Clean-label is a major trend in the bakery sector as consumers want natural, healthy and recognisable ingredients in the products they consume. To respond to this concern, Galactic has developed a range of natural solutions that provide the very best of nature to the bakery industry by combining traditional and state-of-the-art technologies.
Galactic has acquired an extensive expertise in biotechnology since its creation in 1994, serving the food, feed, personal & health care and industrial markets.

Based on its valuable experience in lactic acid fermentation and the development of other derivatives, Galactic continuously creates sustainable, innovative and health-friendly solutions.

In collaboration with its customers and scientific partners, Galactic meets the challenge of sharing the unlimited potential of nature for a sustainable future.
Introduction

The bakery sector is facing the challenge of replacing several ingredients by healthier options. Phosphates and salt replacement as well as shelf-life extension are some of the major concerns bakery manufacturers are dealing with today.

Bakers use chemical leavening systems containing bicarbonate and acidifiers, e.g. phosphates, glucono-delta lactone (GDL) or coated organic acids. The use of phosphates is controversial since they are believed to cause many diseases and disorders, such as kidney stones, ADHD, etc. Phosphates containing aluminum like SALPs are not allowed in Europe anymore and the restriction is likely to be extended in other regions in the world.

Galactic has developed effective solutions to address these concerns, including: ProDough Adagio™ F, Galimax Flavor™ K and Galimax Flavor™ V-100.

Phosphate-free leavening

ProDough Adagio™ F is a natural leavening acidifier solution specially designed for bakery applications. It is made of natural L (+) lactic acid obtained by fermentation. It is formed of small white crystals and with very good flowability. ProDough Adagio™ F helps control the activation of bicarbonate in leavening systems.

Due to its structure, the activity of ProDough Adagio™ F can be accurately adjusted to several processes by controlling different parameters, such as time, temperature, concentration and water content.

Effect of temperature variation on the pH of 0.5% of ProDough Adagio™ F in running water

![Graph showing pH changes with temperature variation]
At low temperatures, the acidity release is slow while it is much faster at higher temperatures. Thus, the CO₂ release can be controlled by temperature, which can vary during different steps of the production process.

**ProDough Adagio™ F** has no negative impact on taste and demonstrates excellent compatibility with all the other ingredients used in bakery products. **ProDough Adagio™ F** is equally effective in fresh, frozen, and ready-to-bake products.

Eliminating SAPPs in chilled and bake-off cookies in order to reduce the sodium and phosphate content in the recipe is also a need in bakery products. **ProDough Adagio™ F** successfully replaces them; it enables the dough to rise even after freezing. The results of the sensory tests show that cookies have an enhanced chocolate flavour and are crunchier compared to the cookies containing SAPPs.

**Gluten-free**

The absence of gluten network in gluten-free bread often leads to a heterogeneous distribution of breadcrumb’s pore size. By partially substituting the yeast (about 25%), **ProDough Adagio™ F** avoids this phenomenon and enables producers to obtain a much more homogeneous breadcrumb and a better structure.

---

**Advantages:**
- 100% natural
- No phosphate
- No sodium
- No carrier
- Allowed in organic products

---

Reference (with yeast)  
Trial (with **ProDough Adagio™ F** and a 25% yeast reduction)
Reduction in the salt content

Sodium reduction is one of the major challenges for the bakery industry as salt does not only impact the taste, but also the structure of the products.

Understanding this particular concern, Galactic has developed Galimax Flavor™ K, a range of clean-label solutions designed to reduce the salt content in bread with no impact on texture, volume and structure.

Galactic’s engineers have run tests using 0.25% of Galimax Flavor™ K reducing the salt content by 25% without impacting the organoleptic properties. When the salt content is reduced, gluten poorly develops and the bread loses volume. Galimax Flavor™ K enables manufacturers to reduce the salt content without losing volume.

Results:

Reference (with salt)      Trial (with a 25% salt reduction + 0.25% Galimax Flavor™ K)

The dosage of Galimax Flavor™ K may however fluctuate between 0.25 and 0.50% depending on the customer’s recipe.

Preservation against moulds

Sodium propionate or calcium propionate are commonly used in bakery to inhibit moulds, but there is a growing concern about their negative effect on health. Propionates develop as well a “cheesy-like” smell in final baked goods. Galactic has developed Galimax Flavor™ V-100, a natural, highly soluble, buffered vinegar powder made by fermentation, which is very efficient to preserve bread and bakery products against fungal contamination.
### Ingredients

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Control (%)</th>
<th>Calcium propionate (%)</th>
<th>Galimax Flavor™ V-100 Powder (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat flour (11.5% protein)</td>
<td>59.50</td>
<td>59.40</td>
<td>59.20</td>
</tr>
<tr>
<td>Cold water</td>
<td>30.90</td>
<td>30.80</td>
<td>30.70</td>
</tr>
<tr>
<td>Fresh yeast</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Sugar</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Salt</td>
<td>1.60</td>
<td>1.60</td>
<td>1.60</td>
</tr>
<tr>
<td>Unsalted margarine</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Calcium propionate</td>
<td>-</td>
<td>0.20</td>
<td>-</td>
</tr>
<tr>
<td>Galimax Flavor™ V-100 Powder</td>
<td>-</td>
<td>-</td>
<td>0.50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

At the concentration of 0.50% Galimax Flavor™ V-100 Powder successfully replaces calcium propionate and shows good efficacy against moulds.

There is no significant difference in the dough and crumb pH. The crust appearance and the structure shows no difference, while the smell of the bread is significantly improved (no “cheesy-like” smell) in the sensory properties.

### Time-saving

Yeast is regularly used in the production of breadcrumbs, which requires a waiting time for the dough to rise before baking.

With ProDough Adagio™ F, in combination with carbonate, the waiting time is no longer needed, helping to substantially reduce the production time without losing the volume of the final product.

### Color control in bread crumbs

At different concentrations ProDough Adagio™ F can also control the color of pH dependent colorant, allowing the processor to standardize the final dry breadcrumbs color (from yellow to orange).

- **A** = Control with yeast (orange)
- **B** = 0.66% (orange)
- **C** = 1.00%
- **D** = 1.50% (yellow)
Since 1994, Galactic has become one of the world leaders in biotechnology serving the food, feed, personal & health care, and industrial markets. Based on its valuable experience in the fermentation of lactic acid and other derivatives, Galactic continuously develops sustainable, innovative and health-friendly solutions in the field of food safety, nutrition and green chemistry. With headquarters and an innovation campus in Belgium, production facilities in the United States (Milwaukee), China (Bengbu) and Europe (Escanaffles), high-performance labs in China (Bengbu) and the United States (Milwaukee) and sales offices in Belgium (Brussels), Japan (Tokyo) and Brazil (Curitiba), Galactic employs more than 380 people worldwide and is active in 65 countries.