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Comparative efficacy of inorganic and organic phosphorus preparations for phosphorus deficient HF cross cow

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Abstract

Background: Phosphorus deficiency (hypophosphatemia) is a widespread nutritional constraint for livestock in India, primarily due to low phosphorus levels in soil, plants, and fodder, compounded by the high demand of lactation in dairy animals. This essential mineral is crucial for ATP generation, bone structure, and numerous physiological processes.

Objective: This study aimed to evaluate the comparative efficacy of an Organic Phosphinate (Toldimfos sodium) versus an Inorganic Phosphate (sodium acid phosphate) in correcting hypophosphatemia in cross-bred Holstein Friesian (HF) cows.

Methods: Twenty HF cross cows in the Banaskantha district exhibiting clinical signs of chronic phosphorus deficiency (e.g., rough coat, pica/chewing of inanimate objects, reduced milk yield, reduced feed intake, and infertility) and having a serum inorganic phosphorus (Pi) level below the critical level (5.6 mg/dl) were divided into two groups (n=10 each). Group A received Sodium Acid Phosphate (Inorganic Phosphate) @ 15 ml intravenously, and Group B received Toldimfos Sodium (Organic Phosphinate) @ 15 ml intravenously. Serum Pi levels were measured before treatment (0 hour) and 24 hours post-treatment.

Results: Both treatments resulted in a significant increase ($P < 0.05$) in serum Pi levels.

- **Group A (Inorganic Phosphate):** Mean serum Pi increased from 4.828 ± 0.1925 mg/dl to 6.104 ± 0.2927 mg/dl, representing a 26.43% increase.
- **Group B (Organic Phosphinate):** Mean serum Pi increased from 4.011 ± 0.1583 mg/dl to 4.744 ± 0.2615 mg/dl, representing an 18.27% increase.

The Inorganic Phosphate preparation (Sodium Acid Phosphate) showed a markedly higher and faster increase in serum phosphorus levels compared to the Organic Phosphinate, suggesting its rapid absorption and distribution.

Conclusion: Inorganic Phosphate preparations, specifically Sodium Acid Phosphate, are more efficacious than Organic Phosphinate (Toldimfos sodium) for the rapid correction of acute or chronic hypo-phosphatemic conditions in HF cross cows.

Keywords: Hypophosphatemia, phosphorus deficiency, inorganic phosphate

Introduction

Phosphorus deficiency in domestic animals is a common problem in India and other tropical and sub-tropical countries. This is primarily because Indian soil is deficient in Phosphorus. A study by Hasan (1996) shows that out of the 363 districts of the country, 179 (49.3%) are low in phosphorus, 177 (48.8%) are medium, and only 7 districts (1.9%) are rich in phosphorus. Ruminants are herbivorous, and they consume plants and fodder, which are again a poor source of phosphorus. Lactation further increases the loss of phosphorus and calcium in milk, and this is not compensated for by the input. The majority of the calcium, phosphorus and magnesium balance disorders are due to low blood concentrations of one or more of these minerals. It is difficult to identify mineral deficiencies and even harder to predict their occurrence. The best indicators of a particular disorder are the characteristic clinical signs. Poor growth, dull hair coat, subnormal milk production, and poor reproductive performance

are among the earliest signs of Phosphorus deficiency (Call *et al.*, 1987) [2].

Phosphorus has a variety of important biological functions that make it essential for animal health and well-being. Oxidative phosphorylation, oxygen delivery, glycolysis and maintenance of cellular structural integrity are among the processes that require phosphorus. It is a major component of bone as well as a buffer contributing to acid-base balance. Phosphorus is necessary for the generation of adenosine triphosphate (ATP), without which many physiological processes could not occur (Grunberg, 2008).

The present study was undertaken to evaluate the comparative efficacy of Organic phosphinate (Toldimfos sodium) and Inorganic Phosphate (sodium acid phosphate) in hypophosphatemic HF cross cow.

Material and Methods

The present study was conducted on 20 cows at different

villages of Banaskantha district by Banas Dairy, Palanpur. The HF cross cows exhibiting signs of rough hair coat, chewing of inanimate objects, licking the hair coat of other animals, reduction in milk production and reduced feed intake, infertility and having serum inorganic phosphorus level of below the critical level of 5.6 mg/dl were selected. The selected 20 cows were divided into 2 groups and each group consisted of 10 animals.

The animals in Group A were treated with sodium acid phosphate (Urimine) @ 15 ml administered by intravenous route. The animals in Group B were treated with organic phosphinate (Toldimfos sodium) @ 15 ml intravenously.

Blood samples were collected on 0 day (pretreatment) and after 24 hours post-treatment for separation of serum for biochemical analysis. Serum phosphorus was estimated in the biochemistry analyser of Humastar 100. The comparative efficacy of the above drugs was evaluated on the basis of improvement in serum inorganic phosphorus level.

Table 1: Individual and Mean Serum Inorganic Phosphorus Levels (mg/dl) in Hypophosphatemic Cows Before and 24 Hours After Treatment with Inorganic Phosphate (Group A) and Organic Phosphinate (Group B)

Animal No. (For Each Group 1 to 10)	Group A			Group B		
	Pre-treatment serum phosphorus level (mg/dl)	Post-treatment serum phosphorus level (mg/dl)	Difference (Post Treatment - Pre Treatment)	Pre-treatment serum phosphorus level (mg/dl)	Post- treatment serum phosphorus (mg/dl)	Difference (Post Treatment - Pre Treatment)
1	5.24	7.76	2.52	3.5	4.92	1.42
2	5.37	6.98	1.61	3.64	5.11	1.47
3	4.64	6.31	1.67	4.2	5.58	1.38
4	4.71	5.88	1.17	4.3	4.58	0.28
5	5.32	6.89	1.57	4.16	4.53	0.37
6	4.86	5.84	0.98	3.73	4.08	0.35
7	4.29	4.66	0.37	4.87	6.2	1.33
8	3.46	5.22	1.76	4.36	3.23	-1.13
9	4.92	5.36	0.44	4.2	4.2	0
10	5.47	6.14	0.67	3.15	5.01	1.86
Mean	4.828	6.104	Percentage Increase	4.011	4.744	Percentage Increase
Standard Error	0.1925	0.2927	26.43%	0.1583	0.2615	18.27%

Results and Discussion

HF cross cows suffering from chronic phosphorus deficiency exhibited signs of rough hair coat, chewing of inanimate objects, licking the hair coat of other animals, reduction in milk production, reduced feed intake, and infertility. Phosphorus supplementation in various forms resulted in a significant improvement in serum phosphorus levels.

In Group A, serum phosphorus values (mg/dl) significantly increased ($P < 0.05$) from pre-treatment level of 4.828 ± 0.1925 to 6.104 ± 0.2927 after 24 hours post-treatment, suggesting a 26.43 percent increase in post-treatment serum phosphorus values.

In Group B, serum phosphorus values (mg/dl) significantly increased ($P < 0.05$) from pre-treatment level of 4.011 ± 0.1583 to 4.744 ± 0.2615 after 24 hours post-treatment, suggesting an 18.27 percent increase in post-treatment serum phosphorus values.

Table 2: Mean values (Mean $\pm$ S.E.) of serum phosphorus (mg/dl) before and after the treatment at various intervals in different groups

Groups	Pre Treatment	Post Treatment
	0 Hours	24 Hours
A	4.828 ± 0.1925	6.104 ± 0.2927
B	4.011 ± 0.1583	4.744 ± 0.2615

The results of the present study indicated a marked increase in serum phosphorus levels in cattle treated with inorganic phosphorus preparations (Group A) as compared to cattle

receiving organic phosphorus treatment (Group B). The present findings support the observation of Jagadeeswaran and Jagadishkumar (1998) [5] and Salunke *et al.* (2010) [6], who reported that inorganic phosphorus preparations would be better than organic phosphorus preparations in treating hypo-phosphatemic conditions in heifers.

The slight increase in serum phosphorus level in Group B may be attributed to the slow release of inorganic phosphorus from the organic complex. When Group A are compared, the net increase in serum phosphorus level was more marked, indicating rapid absorption and distribution of phosphorus in cattle treated with sodium acid phosphate.

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Reference

1. Bhikane AU. Epidemiology, clinico-pathology, treatment and control of phosphorus deficiency in and around Udgir [PhD thesis]. Nagpur: MAFSU; 2000.
2. Call JW, Butcher JE, Shupe JL, Lamb RC, Boman RL, Olsan E. Clinical effects of low dietary phosphorus

- concentrations in feed given to lactating dairy cows. Am J Vet Res. 1987;48:133-6.
3. Grunberg W. Phosphorous homeostasis in dairy cattle: Some answers, more questions. Tri State Dairy Nutr Conf. 2008 Apr 22-23; p. 29-35.
 4. Hasan R. Phosphorus status of soils in India. Better Crops Int. 1996;10:4-5.
 5. Jagadeeswaran A, Jagadishkumar B. Influence of single administration of phosphorus salts on serum and urinary inorganic phosphorus levels in dairy heifers - a comparative study. Indian Vet J. 1998;75:912-4.
 6. Salunke VM, Mendhe MS, Bhikane AU, Gaikwad NZ, Waskar VS. Comparative efficacy of inorganic and organic phosphorus preparations in chronic phosphorus deficiency in Deoni cattle. Intas Polivet. 2010;11(1):55-7.

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