



ISSN Online: 2456-2912
NAAS Rating (2026): 4.61
IJVSAH 2026; 11(10): 29-31
www.veterinarypaper.com
Received: 18-08-2026
Accepted: 17-09-2026
Published: 02-10-2026

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Haematobiochemical and electrolyte alterations in buffaloes affected with ruminal impaction

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DOI: <https://www.doi.org/10.22271/veterinary.2026.v11.i10a.3827>

ABSTRACT

Ruminal impaction is an important gastrointestinal disorder of buffaloes that can interfere with normal forestomach motility, digestion and passage of ingesta. The present study evaluated haematological and electrolyte alterations associated with ruminal impaction in buffaloes. The study was conducted during April and May 2025 and included 78 clinical cases of ruminal impaction. Animals were included on the basis of characteristic clinical findings including absence of defecation, hard and dry faeces often coated with translucent or whitish mucus, absent rumen motility and absence of intestinal ballooning on rectal examination. Advanced pregnant animals, buffaloes with metritis and animals with high fever were excluded. Serum sodium, potassium, chloride, calcium and phosphorus were evaluated. The mean serum concentrations of sodium, potassium, chloride, calcium and phosphorus were 134.87 ± 1.03 mEq/L, 3.34 ± 0.18 mEq/L, 98.54 ± 0.81 mEq/L, 10.02 ± 0.34 mg% and 4.72 ± 0.39 mg%, respectively. Hypokalaemia was observed in 58 (74.3%) cases, while hypophosphataemia was recorded in 66 (84.6%) cases. Sodium, calcium and chloride remained within the normal range in 44, 60 and 76 cases, respectively. Haematological findings were within the normal range in most cases, except for increased packed cell volume, probably due to dehydration. Decreased or absent rumen protozoal motility was also observed in most cases. The findings indicate that potassium and phosphorus disturbances are important metabolic abnormalities associated with ruminal impaction in buffaloes and should be considered during clinical management.

Keywords: Buffalo, Ruminal impaction, Electrolyte imbalance, Hypokalaemia, Hypophosphataemia, Haematology

Introduction

Ruminal impaction is characterized by accumulation and compaction of ingesta within the gastrointestinal tract, resulting in impaired forestomach function and disturbance of normal passage of ingesta (Hussain *et al.*, 2020) [1]. In buffaloes, ruminal impaction has been associated with ingestion of fibrous feed materials, coarse grains and indigestible materials such as polythene, jute bags and ropes (Athar *et al.*, 2010) [2]. Electrolytes are particularly important in animals with gastrointestinal disorders because disturbances in fluid balance and gastrointestinal function can influence systemic status. The present study was therefore undertaken to evaluate electrolyte disturbances associated with ruminal impaction in buffaloes, with particular emphasis on sodium, potassium, chloride, calcium and phosphorus, along with the haematological observations recorded in affected animals.

Materials and Methods

Study design and study population

The study was conducted during April and May 2025. A total of 78 buffaloes affected with ruminal impaction were included in the study.

Inclusion criteria

- Absence of defecation
- Hard, dry faeces, often coated with translucent or whitish mucus
- Absence of rumen motility
- Absence of intestinal ballooning on rectal examination

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Exclusion criteria

- Advanced pregnant animals
- Buffaloes suffering from metritis
- Animals with high fever

Haematological and biochemical evaluation

Haematological examination, serum electrolyte evaluation and rumen liquor examination were performed. The serum electrolytes evaluated were sodium (Na), potassium (K), chloride (Cl), calcium (Ca) and phosphorus (P).

Results

Serum electrolyte profile

The mean potassium and phosphorus concentrations were below the reference ranges, indicating hypokalaemia and hypophosphataemia, respectively. Mean sodium was slightly below the stated reference in-

terval, whereas chloride and calcium were within the reported reference ranges.

Table 1. (Mean serum electrolyte concentrations recorded in the 78 buffaloes with ruminal impaction)

Electrolyte	Mean $\pm$ SD	Reference value
Sodium (mEq/L)	134.87 $\pm$ 1.03	137–155
Potassium (mEq/L)	3.34 $\pm$ 0.18	4–5.8
Chloride (mEq/L)	98.54 $\pm$ 0.81	95–110
Calcium (mg%)	10.02 $\pm$ 0.34	8–12
Phosphorus (mg%)	4.72 $\pm$ 0.39	5.6–8.0

Potassium reduction was recorded in 58/78 buffaloes (74.36%), while phosphorus reduction was observed in 66/78 buffaloes (84.6%). Sodium, calcium and chloride were within the stated normal range in 44, 60 and 76 animals, respectively.

Table 2. (Distribution of electrolyte abnormalities)

Electrolyte	Normal	Decreased	Increased
Sodium	44	34	0
Potassium	18	58	2
Chloride	76	0	2
Calcium	60	8	8
Phosphorus	6	66	6

Haematological findings

Haematological values were within the normal range in most cases, except for increased packed cell volume (PCV), which was considered probably associated with dehydration.

Rumen liquor findings

Decreased or absent motility of rumen protozoa was observed in most of the affected buffaloes.

Discussion

Ruminal impaction causes mechanical accumulation of ingesta and impairment of normal forestomach function. In buffaloes, dietary factors and ingestion of poorly digestible or indigestible materials are recognized associations with the condition. Hussain *et al.* (2020) [1] reported ruminal impaction in buffaloes associated with materials including fibrous feed, coarse grain, polythene, jute bags and ropes.

In the present study, the most prominent biochemical abnormalities were reduced potassium and phosphorus concentrations. Potassium was decreased in 58 of 78 buffaloes, whereas phosphorus was decreased in 66 animals. The predominance of these two abnormalities indicates that electrolyte disturbances, particularly hypokalaemia and hypophosphataemia, may be important components of the metabolic disturbance accompanying ruminal impaction.

The mean potassium concentration was 3.34 $\pm$ 0.18 mEq/L, below the reference range. Previous works have also demonstrated altered potassium concentrations in buffaloes with ruminal impaction. Hussain *et al.* (2012) [3] reported significantly lower potassium and chloride concentrations in buffaloes with rumen impaction compared with healthy controls. Tripathi *et al.* (2016) [4] also reported significant haematobiochemical alterations in buffaloes affected with rumen impaction, including increased bilirubin, aspartate aminotransferase, glucose, blood urea nitrogen and creatinine concentrations and decreased calcium concentration compared with healthy controls, whereas phosphorus did not differ significantly between groups.

Phosphorus showed an even greater frequency of reduction in the present study, with decreased concentrations in 66 of 78 buffaloes. The possible cause for hypophosphatemia is impaired feed intake, altered ruminal function and disturbances in mineral availability associ-

ated with ruminal impaction in buffaloes. Chloride remained within the normal range in 76 of 78 buffaloes, while calcium was normal in 60 cases. Thus, unlike potassium and phosphorus, marked abnormalities in chloride and calcium were not dominant findings in this group. The mean sodium concentration was 134.87 $\pm$ 1.03 mEq/L, while 44 animals had sodium concentrations within the stated normal range and 34 had decreased values. Altered sodium status has previously been reported in buffaloes with reticuloruminal impaction (Khinda *et al.*, 2006) [5]

The haematological findings in the present study were largely within normal limits. The principal reported abnormality was increased PCV, which was considered probably related to dehydration. Dehydration is clinically relevant in ruminal impaction because affected animals may have reduced feed and water intake and impaired gastrointestinal function.

Another important observation was decreased or absent rumen protozoal motility in most cases. This finding is compatible with marked impairment of ruminal function. The study presentation further associated the occurrence of cases during April–May with the introduction of newly harvested wheat straw. As new wheat straw as having low digestibility and poor protein content and suggests that feeding large quantities may predispose buffaloes to ruminal impaction and metabolic disturbances.

From a clinical management perspective, the high frequency of hypophosphataemia and hypokalaemia observed in this study supports consideration of electrolyte assessment and correction during treatment. The presentation recommends gradual introduction of new wheat straw, overnight soaking of straw to improve digestibility and routine monitoring and timely correction of electrolytes, particularly phosphorus.

Conclusion

The present study demonstrated important electrolyte disturbances in buffaloes affected with ruminal impaction. Hypophosphataemia and hypokalaemia were the predominant abnormalities, occurring in 84.6% and 74.3% of affected buffaloes, respectively. Sodium was decreased in a substantial proportion of animals, whereas chloride and calcium were largely maintained within the stated reference ranges. Haematological parameters were generally within normal limits, ex-

cept for increased PCV, probably associated with dehydration. Decreased or absent rumen protozoal motility was also observed in most cases. The findings emphasize the importance of evaluating electrolyte status, particularly potassium and phosphorus, as part of the clinical assessment and management of ruminal impaction in buffaloes.

Acknowledgements

The authors acknowledge the Department of Veterinary Clinical Complex, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, for clinical facilities and support during the study.

Conflict of interest

None.

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How to cite this article: Sindhu N, Mor R, Aruna, Kumar A, Mudgil N, Sharma M, et al. Haematobiochemical and electrolyte alterations in buffaloes affected with ruminal impaction. *International Journal of Veterinary Sciences and Animal Husbandry.* 2026;11(10):29-31. doi: <https://www.doi.org/10.22271/veterinary.2026.v11.i10a.3827>

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