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HAEMATOLOGICAL STATUS OF KARAN FRIES COWS DURING TRANSITION PERIOD IN HOT HUMID CONDITION

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Abstract: A study was carried to observe the changes in the hematological (hemoglobin, PCV, TEC, erythrocytic indices, TLC and DLC parameters of Karan Fries (KF) cows during transition period in hot humid condition. Blood samples were collected from the jugular vein of the selected animals during early morning (6.00 am to 7.00 am) on -30, -15, 0, +15, + 30 with respect to expected date of calving. Day '0' Represented the day of calving from all animals. The haemoglobin, PCV and TEC concentration increased significantly ($p<0.05$) up to the day of calving and then decreased in the subsequent days after calving. The level of TLC, neutrophils and monocytes increased, while number of lymphocytes decreased significantly ($p<0.05$) on the day of calving and then increased after calving. There was no significant effect on erythrocytic indices parameters.

Keywords: Haemoglobin, PCV, TEC, TLC and Karan Fries.

Introduction

The transition from pregnancy to lactation is critically important for health, reproduction and production in dairy cows. Transient cow biology and management has become important part of research during the last two decades. The transition period for dairy cows, defined as 3 wk pre-calving to 3 wk post-calving (Grummer, 1995), is the most critical phase of the lactation cycle. This period is characterized by important physiological, metabolic and nutritional changes. Body of dairy cows undergo tremendous changes during the transition from late gestation to early lactation. The physiological changes occurring in the body of the dairy animals during this period have profound effect on the metabolic profile of cows around calving (Grummer, 1995).During transition period a major change occur in blood cell parameters as dairy cows undergo a tremendous set of metabolic adaptations from late pregnancy to early lactation. These changes normally are exquisitely coordinated by hormonal changes to support the new physiological state of lactation (Grummer, 1995). Despite the remarkable output of research on the nutrition and physiology of transition cows, the transition period remains a problematic area on many dairy farms, and metabolic

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disorders continue to occur at economically important rates on commercial dairy farms (Burhans *et al*., 2003). Therefore, research on understanding the biology of transition cows will be useful to implementing management schemes on dairy farms to optimize production and profitability during this critical period.

Materials and Methods

The experiment was approved by the Institutional Animal Ethics Committee (IAEC) constituted as per the article number 13 of the CPCSEA-rules, laid down by Government of India.

Experimental Animals and Diets

For the present study 18 Karan Fries (KF) peripartum cows were selected from the herd of National Dairy Research Institute (NDRI), Karnal. Blood sample were collected in 10 ml heparinized (20 IU heparin/ml blood) tube at 7:30am before offering any feed from jugular vein on the -30, -15, 0, +15, +30 with respect to expected date of calving. Day '0' Represented the day of calving from all animals. Plasma and serum were separated according to the standard protocol.

Haematology measurement

Hemoglobin in blood was estimated by Sahli's Acid Hematin Method. PCV was estimated by macrohematocrit method. TEC, TLC and DLC were estimated as per the standard protocol. Erythrocyte indices were calculated using the values of hemoglobin, PCV and TEC.

Statistical Analysis

Data were expressed as means ± standard error. Data for all measured variables were analyzed as one way ANOVA using statistical software package SPSS version 22 (SPSS for windows, V22.0; SPSS Inc., Chicago, IL, USA).

Results and Discussion

Haematological parameters

Haemoglobin concentration

The haemoglobin concentration increased from 30 days before calving to the day of calving and then decreased to the normal in the subsequent days of calving (Table 1). The higher levels of hemoglobin on the day of calving and immediately after calving denotes increased requirement of energy by the body tissue for accomplishment of all the physiological processes related to calving. Nazifi *et al*., (2008) reported similar pattern of change in Hb concentration at the time of calving. In early lactating period showed lower Hb, which might be due to a decreased rate of erythropoiesis in these animals (Kumar and Pachauri, 2000) or

to increased Hb requirement of mammary tissues for milk synthesis and concomitant rise in blood flow to mammary glands (El Nouty *et al*, 1986).

Packed Cell Volume (PCV)

The PCV level increased significantly up to the day of calving followed by a gradually decrease (Table 1). The increase of PCV level around calving has been reported by Nazifi *et al*. (2008) and but higher PCV immediately before calving may indicate the requirement of higher red cell volume to carry more oxygen to meet the energy requirement of tissues at the time of calving (Jain, 1996). Rowlands *et al*. (1975) have also reported variation in PCV with the stage of lactation and/or gestation. PCV level positively correlated with TEC, TLC, and blood metabolites.

Total Erythrocyte Count (TEC)

The value of TEC is depicted in Table 1.There was significant increased ($p<0.05$) value of TEC on day of calving on KF cows which might be due to erythropoiesis and slow destruction of erythrocytes during transition period.However, the TEC level decreased to prepartum level after one week of calving. Similar pattern of change in TEC was also reported by (Nazifi *et al*., 2008) in transition dairy cows.

Erythrocytic Indices

In the present study, erythrocytic indices-MCV, MCH and MCHC were found to be unaffected during transition period (Table 1).

Total and Differential Leukocyte Counts

TLC increased significantly ($p< 0.05$) from 15 days before calving till the date of calving and then decreased on 15 days after calving. Significant increase in TLC on day of calving was mainly contributed by increase in neutrophil count. In the present study, neutrophils and monocytes increased and lymphocytes were decreased at calving date, suggesting the positive correlation between TLC with neutrophils and monocytes, and negative correlation with lymphocytes in Karan Fries. There was no significant change in the proportion of eosinophils and basophils. Increase in TLC, neutrophil count and N/L ratio on the day of calving may be stimulated by cortisol release in high stress condition (kulberg *et al.,* 2002). The pattern of change of TLC and DLC was similar to those reported by (Meglia *et al.,* 2001).

Table 1: Mean ± SE of haematological parameters (Erythrocytic series) Karan Fries cows

Parameters	Prepartum		calving	Postpartum	
	- 30 days	**- 15 days**	**0 day**	**+ 15 days**	**+ 30 days**
Hb(g/dl)	11.65 ± 0.32^{a}	12.1 ± 0.13^{b}	14.55 ± 0.34^{c}	12.36 ± 0.21^{bd}	10.17 ± 0.20^{a}
PCV (%)	30.15 ± 1.01^{ac}	35.45 ± 0.26^{ab}	40.13 ± 1.12^{c}	34.15 ± 0.28^{ad}	28.0 ± 0.33^{e}
TEC ($x10^6$/µl)	4.65 ± 0.24^{a}	6.19 ± 0.28^{ab}	7.97 ± 0.45^{c}	6.34 ± 0.50^{ad}	5.37 ± 0.17^{ae}
MCV (fl)	59.24 ± 1.15	53.10 ± 2.76	54.55 ± 3.18	62.39 ± 4.14	51.79 ± 1.98
MCH (pg)	21.45 ± 0.75	19.55 ± 0.91	19.26 ± 0.98	22.40 ± 1.79	18.98 ± 0.99
MCHC (g/dl)	36.06 ± 1.29	37.38 ± 1.25	36.88 ± 0.98	36.88 ± 1.10	37.24 ± 0.50

Means with different superscripts a, b, c, d and e in row differ significantly (P<0.05)

Table 2: Mean ± SE of haematological (Leucocytic series) parameters of Karan Fries cows
Means with different superscripts a, b, c, d and e in row differ significantly (P<0.05)

Parameters	Prepartum		Calving	Postpartum	
	- 30 days	**- 15 days**	**0 day**	**+ 15 days**	**+ 30 days**
TLC ($X10^3$/µl)	7.81 ± 0.54^{a}	10.18 ± 0.73^{ab}	12.45 ± 1.20^{bc}	7.10 ± 1.10^{ad}	7.59 ± 1.11^{ad}
Lymphocytes (%)	69.12 ± 0.97^{ae}	61.25 ± 1.34^{b}	50.87 ± 2.24^{c}	62.75 ± 2.10^{bd}	68.00 ± 1.55^{de}
Neutro (%)	25.50 ± 1.10^{a}	33.25 ± 0.90^{b}	42.50 ± 1.92^{c}	33.00 ± 1.93^{bd}	27.25 ± 1.69^{a}
Eosino (%)	2.62 ± 0.38	2.99 ± 0.41	3.25 ± 0.37	2.62 ± 0.18	2.37 ± 0.46
Baso (%)	0.375 ± 0.18	0.50 ± 0.19	0.50 ± 0.26	0.375 ± 0.18	0.25 ± 0.16
Mono (%)	1.87 ± 0.35^{a}	1.75 ± 0.25^{ac}	3.00 ± 0.38^{b}	1.62 ± 0.26^{ac}	2.00 ± 0.27^{ad}

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