

## Effects of feeding cooked plantain and sour curd to neonatal Murrah buffalo (*Bubalus bubalis*) calves suffering from diarrhoea

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### Abstract

Forty (40) Murrah buffalo calves were observed for diarrhoea up to first 30 days of age; in addition to the routine treatment, calves were supplemented either cooked plantain (prebiotic) or curd (probiotic) or both in combination (synbiotic). The study also included a control group which received only routine treatment. Response to treatment within the first 12 hours was taken as an indicator of efficacy. Results indicated that recovery was highest in the calves receiving synbiotic with 72% cases recovering within 12 hours of feeding the combination. Recovery rate in calves receiving only cooked plantain pulp was 41%, while curd fed calves recovery was 35%, and 23% calves receiving routine treatment also recovered within first 12 hours. The current study results indicate that combination of cooked plantain and curd as synbiotic, in addition to the routine treatment had resulted in earlier recovery compared to all the other groups.

**Keywords:** Buffalo calves, Plantain, Prebiotic, Probiotic, Synbiotic

### Highlights

- Supplementation of synbiotic (cooked plantain and curd) was very effective in enhancing the recovery rate of calf diarrhoea during the neonatal period.
- Prebiotic (cooked plantain) and probiotic (sour curd) are also individually effective against calf diarrhoea, but their combination enhanced the benefits.

Calf health during the neonatal period is considered as vital phase for survival of the young ones for profitable dairy farm management. Mortality of buffalo calves is more than that of calves of white cattle. Since calves are the future replacement stock, reducing mortality during the suckling period is essential for sustaining the milk animal population. Among different health problems during the neonatal period, gastroenteritis is the single largest factor as high as 80% incidents (Sreedhar and Sreenivas, 2015), which causes rapid dehydration beyond recovery. The routine treatment is largely dependent on symptomatic diagnosis or diagnosis based on microscopic examination of faecal material. Coccidia, Ascarids and bacteria are the most frequent causes of calf diarrhoea. While the routine treatment with coccidiostats/dewormers/antibiotics/combo would help in removing the etiology, there is an acute need to restore normal gut health, without which the dehydration may continue, even after removal of the etiology. Role of prebiotics and probiotics in restoring gut health during diarrhoea was well documented (Quigley, 2019). Indian dairy farmers need more local solutions rather than

solutions involving commercial products in view of their traditional practices in rural farming. Hence, the current study attempted to screen a combination of locally available probiotic and prebiotic to supplement the routine treatment of calves suffering from diarrhoea. In the present study, cooked plantain is taken as a source of prebiotic and curd is taken as a source of probiotic. The experimental animals were pre-ruminant buffalo calves aged below 30 days. Hence, prebiotic is relevant in suckling pre-ruminant calves. Plantain is an established source of non-starch polysaccharides (Rayo-Mendez *et al.*, 2019), which would act as prebiotic inhibiting pathogenic bacteria in the alimentary tract (Parsons *et al.*, 2014), while curd is also a proven source of Lactobacilli (Balamurugan *et al.*, 2014). Both of plantain and curd are abundant in rural India and part of Indian kitchen.

Calves born in the farm at Buffalo Research Station, Sri Venkateswara Veterinary University located at Venkataramannagudem of Andhra Pradesh were selected for the study. Calves (n=40) born during the months between June to October, 2022 were allotted one of the four treatment groups with 10 calves

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in each group and the experimental period lasted only up to 30 days of age. Only diarrheic calves were given one of the following treatments according to the allotted group.

- i. Control group, receiving standard treatment as per the diagnosis based on microscopic examination of faecal smear.
- ii. Prebiotic group, receiving 50 g cooked plantain as a single dose in addition to the routine treatment.
- iii. Probiotic group, receiving 50 g sour curd as a single dose in addition to the routine treatment.
- iv. Synbiotic group which received both plantain and curd of 50 g each as single dose in addition to the routine treatment.

Prebiotic, or probiotic or synbiotic was administered only once along with the first dose of drugs used for the following routine treatment. Microscopic examination was done to identify the parasitic ova in the faecal sample.

For the calves diagnosed with ascarids, fenbendazole was administered as a single dose of 10 mg/kg bwt. Calves diagnosed with coccidia were administered amprolium @ 10 mg/kg bwt for three days after dissolving in a sufficient quantity of sterilized water. Calves whose faecal examination did not reveal any visible parasites were concluded as diarrhoea of bacterial origin and given ciprofloxacin @ 5 mg/kg bwt and tinidazole @ 10 mg/kg bwt for three consecutive days, after dissolving in sufficient quantity of sterilized water.

Out of 40 calves, there are 66 incidences of diarrhoea before 30 days of age. In the calves where diarrhoea recurrence was noticed, the etiological agent was different from previous occurrences of diarrhoea. The recurrence of diarrhoea was uniform in all the treatment

groups. The diagnosis of calf diarrhoea group-wise and the treatment results within 12 hours are presented in Table 1. The routine treatment continued as per standard protocol for 3 days irrespective of results, and all the cases were successfully treated by 3<sup>rd</sup> day. Efficacy of prebiotic, probiotic and synbiotic was assessed with a single dose and the visible results within 12 hours of administration.

The results indicate that both probiotic (curd) and prebiotic (cooked plantain) are individually effective in supporting the treatment of diarrhoea of coccidial or bacterial origin; compared to the control group, the synbiotic (cooked plantain plus curd in combination) is more effective with recovery of more than 80% cases. It may be further noted that, the synbiotic is less effective (40%) against ascariasis. These results agreed with the earlier findings (Rai *et al.*, 2020), who reported that synbiotic feeding is beneficial in improving the gut health of crossbred Jersey calves. The observations of current study are also in agreement with the findings of Sharma *et al.* (2020), who concluded that synbiotic (combination of inulin and fermented milk) supplementation in buffalo calves had improved gut health by reducing coliform count and improved cell mediated immunity. The results of the present study are in agreement with the findings of earlier investigators, Dar *et al.* (2018) in crossbred calves with supplementation of prebiotic (Mannan oligosaccharide), probiotic (*Lactobacillus acidophilus*) and their combination as synbiotic. In another study including Murrah buffalo calves by Singh *et al.* (2021), it was reported that synbiotic feeding improves gut health as assessed through faecal score. In the present trial, gut health improvement was noticed through speedy recovery from diarrhoea.

**Table 1. Efficacy of prebiotic, probiotic and synbiotic in treating diarrhoea in neonatal buffalo calves**

	Aetiological factor	Control	Prebiotic	Probiotic	Synbiotic
Coccidiosis	Cases	10	8	9	8
	Recovery in 12 hours	4	5	4	7
	Recovery in 12 hours (%)	40.00	62.50	44.44	87.50
Ascariasis	Cases	4	5	2	5
	Recovery in 12 hours	0	0	0	2
	Recovery in 12 hours (%)	0	0	0	40.00
Bacterial	Cases	3	3	3	5
	Recovery in 12 hours	0	2	1	4
	Recovery in 12 hours (%)	0	66.67	33.33	80.00
Total	Cases	17	17	14	18
	Recovery in 12 hours	4	7	5	13
	Recovery in 12 hours (%)	23.53	41.18	35.71	72.22

Note: The above data is based on a preliminary clinical trial. There is no uniformity in number of diarrhoea cases in different groups. Hence, only percentages were mentioned.

It is again stressed that, either probiotic or prebiotic or synbiotic was given in addition to the routine treatment, and not a replacement to the existing drugs in treatment of diarrhoea in suckling calves. Both plantain and sour curd are available in Indian kitchen throughout the country. Advising farmers to feed this combination, in addition to the treatment, would enhance the efficacy of the treatment and reduce calf mortality.

Further, it is also recommended that a detailed trial may be conducted to assess the nutraceutical value of cooked plantain, sour curd or their combination as preventive measures against calf diarrhoea during the first 30 days of the age of calves and trials in the different species with suitable age modification would also be useful. The trial may include other parameters like growth, gut microbiology and serum parameters for a deeper understanding of this recommended synbiotic.

The findings of the present study concluded that efficacy of the supplementation of synbiotic (cooked plantain and curd) was very high in buffalo calves' diarrhoea of coccidial or bacterial origin and slightly lesser in diarrhoea of ascarid origin. In the current study, only visual assessment of benefits was studied. Hence,

it is recommended to conduct more studies for wider understanding of the beneficial effects of feeding combination of cooked plantain and curd to suckling calves to enhance the recovery rate from diarrhoea or as a preventive measure against diarrhoea during neonatal period.

**Conflict of interest:** Authors have no conflict of interest in this study.

**Author's contribution:** MR, AT: Conceptualization and design; MR, AT, KA: Data compilation; MR, AT, CG: Performed statistical analysis of data; MR, AT: Performed interpretation of the results.

**Data availability statement:** All the data supporting the research findings have been presented in this paper. The corresponding author is willing to provide the raw data upon reasonable request.

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