**Commentary Article**
Volume 7:1, 2023

Hepatology and Pancreatic Science

ISSN: 2573-4563 Open Access

# Supplementing the Diet with Sodium Butyrate Improves Sodium Butyrate and Pancreatic Secretion in Young Milk-Fed Calves

**Katsuyoshi Sato***

*Department of Animal Physiology, Graduate School of Agricultural Science, Tohoku University, Sendai, Japan*

## Introduction

Eight calves fed milk formula based on soybean protein were the subjects of this study, and their ability to improve nutrient digestibility and alter the kinetics of daily pancreatic secretions were examined in relation to SB supplementation. Additionally, the effects of duodenal SB infusion were examined. The bloodstream levels of cholecystokinin, secretin, and gastrin were measured. When butyrate was added to milk formula, both the total daily pancreatic secretions and the digestibility of nutrients improved. Juice volume showed the greatest increase between 12 and 17 hours after breakfast. When compared to a diet devoid of SB, the consumption of SB led to an increase in pancreatic secretion. Additionally, oral SB supplementation reduced the physiological decrease in postprandial pancreatic secretion during the three-hour postprandial period (while the duodenal digest a flow rate was at its highest). These findings taken together may provide an explanation for the observed increase in nutrients' digestibility. The duodenal SB infusion had no effect on pancreatic secretion, with the exception of increased lipase output in comparison to the control. It does not appear that circulating gut regulatory peptides are involved, and the mechanisms that underlie these events are unknown. Our research provides new information regarding SB as a feed additive used in the nutrition of young calves. Butyric acid, one of the volatile fatty acids, naturally occurs in the colons of monogastric and ruminant species. Nutrient digestibility can be measured simultaneously with growth and feed efficiency to better comprehend the effects of a diet. However, we are aware of no digestibility studies utilizing SB supplementation for calves. Contradictory results are frequently found in digestibility tests conducted on pigs of various ages or developmental stages. Only a few experiments have examined the effects of SB on pancreatic secretion. In vitro studies with sheep and goat pancreatic lobule preparations showed that administration of SB resulted in an increase in amylase release. Both SB intravenous injections and SB intraduodenal or intra-ileal infusions stimulated pancreatic secretion in conscious guinea pigs, sheep, and calves. Elastase-II activity increased by 50% when oral SB supplementation was given to calf pancreatic tissue. In a similar vein, this supplementation increased the activities of disaccharidase in various parts of the small intestine in pigs. The physiological effects of oral SB supplementation on pancreatic juice secretion have not been studied to date [1,2].

## Description

The purpose of this study was to determine how oral and intraduodenal SB organization affected supplement absorbability, total pancreatic discharge, and circadian energy of pancreatic emission in conscious calves. By injecting SB directly into the duodenal lumen through a duodenal cannula, we tested its capacity to increase digestive capacity because SB is used in the stomach. The European Union's guidelines for the safety of experimental animals were followed in both the treatments and the experiments. Eight Holstein-Friesian male calves were obtained right after birth for the experiment, which was carried out between the ages of 54 and 88 days. All calves were fed a milk replacer diet of tallow, whey powder, and skim milk powder after receiving colostrum (25 g/kg of BW per meal) for the first two days of life. These liquid diets were only given twice per day until the animals were 54 days old, when the experiment began. This milk replacer produced 231 g of CP (N 6.25), 215 g of rough fat, and 76 g of debris per kg of DM. Throughout the entirety of the experiment (d 54–88), calves were fed a milk replacer diet containing proteins from whey powder and alcohol-extracted soybean concentrate (73.6%). Soybean protein was chosen because it mostly replaces natural milk proteins in modern milk replacers used to raise calves. It is less digestible than protein powder from skim milk. Soybean protein made it possible to determine whether or not supplementation with SB can improve supplement absorbability [3].

Representative aliquots were frozen prior to freeze-drying and analysis of the total faces from each period, which were collected over the course of four consecutive days. A pump that extracted a constant proportion of pancreatic juice (8 percent) at 5-minute intervals was used to collect, measure, and reintroduce (92 percent) pancreatic juice into the duodenum on the third day of P1, P2, and P3. A computer was used to record the pancreatic juice secretion (volume as a function of real time), and 42 samples of pancreatic juice were taken between 0.5 and 3.0 hours after the morning meal. Apparent digestibility was measured in P0 (after 45 days), P1, P2, and P3. These samples were immediately placed in a fraction collector at 4°C prior to analysis, and aliquots were stored at 20°C. A second aliquot of pancreatic juice that had been collected throughout the remainder of the day was also prepared. When sampling was not being done, the connection between the two cannulas allowed pancreatic juice to freely flow into the duodenum. At the conclusion of day 4 in each experimental period, blood samples were collected by inserting a catheter into the jugular vein of the calves. Blood samples were collected in tubes containing heparin (500 UI/mL) and aprotinin (10,000 UI/mL) on day 5 of each period, 60 and 30 minutes prior to the breakfast meal and 5, 15, 30, 45, 60, 90, 120, 150, 180, and 210 minutes after the dinner. Plasma samples were kept at –20°C until they were analyzed. In the second study, the effects of duodenal SB infusion on four of the calves used in the first experiment were examined on days 6 of P1, P2, and P3. A control solution of NaCl 0.9% (saline infusion, during P1) or SB solution (SB infusion, during P2 and P3) was infused between 5 and 7 hours after the morning meal, when proximal digestion of the meal had largely completed. The amount of SB infused into the calves used in the study was the same for each meal. It was difficult to complete four progressive whole periods from the same cannulated calf for specific reasons. Four additional calves were cannulated and used as needed. Although they were unable to participate in the digestibility studies, these calves were a part of the pancreas measurements and plasma sample collection in both studies. We selected measurements of pancreatic secretions at the beginning and their duration (from 0.5 before to 3.5 h after the morning meal for study 1 and from 5 to 7 h after the morning meal for study 2) in accordance with our previous

***Address for Correspondence:** Katsuyoshi Sato, Department of Animal Physiology, Graduate School of Agricultural Science, Tohoku University, Sendai, Japan, E-mail: sato_k111@gmail.com*

***Copyright:** © 2023 Sato K. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.*

**Received:** 02 January, 2023, Manuscript No. hps-23-90247; **Editor assigned:** 03 January, 2023, PreQC No. P-90247; **Reviewed:** 16 January, 2023, QC No. Q-90247; **Revised:** 21 January, 2023, Manuscript No. R-90247; **Published:** 30 January, 2023, DOI: 10.37421/2573-4563.2023.7.212

data from calves. The postprandial period was the first interval, and the basal period was the second [4,5].

## Conclusion

When supplemented with SB in liquid feeds (milk or milk replacer), growth performance, feed efficiency, and antioxidant capacity of pre-weaned dairy calves improved. We suggested incorporating 45 g/d of SB into liquid feeds prior to weaning to increase dairy calves' growth and antioxidant capacity. Large-scale farm-level studies with a lot of calves are needed to see if SB can improve animal health and the growth and development of the rumen and intestine. To learn how butyrate boosts growth and antioxidant function before calves are weaned, mechanistic studies utilizing physiological, immunological, transcriptomic, proteomic, and proteomic technologies are required.

## Acknowledgement

None.

## Conflict of Interest

None.

## References

1. Wang, Nicholas C., Peng Zhang, Elliot B. Tapper and Sameer Saini, et al. "Automated measurements of muscle mass using deep learning can predict clinical outcomes in patients with liver disease." *Am J Gastroenterol* 115 (2020): 1210.
2. Kobayashi, Soma, Joel H. Saltz and Vincent W. Yang. "State of machine and deep learning in histopathological applications in digestive diseases." *World J Gastroenterol* 27 (2021): 2545.
3. Kather, Jakob N. and Julien Calderaro. "Development of AI-based pathology biomarkers in gastrointestinal and liver cancer." *Nat Rev Gastroenterol Hepatol* 17 (2020): 591-592.
4. Wei, Jason W., Arief A. Suriawinata, Louis J. Vaickus and Bing Ren, et al. "Evaluation of a deep neural network for automated classification of colorectal polyps on histopathologic slides." *JAMA Netw Open* 3 (2020): e203398-e203398.
5. Zou, Winnie Y., Binu E. Enchakalody, Peng Zhang and Nidhi Shah, et al "Automated measurements of body composition in abdominal CT scans using artificial intelligence can predict mortality in patients with cirrhosis." *Hepatol Commun* 5 (2021): 1901-1910.

**How to cite this article:** Sato, Katsuyoshi. "Supplementing the Diet with Sodium Butyrate Improves Sodium Butyrate and Pancreatic Secretion in Young Milk-Fed Calves." *Hepatol Pancreat Sci* 7 (2023): 212.