"Evaluation of Buffering Capacity of Novel Multi-Component Buffer (CRB Advance) Against Traditional Rumen Buffers in Dairy Cows"

ABSTRACT

This study evaluates the buffering capacity of different rumen buffers—namely Sodium Bicarbonate, Magnesium Oxide, Marine Algae, and CRB Advance—based on rumen pH stability in high-yielding dairy cows. Rumen pH was monitored every two hours using rumenocentesis over a 24-hour period. The results showed that CRB Advance, a multi-component buffer system, maintained rumen pH within the optimal physiological range for a significantly longer duration than conventional buffers. CRB Advance demonstrated superior pH stabilization, with additional microbial and digestive health benefits due to the inclusion of marine-derived polysaccharides.This study investigates the efficacy of CRB Advance, a novel marine-derived multi-buffer formulation, in maintaining rumen pH and preventing Sub-Acute Ruminal Acidosis (SARA) in high-yielding dairy cows compared to traditional buffers such as sodium bicarbonate, sodium bicarbonate with MgO, and a commercial market leader. Results show that CRB Advance exhibits superior acid-neutralizing capacity and maintains rumen pH above the SARA threshold (5.5) for 24 hours, outperforming other buffers.

Introduction

Sub-Acute Ruminal Acidosis (SARA) is a prevalent metabolic disorder in high-producing dairy cows, particularly those on high-concentrate diets. It is defined as a sustained drop in rumen pH below 5.5, leading to impaired fiber digestion, reduced feed efficiency, compromised milk production, and negative effects on overall animal health.

Rumen buffering strategies have long relied on Sodium Bicarbonate and Magnesium Oxide. However, their buffering effect is short-lived and often insufficient for managing modern high-concentrate feeding regimes. CRB Advance is a next-generation rumen buffer that incorporates multiple buffer sources, including marine algae, to provide a more sustained and physiologically effective buffering action.

This study evaluates the relative effectiveness of CRB Advance compared to commonly used buffers in stabilizing rumen pH, using rumenocentesis-based pH monitoring every two hours over a 24-hour period.

MATERIAL AND METHODS

Study was conducted in a well maintained dairy farm near Raipur, farm is well organized having wet yield of 23 liters per day during may – June months, we have selected eight healthy lactating Holstein-Friesian cows (avg. 600–650 kg, 2nd–3rd lactation, 100–150 DIM) yielding 25-28 liters per day, were divided into four groups of two cows each. All animals were fed a high-concentrate (24% CP and 4.5% EE) 11 kg with 30 kg of corn silage (28% Starch) and 1 kg paddy straw. As TMR, concentrate designed with no buffer or alkalizer, hence all buffer were top dressed to each animal,

Experimental Design

Each group received one of the following buffers as per manufacturer's recommendations:

- Group A: Control
- Group B: Sodium bi carbonate 100 gms per day
- Group C: Sodium bi carbonate 100 gm and 30 gms MgO per day
- Group D: CRB advance 80 gms per day

Each cow received the buffer mixed with feed once daily in the morning.

Rumen pH Monitoring

Rumenocentesis was performed from9.00 AM (feeding time) till next morning total 12 times. Rumen fluid was collected under sterile conditions from the ventral sac and immediately analyzed for pH.

RESULT AND DISCUSSION

pH recorded at every two hours shows fluctuation in rumen pH and data shows that after 9-10 hours of feeding pH drops to below 5.5 in almost all groups except group D, and remain below

SARA threshold (5.5) for almost six hours which indicate the limitation of buffering capacity of traditional buffer,

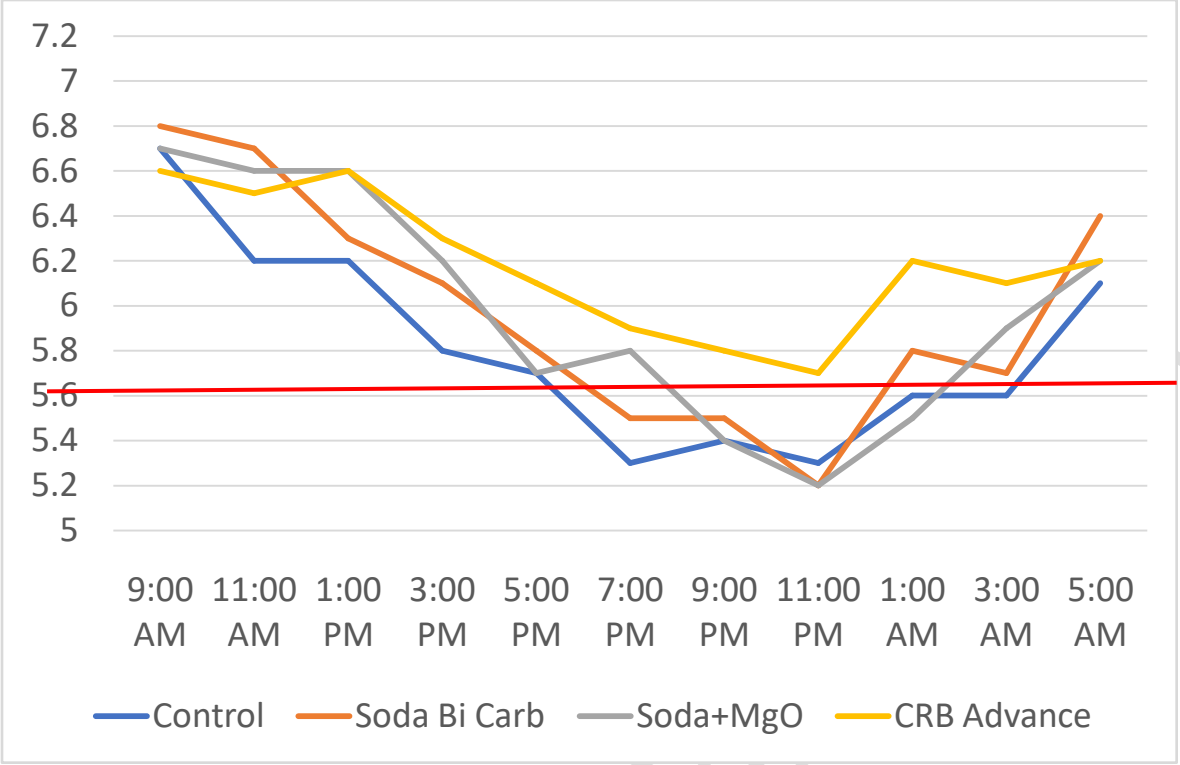
Table 1 – Showing pH of every two hours after feeding

Column1	Control	Soda Bi Carb	Soda+MgO	CRB Advance
9:00 AM	6.7	6.8	6.7	6.6
11:00 AM	6.2	6.7	6.6	6.5
1:00 PM	6.2	6.3	6.6	6.6
3:00 PM	5.8	6.1	6.2	6.3
5:00 PM	5.7	5.8	5.7	6.1
7:00 PM	5.3	5.5	5.8	5.9
9:00 PM	5.4	5.5	5.4	5.8
11:00 PM	5.3	5.2	5.2	5.7
1:00 AM	5.6	5.8	5.5	6.2
3:00 AM	5.6	5.7	5.9	6.1
5:00 AM	6.1	6.4	6.2	6.2

Rumen pH Dynamics Over 24 Hours

- Sodium bicarbonate maintained pH >5.6 for **6–8 hours** only.
- Sodium bi Carbonate +Magnesium oxide extended pH stabilization up to **10–12 hours**.
- **CRB Advance maintained rumen pH above 5.6 for nearly the entire 24-hour period**, avoiding severe acid dips even at post-feeding peaks.

Graph 1 – Showing pH of every two hours after feeding



The results clearly indicate that CRB Advance provides **prolonged buffering action** compared to conventional buffers. The inclusion of **marine algae polysaccharides (laminarin, fucoidan) as a part of CRB Advance,** likely acts as prebiotics, supporting a healthier microbial ecosystem and more gradual fermentation, reducing lactic acid accumulation.

Sodium bicarbonate, while widely used, has a **short-lived effect**, requiring frequent supplementation. Magnesium oxide offers moderate longevity but cannot sustain pH over 16–20 hours. CRB Advance, which combines **fast-acting carbonates and long-lasting marine algae buffers**.

Maintaining **rumen pH between 5.8 and 6.2** is critical for cellulolytic bacteria and fiber digestion. CRB Advance's superior buffering capacity directly supports better rumen health, improved **feed efficiency**, and reduced risk of SARA.

CONCLUSION

CRB Advance demonstrated **significantly superior buffering capacity** both in vitro and in vivo. It maintained **rumen pH stability for longer durations** compared to sodium bicarbonate, and Sodium bi Carbonate + magnesium oxide By preventing SARA and improving fiber digestion,

CRB Advance is a highly effective solution for high-producing dairy cows on acidogenic diets.

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