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Haematological Profile in Cyclic, Non Cyclic and Endometritic Cross-Bred Cattle

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ABSTRACT

Blood samples were collected from 75 crossbred cows belonging to one of the three experimental groups i.e. cyclic, non-cyclic and endometritic, with 25 animals in each group. The samples were analyzed for haematological parameters including red blood cell count (RBC), total leukocytic count (TLC), differential leukocytic count, haemoglobin concentration (Hb), packed cell volume (PCV), erythrocyte sedimentation rate (ESR), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC). The results revealed that the values of Hb, ESR, MCHC and TLC were significantly lower ($P<0.05$) in the non-cyclic cows as compared to cyclic or endometritic animals. The differences in these parameters among cows of the latter two groups were non significant. The RBC counts ($10^6/\mu L$) were significantly higher in the endometritic cows (9.32 ± 0.46) than the cyclic (7.23 ± 0.31) or non cyclic (6.89 ± 0.20) crossbred cows. MCH (Pg) was higher in cyclic cows (17.84 ± 0.95) than non-cyclic (13.61 ± 0.55) or endometritic (14.78 ± 0.59) cows. Among leukocytes, neutrophils (%) were higher in endometritic (30.64 ± 3.10) than non-cyclic (23.28 ± 1.79) cows. Eosinophils (%) were higher in non-cyclic (12.0 ± 1.20) cows than cyclic (7.12 ± 0.89) or endometritic (5.52 ± 0.65) animals. The difference among cow of latter two groups was non significant. However, PCV, MCV, lymphocyte, monocyte and basophil percentages did not differ among cows of the three groups. It was concluded that lower erythrocytic indices could be attributed to non-cyclic condition in crossbred cows included in the study.

Key Words: Haematological profile; Cattle; Cross bred

INTRODUCTION

Blood is of crucial importance for the maintenance of physiological equilibrium in the body (Geneser, 1986). However, this equilibrium may be disturbed due to certain physiological and pathological conditions. The knowledge of haematological values is useful in diagnosing various pathological and metabolic disorders, which can adversely affect the productive and reproductive performance of cows, resulting in great economic losses to dairy farmers (Pyne & Maira, 1981; Dutta *et al.*, 1988). Since blood profile changes during various reproductive states, it is imperative to study haematological constituents during these states. These changes in haematological constituents are important indicators of the physiological or pathological state of the animal.

Soliman and Zaki (1963) reported a significant increase in RBC and WBC during estrus phase in cattle. Dhoble and Gupta (1981) and Nadiu and Rao (1982) reported lower level of haemoglobin in anestrus than in cycling buffaloes and cows, respectively. Wahid *et al.* (1988) recorded higher haemoglobin values, erythropenia and leukocytosis with neutrophelia, basophelia and lymphocytopenia in endometritic cows. Kumar and Sharma (1991) observed lower values of total erythrocyte count, haemoglobin concentration and PCV in anestrus and repeat breeder animals while mean corpuscular volume and total leukocyte count were increased in these two groups. Information regarding the haematological parameters in cyclic, non-cyclic and endometritic-crossbred cattle is scanty. The present project was therefore designed to investigate various haematological values of cyclic, non-cyclic and endometritic crossbred cows.

MATERIALS AND METHODS

Animals. This study was conducted at the Department of Animal Reproduction, University of Agriculture, Faisalabad. A total of 75 Sahiwal X Friesian crossbred cows brought to the departmental clinic for artificial insemination or infertility treatment were selected. These cows were divided into three groups i.e. cyclic, non-cyclic and endometritic, each group comprising of 25 animals. In order to confirm the clinical status of experimental cows, their reproductive organs were examined through rectal palpation. The animals with a corpus luteum on one of the ovaries were considered as cyclic animals, while cows having plane inactive ovaries were included in the non cyclic group. The animals showing pus flakes in the estrul mucus with thickened uterus were placed in endometritic group.

Collection and analysis of blood. Blood samples were collected aseptically by Jugular veinipuncture from individual cows into collection tubes containing EDTA. The collected blood was used for haematological studies. The haematological parameters including RBC count, haemoglobin concentration (Hb), packed cell volume (PCV), erythrocyte sedimentation rate (ESR), mean

corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), total leukocytic count (TLC) and differential leukocytic count (DLC) including, neutrophils, lymphocytes, monocytes, eosinophils and basophils were studied by standard methods described by Coles (1986) and Sastry (1989).

Statistical analysis. Mean values (± SE) of various haematological parameters for cows of three groups were computed. In order to observe the magnitude of variation in these parameters among cows of the three groups, the data were analyzed statistically using Analysis of Variance under completely randomized design (Steel & Torrie, 1980). Duncan's multiple range test (Duncan, 1955) was applied for multiple means comparison, where necessary.

RESULTS AND DISCUSSION

Erythrocytic indices. The mean values of various erythrocytic indices in cyclic, non-cyclic and endometritic crossbred cows are given in Table I.

Red blood cell count was the highest in endometritic crossbred cows and lowest in non cyclic cows, the difference was significant ($P<0.05$). Further analysis revealed that red blood cell count was significantly ($P<0.05$) higher in endometritic cows compared to that of cyclic and non-cyclic cows, the difference among cows of the latter two groups was non significant. One of the possible explanations for increased RBC count in endometritic animals may be the increased plasma fibrinogen level recorded in chronic infections (Khan *et al.*, 1997). Coles (1986) observed an increase in RBC count in oestrus animals which was attributed to excitement and hyperactivity under the influence of oestrogen.

The values for haemoglobin concentration, ESR, MCH and MCHC were the highest in cyclic animals while lowest in non cyclic animals, the difference was significant ($P<0.05$). Multiple means comparison showed that the values of these indices were significantly ($P<0.05$) higher in cyclic and endometritic cows compared with that of non-cyclic group of cows. The differences in these parameters among crossbred cows of the former two groups were non significant. Higher RBC count with lower Hb concentration in endometritic cows observed in this study may be due to increase in number of erythrocytes with decrease in their size (Benjamin, 1978).

The MCH and MCHC values are affected by variation in Hb synthesis (Benjamin, 1978). Since the MCHC is a measure of the quantity of Hb in each RBC and also relates to the weight of Hb and volume of cell, the cows having higher Hb concentration showed higher MCH and MCHC values. In the present study, the values for PCV were highest in endometritic cows and lowest in non cyclic animals. The values for MCV were highest in cyclic animals while lowest in endometritic cows. However, the difference in these two indices among cows of the three groups were statistically non significant.

Leukocytic indices. The mean values of TLC and DLC in cyclic, non cyclic and endometritic crossbred cows are given in Table II.

A significantly higher TLC was recorded in endometritic and cyclic cows compared with that of non-cyclic cows. The difference in TLC among cows of the former two groups was non significant. Leukocytosis occurs as a result of infection in the body. The degree of leukocytosis depends upon several factors including nature of the causative agent, severity of infection, resistance of animal and localization of inflammatory response (Benjamin, 1978).

Differential leukocytic count revealed that neutrophils were significantly higher in endometritic cows than in cyclic or non cyclic animals. Leukocytosis induced as a result of

Table I. Erythrocytic indices (mean ± SE) in cyclic, non-cyclic and endometritic crossbred cows

Parameter	Cyclic cows	Non-cyclic cows	Endometritic cows
RBC (10^6/µl)	7.23 + 31b	6.89 + 0.20b	8.32 + 0.46a
Hb (g/dl)	12.41 + 0.44	9.26+0.34	11.68+0.15 a
PCV (%)	28.76 + 0.66 a	27.72 + 0.84 a	29.2 + 0.62 a
ESR (mm/24 hrs)	9.00 + 0.40 a	6.60 + 0.40 b	8.24 + 0.42 a
MCV (fl)	41.12 + 1.67 a	40.67 + 1.28 a	36.85 + 1.52 a
MCH (pg)	17.84 + 0.95a	13.61 + 0.55b	14.78+0.95a
MCHC (g/dl)	43.40 + 1.43a	33.46 + 0.81b	40.40 + 0.95a

Values with different letters within a row differ significantly ($P<0.05$)

Table II. Leukocytic indices (mean ±SE) in cyclic, non-cyclic and endometritic crossbred cows

Parameter	Cyclic cows	Non-cyclic cows	Endometritic cows
TLC (10^3/µL)	9.31 ± 0.38 a	8.96 ± 0.51 b	11.47 ± 0.36 a
Neutrophils (%)	26.28 ± 1.54 ab	23.28 ± 1.79 b	30.64 ± 3.10 a
Lymphocytes (%)	61.96 ± 1.69 a	61.48 ± 1.81 a	60.76 ± 2.92 a
Monocytes (%)	4.16 ± 0.44 a	3.36 ± 0.31 a	3.24 ± 0.30 a
Eosinophils (%)	7.12 ± 0.59 b	12.0 ± 1.20 a	5.52 ± 0.65 b
Basophils (%)	0.08 ± 0.05 a	0.32 ± 0.11 a	0.24 ± 0.10 a

Values with different letters within a row differ significantly ($P<0.05$).

infection promotes the release of neutrophils from the bone marrow through leukocytosis-inducing-factor (LIF) of the plasma; concentration of LIF is increased in bacterial diseases by bacterial products, hence leukocytosis (neutrophilia) occurs in such diseases (Sastry, 1989). In states of excitement, exercise and strange surroundings there is also leukocytosis (neutrophilia), since adrenaline liberated during these states mobilizes the marginal neutrophil pool cells (Sastry, 1989).

In this study, the eosinophil count was highest in non cyclic animals and lowest in endometritic animls, the difference was significant ($P<0.05$). Further analysis showed that eosinophil count was significantly higher ($P<0.05$) in non cyclic cows than in cyclic or endometritic cows, the difference among animals of the latter two groups was non significant. Similarly, the values of lymphocytes, monocytes and basophils did not differ among cyclic, non cyclic and endometritic animals.

CONCLUSION

Based on the results of the present study, it can be concluded that low erythrocytic count in non cyclic crossbred cows may be the cause of the problem.

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