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Changes in haematological parameters of postpartum Surti buffaloes fed with fresh sugarcane tops

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Abstract
The present study was conducted to investigate changes in haematological parameters of postpartum Surti buffaloes fed with fresh sugarcane tops. Eighteen postpartum Surti buffaloes based on their body weight, body condition score and parity were selected and divided in three groups with 6 animals in each group *viz*. Control group (T_1 group) fed with basal diet (green Jowar/Oat, dry Jowar/Oat, Paddy straw, Concentrates and Lucerne), T_2 group fed with replacement of green Jowar/Oat with sugarcane tops in basal diet and T_3 group fed with replacement of green Jowar/Oat with sugarcane tops in basal diet + yeast (1gram *Saccharomyces cerevisiae* containing 10 x 10^9 CFU per animal per day) from calving till 8 weeks postpartum. Blood samples were collected at 2nd, 6th and 10th weeks postpartum and analyzed for hematological parameters. All the hematological parameters revealed non-significant changes between different treatment groups of Surti buffaloes except hemoglobin concentration that was significantly ($p \leq 0.05$) lower in T_2 group of buffaloes as compared to Control (T_1) whereas in T_3 group its concentration was intermediate. Total erythrocyte count (TEC) was highest in T3 group and lowest in T_2 group at postpartum weeks 2, 6 and 10. Total leukocyte count (TLC) was almost similar in all the groups at 2, 6 and 10 weeks postpartum without any significant differences between groups. Difference for differential leukocyte count between groups was non-significant at any stage of experimental period. Thus, it was concluded that replacement of green jowar/oat during its scarcity with fresh sugarcane tops lowers haemoglobin level in postpartum Surti buffaloes so it should be done with close and regular monitoring of haemoglobin level. However, such replacement does not adversely impact other haemogram and Leukogram parameters. Additionally, supplementation of probiotic yeast *Saccharomyces cerevisiae* to fresh sugarcane tops can be beneficial.

Keywords: Postpartum, surti buffaloes, sugarcane tops, haematological parameters

Introduction
Indian sub-continent has a huge population of buffaloes (*Bubalus bubalis*) as an asset to its livestock industry that amounts to about half of the world's buffalo population. Nutrition plays a key role in improving growth, production and reproduction performance. Surti buffaloes are native to south Gujarat region. Calving in Surti buffaloes can occur at any time of the year but they tend to undergo parturition from august to march months of the year that are comparatively cooler spanning the later phases of rainy season to almost end of the winter season. This results in occurrence of phases of increased metabolic demands i.e. postpartum and early lactation phase of buffaloes to occur during summer season. However, there is paucity of fresh green forage especially during summer season that is substantiated by government sources (Ministry of Agriculture) stating that there is shortage of green fodder by approximately 35% (GOI, 2013) [1]. Thus, a gap is created between animal's physiological demand and nutritional supply that poses a risk for loss of milk production as well as health of buffaloes. As an alternative to shortage of fresh green forage, locally and abundantly grown crop that is also harvested at the same time can be fed to the animals considering the loss incurred for milk production and general health should be minimum. One such option is feeding Sugarcane tops. India is the largest producer and consumer of sugar in the World and second largest producer of sugarcane (OECD/FAO, 2019) [2]. Sugarcane is usually grown in large quantities in and around Surat in Gujarat. Stem and other ancillary portions of Sugarcane crop are primarily utilized and portion of sugarcane after extraction of juice is termed bagasse and can be utilized for roughage feeding in livestock. Green and leafy aerial part of this crop termed as sugarcane tops is a major by-product of sugarcane industry after sugarcane milling (Devendra, 1985) [3] that is left unutilized after harvesting (Naseeven, 1988) [4].

They are rich in soluble polysaccharides, amino acid and phenols that interfere with desired crystallization while sugar production and also imparts unwanted colour to sugar crystals (Larrahondo, 1995) [5]. Thus, they are not utilized and discarded for either being burned or utilized as fertilizer (McKenzie, 1994) [6]. In the sugarcane belt, sugarcane tops (SCT) are abundant and available at low cost as low as Rs.3/kg when other green fodder is not available (Rangnekar, 1988) [7]. Thus, the recycling of such a co-product towards milk production is of potential importance in improving India's dairy industry (Thole *et al.*, 1988) [8]. Major constraints in feeding Sugarcane tops are facts that they are low in protein and lipid but high in fibre content. Thus, it compels supplementation of nitrogen source in diet (Naseeven, 1988) [4]. High fibre content of Sugarcane tops can be tackled using probiotic yeast *Saccharomyces cerevisiae* that can help to degrade fibre and enhance its utilization. Probiotic yeast *Saccharomyces cerevisiae* acts as source of important nutrients such amino acids, vitamins and other essential entities that help to compensate the low nutritional quality of Sugarcane tops. Very limited research is available focussing on effect of feeding fresh sugarcane tops alone as well as with probiotic yeast *Saccharomyces cerevisiae* on postpartum Surti buffaloes. As one of the important indicators of good general health is served by variation in hematological parameters, the present study was planned with the objective to investigate the hematological changes on replacement of green oat and jowar fodder with fresh sugarcane tops in post parturient Surti buffaloes.

2. Materials and Methods

The present study was conducted in the Department of Veterinary Physiology and Biochemistry, College of Veterinary Science and Animal Husbandry, Navsari (Kamdhenu University, Gujarat). Eighteen healthy postpartum buffaloes of Surti breed based on their parity, body condition score and body weight were categorized into 3 groups having 6 buffaloes each *viz*. Control (T_1), T_2 and T_3. Buffaloes of Control (T_1) group was fed basal diet comprising of green Jowar/Oat, dry Jowar/Oat, Paddy straw along with concentrates and Lucerne. T_2 group was fed basal diet with replacement of green Jowar/Oat with sugarcane tops. Basal Diet of T_3 group was similar to T_2 group i.e. replacement of green Jowar/Oat with sugarcane tops but additionally yeast (1gram *Saccharomyces cerevisiae* containing 10 x 10^9CFU per animal per day) was also added. The animals were housed and managed at Livestock Research Station, Kamdhenu University, Navsari.

Approximately 10 ml whole blood samples were collected from all the animals at 2nd, 6th and 10th weeks postpartum. The blood samples were collected in vacutainer containing anticoagulant K_3EDTA and used for analysis of hematological parameters *viz*. Total erythrocyte count (TEC), hemoglobin (Hb, packed cell volume/hematocrit (PCV), total leukocyte count (TLC), differential leukocyte count (DLC) comprising percent of lymphocytes, neutrophils, monocytes, basophils and eosinophils.

Descriptive statistics was used to determine Mean±SE for different groups and means were compared by one way ANOVA using DMRT at 5% level of significance.

3. Results and Discussion

The results obtained for hematological parameters in different groups *viz* control (T_1), T_2 group and T_3 group different stages i.e. 2nd, 6th and 10th week postpartum are presented in table 1.

Table 1: Changes in hematological parameters (Mean±SE) in different supplemental groups at 2nd, 6th and 10th week after calving in Surti buffaloes

Haematological parameters	Group	2nd Week	6th Week	10th Week
Total erythrocyte count-TEC (x10^6/µl)	T1	5.94±0.19	6.81±0.17	7.23±0.14
	T2	5.87±0.15	6.56±0.23	7.18±0.17
	T3	6.26±0.16	6.86±0.14	7.24±0.13
Hemoglobin-Hb (g/dl)	T1	9.42±0.35	10.58±0.45	11.33^{a}±0.53
	T2	9.25±0.44	9.83±0.49	10.08^{b}±0.27
	T3	9.58±0.30	10.42±0.44	11.08^{ab}±0.30
Packed cell volume – PCV (%)	T1	31.70±0.49	33.22±0.44	32.77±0.61
	T2	31.28±0.50	32.38±0.48	31.77±0.40
	T3	32.25±0.32	32.68±0.46	32.67±0.64
Total leukocyte count-TLC (x10^3/µl)	T1	11.26±0.16	9.33±0.20	9.02±0.11
	T2	11.12±0.09	9.37±0.17	8.93±0.14
	T3	11.36±0.16	9.40±0.13	8.96±0.09
Lymphocytes (%)	T1	62.83±0.40	62.83±0.60	63.67±0.67
	T2	62.17±0.98	63.67±0.67	64.17±0.65
	T3	62.67±0.84	62.83±0.70	63.67±0.61
Neutrophils (%)	T1	29.50±0.72	29.67±0.95	29.67±0.95
	T2	29.33±0.56	28.83±0.48	29.00±0.97
	T3	28.50±0.99	28.33±0.80	28.17±0.87
Monocytes (%)	T1	4.17±0.31	4.17±0.31	3.67±0.33
	T2	4.50±0.34	4.00±0.37	3.83±0.31
	T3	4.83±0.40	4.83±0.40	4.33±0.49
Basophils (%)	T1	0.17±0.17	0.17±0.17	0±0
	T2	0.33±0.21	0.33±0.21	0.17±0.17
	T3	0.33±0.21	0.17±0.17	0±0
Eosinophils (%)	T1	3.33±0.42	3.17±0.31	3.00±0.26
	T2	3.67±0.33	3.17±0.31	2.83±0.48
	T3	3.67±0.33	3.83±0.31	3.83±0.48

Means bearing different superscripts in lower case (a, b) differ significantly ($p \leq 0.05$) between groups (T_1 = Control group, T_2 = Replacement of green Jowar/Oat with sugarcane tops and T_3 = Replacement of green Jowar/Oat with sugarcane tops + *Saccharomyces cerevisiae*)

Total erythrocyte count (TEC) was highest in T_3 group and lowest in T_2 group at postpartum weeks 2, 6 and 10. However, the differences between groups were not significant.

Comparison between groups for hemoglobin concentration revealed that it was significantly ($p \leq 0.05$) lower in T2 group of buffaloes as compared to Control (T1) whereas in T3 group its concentration was intermediate. During initial period i.e. week 2 and 6 postpartum though Hb concentration were numerically lowest in T2 group there were non-significant differences between groups.

Packed cell volume (PCV) between groups was lowest in T2 at all periods i.e. week 2, 6 and 10 postpartum. Highest PCV values were noticed at 2 and 6 weeks postpartum in T3 and at 10 weeks postpartum in T1 control. However, none of these variations between groups were significant.

Total leukocyte count (TLC) was almost similar in all the groups at 2, 6 and 10 weeks postpartum without any significant differences between groups. Numerically the values were highest at postpartum week 2 (11.36±0.16 x10^3/µl) as well as week 6 (9.40±0.13 x10^3/µl) in T3 group and at week 10 (9.02±0.11 x10^3/µl) in T1 group whereas it was lowest at week 2 (11.12±0.09 x10^3/µl) as well as 10 (8.93±0.14 x10^3/µl) postpartum in T_2 and at week 6 (9.33±0.20 x10^3/µl) in T_1 group.

Among the parameters for differential lymphocyte count, none of the differences between groups were found to be

significant at any stage during postpartum period. Lymphocytes in T_2 group at week 2 was lower and at week 6 and week 10 was higher than control and T_1 group. Neutrophil levels were lower in T_2 and T3 groups than control group (T_1) at all stages after parturition i.e. week 2, 6 and 10. Monocyte levels were highest in T_3 group at all weeks i.e. 2, 6 and 10 between groups with lowest values at week 2 as well as week 10 in T_1 and at week 6 in T_2. At all stages during postpartum i.e. week 2, 6 and 10 basophils were highest in T2 group and eosinophils were highest in T_3 group.

At various stages of an animal's life, hematological markers are frequently utilized to assess an animal's health, nutritional state, and metabolism. It helps to identify causes of productivity loss and evaluate animal stress and welfare (Astuti *et al.*, 2021) [9]. Red blood cells (RBCs), hemoglobin (Hb), hematocrit (PCV) and white blood cells (WBCs) are the representatives of body's immunity. During stressful condition, these parameters are adversely affected (Anderson *et al.*, 1999) [10].

In the present study, we found overall lower hematocrit (TEC, Hb and PCV) values at 2nd week than 6th and 10th week. The values found during the study period were within normal range. Lower hematocrit values in the transition period had also been attributed to diminished immunological status of animals due to suppression of erythropoiesis from bone marrow (Reddy and Sivajothi, 1994) [11].

Non-significant differences between groups for total leukocyte count and differential leukocyte count in the present study shows that there was no adverse effect either due to feeding of sugarcane tops alone or along with probiotic yeast. Similar to the present findings non-significant differences for TLC and DLC in postpartum Surti buffaloes supplemented with rumen specific yeast *Saccharomyces cerevisiae* has been reported by Singh (2017) [12] whereas increased TLC and eosinophils were found in the yeast-supplemented group in dairy heifers of the Sahiwal breed, as reported by Ghazanfar *et al.* (2015) [13].

4. Conclusion

Thus, it was concluded that replacement of green jowar/oat during its scarcity with fresh sugarcane tops lowers haemoglobin level in postpartum Surti buffaloes so it should be done with close and regular monitoring of haemoglobin level. However, such replacement does not adversely impact other haemogram and leukogram parameters. Additionally, supplementation of probiotic yeast *Saccharomyces cerevisiae* to fresh sugarcane tops can be beneficial.

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6. References

1. GOI. Ministry of agriculture, Government of India, Published in 2013; c2013.
2. OECD/FAO OECD-FAO Agricultural Outlook 2019-2028, OECD Publishing, Paris/Food and Agriculture Organization of the United Nations, Rome; c2019.
3. Devendra C. Non-conventional feed resources in Asia and the Pacific. FAO/APHCA publication; c1985. p. 6.
4. Naseeven R. Sugarcane tops as animal feed. In: Sugarcane as feed. Sansoucy, R., Aarts, G. and Preston, T.R. (Eds.) FAO Animal Health and Production Paper. 1988;72:106-122.
5. Larrahondo JE. Calidad de la caña de azúcar. El cultivo de la caña en la zona azucarera de Colombia. Eds. Cassalett, C; c1995. p. 337-354.
6. McKenzie RJ. Cane tops as cattle fodder. Agnote-New South Wales Agriculture (Australia); c1994.
7. Rangnekar DV. In: Sugarcane as feed. Sansoucy, R., Aarts, G. and Preston, T.R. (Eds.). FAO Animal Health and Production Paper No.72; c1988. p. 176-187.
8. Thole NS, Joshi AL, Rangnekar DV. Feed availability and Nutritional status of dairy animals in Western Maharashtra India. A paper presented in Workshop on Bioconversion of Crop Residues held at Bangalore; c1988. p. 27-29.
9. Astuti A, Widyobroto BP, Noviandi CT. Nutrient status, hematological and blood metabolite profile of mid-lactating dairy cows during wet and dry seasons raised under Indonesian tropical environmental conditions. Journal of Animal Behaviour and Biometeorology. 2021;10(1):1-6.
10. Anderson, BH, Watson DL, Colditz IG. The effect of dexamethasone on some immunological parameters in cattle. Veterinary Research Communications. 1999;23(7):399-413.
11. Reddy BS, Sivajothi S. Assessments of haemato-Biochemical and stress parameters during the transition period in buffaloes. Buffalo Bulletin. 2020;39(2):161-165.
12. Singh VK. Hemato-biochemical, oxidative stress, production parameters and gene expression studies in Surti buffalo with yeast (*Saccharomyces cerevisiae*) supplementation. Ph.D. thesis, Navsari Agricultural University, Navsari, Gujarat (India); c2017.
13. Ghazanfar S, Anjum MI, Azim A, Ahmed I. Effects of dietary supplementation of yeast (*Saccharomyces cerevisiae*) culture on growth performance, blood parameters, nutrient digestibility and fecal flora of dairy heifers. JAPS: Journal of Animal and Plant Sciences. 2015;25(1):53-59.