Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 7 [11] October 2018 : 37-41

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.876
Universal Impact Factor 0.9804
NAAS Rating 4.95

ORIGINAL ARTICLE **OPEN ACCESS**

Serum Macro-Micro Minerals Profile in Dystocia Affected Dangi Cows Treated With Different Ecbolic Agents

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ABSTRACT
The study was conducted in eighteen dystocia affected Dangi cows that delivered with artificial aids without any complications from various villages of Dangs district in South Gujarat to evaluate the effect of different ecbolic therapies on serum macro-micro minerals profile. The cows were divided in to three groups consisting six cows in each. Group-I (T1) and II (T2) cows were given methylergometrine (Nexbolic, 5 mg) and dinoprost tromethamine (Lutalyse, 25 mg) i/m, respectively, immediately after parturition. The cows in Group-III (T3) received herbal ecbolic (Exapar, 2-4 boluses, b.i.d.) on the day after parturition till 10 days. The jugular vein punctured blood samples were aseptically collected on day 0 (day of calving), 7th, 14th 21st and 28th day postpartum to harvest serum and macro-minerals (calcium, inorganic phosphorus, magnesium) and micro-minerals (copper, cobalt, zinc, iron, manganese) were analyzed using commercially available kits. The mean serum calcium level of Dangi cows did not differ significantly ($p>0.05$) between T1, T2 and T3 with overall calcium level found to be 10.74 ± 0.16 mg/dl from all the treatment groups. The serum calcium levels were found increased trend from day 0 to 28th day postpartum and significantly higher ($p>0.05$) calcium levels were observed on 28th day postpartum. The serum inorganic phosphorus and magnesium levels did not differ significantly ($p>0.05$) at 0 day, 7th, 14th, 21st and 28th day postpartum within and between all the treatment groups including overall mean at different time intervals with overall pooled levels to be 7.43 ± 0.12 mg/dl and 3.14 ± 0.11 mg/dl, respectively. The mean copper, cobalt, zinc, iron and manganese concentrations in treatment T1, T2 and T3 groups did not differ significantly ($p>0.05$) at different time intervals among all the treatment groups.
***KEYWORDS**: macro-micro minerals, ecbolic, Dangi cow, postpartum, dystocia*

Received 12.07.2018 Revised 20.08.2018 Accepted 10.09.2018

INTRODUCTION

Dangi cow (*Bos indicus*) is one of the recognized 38 cattle breeds of India reared mostly by tribes in forest area with undulated hilly track, heavy rainfall and very poor agricultural economy found in Dangs district and adjoining areas of Navsari and Tapi districts in Gujarat and Nashik, Ahmednagar and Dhule districts in Maharashtra. The breed is important for livelihood of tribal farmers, therefore, the productive potential of Dangi cow needs to be exploited in view to amplify the economic returns to poor class of people and to meet the requirements of researchers. Dystocia causes retention of placenta, endometritis, infertility and subsequent economic losses [20]. To increase the productive performance, more emphasis should be given to reproductive health of the herd and priority should be given to postpartum period to reduce inter-calving interval [9]. The puerperal period is a critical phase in the reproductive cycle of dairy cows which includes reduction of uterine size, regeneration of the endometrium, elimination of bacterial contamination and resumption of ovarian cyclicity [28]. A dietary deficiency causes metabolic, endocrine and nervous disorders, disturbing the activity of hypothalamic-pituitary-ovarian system, with negative effects on process of breeding, ovogenesis and folliculogenesis, extending postpartum anestrous period and decreasing fertility indices in cows [23]. As catalytic components of enzymes or to regulate several mechanisms involved in pregnancy and lactation, cows require minerals like calcium, phosphorus and magnesium for growth, reproduction and lactation [31]. Trace elements may function as co-factors, as activators of enzymes or stabilizers of secondary molecular structure. Lack of trace elements such as copper, cobalt, zinc, iron, manganese etc. upset the proper functioning of genital organs [18]. Hence, the present study was aimed to evaluate the effect of different ecbolic treatments at calving on serum macro-micro mineral constituents during postpartum period in dystocia affected Dangi cows.

MATERIAL AND METHODS

Experimental Animals and Blood Collection Schedule

The present study was carried out on 18 dystocia affected Dangi cows followed by successful parturition with artificial aids without any complications, from parturition to puerperal period and thereafter up to eighteen months postpartum maintained at farmer's doorstep in different villages of Dangs district, Gujarat, India. They were randomly divided into three groups comprising six cows in each. The cows in Group-I (T1) and II (T2) were treated intramuscularly with Methylergometrine maleate (inj. Nexbolic, 5 mg, Intas Pharmaceuticals Ltd.) and Dinoprost tromethamine, a natural PGF2α (inj. Lutalyse, 25 mg, Pfizer Animal Health Ltd.), respectively, immediately after parturition. The cows in Group-III (T3) were treated with herbal ecbolic (bol. Exapar, 2-4 bolus b.i.d, Ayurvet Limited, P.O.-Baddi-173 205, Distt. Solan, H.P., India) after calving till 10 days.

Jugular vein punctured blood samples were collected from all animals on day of parturition (0 day), on 7^{th}, 14^{th}, 21^{st} and 28^{th} day postpartum in vaccutainers (serum clotting vaccutainers, BD vaccutainers) and serum was separated after clotting and centrifugation at 3000 rpm for 15 minutes and stored at -20°C in deep freezer until analysis for estimation of serum macro-minerals (calcium, inorganic phosphorus, megnesium) and micro-minerals (copper, cobalt, zinc iron, manganese). The biochemical analysis was performed using commercially available kits (Diatek Healthcare Pvt. Ltd. Hooghly, WB, India).

Statistical Analysis

The data on macro-micro mineral profiles were suitably tabulated and analyzed following standard statistical methods using CRD and DMRT as per Steel and Torrie [30].

RESULTS AND DISCUSSION

Macro-minerals Profile

The mean serum calcium, inorganic phosphorus and magnesium concentrations at different time intervals in treated Dangi cows are presented in Table 1.

The present findings on overall mean serum calcium concentration as 10.74 ± 0.16 mg/dl was in agreement with 10.69 ± 2.05 mg/dl and 10.71 ± 0.36 mg/dl reported by Sharma *et al*. [27] and Joe Arosh *et al*. [12], respectively in cyclic cows and 10.77 ± 0.37 mg/dl reported by Sharma *et al*. (1998) in Jersey crossbred cows. The overall mean serum calcium level of Dangi cows did not differ significantly ($p>0.05$) between T1, T2 and T3 groups. Moreover, the calcium level in T1 did not differ significantly ($p>0.05$) between 0 day (day of calving), 7^{th}, 14^{th} and 21^{st} day postpartum but differ significantly ($p<0.01$) at 28^{th} day postpartum. The trend of serum calcium concentration observed in present study was supported by Devraj (1982), who also reported that serum calcium levels in postpartum non-suckled Surti buffaloes fluctuated at very narrow range starting from two hours till 38^{th} day postpartum. The mean serum calcium levels were found within the normal physiological range in cows reported as 9.72 to 12.4 mg/dl by Radostits *et al.* (2000) and 8.4 to 11.2 mg/dl by Merck (2003), respectively.

The mean serum inorganic phosphorus level of Dangi cows did not differ significantly ($p>0.05$) at 0 day (day of parturition), 7^{th} day, 14^{th} day, 21^{st} day and 28^{th} day postpartum within and between all the treatment groups including overall mean between & within the groups at different time intervals. The overall mean serum inorganic phosphorus level from all the groups was 7.43 ± 0.12 mg/dl was in agreement with 7.26 ± 0.11 and 7.26 ± 0.41 mg/dl reported by Gopinath *et al*. [7] and Sarker *et al*. [24] in lactating crossbred cows and non-lactating HF × local crossbred dairy cows, respectively. Though, it was within the normal range reported as 4.33 to 7.74 mg/dl by Merck [17]. However, lower and higher phosphorus levels were also reported as 6.23 ± 0.19 mg/dl and 7.95 ± 1.36 mg/dl by Khasatiya *et al.* [15] and Yokus *et al*. [33] in Surti buffaloes and in postpartum cows, respectively. In inorganic phosphorus deficiency, fertility of the cows reduced leading to delayed conception, while increased blood phosphorus level was related to the improvement of ovarian activity [32].

Table.1 Serum macro-micro minerals profile of ecbolic treated Dangi cows at different time intervals (Mean ± SEM)

Groups/ Parameter	Time Intervals/Days					Overall	F-Value	P-Value
	0 day (Day of Calving)	7th Day postpartum	14th Day postpartum	21st Day postpartum	28th Day postpartum			
Macro-minerals Profile								
Calcium (mg/dl)								
Group-I	09.89±0.41$^{a}_{w}$	09.87±0.45$^{a}_{w}$	10.43±0.39$^{a}_{w}$	10.94±0.27$^{a}_{w}$	12.43±0.57$^{b}_{w}$	10.71±0.25$_{w}$	5.897**	0.002
Group-II	09.83±0.48$^{a}_{w}$	09.95±0.50$^{a}_{w}$	10.61±0.56$^{a}_{w}$	11.21±0.60$^{ab}_{w}$	12.29±0.48$^{b}_{w}$	10.78±0.27$_{w}$	3.621*	0.018
Group-III	09.73±0.65$^{a}_{w}$	10.15±0.78$^{a}_{w}$	10.14±0.67$^{a}_{w}$	10.92±0.63$^{ab}_{w}$	12.70±0.61$^{b}_{w}$	10.73±0.34$_{w}$	3.063*	0.035
Overall	09.82±0.28^{a}	09.99±0.32^{a}	10.39±0.30^{ab}	11.02±0.29^{b}	12.47±0.30^{c}	10.74±0.16	12.510**	0
Inorganic Phosphorus (mg/dl)								
Group-I	7.80±0.37$^{a}_{w}$	7.70±0.51$^{a}_{w}$	7.78±0.62$^{a}_{w}$	7.55±0.83$^{a}_{w}$	7.19±0.48$^{a}_{w}$	7.60±0.24$_{w}$	0.185	0.944
Group-II	7.50±0.54$^{a}_{w}$	7.63±0.30$^{a}_{w}$	7.29±0.41$^{a}_{w}$	7.14±0.39$^{a}_{w}$	7.06±0.48$^{a}_{w}$	7.32±0.18$_{w}$	0.303	0.873
Group-III	7.67±0.53$^{a}_{w}$	7.45±0.40$^{a}_{w}$	7.34±0.57$^{a}_{w}$	7.22±0.56$^{a}_{w}$	7.20±0.56$^{a}_{w}$	7.38±0.22$_{w}$	0.132	0.969
Overall	7.65±0.26^{a}	7.59±0.22^{a}	7.47±0.29^{a}	7.30±0.34^{a}	7.15±0.27^{a}	7.43±0.12	0.537	0.709
Magnesium (g/dl)								
Group-I	3.00±0.19$^{a}_{w}$	3.12±0.35$^{a}_{w}$	3.67±0.62$^{a}_{w}$	3.74±0.40$^{a}_{w}$	3.98±0.40$^{a}_{w}$	3.50±0.18$_{x}$	1.002	0.425
Group-II	2.79±0.25$^{a}_{w}$	3.28±0.28$^{a}_{w}$	3.71±0.64$^{a}_{w}$	3.05±0.38$^{a}_{w}$	3.30±0.46$^{a}_{w}$	3.23±0.18$_{x}$	0.635	0.642
Group-III	2.39±0.26$^{a}_{w}$	2.73±0.47$^{a}_{w}$	2.57±0.27$^{a}_{w}$	2.77±0.46$^{a}_{w}$	3.02±0.58$^{a}_{w}$	2.70±0.18$_{w}$	0.291	0.881
Overall	2.73±0.14^{a}	3.04±0.21^{a}	3.32±0.31^{a}	3.18±0.24^{a}	3.43±0.28^{a}	3.14±0.11	1.198	0.317
Micro-minerals Profile								
Copper								
Group-I	0.742±0.024$^{a}_{w}$	0.742±0.028$^{a}_{w}$	0.750±0.024$^{a}_{w}$	0.738±0.031$^{a}_{w}$	0.728±0.026$^{a}_{w}$	0.740±0.011$_{w}$	0.09	0.985
Group-II	0.769±0.044$^{a}_{w}$	0.764±0.034$^{a}_{w}$	0.771±0.023$^{a}_{w}$	0.746±0.036$^{a}_{w}$	0.741±0.036$^{a}_{w}$	0.758±0.015$_{w}$	0.148	0.962
Group-III	0.730±0.038$^{a}_{w}$	0.723±0.028$^{a}_{w}$	0.746±0.019$^{a}_{w}$	0.734±0.012$^{a}_{w}$	0.733±0.019$^{a}_{w}$	0.733±0.010$_{w}$	0.112	0.977
Overall	0.747±0.020^{a}	0.743±0.017^{a}	0.756±0.012^{a}	0.739±0.015^{a}	0.734±0.015$^{a}_{w}$	0.744±0.007	0.251	0.908
Cobalt								
Group-I	0.599±0.140$^{a}_{w}$	0.625±0.125$^{a}_{w}$	0.652±0.110$^{a}_{w}$	0.683±0.147$^{a}_{w}$	0.685±0.144$^{a}_{w}$	0.649±0.056$_{w}$	0.077	0.989
Group-II	0.606±0.146$^{a}_{w}$	0.590±0.138$^{a}_{w}$	0.636±0.147$^{a}_{w}$	0.672±0.141$^{a}_{w}$	0.672±0.111$^{a}_{w}$	0.635±0.057$_{w}$	0.074	0.989
Group-III	0.587±0.063$^{a}_{w}$	0.587±0.074$^{a}_{w}$	0.642±0.091$^{a}_{w}$	0.672±0.091$^{a}_{w}$	0.692±0.075$^{a}_{w}$	0.636±0.034$_{w}$	0.362	0.833
Overall	0.597±0.066$_{w}$	0.601±0.063$_{w}$	0.644±0.064$_{w}$	0.676±0.070$_{w}$	0.683±0.061$_{w}$	0.640±0.028	0.382	0.821
Zinc								
Group-I	0.773±0.162$^{a}_{w}$	0.770±0.144$^{a}_{w}$	0.783±0.180$^{a}_{w}$	0.792±0.129$^{a}_{w}$	0.796±0.120$^{a}_{w}$	0.783±0.061$_{w}$	0.006	1
Group-II	0.800±0.124$^{a}_{w}$	0.786±0.115$^{a}_{w}$	0.778±0.141$^{a}_{w}$	0.784±0.113$^{a}_{w}$	0.781±0.120$^{a}_{w}$	0.786±0.051$_{w}$	0.005	1
Group-III	0.761±0.139$^{a}_{w}$	0.773±0.141$^{a}_{w}$	0.767±0.153$^{a}_{w}$	0.787±0.154$^{a}_{w}$	0.768±0.138$^{a}_{w}$	0.771±0.060$_{w}$	0.004	1
Overall	0.778±0.077$_{w}$	0.776±0.072$_{w}$	0.776±0.086$_{w}$	0.787±0.072$_{w}$	0.782±0.068$_{w}$	0.780±0.033	0.004	1
Iron								
Group-I	1.116±0.098$^{a}_{w}$	1.225±0.127$^{a}_{w}$	1.202±0.119$^{a}_{w}$	1.158±0.097$^{a}_{w}$	1.126±0.119$^{a}_{w}$	1.165±0.047$_{w}$	0.174	0.95
Group-II	1.118±0.109$^{a}_{w}$	1.237±0.128$^{a}_{w}$	1.254±0.162$^{a}_{w}$	1.163±0.120$^{a}_{w}$	1.112±0.133$^{a}_{w}$	1.177±0.055$_{w}$	0.25	0.907
Group-III	1.095±0.129$^{a}_{w}$	1.215±0.153$^{a}_{w}$	1.211±0.107$^{a}_{w}$	1.144±0.126$^{a}_{w}$	1.100±0.155$^{a}_{w}$	1.153±0.057$_{w}$	0.184	0.945
Overall	1.110±0.061^{a}	1.226±0.074^{a}	1.222±0.071^{a}	1.155±0.062^{a}	1.113±0.074^{a}	1.165±0.030	0.673	0.612
Manganese								
Group-I	0.767±0.099$^{a}_{w}$	0.718±0.094$^{a}_{w}$	0.739±0.088$^{a}_{w}$	0.749±0.089$^{a}_{w}$	0.765±0.086$^{a}_{w}$	0.748±0.038$_{w}$	0.048	0.995
Group-II	0.766±0.099$^{a}_{w}$	0.723±0.112$^{a}_{w}$	0.722±0.093$^{a}_{w}$	0.752±0.100$^{a}_{w}$	0.753±0.107$^{a}_{w}$	0.743±0.042$_{w}$	0.037	0.997
Group-III	0.755±0.086$^{a}_{w}$	0.701±0.077$^{a}_{w}$	0.738±0.073$^{a}_{w}$	0.742±0.053$^{a}_{w}$	0.750±0.061$^{a}_{w}$	0.737±0.029$_{w}$	0.087	0.986
Overall	0.762±0.051$_{w}$	0.714±0.052$_{w}$	0.733±0.046$_{w}$	0.748±0.045$_{w}$	0.756±0.047$_{w}$	0.743±0.021	0.158	0.959

Means bearing different superscripts within the column (w,x) or within the row (a,b,c) for a trait differ significantly ($p<0.05$).

The mean serum magnesium level did not differ significantly ($p>0.05$) at 0 day (day of parturition), 7th day, 14th day, 21st day and 28th day postpartum within all the treatment groups. However, it differed significantly ($p<0.05$) between T1 and T3 as well as between T2 and T3. The overall mean serum magnesium level as 3.14 ± 0.11 mg/dl was in agreement with 3.02 ± 0.36, 3.13 ± 0.27 and 3.20 ± 0.96 mg/dl reported by Hagawane *et al*. [8] in cows during early, mid and late lactation, respectively. Whereas, higher magnesium levels reported as 3.27 ± 0.07, 3.35 ± 0.07 and 3.36 ± 0.06 mg/dl by Patel *et al*. [19] in Methylergometrine, $PGF_2\alpha$ and Utrovet treated HF crossbred cows, respectively and lower magnesium levels as 2.15 ± 0.05 mg/dl by Regmi and Pande [22] in lactating crossbred Jersey cattle. Finally, the various differences reported in mean serum calcium, inorganic phosphorus and magnesium concentrations by various research workers could be attributed to variation in breed, species, parity, lactational and nutritional status in addition to analytical differences.

Macro-minerals Profile

The mean serum copper, cobalt, zinc, iron and manganese levels did not differ significantly ($P>0.05$) within and between all the treatment groups including overall mean at different time intervals (Table. 1). The overall serum copper concentration as 0.744 ± 0.007 µg/ml was in agreement with 0.64 to 0.75 µg/ml reported by Chauhan *et al.* [3] in puerperal cows and 0.72 ± 0.06 µg/ml and 0.75 ± 0.07 µg/ml reported by Chauhan and Nderingo [2] during cycling and late postpartum cows, respectively. However, higher levels as 0.98 ± 0.07 µg/ml reported by Desai *et al.* [4] in Dangi cows and 0.997 ± 0.033, 1.018 ± 0.030 and 1.018 ± 0.033 µg/ml reported by Patel *et al*. [19] in Methylergometrine, $PGF_2\alpha$ and Utrovet treated groups in HF crossbred cows, respectively. The present findings were also in agreement with Bostedt *et al*. [1], who reported serum copper concentrations remained almost constant during pregnancy and puerperal period in cows.

The overall serum cobalt concentration as 0.640 ± 0.028 µg/ml was comparable with 0.63 ± 0.09 reported by Djokovic *et al*. [6] in Simmental cows and 0.64 ± 0.02 µg/ml reported by Khasatiya [14] in postpartum Surti buffaloes treated with $PGF_2\alpha$. The non-significant variation in mean serum cobalt concentration was in agreement with Khasatiya [14] in suboestrus postpartum Surti buffaloes. However, cobalt deficiency has been associated with non-functional ovaries and general infertility as it is important in the synthesis of Vitamin B_{12}.

The overall serum zinc concentration as 0.780 ± 0.033 µg/ml was in agreement with 0.765 ± 0.04 µg/ml reported by Singh *et al.* [29] in buffaloes during postpartum period. The mean serum zinc levels observed non-significantly increased in post-parturient cow reported by Rajora and Pachauri [21], such trend was also found in present study.

The overall serum iron concentration as 1.165 ± 0.030 µg/ml was in agreement with 1.13 ± 0.09 ppm reported by Jacob *et al*. [10] in crossbred cows during early lactation in first month and 122.93 ± 26.18 and 125.68 ± 26.51 µg/dl reported by Karimi *et al*. [13] during one week and three week after calving in dairy cows, respectively. The present findings were in agreement with Mehere *et al*. [16], who reported iron levels did not show significant variation in weekly time intervals from one month prepartum to one month postpartum in crossbred cows.

The overall mean serum manganese concentration as 0.743 ± 0.021 µg/ml was in agreement with 0.71 ± 0.19 ppm reported by Shahjalal *et al*. [25] in cattle. The present findings were in agreement with Jain and Madan [11], who found non-significant differences in circulatory levels of manganese in non-pregnant buffalo heifers.

The higher or lower values in various trace elements reported by various research workers as compared to present findings might be attributed to either difference in breed, species, age and parity or variation in nutrition, reproductive and health status of animals, apart from seasonal and analytical differences.

CONCLUSION

Non-significant differences in serum macro and micro-minerals between various ecbolic treated groups at different time intervals which can be correlated well with better micronutrient status of Dangi cows especially maintained on entire grazing in the dense forest area enriched with wide range of biodiversity in the Dangs district of Gujarat state. The microelements cannot be synthesized in the body. Hence, it is concluded that trace elements should be daily supplied in the field and in organized farms in the form of mineral mixture to suffice the requirement of the trace elements. It had been found that dairy animals are frequently affected with varying degree of trace element deficiencies, especially Cu, Co, Zn, Fe and Mn in various regions of the world and the imbalances leads to inactive ovaries with decreased progesterone production by corpus luteum and subsequent infertility.

ACKNOWLEDGEMENT

Authors are highly thankful to Dean and Principal, Veterinary College, NAU, Navsari for financial support and Head, Department of Veterinary Physiology and Biochemistry and Department of Animal Nutrition for providing valuable research facilities during present study.

REFERENCES

1. Bostedt, H., Wagenseil, F. and Garhammer, M. (1974). Studies on the iron and Copper content and the erythrocyte picture in the blood of cows during pregnancy and the puerperal period. *Zuchthygiene,* **9**: 49-57. (c.f. *Vet. Bull.,* **44***:*773 abstr.).
2. Chauhan, F. S. and Nderingo, N. E. (1997). Seasonal variations in mineral elements of soil pasture and blood serum in different phases of normal reproduction in dairy cattle. *Indian Vet. J.* **74** (1): 32-34.
3. Chauhan, F. S., Nderingo, N. E. and Fredinand. (1992). Seasonal variation in mineral elements of soil, pasture and blood in normal and abnormal reproduction in cows. *A paper presented in 10th National Symposium of ISSAR Madras* pp: 28.
4. Desai, H. B., Pande, M. B., Desai, M. C. and Shukla, P. C. (1979). Haematological and chemical status of blood of Dangi cattle. *Indian J. Anim. Res.* **13** (1): 43-46.
5. Devraj, M. **(1982)**. *Blood serum profile in calves and postpartum buffaloes (Surti breed) with associated peridata to reproductive efficiency.* Doctorate Thesis, Gujarat Agricultural University, Anand, Gujarat, India.
6. Djokovic, R. D. Kurcubic, V.S. and Ilic, Z. Z. (2014). Blood serum levels of macro - and micronutrients in transition and full lactation cows. *Bulgarian Journal of Agricultural Science.,* **20** (3): 715-720.

7. Gopinath, D., Sharma, M. C., Shekhar, P., Gurupriya, V. S., Aswathi P. B. and Singh, M. (2014). Macromineral status of soil, fodders and cattle from idukki and ernakulam districts of kerala, india and their interrelation. *International J. Advn. Res.,* **2** (7): 868-872.
8. Hagawane, S. D., Shinde, S. B. and Rajguru, D. N. (2009). Haematological and blood biochemical profile in lactating buffaloes in and around parbhani city. *Veterinary World*., **2** (12): 467-469.
9. Humblot, P. and Thibier, M. (1980). Progesterone monitoring of anestrous dairy cows and subsequent treatment with prostaglandin F_2 alpha analogue and gonadotrophin- releasing hormone. *American J. of Vet. Res.*, **41**:1762-6.
10. Jacob. S. K., Philomina, P. T. and Ramnath, V. (2003). Influence of gestation and early lactation on serum levels of iron, copper and zinc in crossbred heifers. *Indian J. Anim. Sci*., **46** (2): 245-248.
11. Jain, G. C. and Madan, M. L. (1984). Circulatory levels of minerals associated with Fertile and non-fertile inseminations among buffalo heifers. *Indian J. Anim. Reprod.,* **5**(2): 19-22.
12. Joe Arosh, A., Kathiresan, D., Devanathan, T. G., Rajasundaram, R. C. and Rajasekaran, J. (1998). Blood biochemical profile in normal cyclic and anoestrus cows. *Indian J. Anim. Sci*., **68** (1): 1154-1156.
13. Karimi, N., Mohri, M., Seifi, H. A., Azizzadeh, M. and Heidarpour, M. (2015). Relationships between trace elements, oxidative stress and subclinical ketosis during transition period in dairy cows. *Iranian J. Vet. Sci. & Tech.,* **7** (2): 46-56.
14. Khasatiya, C. T. (2003). Fertility Management in Postpartum Surti Buffaloes Through clinical Diagnosis and Hormonal Regimes. *Ph.D. Thesis,* Gujarat Agril. Univ., Anand Campus. Anand, India**.**
15. Khasatiya, C. T., Dhami, A. J., Ramani, V. P., Savalia, F. P. and Kavani, F. S. (2005). Reproductive performance and mineral profile of post partum fertile and infertile Surti buffaloes. *Indian J. Anim. Reprod.,* **26** (2): 145-148.
16. Mehere, Y. S., Talvelkar, B. A., Deshmukh, B. T., Nagvekar, A. S. and Ingole, S. D. (2002). Haematological and trace element profile during peripartum period in crossbred cows. *Indian .J. Anim. Sci.,* **72** (2): 148-150.
17. Merck (2003). Merck Veterinary Manual. 8th Edn. Merck Co., Inc., Whitehouse Station, NJ, USA.
18. Parmar, S.C., Khasatiya, C.T., Chaudhary, J.K., Patel, R.V. and Dhamsaniya, H.B. **(2015)**. Serum metabolic and minerals profile in norgestomet primed postpartum anestrous Surti buffaloes. *Vet. World.,* **8**: 625-30.
19. Patel, R. V., Khasatiya, C. T., Parmar, S. C., Chaudhary, S. S. and Patel, V. R. (2017). Comparative Evaluation of Different Therapies on Post-partum Fertility and Blood Biochemical profile in Holstein Friesian Crossbred cows. *Intas Polivet.,* **18** (1): 22-28.
20. Radostits, O. M., Blood, D. C. and Gay, C. C. (2000). Veterinary Medicine. A textbook of the diseases of cattle, sheep, goats and horses. 8th ed., London.
21. Rajora, V. S. and Pachauri, S. P. (1994). Blood profiles in pre parturient and post parturient cows and in milk fever cases. *Indian J. Anim. Sci.,* **64** (1): 31-34.
22. Regmi, B. and Pande, K. R. (2017). Determination of hematological and important blood biochemical parameters in cross jersey cattle at lactating stage: reference value. *Inter. J. Res. Culture soc.,* **1** (4): 47-49.
23. Ruginosu, R., Creanga, S., Sofronie, M., Malancuş, R., Boghian, V., Solcan, G. (2011). The biochemical profile in cows with reproductive disorders. *Cercetări Agronomice în Moldova.,* **XLIV** (2): 75-86.
24. Sarker, M. S., Ahaduzzaman, M., Sayeed, M. A., Sarker, R., Nanno, M. A., Mannan, A. and Hossain, M. B. (2015). Comparison of some serum biochemical parameters between lactating and non-lactating dairy cows in selected dairy farms of Chittagong district of Bangladesh. *Asian J. Med. Biol. Res.,* **1** (2): 259-264.
25. Shahjalal, M., Khaleduzzaman, A. B. M. and Khandaker, Z. H. (2008). Micro mineral profile of cattle in four selected areas of Mymensingh district. *Bang. J. Anim. Sci.*, **37** (1) : 44 – 52.
26. Sharma, M. C., Shankar, U., Gupta, O. P., Verma, R. P. and Mishra, R. R. (1984). Biochemical studies in cyclic anoestrus and repeat breeding crossbred cows. *Indian J. Anim. Reprod*., **4** (2): 51-53.
27. Sharma, M., Bishnoi, P. C. and Mohanty, B. P. (1998). Serum constituents in indeginous and crossbred cattle. *Indian J. Anim. Sci*., **68** (5): 474-475.
28. Sheldon I. M., Williams E. J., Miller A. N., Nash D. M., Herath, S. (2008) Uterine diseases in cattle after parturition. *Veterinary journal*, **176**:115–21.
29. Singh, R., Sinha, S. P. S., Singh, R. and Setia, M. S. (1991). Distribution of trace elements in blood, plasma and erythrocytes during different stages of gestation in buffalo (*Bubalus bubalis). Buffalo J.,* **7** (1): 77-85.
30. Steel, R.G.D. and Torrie, J.H. **(1981)**. *Principles and Procedures of Statistics, A Biometric Approach*. 2nd edn. Mc Graw Hill Book Agency, Singapore.
31. Tanritanir, P., Dede, S. and Ceylan, E. **(2009)**. Changes in some macro minerals and biochemical parameters in female healthy Siirt hair goats before and after parturition. *J. Anim. Vet. Adv.* **8**: 530-33.
32. Upadhyay, S.R., Singh, A.K., Sharma, N., Kumar, P., Hussain, K. and Soodan, J.S. **(2006)**. Impact of minerals upon reproduction in farm animals. *Indian Cow* **4**: 38-41.
33. Yokus, B., Cakir, D., Icen, H., Dukar, H. and Bademkiran, S. (2010). Prepartum and postpartum serum mineral and steroid hormone concentration in cows with dystocia. *Veteriner Fakultesi Dergisi*., **21**: 185-190.

CITATION OF THIS ARTICLE

D. B. Bhoi, C. T. Khasatiya and J. B. Dobariya. Serum Macro-Micro Minerals Profile in Dystocia Affected Dangi Cows Treated With Different Ecbolic Agents. Bull. Env. Pharmacol. Life Sci., Vol 7 [11] October 2018: 37-41