

SODIUM BUTYRATE – a new step in a proper protection

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INTRODUCTION

The butyric acid market has evolved in the last years, as there is a wider knowledge about its benefits of use in different species, because of the constant research, and the production of the different presentations of the active principle improved, regarding efficiency in the animals and handling. The first generation of acid source (sodium and calcium salts) has the main advantage of containing a high level of butyric acid, but their main drawback is a strong and persistent smell. These products can also have caking problems in presence of moisture, and, more importantly, once ingested, the butyrate salt is quickly absorbed by the enterocytes, so the activity is limited to the upper part of the digestive tract

In the second generation of butyrates, the so-called coated butyrates, palm stearin is used to trap the active ingredient. Even if the issues of smell and caking are solved, using the coating technology has a low percentage of sodium butyrate and requires a higher dosage in feed to reach a sufficient level of active ingredient in the animal

The third generation of butyrate uses a specific fat coating process to protect a higher level of active ingredient, avoiding the smell problems and allowing an effect along the gastrointestinal tract (upper and distal sections) acting as a natural growth promoter and reducing the levels of pathogenic bacteria especially *Salmonella* (Fernández-Rubio et al. 2009)



But protection with vegetable fat requires an effective lipase activity to release the sodium butyrate. This is especially an issue in young birds: when the fat layers are not easily degraded, being sometimes possible to find the microgranules quite intact in the faeces. The efficacy of such products, mainly second generation, can be therefore questioned. Our R&D department has continued its investigations with the aim of developing a new protection, to be more efficient source of butyric acid without handling problems. Sodium butyrate protected with sodium salts of palm fatty acid distillates (**GUSTOR N'RGY**) is the latest addition to the health and performance booster portfolio

TRIALS

In a trial presented in the European Symposium on Poultry Nutrition 2013, sodium butyrate protected with sodium salt of palm fatty acids (**GUSTOR N'RGY**) at 3 kg/t and sodium butyrate encapsulated (SBE) with hydrogenated palm stearin at 7 kg/t were compared with a control group (without any additives) on the production of healthy broiler chickens. The broilers receiving **N'RGY** in their feed, had a higher final body weight (3165 g; $p < 0.05$) than SBE and control (3052 g and 2850 g) and better ADG (g/d) (67.8, 65.3, 60.9; $p < 0.05$) (Figure 1)

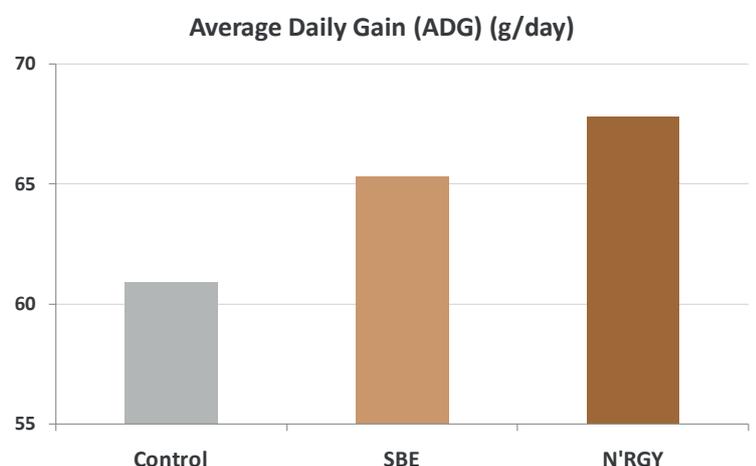


Figure 1.- Effect of the type of protection (SBE-sodium butyrate encapsulated with hydrogenated palm stearine and N'RGY- sodium butyrate protected with sodium salt of palm fatty acids) on average daily gain (g/day) in broilers

Animals receiving **N'RGY** and sodium butyrate encapsulated with fat tended to have better performance in terms of Feed Conversion Ratio ($p < 0.1$) (1.79, 1.78, 1.82) (Figure 2). The economic analysis shows an improvement in the income over feed cost (IOFC) of broilers fed diets with different forms of sodium butyrate. Broilers fed with control diet had the lowest IOFC (2.255 euros per bird) while SBE diet had 2.337 euros per bird (+3.6%) and **N'RGY** diet had the highest IOFC (2.487 euros per bird, and improvement of +10.3% versus control and 6.4% vs SBE)

An *in vitro* test presented in the IPSF 2014 in Atlanta, was performed with the objective to determine the release of butyric acid during an *in vitro* digestion. The products were two butyrate salts with different protections, a sodium butyrate encapsulated (freeze dried) with palm stearine (SBE) and sodium butyrate protected with sodium salt of palm fatty acids (**GUSTOR N'RGY**)

The content of butyric acid was 25.54% in SBE and 56% on **N'RGY**. The test was an adaptation of the protocol described in Boisen (1991), and the two treatments were replicated 2 times. The *in vitro* evaluation revealed a higher gradual release of butyrate from **N'RGY** during the 6 h that the experiment lasted, 511.7 g/Kg; 91.38%; the coated released 193.8 g/Kg; 75.88% (Figure 3)

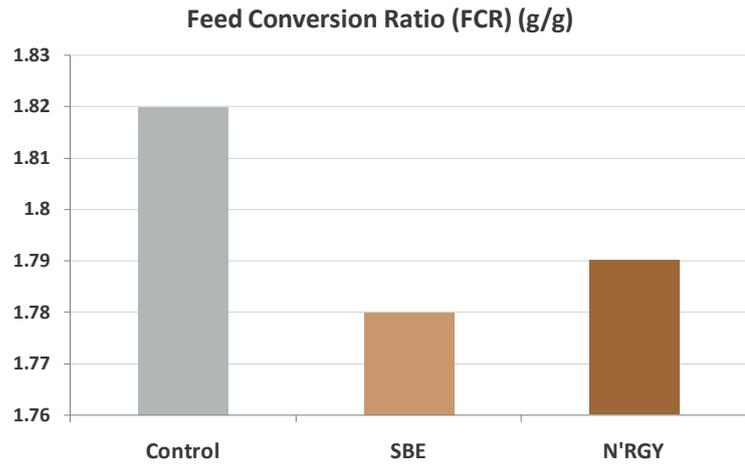


Figure 2.- Effect of the type of protection (SBE-sodium butyrate encapsulated with hydrogenated palm stearine and N'RGY- sodium butyrate protected with sodium salt of palm fatty acids) on feed conversion ratio in broilers

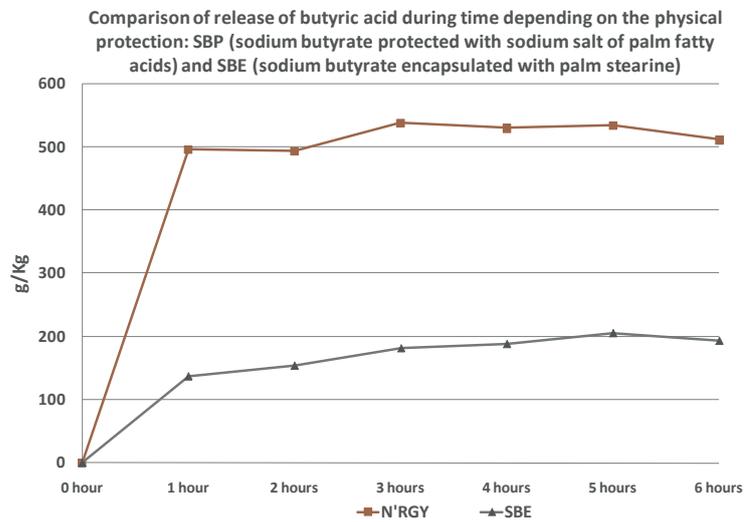


Figure 3.- Comparison of release of butyric acid during time depending on the physical protection: N'RGY (sodium buyrate protected with sodium salt of palm fatty acids) and SBE (sodium butyrate encapsulated with palm stearine)

CONCLUSIONS

The better effect in productive parameters and gradual release of **GUSTOR N'RGY** might be explained by the way the two fats are digested, either by acid hydrolysis or by enzymatic digestion (in birds, this point is of utmost importance in young animals). SBE (coated with palm stearine) might be less available to chicks as their fat coverage has to be degraded by enzymes to release the active ingredient (sodium butyrate). **N'RGY** (protected with salts of palm fatty acids) might be more available to chicks as they are hydrolyzed by acids in the gastrointestinal tract

