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Haematology, Serum Biochemistry and Urinnalysis Values in Adult Badri Cattle

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Abstract

The present study was planned to establish the haematological, biochemical and urine analysis data of healthy Badri cows; for the purpose, the blood and urine samples were collected and were analysed as per standard protocols. The TEC were 6.49 ± 0.41 x10^6 / µl while the TLC were recorded as 7.64± 0.12 x10^3 / µl. The PCV were 33.0±0.85 % and mean Hb were 13.37±0.32 g%. In the Badri cows, the mean ALC and ANC were 4.57and 2.56 x 10^3 / µl, respectively. The values of MCV, MCH and MCHC were 51.42 ± 1.03 fL, 21.00 ± 0.73 picogm and 40.91 ± 0.83 %, respectively. The mean serum cholesterol levels were 180.50 ± 4.83; of which HDL was 115.42 ± 3.11 and LDL was 65.63 ± 2.18 mg/dl while the ratio of HDL and LDL was 1.606 and mean triglycerides was 31.35 ± 2.11mg/dl. The mean mineral values of Ca, P, K, Cl and Na were 10.25 ± 0.19 mg/dl, 5.93 ± 0.47 mg/dl, 3.32 ± 0.14 mEq/L, 99.64 ± 2.17 mEq/L and 123.56 ± 4.35 mEq/L, respectively. The mean values of ALT and AST were 15.89 ± 3.24 and 21.54 ± 4.21 U / L. The mean serum protein, albumin, globulin and gamma-globulin contents were 8.98±0.89, 3.56 ± 0.54, 5.27± 0.73 and 2.86± 0.68 g/dl with albumin globulin ratio 0.67. Mean blood glucose levels in the Badri cows were 52.20 ± 2.52 mg/dl. The yellow colour of urine samples was recorded with clear transparency and ammonical odor. The urine was alkaline with few (0-4) epithelial cells phpf and were negative for sugar, protein, casts, crystals, WBC, RBC and microorganisms. This constitutes the first report of its kind on haematology, serum biochemistry and urine analysis of Badri cows.

Keywords: Badri Cow, Haematology, Serum Biochemistry, Urine Analysis

Introduction

Badri cow is normally inhabitant of Uttarakhand from plain tarai area to hilly region of about 2200 MSL. Though on the basis of physical characters and body measurements, it has been characterized long ago (Chauhan and Prasad,2004; Banga *et al.*, 2005; Kumar and Gaur, 2015) as Badri cow on the name of SHRI BADRINATH DHAM of Uttarakhand. However, it has now been confirmed as a registered breed of Badri cow by NBAGR (ICAR) in the year 2017 (Chauhan, 2020). The coat colour of Badri cow varied from black, brown, white, red or grey; of which red colour is comparatively more common and such cows are seen in more numbers in comparison to others. These cows give 1.0 to 4.0 liters of milk daily with "0" input as these cows are kept as a grazing animal and is seldom stall fed. Cows can walk easily on heights of mountains and valley as well in hilly areas. Since these cows are maintained on grazing, they utilize different kind of herbs/ medicinal plants present in the Himalayan region of hilly areas and thus the products of such cows like milk, curd, ghee, urine and dung are considered high value products in comparison to other cows (Singh *et al.*, 2004). It has also been reported that the urine of Badri cow is having anticancer and immunomodulatory properties (Chauhan *et al.*, 2001; Joshi and Chauhan, 2014; Chauhan, 2020). Based on the characteristics of the products of these cows, people become more interested in this breed of cows. Hence, considering the above facts, present study was planned to establish the hematological, biochemical and urine analysis parameters of normal healthy Badri cows, which may be useful to the veterinarians, researchers, students, diagnostic laboratories, animal keepers and gaushala workers in their future endeavours.

Materials and Methods

The blood and urine samples were collected from the 7 adults (4-5 years of age) Badri cows from their breeding tract. These cows were kept mainly on grazing. However, green grasses and wheat bhoosa/paddy straw were provided during off hours and clean water was given to them for drinking. Blood samples from seven Badri cows were collected according to established procedure from the jugular vein for hematological parameters like total leucocyte count (TLC), differential leucocyte count (DLC), total erythrocyte count (TEC), hemoglobin content (Hb), packed cell volume (PCV), absolute lymphocyte count (ALC), absolute neutrophil count (ANC), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) in EDTA vials. Hematological parameters were determined using standard procedures as described (Chauhan and Chandra, 2007). For serum biochemicals, the blood samples were collected without any anticoagulant in the sterile red top vacutainer vials for the separation of the serum. After blood collection for the formation of clot, vacutainers were kept upright for minimum 30 minutes and maximum 60 minute at the room temperature. At the end of the clotting, the sample were centrifuged in horizontal rotor at 1100-1300 g for 20 minutes at room temperature for the separation of serum. After centrifuge serum samples were transferred to a sterile eppendorf tube and were stored at temperature -20°C for further studies. Serum biochemical tests were performed using standard protocol given along with kits supplied by ERBA India limited (Koller, 1984).Total serum protein, serum albumin, serum globulin, Serum Alanine Transaminase (ALT), Serum Aspartate Transaminase (AST) , cholesterol, HDL-cholesterol, LDL-cholesterol, triglycerides, HDL:LDL ratio, calcium, chloride, phosphorus (Autozyme - Acuurex Biomedical Pvt. Ltd.), potassium and sodium (Excel Diagnostics Pvt. Ltd.) were measured using standard protocol given along with the kits. The serum gamma globulins were measured by mixing ammonium sulfate and sodium chloride solution in the serum (Chauhan, 1998). After mixing, the solution was kept in ice bath for overnight and then it was centrifuged to separate the precipitate. Precipitate obtained will then be dissolved in the NSS and biurate regent was mixed and optical density was read against 555 nm. The urine was collected in the clean and sterile glass containers from the cows through stimulation of the vulva, which allows the cow to urinate. The collected urine samples were examined immediately after collection using standard protocols as per the method described (Chauhan, 1995). The data of hematology, serum biochemistry and urine analysis thus obtained is analysed statistically ($p<0.05$).

Results and Discussion

The analysis of blood, serum and urine samples are described as under:

Hematology

Blood samples from a total of 7 Badri cows were examined and the results of hematological examination are summarized in Table 1.

Table 1: Mean values of hematological examination of blood samples

S. No.	Hematology Parameter	Mean Values ±SE	Standard Values
1	TEC (10^6/µl)	6.49 ± 0.41	05-08
2	TLC (10^3/µl)	7.64 ± 0.12	5.6-9.25
3	PCV (%)	33.00 ±0.85	26-42
4	Hb (g %)	13.37 ± 0.32	8-14
5	ALC (10^3µl)	**4.57 ± 0.01**	4.43
6	ANC (10^3µl)	**2.56 ± 0.01**	2.23
7	MCV (fL)	51.42 ± 1.03	40-60
8	MCH (pg)	**21.00 ± 0.73**	11-17
9	MCHC%	**40.91 ± 0.83**	26-34

The mean values of total erythrocyte counts (TEC) were 6.49 ± 0.41 x10^6 / **µ**l while the total leucocyte counts (TLC) were recorded as 7.64± 0.12 x10^3 / µl. The mean values of packed cell volume (PCV) were 33.0± 0.85 % and mean hemoglobin contents were 13.37+0.32 g% . In the Badri cows, the mean absolute lymphocyte and neutrophil counts were 4.57and 2.56 x 10^3 / µl, respectively. The values of MCV, MCH and MCHC were 51.42±1.03 fL, 21.00 ± 0.73 pg and 40.91 ± 0.83 %, respectively.

Serum Biochemistry

Serum samples from a total of 7 Badri cows were examined and the results of serum biochemical examination are summarized in Table 2.

Table 2: Mean values of biochemical attributes of serum samples from Badri cattle

S. No.	Biochemical Attributes	Mean Values ± SE	Standard Values
1	Cholesterol (mg/dl)	**180.50 ± 4.83**	183.95±4.28
2	HDL–Cholesterol (mg/dl)	**115.42 ± 3.11**	100.84±2.14
3	LDL–Cholesterol (mg/dl)	**65.63 ± 2.18**	83.10±2.19
4	Triglycerides (mg/dl)	**31.35 ± 2.11**	29.00±2.14
5	HDL/LDL Ratio	1.606	1.803
6	Calcium (mg/dl)	10.25 ± 0.19	11.08
7	Chloride (mEq/ L)	99.64 ± 2.17	97-111
8	Phosphorus (mg/dl)	**5.93 ± 0.47**	5.56
9	Potassium (mEq/ L)	3.32 ± 0.14	3.9-5.8
10	Sodium (mEq/ L)	123.56±4.35	132-152
11	Serum alanine transaminase (ALT) (U/L)	15.89 ± 3.24	43.8
12	Serum aspartate transaminase (AST) (U/L)	21.54±4.21	19.7
13	Total serum protein (g/dl)	**8.98±0.89**	7.56
14	Serum albumin (g/dl)	**3.56±0.54**	3.4
15	Serum globulin (g/dl)	**5.27± 0.73**	4.16
16	Serum gamma globulin (g/dl)	**2.86± 0.68**	2.16
17	Blood glucose (mg/dl)	52.20±2.52	42-75

The mean values of serum cholesterol levels were 180.50 ± 4.83; of which HDL-cholesterol was 115.42 ± 3.11 and LDL-cholesterol was 65.63 ± 2.18 mg/dl while the ratio of HDL and LDL was 1.606 and mean concentration of triglycerides was 31.35 ± 2.11mg/dl in the Badri cows. The recorded mean mineral values of calcium, phosphorus, potassium, chloride and sodium were 10.25 ± 0.19 mg/dl, 5.93 ± 0.47 mg/dl, 3.32 ± 0.14 mEq/l, 99.64 ± 2.17 mEq/l and 123.56±4.35 mEq/l, respectively. The mean values of serum alanine transaminase (ALT) and serum aspartate

transaminase (AST) were 15.89 ± 3.24 and 21.54±4.21U/L, respectively. The mean serum protein, albumin, globulin and gamma-globulin contents were 8.98±0.89, 3.56±0.54, 5.27± 0.73 and 2.86± 0.68 g/dl with albumin globulin ratio 0.67. Mean blood glucose levels in the Badri cows were 52.20±2.52 mg/dl.

Urine Analysis

Urine samples from a total of 7 Badri cows were examined and the results of urine examination are summarized in Table 3.

Table 3: Analysis of Badri cow urine

1	Colour	Yellow
2	Transparency	Clear
3	Odors	Ammonical
4	pH	Alkaline(pH7.8)
5	Sugar	Nil
6	Protein	Nil
7	Leucocytes (pus cells)	Nil
8	Erythrocytes	Nil
9	Epithelial cells	0-4/hpf
10	Cast	Nil
11	Crystals	Nil
12	Microorganisms	Sterile (No growth on media)

The yellow colour of urine samples from all 7 Badri cows was recorded with clear transparency and ammonical odor. The urine of Badri cows was acidic with few (0-4) epithelial cells per high power field when examined under light microscope. All the urine samples were negative for the presence of sugar, protein, casts, crystals, leucocytes, erythrocytes and any type of microorganisms.

The indigenous cattle and particularly the Badri cows are used for production of Panchgavya products, which are widely used in prevention and control of several human ailments. Since the Badri cattle were recently characterized and classified as breed, their normal parameters of hematology, serum biochemicals and urine need to be established. This paper is to provide the results of hematology, serum biochemistry and urine analysis of 7 Badri cows. The obtained results may represent a contribution to a better understanding of the hematology, biochemical and urine profile of Badri cows, which may be useful for the determination of their health status for collection of their products for Panchagavya purpose (Chauhan, 2002). In Uttarakhand State, there are 20.06 lacs cattle; besides other animals, which forms base for livestock farming system. Small and uneconomical land holdings in the state are over 70 per cent. These are rainfed and coupled with the vagaries of the monsoons. In such conditions, it is animal farming that provides stability to agriculture and family. In the context of hill development, cow-based enterprises are the most suited activities. which are “walking food factories” converting crop residues, grasses etc into food like milk, “powerhouses” producing vast amount of energy for agriculture, cooking and transportation and ‘fertilizer factories’ providing enormous amount of organic manure. The Badri cow is considered as pharmaceutical factory as its Panchgavya products are considered as one of the best to treat human ailments. In most of the houses of hilly areas, people keep 2-5cow for their own requirement of milk. The owners provide very less amount of concentrate and most of the time allows the cattle to graze in the fields. Majority of the cattle are bred through natural services and practice of artificial insemination is not very much popular in rural areas.

The haematology profile of Badri cows is similar to that of other cattle reported in literature (Dash *et al*.,2015); however, the values of ALC and ANC were higher 3.16% and 14.79%, respectively in Badri cows as compared to the normal haematological data of other breeds of cows, which may be interpreted as their strong natural immunity which provides them protection from natural foreign agents. Similarly, the values of MCH and MCHC were also higher in Badri cows to the tune of 50% and 33.3%, respectively from the normal data indicating the higher hemoglobin contents required in cows of hilly areas in order to have enhanced oxygen carrying capacity (Mahima

et al., 2013).

Badri cows showed higher values for HDL- cholesterol (good cholesterol) and triglycerides. Also, their LDL-cholesterol (bad cholesterol) was low as compared to the standard values of other cows (Tamarkar *et al.,* 2016). The values for LDL-cholesterol were calculated by subtracting mean values of HDL-cholesterol from the mean values of cholesterol. On perusal of biochemical parameters in the blood serum of Badri cows, it can be understood that the phosphorus content, total serum protein, serum albumin, serum globulin and serum gamma globulins were 6.65%, 18.78%, 4.70%, 26.60% and 32.40%, respectively higher than that of normal data of the cattle which indicates that the Badri cows are having better immunity power than other cows. It can be further substantiated that these cows are mainly maintained on grazing with zero input basis; on grazing it is the choice of the cow what to eat and what not to eat and most of the time they get fresh grass along with many known and unknown medicinal herbs as their food which in turn enhances their immunity in the form of higher serum proteins, serum globulins and serum gamma globulins (Kalakoti and Chauhan, 2010). This may also be due to exposure of various pathogenic/ non- pathogenic microorganisms which in turn activate immunity and ended with enhanced serum gamma globulins (Garg *et al.,* 2005).

Normally the urine of cows is alkaline with no cells and / or microorganisms. The Badri cow urine is also alkaline with pH7.8 and as far as microorganisms are concerned its sterile. The data of this paper is to provide normal hematology, serum biochemistry and urine examination which may be useful to the future workers in this field. However, before collection of urine for *Panchgavya* purpose, it should be kept in mind that such cows must be free from infectious diseases particularly tuberculosis, paratuberculosis and brucellosis. The cows must be tested for these diseases annually and the *Panchgavya* products should only be collected from the disease negative cows. Generally, it is felt that Badri cows are the most suitable for usage in preparation of *Panchagavya* which needs further research regarding properties of the ingredients of *Panchagavya* products (Chauhan and Sharma,2005; Chauhan, 2018). This constitutes the first report of its kind on hematology, serum biochemistry and urine analysis of Badri cows.

Conclusion

The data of this paper is to provide normal haematology, serum biochemistry and urine examination which may be useful to the future workers in this field. Badri cows as compared to the other breed of cows have strong natural immunity which provide them protection from natural foreign agents.

Conflict of Interests

There is no conflict of interest.

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