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Comparison of Haematology in Various Physiological States in Sahiwal Cattle

KEYWORDS: Haematology, Lactation, Pregnancy, Sahiwal cows

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ABSTRACT *Twenty seven Sahiwal cows were used in the experimentation and were divided into 3 groups (n=9). Animals were divided into three groups as Pregnant dry cows, Non Pregnant Lactating cows and Non Pregnant Dry cows. The highest Hb concentration (10.42 ± 0.42 gm/dl) was recorded in group-1, while the lowest (9.26 ± 0.34 gm/dl) was observed in group-2. The highest and lowest RBCs count and PCV (5.83 ± 0.39 x 106/µl, 32.67 ± 1.36% and 4.57 ± 0.27 x 106/µl and 29.26 ± 1.11%) were recorded in group-3 and group-1 respectively. The highest MCV, MCH and MCHC (65.10 ± 2.27fl, 23.36 ± 1.51pg and 35.58 ± 1.04 gm/dl) were noted in group-1 and the lowest (57.87 ± 2.15 fl, 18.59 ± 1.43pg and 31.76 ± 1.22 gm/dl) were noted in group-3. The highest and lowest ESR (7.58± 1.15 mm/24 hours and 5.12 ± 0.67 mm/24 hours) was recorded in group-1 and group-2 respectively. The highest and lowest WBCs count (8.72 ± 1.32 x 103/µl and 7.61 ± 0.87 x 103/ µl) was observed in group-3 and group 2 respectively. Highest lymphocyte count (65.24 ± 3.00 %) was observed in group-2, while lowest count (64.29 ± 2.91%) was in group-1.*

INTRODUCTION

Physiological equilibrium is maintained mainly by the blood in the body (Geneser, 1986) but this equilibrium is altered in various physiological conditions changing the homeostasis of animals. Hence, the haematological values during different physiological situations should be known for the diagnosis of various pathological and metabolic disorders, which can adversely affect the productive and reproductive performance of cows, leading to heavy economic losses (Dutta *et al*., 1988).

MATERIALS AND METHODS

Twenty seven Sahiwal cows of different age groups were used in the experimentation. These animals were maintained and housed under similar conditions of feeding and management. The animals were fed daily 40-50 Kg of green fodder and 2-3 Kg of concentrate mixture; containing 15% crude protein and 65% total digestible nutrients. These animals were divided into 3 groups, having 9 animals in each group. The grouping was done depending upon their physiological conditions as follows: group1- Pregnant dry cows, group 2- Non Pregnant Lactating cows and group 3-Non Pregnant Dry cows.

Fifteen ml of venous blood from the Jugular vein of each animal was collected, using one mg of disodium salt of ethylenediaminetetraacetic acid per ml of blood as an anticoagulant (Sastri, 1985). Haematological parameters were studied according to the methods described by (Sastri 1985). The detail of the parameters studied is as follows: haemoglobin (Hb) concentration, red blood cells (RBC) count, packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), erythrocyte sedimentation rate (ESR), white blood cells (WBC) count and differential leucocytic count (DLC).

Statistical analysis

The arithmetic means (± SE) of haematological parameters in different groups were calculated. Further analysis was done using analysis of variance (ANOVA) technique (Steel and Torrie, 1984) and significant results were subjected to Duncan's multiple range (DMR) test (Duncan, 1955). The differences were considered statistically significant at $P<0.05$.

RESULTS

The results for various haematological parameters of three physiological states of Sahiwal cattle are given in Table 1. The highest Hb concentration was recorded in Pregnant dry cows (Group-1), while the lowest values were observed in non-pregnant lactating cows (Group-2), the difference was statistically significant ($P<0.05$). Similarly, the highest RBCs count and PCV were recorded in Non Pregnant Dry cows (Group-3), while the lowest values were observed in pregnant dry cows (Group-1), the difference being statistically significant ($P<0.05$). In the current study, the highest MCV, MCH and MCHC were noted in Pregnant dry cows (Group-1) and the lowest values were observed in Non Pregnant Dry cows (Group-3), the differences were statistically significant ($P<0.05$). In the present study, the highest ESR was recorded in pregnant dry cows (Group- 1) and the lowest values were observed in Non Pregnant Lactating cows (Group-2), the difference was statistically significant ($P<0.05$). The highest WBCs count was recorded in Non Pregnant Dry cows (Group-3) and the lowest values were observed in Non Pregnant Lactating cows (Group-2), the difference was significant ($P<0.05$). Significantly ($P<0.05$) higher lymphocyte count was observed in Non Pregnant Lactating cows (Group-2) compared to Pregnant dry cows (Group-1).

DISCUSSION

Ahmad (1995) reported PCV 28.4 ± 0.61 to 31.4 ± 0.50%, Hb 9.7 ± 0.30 to 11.1 ± 0.30 gm/dl and RBC count 4.7 ± 0.41 to 7.0 ± 0.42×10^6/µl in Sahiwal cows during last trimester of pregnancy (pregnant dry cows). These values are closely related to the values of the present study. Unlike our study, Steinhardt *et al*. (1994) reported decrease in Hb with advancing lactation and pregnancy, which increased at parturient stage. Kumar and Pachauri (2000) reported highest MCV and MCH, and lowest MCHC in non-pregnant dry cows compared to other groups which are closely related to our study. Ahmad (1995) reported WBC count of 6.8 ± 0.28 to 8.3 ±

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0.29 10^3/µl, lymphocytes 55.5 ± 1.96 to 65.3 ± 2.49%, monocytes 3.50 ± 0.87 to 3.90 ± 0.81%, neutrophils 21.1 ± 1.12 to 30.0 ± 3.69%, eosinophils 5.50 ± 1.66 to 8.00 ± 0.71% and basophils 0.20 ± 0.25 to 0.40 ± 0.18% and ESR 5.9 ± 0.40 to 17.1 ± 1.89 mm/24hr in Sahiwal cows during last trimester of pregnancy (pregnant dry cows) on the other hand, the differences of monocytes, neutrophils, eosinophils and basophils between all the groups were statistically non-significant. Most of these values are closely related to the present study. Pereira *et al*. (1987) also reported that there was an increase in the number of leukocytes during gestation. Discrepancies in values for various haematological parameters between our findings and previous studies may be explained by differences in sampling interval, methods used, numbers of cows sampled, and/or degree of metabolic disturbances. Moreover, genetic differences between cows (Mallard *et al.*, 1998) and environmental conditions of the present study might have played a role for the differences with other studies. In the present study, the reasons for immune suppression in pregnant cows are not fully known, but several factors such as management, feeding and changes in hormonal levels may be involved (Meglia *et al.*, 2005). According to Meglia *et al.* (2005), suppression of leukocyte functions in dairy cows has been associated with negative energy balance around calving and in early lactation. Sometimes blood leukocyte numbers and their functions change considerably around parturition, resulting in suppression of the immune response from a few weeks before to a few weeks after calving (Mallard *et al.*, 1998). Lymphocytes decrease around parturition mainly due to reduced lymphocyte proliferation (Saad *et al.*, 1989).

CONCLUSION

The responses of the studied haematology in various physiological states in sahiwal cattle show that the dairy cows are in a particular quantum of stress during different physiological stages ranging from pregnancy to lactation. These stressors although inevitable during pregnancy and lactation, can be abated by good nutrition and proper management of dairy and pregnant cows.

Table 1: Haematological parameters (mean ± SE) in sahiwal cattle at different physiological stages

Haematological Parameters	Pregnant dry cows (Group1)	Non Pregnant Lactating cows (Group2)	Non Pregnant dry cows (Group3)
Haemoglobin conc(gm/dl)	10.42 ± 0.42^{abc}	9.26 ± 0.34^{c}	10.31 ± 0.41^{bc}
RBC count (x 10^6/µl)	4.57 ± 0.27^{c}	5.36 ± 0.57^{abc}	5.83 ± 0.39^{ab}
PCV (%)	29.26 ± 1.11^{b}	29.81 ± 1.79^{b}	32.67 ± 1.36^{ab}
MCV (fl)	65.10 ± 2.27^{ab}	58.27 ± 2.46^{bc}	57.87 ± 2.15^{c}
MCH (pg)	23.36 ± 1.51^{ab}	18.75 ± 1.64^{bc}	18.59 ± 1.43^{c}
MCHC (gm/dl)	35.58 ± 1.04^{a}	31.72 ± 1.56^{bc}	31.76 ± 1.22^{c}
ESR (mm/24 h)	7.58± 1.15^{a}	5.12 ± 0.67^{ab}	5.22 ± 0.36^{ab}
WBC count (x 10^3/µl)	8.10 ± 0.76^{ab}	7.61 ± 0.87^{ab}	8.72 ± 1.32^{ab}
Lymphocytes (%)	64.29 ± 2.91^{ab}	65.24 ± 3.00^{ab}	64.41 ± 6.63^{ab}
Monocytes (%)	6.29 ± 0.88^{a}	6.41 ± 0.78^{a}	5.69 ± 1.16^{a}
Neutrophil (%)	22.88 ± 2.20^{a}	23.32 ± 2.97^{a}	25.43 ± 5.00^{a}
Eosinophil (%)	5.39 ± 1.24^{a}	4.31 ± 0.54^{a}	3.83 ± 1.57^{a}
Basophil (%)	1.10 ± 0.35^{a}	0.80 ± 0.20^{a}	0.70 ± 0.26^{a}

Values bearing different superscripts in a row differ significantly (P<0.05) but sharing at least one superscript in a row differ non-significanlty

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