

Butyrate based additives improve performance and reduce piglet diarrhoea

by **Valentine Van Hamme**,
Product manager, **Impextraco**,
Wiekevorstsesteenweg 38, 2220
Heist-Op-Den-Berg, Belgium.

Butyric acid is a substance with a biological role consistently present in the intestinal ecosystem, as it is naturally produced by the intestinal microbiota.

It is a key molecule in enhancing gut health and its beneficial effects are well described.

In young animals, butyric acid is known to promote the maturation of the intestinal mucosal immune system and to stimulate the intestinal mucosal development.

As the mature gut is a complex system, it is no secret the newborn's digestive tract is underdeveloped, and needs to mature during the first weeks of life, which makes piglets a main target group for butyrate based products.

Newborn intestinal tract

At birth, there is a significant and immediate demand on the gut to digest and absorb nutrients efficiently in order to maintain a high growth rate.

Intestinal epithelial cell integrity is of prime importance considering that this epithelium is responsible for absorption of water, electrolytes, and nutrients.

On top, this layer of cells must

provide a selective barrier against the complex and potentially harmful environment of the gut lumen.

Dietary nutrients are essential for gastrointestinal growth and maturation. Nutritional support of this gut development is thus significant for young growing animals.

For example, colostrum ingestion causes a significant growth of the small intestine leading to an increased length by 30% within three days postpartum.

Butyric acid is one of the components of colostrum and milk and will thus promote gut development.

It supports normal maturation and function of the intestinal tract: it promotes the intestinal barrier function and the development of a competent mucosal immune system.

Impairment of the normal gut function, leading to intestinal dysfunction, diarrhoea and even death needs to be avoided at all times.

Shortening of the suckling period is a widespread practice in the modern swine industry. As a side effect, piglets weaned at an early age suffer from different stresses.

For example, the sudden change in dietary regimens at weaning places a heavy burden on the immature digestive system of the piglet, resulting in intestinal damage.

In addition, weanlings have a limited capacity for digesting protein in solid diets, as they do not have the ability yet to secrete sufficient HCl to obtain a gastric pH of 3 which is

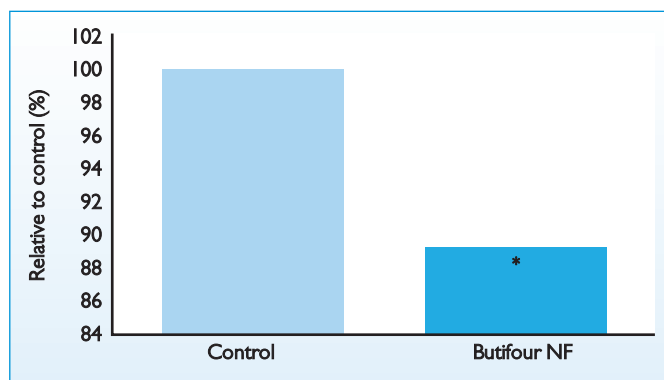


Fig. 2. Positive effect on diarrhoea of Butifour NF supplementation to piglets at 35 days of evaluation (* $p < 0.0001$).

required for conversion of the inactive gastric zymogens into active protein digesting enzymes.

Undigested protein in the gut could lead to microbial growth and subsequently to diarrhoea.

Diarrhoea problems and the huge impact on performance are thus a big concern in piglets.

Therefore it is important to support piglets with gut health promoting ingredients during their first weeks of life.

Butyrate based products

As Impextraco is aware of these problems in newborn piglets, a new product, Butifour NF was designed. This product is based on a synergism between calcium butyrate on the one hand, stimulating gut development and maturity, and natural ingredients on the other, supporting the gut's digestive activity.

As nature still harbours a lot of interesting ingredients, it is not a coincidence that Impextraco is focusing on these natural plant derived solutions.

Unlike pancreatic enzymes, plant derived molecules work in the mouth and the stomach where they are able to digest the feed.

These plant derived substances also operate in the small intestine, aiding pancreatic enzymes in continuing the digestive process.

Therefore we see an additional

beneficial effect on FCR and diarrhoea by adding these natural extracts to our butyrate based product, as these young piglets are unable to digest proteins efficiently.

A trial was carried out at the Swine Research Unit of PUCPR, Brazil, to prove the efficacy of this new product.

Some 48 weaned piglets, with an average body weight of 7kg, were housed in nursery pens for 35 days and divided into two groups: control and Butifour NF.

Two corn and soybean meal based diets were formulated according to animal age: prestarter (1-14 days of evaluation) and starter feed (15-35 days of evaluation).

Treatments consisted of a negative control (standard feed without inclusion of additives) and a supplementation with Butifour NF at 0.15% in prestarter and 0.075% in starter phase.

Body weight (BW) and feed consumption were controlled weekly to provide data on feed conversion ratio (FCR).

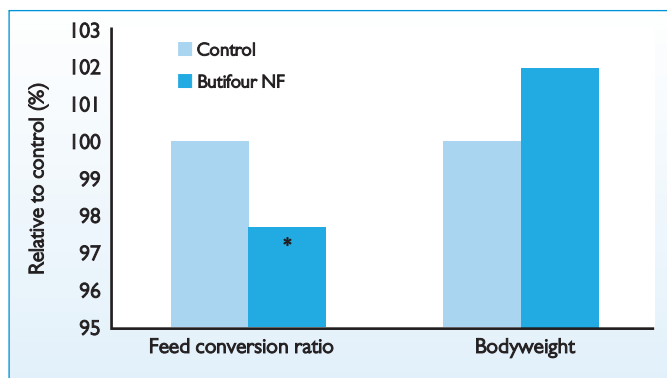
Diarrhoea incidence was verified on a daily basis and a score was attributed:

- 0 = normal faeces.
- 1 = soft faeces.
- 2 = slurry faeces.
- 3 = aqueous faeces.

Piglets supplemented with Butifour NF had a higher body weight and a significantly lower feed conversion

Continued on page 37

Fig. 1. Positive effect of Butifour NF supplementation to piglets at 35 days of evaluation (* $p < 0.0894$).



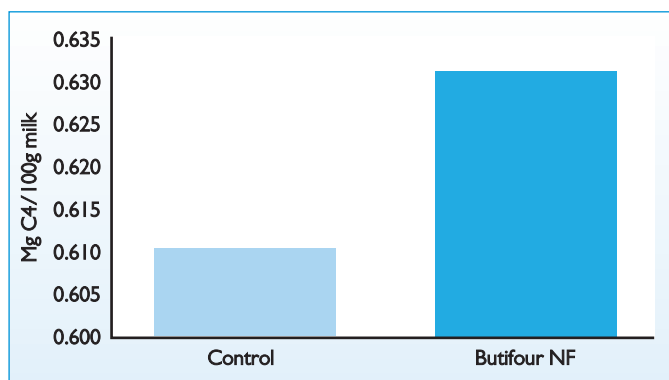


Fig 3. Butyric acid content of sow's milk 48 hours after farrowing.

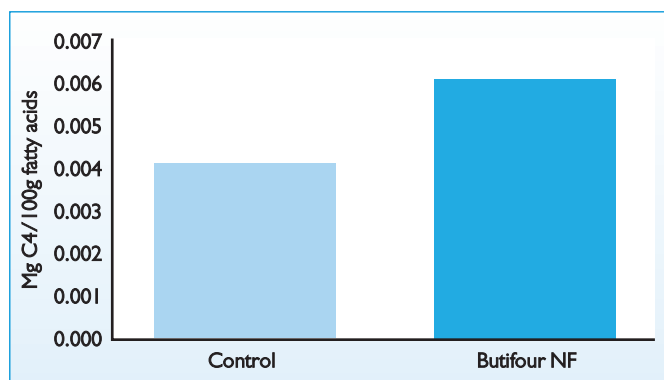


Fig. 4. Butyric acid content compared to 100g fatty acids of sow's milk 48 hours after farrowing.

Continued from page 35

ratio, which reflected positive on performance results. On top, these piglets suffered significantly less from diarrhoea, leading to a positive health status.

The trial shows butyrate supplementation is important from weaning on, but what about the period before weaning?

This period is primordial for the gut's development and maturation. Butyric acid is an interesting ingredient of the sow's milk and colostrum, as typical chain length of the fatty acids in milk is between 4 and 18 carbons.

Literature describing the fatty acid content of sow's milk is rare. Some

authors, report the fatty acid composition of sow milk being about: $\pm 2\%$ of C2:0-C12:0, 0.4-2% of C14:0, 15-28% of C16:0, 0.5-35% of C18:1, $\pm 14\%$ of C18:2, and $<1\%$ of C18:3.

As each author uses a different method of analysis to determine the fatty acid content in sow's milk, these published figures could only be used as an indication.

Fatty acids found in milk are coming from two sources: lipids connected to transport proteins in the blood and de novo synthesis in the mammary gland.

The lipoprotein complexes circulating through the blood into the mammary gland may contain fatty

acids originating from the diet or lipids mobilised from body fat. Based on these physiological and metabolic processes, we formulated a new hypothesis: could we increase sow's milk's butyric acid content by supplying butyrate based feed additives to sows?

From our internal data, we could conclude that sow's milk contains $\pm 0.6\text{mg C4}/100\text{g milk}$.

Supplementing Butifour NF to Topigs sows, of different parity, one week before weaning until farrowing at 20g/sow/day increased butyric acid content of milk 48 hours after farrowing.

Consequently, this improved the

intestinal development and maturity of suckling piglets.

Conclusion

It is clear the gut needs to mature during the first weeks of life, and we need to support the piglet during this period.

Research has proven that butyrate based supplementation is supporting optimal intestinal growth, development, and health in piglets. ■

References available on request from
valentine@impextraco.com