

Urine Analysis in Zebu, as Tool for Clinico-Patho-Biological Evaluation**Sambhunath Saha¹, Sunit Kumar Mukhopadhyay², Saswati Prasad Ghosh³, Debarshi Jana⁴, Sanchita Saha Das⁵, Suchismita Saha⁶**¹Research Scholar, Department Of Veterinary Pathology, Faculty of Veterinary and Animal Sciences, West Bengal University of Animal and Fishery Sciences, 37 K. B. Sarani, Belgachia, Kolkata, West Bengal, 700037.²Professor M.V.Sc, Ph.D, Head of the Department Pathology, Ex- Head of the Department Veterinary Microbiology, Department Of Veterinary Pathology, Faculty Of Veterinary And Animal Sciences, West Bengal University Of Animal And Fishery Sciences, 37 K. B. Sarani, Belgachia, Kolkata, West Bengal, 700037.³Associate Professor, Department of Pharmacology, School of Pharmacy, Techno India University, EM 4, Sec V, Saltlake, West Bengal, Kolkata-700091.⁴PhD (Cal), Biostatistics and Epidemiology (IBRI), Consultant Biostatistician and Epidemiologist, Young Scientist (Associate Professor), Department of Science & Technology, Government of India, IPGMR and SSKM Hospital, Kolkata, 57A, Southern Avenue (Near Southern Avenue Swimming Club), South End Park, Dhakuria, Kolkata, West Bengal 700029⁵Veterinary Pathologist, attached with West Bengal University of Animal and Fishery Sciences, 37 K. B. Sarani, Belgachia, Kolkata, West Bengal, 700037.⁶Researcher, West Bengal University of Animal and Fishery Sciences, 37 K. B. Sarani, Belgachia, Kolkata, West Bengal, 700037.

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Conflict of interest: Nil

Abstract**Introduction:** Zebu is a French term that was translated into English. The word may have originated in Tibet and refers to a particular kind of bull. Originating in South Asia, specifically India, the zebu (*Bos indicus*), often referred to as Indigenous cattle, is a species or subspecies of domestic cattle that can also be found in portions of Africa and other tropical countries.**Aims:** To establish early diagnostic protocol. To study different physiological parameters (for PD etc). To study beneficial effects of cow urine, if any. To develop inexpensive diagnostic tool, if possible.**Materials and Methods:** The present study was an experimental study. Department of Veterinary Pathology, West Bengal University of Animal and Fishery Sciences, 37 & 68 K. B. Sarani, Belgachia, Kolkata, West Bengal. Total 80 Zebu Cows were included in this study.**Result:** In Group-1, the mean Monocyte (%) (mean $\pm$ s.d.) of Zebu cow was .9300 $\pm$.3524. In Group-2, the mean Monocyte (%) (mean $\pm$ s.d.) of Zebu cow was .9550 $\pm$.3121. Distribution of mean Monocyte (%) with Group was not statistically significant (p=0.7379).**Conclusion:** In conclusion, urine analysis in Zebu cattle is a crucial tool for evaluating health, diagnosing diseases, and monitoring metabolic and organ functions. It provides valuable insights into the presence of infections, toxins, and diseases, helping in early diagnosis and disease progression tracking. This method also aids in assessing the impact of environmental and nutritional factors on cattle health. When combined with other diagnostic techniques, urine analysis enhances disease management and preventive care, improving overall animal health. Future advancements in this field could further refine diagnostic accuracy, benefiting Zebu cattle health management.**Keywords:** Urine Analysis, Zebu Cattle, Clinico-Pathobiological Evaluation And Veterinary Diagnostics.

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Introduction

Zebu is a French term that was translated into English. The word may have originated in Tibet and refers to a particular kind of bull. Originating in South Asia, specifically India, the zebu (*Bos indicus*), often referred to as indicine cattle, camel

cow, or humped cattle, is a species or subspecies of domestic cattle that can also be found in portions of Africa and other tropical countries. In contrast to other cattle breeds, Zebu cattle are distinguished by their drooping ears, a noticeable hump over their

shoulders, and a longer, slimmer frame. Because they can tolerate heat, are resistant to some illnesses, and can survive drought, zebus are ideally suited to hot, dry climates. Zebu are utilized as dairy cattle, beef cattle, draught and riding animals, and for by products like dung and hides for manure and fuel. Some small breeds, such the miniature zebu or Nadudana, are also kept as pets. Certain zebu breeds, like the Brahman, are also frequently crossed with other cattle to enhance the offspring's resistance to diseases and heat. Because of their adaptability and durability, zebu cattle are essential in many rural communities. In nations like Brazil, India, and portions of Africa, they are vital to the cattle and agricultural industries. Zebus have important religious connotations in various areas.

Materials and Methods

Group-I: 40 Zebu Cows farm animal from Calcutta Pinjrapole Society in Sodepur, Kolkata.

Group-II: 40 Zebu Cows field animal from Habra block of North 24 Parganas.

Plan of Work

The characteristics of urine consists of

- 1) **Physical:** Which includes volume, color, transparency, odor, specific gravity, pH etc/-
- 2) **Chemical:** These includes glucose, ketones, urobilinogen, blood etc.
- 3) **Microscopic/cytological tests:** These includes study of crystals, RBC, WBC, casts, bacteria and other organisms, exfoliated cells etc.
- 4) **Microbial study:** These includes culture, sensitivity etc/- to study pathogenic organisms present in urine and its remedy.
- 5) **Field trials:** To study beneficial effect of zebu urine & also scientifically verifying the truth behind indigenous traditional-practices of zebu urine (cow).

To perform the above noted five parameters effectively, they will follow conventional methodology which are being done in day-to-day laboratory practice for that collection of urine is to

be done aseptically and the urine examination /evaluation/experimentation was divided into 5 stages.

- a) At first, evaluation of physical parameters was undertaken by standard laboratory procedures.
- b) Now urine sample was undergoing chemical evaluation. These tests was undertaken either by conventional methods or by modern instruments.
- c) Then urine sample was evaluated microscopically for crystals, RBC, WBC, casts, bacteria and other organisms, exfoliated cells etc.
- d) Now emphasis was given on microbial examination with the help of culture media, standard staining procedures, and other techniques for identification of organisms. e.g: biochemical tests, sensitivity tests etc, as the case may be.
- e) Field trial for evaluation of urine to examine scientifically regarding beneficial effects, if any, regarding traditional uses of urine in day-to-day life.).

Preparation of Cow's urine sample: Prior to being used as test material, these samples were filtered and free of any additional particles. Note: After the cattle were woken in the morning, it was made sure that the pee sample that was taken was the first urine micturated.

Preparation of Micro-organism cultures: Pure strains of *Sclerotinia sclerotiorum* and *Penicillium expansum* cultures were obtained by pure-culturing and sub-culturing the MTCC culture samples for both *Sclerotinia* and *Penicillium*. Both streak and slant culture methods were used to create the subcultures. Luria Bertani Medium (LB) was used to cultivate *Escherichia coli* DH5 Alpha cells clean before they were subcultured.

For all urine-based tests, On potato dextrose agar (PDA) and nutrient agar, respectively, bacterial and fungal cultures were cultivated.

Result

Table 1: Distribution of mean Hb (gm/dl), PCV (%), TLC (Thousand/mm³)

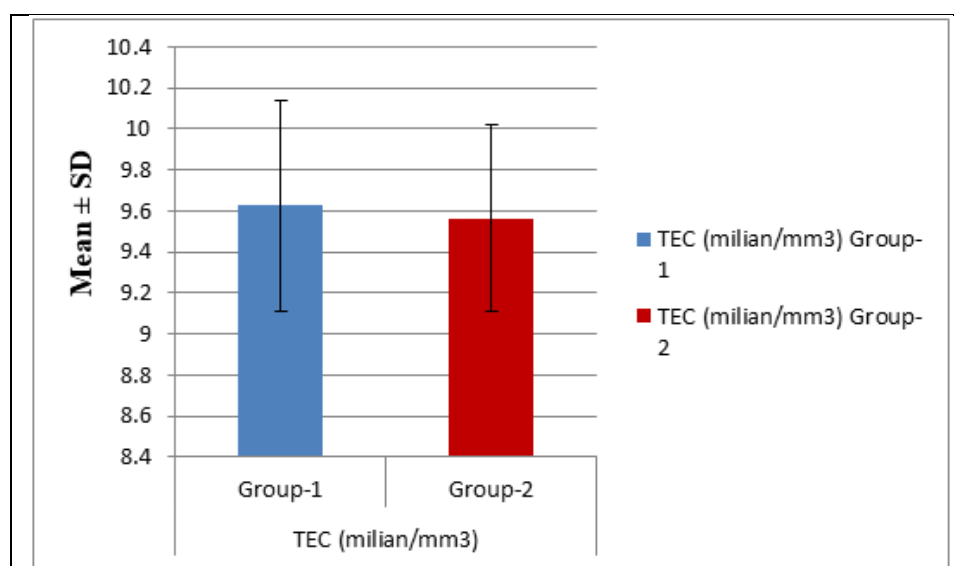
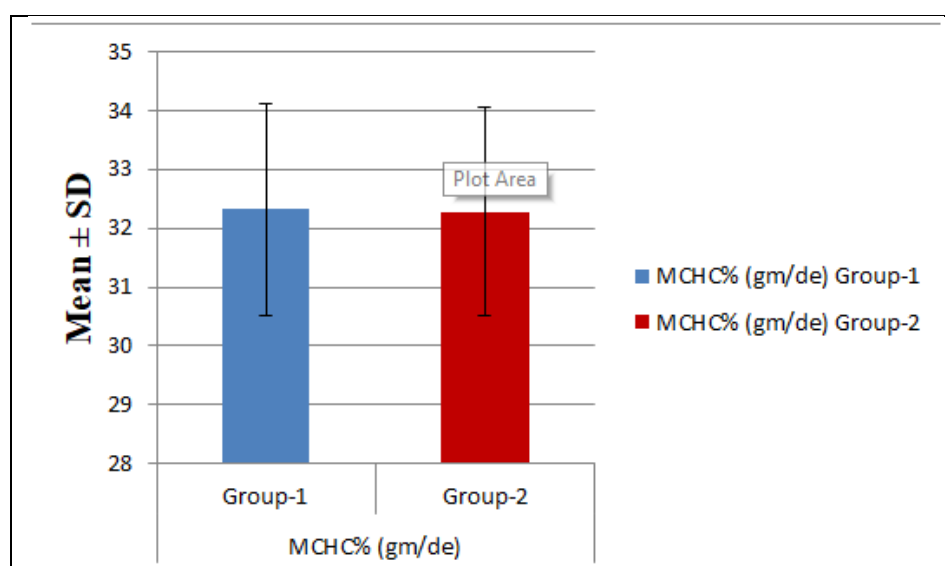
		N	Mean	SD	Minimum	Maximum	Median	p-value	T Statistic
Hb (gm/dl)	Group-1	40	12.9618	1.0899	11	14.6	13.19	0.6944	0.3943
	Group-2	40	12.868	1.0359	11	14.6	12.9		
PCV (%)	Group-1	40	39.6555	1.7451	36.5	42.12	39.62	0.5443	0.609
	Group-2	40	39.423	1.6687	36.5	42.12	39.24		
TLC (Thousand/mm ³)	Group-1	40	12.0805	4.3366	1.1	15.34	13.18	0.6731	0.4235
	Group-2	40	11.6575	4.5933	1.1	15.34	13		

Table 2: Distribution of mean MCH (Pg), MCV (fl)

		N	Mean	SD	Minimum	Maximum	Median	p-value	T Statistic
MCH (Pg)	Group-1	40	13.5081	0.6346	12.34	14.35	13.642	0.8818	0.1491
	Group-2	40	13.4864	0.6635	12.34	14.35	13.584		
MCV (fl)	Group-1	40	41.1959	1.7569	37.588	43.708	41.688	0.7071	0.3772
	Group-2	40	41.3395	1.6449	37.588	43.708	41.688		

Table 3: Distribution of mean Neutrophil (%), Lymphocyte (%), Monocyte (%), Basophil (%)

		N	Mean	SD	Minimum	Maximum	Median	p-value	T Statistic
Neutrophil (%)	Group-1	40	20.39	3.388	14.8	26.6	19.8	0.4608	0.7412
	Group-2	40	19.85	3.1226	14.8	26.6	19.8		
Lymphocyte (%)	Group-1	40	66.095	2.4503	62.8	70	66	0.6103	0.5117
	Group-2	40	65.825	2.266	62.8	70	65.4		
Monocyte (%)	Group-1	40	0.93	0.3524	0.4	1.6	1	0.7379	0.3359
	Group-2	40	0.955	0.3121	0.4	1.6	1		
Basophil (%)	Group-1	40	0.735	0.3017	0.2	1.2	0.8	0.5541	0.5942
	Group-2	40	0.695	0.3004	0.2	1.2	0.8		

**Figure 1: mean TEC (milian/mm3): Group****Figure 2: mean MCHC% (gm/de): Group**

In Group-1, the mean Hb (gm/dl) (mean $\pm$ s.d.) of Zebu cow was 12.9618 $\pm$ 1.0899. In Group-2, the mean Hb (gm/dl) (mean $\pm$ s.d.) of Zebu cow was 12.8680 $\pm$ 1.0359. Distribution of mean Hb (gm/dl) with Group was not statistically significant ($p=0.6944$). In Group-1, the mean PCV (%) (mean $\pm$ s.d.) of Zebu cow was 39.6555 $\pm$ 1.7451. In Group-2, the mean PCV (%) (mean $\pm$ s.d.) of Zebu cow was 39.4230 $\pm$ 1.6687. Distribution of mean PCV (%) with Group was not statistically significant ($p=0.5443$). In Group-1, the mean TLC (Thousand/mm³) (mean $\pm$ s.d.) of Zebu cow was 12.0805 $\pm$ 4.3366. In Group-2, the mean TLC (Thousand/mm³) (mean $\pm$ s.d.) of Zebu cow was 11.6575 $\pm$ 4.5933. Distribution of mean TLC (Thousand/mm³) with Group was not statistically significant ($p=0.6731$). In Group-1, the mean MCH (Pg) (mean $\pm$ s.d.) of Zebu cow was 13.5081 $\pm$.6346. In Group-2, the mean MCH (Pg) (mean $\pm$ s.d.) of Zebu cow was 13.4864 $\pm$.6635. Distribution of mean MCH (Pg) with Group was not statistically significant ($p=0.8818$). In Group-1, the mean MCV (fl) (mean $\pm$ s.d.) of Zebu cow was 41.1959 $\pm$ 1.7569. In Group-2, the mean MCV (fl) (mean $\pm$ s.d.) of Zebu cow was 41.3395 $\pm$ 1.6449. Distribution of mean MCV (fl) with Group was not statistically significant ($p=0.7071$). In Group-1, the mean Neutrophil (%) (mean $\pm$ s.d.) of Zebu cow was 20.3900 $\pm$ 3.3880. In Group-2, the mean Neutrophil (%) (mean $\pm$ s.d.) of Zebu cow was 19.8500 $\pm$ 3.1226. Distribution of mean Neutrophil (%) with Group was not statistically significant ($p=0.4608$). In Group-1, the mean Lymphocyte (%) (mean $\pm$ s.d.) of Zebu cow was 66.0950 $\pm$ 2.4503. In Group-2, the mean Lymphocyte (%) (mean $\pm$ s.d.) of Zebu cow was 65.8250 $\pm$ 2.2660. Distribution of mean Lymphocyte (%) with Group was not statistically significant ($p=0.6103$). In Group-1, the mean Monocyte (%) (mean $\pm$ s.d.) of Zebu cow was .9300 $\pm$.3524. In Group-2, the mean Monocyte (%) (mean $\pm$ s.d.) of Zebu cow was .9550 $\pm$.3121. Distribution of mean Monocyte (%) with Group was not statistically significant ($p=0.7379$). In Group-1, the mean Basophil (%) (mean $\pm$ s.d.) of Zebu cow was .7350 $\pm$.3017. In Group-2, the mean Basophil (%) (mean $\pm$ s.d.) of Zebu cow was .6950 $\pm$.3004. Distribution of mean Basophil (%) with Group was not statistically significant ($p=0.5541$).

Discussion

We found that, mean Hb (gm/dl) was more in Group-1 [12.9618 $\pm$ 1.0899] compared to Group-2 [12.8680 $\pm$ 1.0359] but this was not statistically significant ($p=0.6944$). Similar study by FAJILADE OT et al [1] (2022) found that the animal's blood samples were taken for hematological examination. Hemoglobin (Hb) is the metric used. The analysis's outcome demonstrated that every cow pee sample used was successful in treating illnesses brought on by bacterial infections. Shinde KV et al [2](2024)

found that Significant alterations were also observed in hematological parameters, with decreased hemoglobin, packed cell volume, total red blood cell count, and lymphocytes and increased total white blood cell count, monocytes, and granulocytes.

We observed that, mean PCV (%) was Higher in Group-1 [39.6555 $\pm$ 1.7451] compared to Group-2 [39.4230 $\pm$ 1.6687] but this was not statistically significant ($p=0.5443$). Similar study by FAJILADE OT et al [1] (2022) found that the animal's blood samples were taken for hematological examination. The following characteristics were measured: PCV (packed cell volume). The analysis's outcome demonstrated that every cow pee sample used was successful in treating illnesses brought on by bacterial infections. Shinde KV et al [2](2024) found that Significant alterations were also observed in hematological parameters, with decreased hemoglobin, packed cell volume, total red blood cell count, and lymphocytes and increased total white blood cell count, monocytes, and granulocytes.

JI O et al [3] (2024) showed that throughout the trial period, every animal was monitored every day for indications of toxicity. In order to estimate several hematological parameters (TEC, TLC, DLC, Hct, Hb, MCV, MCH, and MCHC) and biochemical parameters (AST, ALT, ALP, Creat, BUN, and TSP concentration), the blood and serum samples were examined on days 0, 30, 60, and 90. The concentration of several hematological and biochemical markers under study changed significantly. In our study, mean TLC (Thousand/mm³) was more in Group-1 [12.0805 $\pm$ 4.3366] compared to Group-2 [11.6575 $\pm$ 4.5933] but this was not statistically significant ($p=0.6731$).

We observed that, mean MCH (Pg) was Higher in Group-1 [13.5081 $\pm$.6346] compared to Group-2 [13.4864 $\pm$.6635] but this was not statistically significant ($p=0.8818$). Almost identical study by FAJILADE OT et al [1](2022) found that the animal's blood samples were taken for hematological examination. MCH, or mean corpuscular hemoglobin, is one of the measures used. The analysis's outcome demonstrated that every cow pee sample used was successful in treating illnesses brought on by bacterial infections.

We examined that, mean MCV (fl) was lower in Group-1 [41.1959 $\pm$ 1.7569] compared to Group-2 [41.3395 $\pm$ 1.6449] but this was not statistically significant ($p=0.7071$). Similar study by FAJILADE OT et al [1](2022) found that the animal's blood samples were taken for hematological examination. Hemoglobin (Hb), White Blood Cell Count (WBC), Neutrophil, Lymphocytes, Monocytes, Eosinophils, Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC),

Red Blood Cell Count (RBC), and Packed Cell Volume (PCV) are the parameters measured. The analysis's outcome demonstrated that every cow pee sample used was successful in treating illnesses brought on by bacterial infections. We found that, mean MCHC% (gm/de) was more in Group-1 [32.3159 ± 1.8015] compared to Group-2 [32.2805 ± 1.7669] but this was not statistically significant ($p=0.9295$). Related study by JI O. et al [3](2024) showed that during the trial period, every animal was checked for indications of toxicity every day. In order to estimate several hematological parameters (TEC, TLC, DLC, Hct, Hb, MCV, MCH, and MCHC) and biochemical parameters (AST, ALT, ALP, Creat, BUN, and TSP concentration), the blood and serum samples were examined on days 0, 30, 60, and 90. The concentration of several hematological and biochemical markers under study changed significantly. We observed that, mean Neutrophil (%) was Higher in Group-1 [20.3900 ± 3.3880] compared to Group-2 [19.8500 ± 3.1226] but this was not statistically significant ($p=0.4608$).

FAJILADE OT et al [1] (2022) found that the animal's blood samples were taken for hematological examination. Hemoglobin (Hb), White Blood Cell Count (WBC), Neutrophil, Lymphocytes, Monocytes, Eosinophils, Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC), Red Blood Cell Count (RBC), and Packed Cell Volume (PCV) are the parameters measured. The analysis's outcome demonstrated that every cow pee sample used was successful in treating illnesses brought on by bacterial infections. In our study, mean Lymphocyte (%) was more in Group-1 [66.0950 ± 2.4503] compared to Group-2 [65.8250 ± 2.2660] but this was not statistically significant ($p=0.6103$). Similar study by FAJILADE OT et al [1] (2022) found that the animal's blood samples were taken for hematological examination. Hemoglobin (Hb), White Blood Cell Count (WBC), Neutrophil, Lymphocytes, Monocytes, Eosinophils, Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC), Red Blood Cell Count (RBC), and Packed Cell Volume (PCV) are the parameters measured. The analysis's outcome demonstrated that every cow pee sample used was successful in treating illnesses brought on by bacterial infections. Shinde KV et al [2](2024) found that Significant alterations were also observed in hematological parameters, with decreased hemoglobin, packed cell volume, total red blood cell count, and lymphocytes and increased total white blood cell count, monocytes, and granulocytes..

We found that, mean Monocyte (%) was higher in Group-2 [$.9550 \pm .3121$] compared to Group-1 [$.9300 \pm .3524$] but this was not statistically significant ($p=0.7379$). Almost identical study by FAJILADE OT et al [1] (2022) found that the The animal's blood samples were taken for hematological examination. Hemoglobin (Hb), White Blood Cell Count (WBC), Neutrophil, Lymphocytes, Monocytes, Eosinophils, Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC), Red Blood Cell Count (RBC), and Packed Cell Volume (PCV) are the parameters measured. The analysis's outcome demonstrated that every cow pee sample used was successful in treating illnesses brought on by bacterial infections. Shinde KV et al [2](2024) found that Significant alterations were also observed in hematological parameters, with decreased hemoglobin, packed cell volume, total red blood cell count, and lymphocytes and increased total white blood cell count, monocytes, and granulocytes.

We observed that, mean Basophil (%) was more in Group-1 [$.7350 \pm .3017$] compared to Group-2 [$.6950 \pm .3004$] but this was not statistically significant ($p=0.5541$).

Conclusion

In conclusion, urine analysis in Zebu cattle is a crucial tool for evaluating health, diagnosing diseases, and monitoring metabolic and organ functions. It provides valuable insights into the presence of infections, toxins, and diseases, helping in early diagnosis and disease progression tracking. This method also aids in assessing the impact of environmental and nutritional factors on cattle health. When combined with other diagnostic techniques, urine analysis enhances disease management and preventive care, improving overall animal health. Future advancements in this field could further refine diagnostic accuracy, benefiting Zebu cattle health management.

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