

HEMATOLOGICAL PROFILE DURING GESTATION IN TRIPLE CROSS HEIFERS AND COWS

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A study conducted on forty four triple cross-bred (½ Kankrej X ¼ Jersey X ¼ Holstein Friesian) pregnant heifers (20) and cows (24) on days 90,150, 210 and 275 of gestation for hematological parameters like hemoglobin, red blood cell count and pack cell volume revealed that the values decreased significantly ($P<0.01$) during advanced pregnancy while MCV, MCH and MCHC did not show any significant difference during the different stages of gestation.

Key words: **Gestation, hemoglobin,**

pack cell volume, triple cross cattle

Physiological stages such as gestation, parturition and lactation alter the hematological picture. Pregnancy is a physiological condition in which the nutritional requirement of the mother becomes greatly intensified since the fetus is dependent on the mother and she has to mobilize nutrients from her tissues for meeting the fetal requirements. Erythropoiesis is a complex process requiring variable number of nutrients and hence hematocrit and hemoglobin concentration in animals reflect the nutritional status of the animal. In view of the above, the current study was undertaken in pregnant triple cross heifers and cows.

MATERIALS AND METHODS

The present work was conducted on pregnant triple cross-bred (1/2 Kankrej×1/4 Jersey×1/4 Holstein Friesian)

heifers (20) and cows (24) maintained under standard management and feeding practices at Livestock Research Station, Anand, Gujarat. Blood was collected through jugular venipuncture on days 90, 150, 210 and 275 of gestation. Hemoglobin, total RBC (TRBC) and Packed cell volume (PCV, hematocrit) were determined by Sahli's acid hematin method, by Neubauer's hemocytometer and micro hematocrit method, respectively as described by Jain (1986). Mean corpuscular volume ($MCV = \text{hematocrit} \times 10 / \text{RBC}$), mean corpuscular hemoglobin ($MCH = \text{hemoglobin} \times 10 / \text{RBC}$) and mean corpuscular hemoglobin concentration data ($MCHC = \text{hemoglobin} \times 100 / \text{hematocrit}$) were calculated. Statistical analysis was done using unequal Completely Randomized Design (CRD) as per Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The mean \pm S.E. values of hemoglobin, PCV, RBC count, MCV, MCH and MCHC in triple cross cattle during the various stages of gestation are presented in Table 1.

Hemoglobin (Hb) and total red blood corpuscular (TRBC) count

Both hemoglobin concentration and red blood cell count in triple cross heifers and cows was significantly ($P<0.01$) high on day 90 from the lower value observed on day 275 of gestation. The combined overall values for cows and heifers also revealed a significant difference. No significant difference was observed in

Table:1 Hematological profile at different stages of gestation in triple cross cattle (Mean \pm S.E.)

Days	90			150			210			275			
	Animals	Heifers	Cows	Overall	Heifers	Cows	Overall	Heifers	Cows	Overall	Heifers	Cows	Overall
Parameters													
Hemoglobin (g/dl)	9.76 ^b ± 0.27	9.40 ^y ± 0.22	9.54 ^j ± 0.17	9.54^j ± 0.17	8.30 ^a ± 0.26	8.42 ^{xv} ± 0.27	8.35ⁱ ± 0.18	7.86 ^a ± 0.17	8.04 ^x ± 0.20	7.95ⁱ ± 0.13	7.66 ^a ± 0.22	8.12 ^x ± 0.31	7.93ⁱ ± 0.20
PCV (%)	29.40 ^b ± 1.17	29.50 ^y ± 0.63	29.46 ^j ± 0.56	29.46^j ± 0.56	27.08 ^{ab} ± 0.87	27.00 ^{xv} ± 0.82	27.05ⁱ ± 0.60	27.60 ^b ± 0.83	26.08 ^x ± 0.81	26.81ⁱ ± 0.59	24.29 ^a ± 1.02	25.80 ^x ± 0.63	25.18ⁱ ± 0.57
TRBC (10 ⁹ / μ l)	5.10 ^b ± 0.12	4.92 ^y ± 0.15	4.96 ^j ± 0.21	4.96^j ± 0.21	4.80 ^a ± 0.15	4.60 ^x ± 0.18	4.70^j ± 0.20	4.80 ^a ± 0.13	4.40 ^x ± 0.17	4.60ⁱ ± 0.20	4.30 ^a ± 0.16	4.20 ^x ± 0.15	4.25ⁱ ± 0.23
MCV (fl)	57.65 ± 14.22	59.96 ± 12.51	59.40 ± 12.83	59.40 ± 12.83	56.42 ± 13.34	58.70 ± 14.10	57.55 ± 15.05	57.50 ± 13.22	59.27 ± 12.62	58.28 ± 13.48	56.49 ± 12.54	61.43 ± 13.59	59.25 ± 14.34
MCH (pg)	19.14 ± 3.41	19.11 ± 2.89	19.23 ± 3.11	19.23 ± 3.11	17.29 ± 3.49	18.30 ± 4.01	17.77 ± 3.51	16.38 ± 2.75	18.27 ± 3.14	17.28 ± 4.00	17.81 ± 3.52	19.33 ± 3.19	18.66 ± 2.89
MCHC (%)	33.20 ± 5.12	31.86 ± 5.82	32.38 ± 6.14	32.38 ± 6.14	30.65 ± 6.53	31.19 ± 5.89	30.87 ± 5.43	28.48 ± 4.98	30.83 ± 5.10	29.65 ± 5.62	31.54 ± 6.45	31.47 ± 6.10	31.49 ± 6.47

Note: Heifers: n=20, Cows: n=24, Overall: n=44

Means with different superscripts within the row vary significantly (P<0.01) for Hb, TRBC and PCV. Superscripts - **a,b** – Heifers; **x,y** – Cows and **i,j** – Overall

hemoglobin concentration and TRBC between heifers and cows, during the various stages of gestation studied.

The values obtained in Jersey crossbred by Sivaraman *et al.* (2003) during the first, second and third trimester were slightly higher than values obtained in the present investigation. Similar decreasing trend from first trimester to third trimester in cross-bred animals was observed by Jacob (2000), Kumar *et al.* (2001), Mehere *et al.* (2002), Sivaraman *et al.* (2003), Sattar and Mirza (2009) and Roy *et al.* (2010). However, a significant increasing trend with the advance in pregnancy was reported by Samak *et al.* (1981) and Baqi and Rehman (1986). The decrease in Hb concentration during pregnancy may be due to stress of pregnancy (Gupta *et al.*, 1996) and mobilization of maternal Hb into fetal circulation (Prakash and Tandon, 1978). The breakdown of maternal red cells by the maternal cotyledons and subsequent transfer of pigment brings about this mobilization of the maternal Hb. The reduction in RBC, hematocrit and haemoglobin, occurs in the third period of gestation, which represents the main cause of "pregnant physiological anemia" a clinical condition described in various species (Kim, 2002).

Packed Cell Volume (PCV)

The values for packed cell volume significantly decreased in case of heifers ($P < 0.05$) and cows ($P < 0.01$) as pregnancy advanced with the levels on day 90 being significantly higher than that on day 275 of gestation. Similar decreasing trend was found in overall values of cows and heifers. The PCV values between the heifers and cows showed no significant difference at different stages of gestation.

The PCV values obtained in present investigation were lower than the values during 3rd, 5th, 7th and 9th month of pregnancy in cross-bred heifers as reported by Jacob (2000). A similar decreasing trend was observed by Prakash and Tandon (1978), Gupta *et al.* (1996), Jacob (2000), Sivaraman *et al.* (2003) and Mir *et al.* (2008) in crossbred animals. However, Baqi and Rahman (1986) and Samak *et al.* (1981) reported an increasing trend in PCV values with advancing pregnancy in crossbred

animals. The decline in PCV values with approaching parturition may be due to the developing fetus (Prakash and Tandon, 1978) and increase in circulating corticosteroids which in higher concentration cause anemia by lowering the iron and zinc concentration in the serum (Kumar *et al.*, 2001).

CONCLUSION

Hemoglobin, red blood cell and Packed Cell Volume in triple crossbred heifers and cows decreased significantly during advancing gestation, with the values being significantly lower on day 275 than day 90 of gestation.

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