BENEFICIAL EFFECTS OF BUTYRATE FOR CALVES

Feeding butyrate to calves accelerates the natural development of their gastrointestinal tract. Colostrum and milk provide considerably high dosages of butyrate to suckling calves, with butyrate concentrations of approximately 1 to 2% on a dry matter base. For calves fed calf milk replacers, it is advisable to include butyrate as well, to promote gastrointestinal development. Not only in the milk replacers butyrate supplementation is suitable. Also in solid feed for calves, butyrate acts beneficial for ruminal and/or intestinal development and addition of a butyrate source to a starter concentrate can improve calves health and performance.

The challenge of a good development

The development of the gastrointestinal tract is an important challenge of early life. Anatomy and physiology change considerably on a very short period of time. Starting from single stomach digestion in the abomasum, within a few weeks calves need to develop four functional stomachs. Both function and structure need to change as the calf grows. Butyrate is important to support in the development of the different epithelia from the rumen, the abomasum and the intestines.

During rumen development not only size needs to increase, also growth of papillae is required to develop a high surface area for absorption. This will be important for absorption of nutrients and for feed efficiency.

Once the functional rumen is fully developed, ruminal microbial population will generate high concentrations of volatile fatty acids (VFA): acetate, propionate and butyrate. In cows and fully matured ruminants, the natural butyrate produced by microbial fermentation of carbohydrates will further support the epithelial structure. A well-developed rumen contributes to a high milk production, as an optimal absorption of VFA is essential to meet the high energy requirements for production.

Supplementation of butyrate

Raising replacement heifers accounts for about 15 to 20% of expenses on a dairy farm. A good rumen development is necessary to support growth performance and feed efficiency, which can reduce the cost of replacement heifers.

For the young calves, additional butyrate will improve the development of their gastrointestinal tract and promote secretion of enzymes leading to improved digestibility of fat, lactose and protein. Adding butyrate to their diet, improves feed efficiency and growth, which is also essential for later performance. Next to that, antimicrobial effects of butyrate against different pathogens are widely reported and butyrate use also tends to lower the incidence of diarrhea (scours).

The impact of butyrate on the calf can vary depending on the source of dietary butyrate being used (Figure 1). When butyrate is supplemented in **liquid feed**, which generally bypasses the rumen via the esophageal reflex, butyrate predominately affects the abomasum and small intestine. If butyrate is added to **solid feed**, it primarily affects the rumen, unless it is protected by micro-encapsulation providing a slow-release further in the intestinal tract, in the abomasum and intestines.

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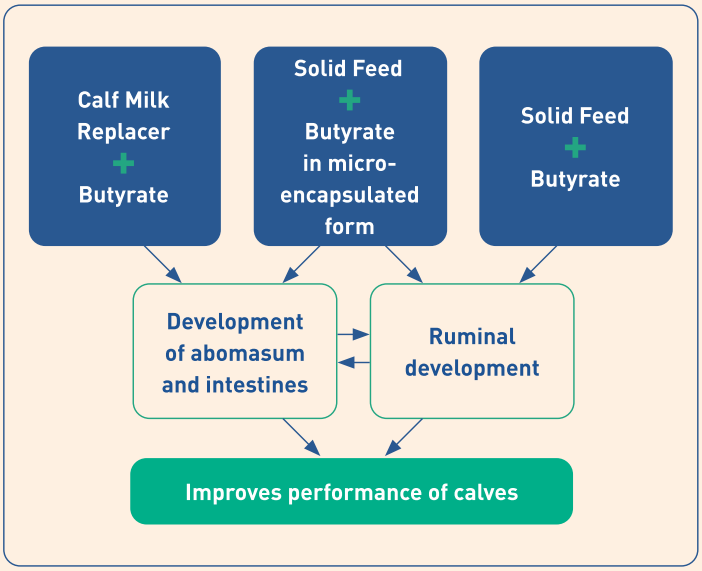

Figure 1: The application of butyrate sources in calves

Available sources of butyrate for calves

Different sources of butyrate are available on the market. Some contain butyrate in the form of glycerides or in the form of a calcium or sodium salt. Sodium butyrate can moreover be micro-encapsulated to obtain a gradual delivery over the digestive tract. Free available butyrate will be easily absorbed and metabolized. To provide butyrate at lower intestinal spots in small or even large intestine, a high-quality micro-encapsulated product with sustained release is essential. This targeted release over the entire intestinal tract is suitable for solid feed application. For the use in calf milk replacers or when especially development of the rumen is targeted, a more readily available source of butyrate will be suitable, such as pure sodium butyrate.

Development of abomasum and intestines will also influence ruminal development and vice versa. Consequently, both micro-encapsulated and unprotected products will have beneficial impact on growth and animal performance (Figure 1).

Conclusion

In conclusion, the use of butyrate in calves acts beneficial to accelerate rumen development and to improve enzyme secretion and digestibility. It can be observed that supplementation enhances growth, reduces incidence of scours and boosts calf performance. Therefore, butyrate supplementation is beneficial to optimize the raise of replacement heifers.

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