5.09±0.62	10.31±2.27	38.6±2.85	12.82±0.96
Proestrus	5	14.86±0.79	14.86±1.99	41.4±4.16	13.46±1.40
Oestrus	8	4.06±0.81	12.25±1.52	40.3±2.12	13.1±0.62
Pregnant	7	3.86±0.35	7.99±0.65	37.7±3.77	12.6±1.13
Dioestrus non-Preg.	6	4.70±1.35	16.0±1.32	40.2±2.80	12.0±2.83

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