

Re-inventing chocolate and cocoa:

The Barry Callebaut Group - combining trend insights, science and knowledge to drive differentiation

As the world's leading, fully integrated manufacturer of high-quality chocolate and cocoa products, innovation is not only at the heart of our business and our corporate strategy. It is also part of our heritage as some of our founding fathers already developed breakthrough innovations: For example Coenraad Van Houten who invented the cocoa press in 1828, made it possible to separate cocoa solids from cocoa butter, or Frans Callebaut who was the first to make liquid Belgian chocolate couverture.



With innovation in our DNA, the Barry Callebaut Group has become the reference for innovation in chocolate and cocoa, for individual artisans and industrial manufacturers alike. Combining trend insights – gathered from around the world – science and knowledge results in a consistent pipeline of novel chocolate and cocoa products as well as continuous improvements to existing products and processes. Our goal is to help our customers grow their business through differentiation while meeting the needs of today's consumers who ask for healthy products that taste good, delight all senses and are fun to enjoy.

From its **two global R&D Centers** in Wieze/Belgium for chocolate and in Louviers/France for cocoa, the company focuses on **four discover (knowledge) areas** spanning the entire value chain from the cocoa bean to the finest chocolate product:

1. **Cocoa science**
2. **Structure, Texture, Sensory**
3. **Authenticity & permissibility**
4. **New process technology**

Through a network of **over 20 R&D Centers** across Europe, the Americas, Asia-Pacific and Africa, over 200 dedicated specialists work in close cooperation with customers to develop individual solutions or tailor-made applications.



The Barry Callebaut Group is working with a network of universities, research institutes, labs and scientists to get access to the world's best experts as well as cutting-edge knowledge. The fundamental R&D activities of Barry Callebaut are guided by an independent scientific advisory board.

Discover Area 1 – Cocoa Science

With over 10,000 bioactive components, cocoa is one of the most complex food products. Through fundamental research into the secrets of the cocoa bean, the Barry Callebaut Group is able to deliver insights that address current business needs, while maintaining a long-term strategic focus. By deciphering the potential of each bean the Barry Callebaut Group is able to develop chocolate and cocoa products with specific properties with regards to taste, appearance or processing.

Controlled Fermentation resulting in superior tasting chocolates

The fermentation of cocoa beans is the critical step in developing the full flavor potential of the cocoa bean. It is a spontaneous process conducted by the artisan-farmer directly after harvesting the cocoa fruits (pods). Because of its critical position in the quality chain linking plantation to chocolate production, the Barry Callebaut Group identified this fermentation more than a decade ago as one of the key steps that required optimization in order to close the quality chain and provide the purest, most intense, natural chocolate experience up to now. Therefore an extensive program towards that goal was initiated culminating in 2015 with the introduction of the first viable, 100% natural yeast-based starter cultures optimally adapted to the cocoa fermentation.

Unlocking the full potential of cocoa

Decoding thousands of bioactive components in the cocoa bean makes it possible to predict which bean will deliver the deepest brown color or the most intense flavor. With the goal to analyze the around 20,000 chemical components of the cocoa bean, the Barry Callebaut Group is conducting a six-year research project called COMETA with Jacobs University in Bremen, Germany. At the end of the cooperation in 2020, a unique database, new methods and rapid tests for the classification and quality control of the cocoa beans used by the Barry Callebaut Group in its production will be available, allowing the manufacturing of precisely tailored products.

Innovation facts

- Based on its proprietary Controlled Fermentation technique, the Barry Callebaut Group has been able to develop a range of superior tasting chocolates under the Cacao Barry label. Inaya, Ocoa and Alunga were the best-selling new launches in 2014.
- Barry Callebaut recently announced it finished the development of a platform to customize flavor development through the cocoa fermentation, a unique achievement in the world of cocoa.

Discover Area 2 – Structure, Texture, Sensory

Cocoa and chocolate are pure indulgences; their appeal is the promise of a moment of gratification and pleasure. Taste and flavor are crucial. They are enhanced and differentiated through a range of various structures and textures. Together, these attributes provide the decadent experience that chocolate is loved for.

The Barry Callebaut Group strives to maximize the sensory experience and functional properties of its products. By offering a portfolio of indulgent products with tailored structure, texture and sensory attributes, the Barry Callebaut Group answers and fulfills the needs of its customers for product differentiation. These attributes are not only utilized to create unique products, but also to increase the longevity of the product. For example, the Barry Callebaut Group's prolonged shelf-life innovation allows products to be distributed and sold in markets that were previously not possible.

Anti-bloom barrier

Avoiding fat bloom – a whitish discoloration on the surface of chocolate - has always been a challenge for the chocolate industry. This whitish layer affects the appearance of the chocolate, although the product is still fine to consume. To prevent enrobed and filled-by-mold chocolates from early blooming, the Barry Callebaut Group developed a “cocoa barrier” that is placed between the filling and the inside of the outer-chocolate layer. Tests conducted up to one year after production showed that the chocolate products with a cocoa barrier did not bloom whilst the control chocolate products (without the protection) showed pronounced bloom.

Barista products

Indulgent chocolate drinks based on chocolate powder are also being researched at the Barry Callebaut Group. Chocolate powder—instead of cocoa powder—that is richer, creamier, and more easily mixed, and cocoa drinks which have no residual sediment are just a few topics of innovation within this area.

Inclusions

Enriching confectionary, ice cream and desserts with dynamic or contrasting inclusions provides great possibilities for consumers with multi-flavor or multi-texture sensation product requirements. Recent examples of such innovations are caramelized nibs, nuts and almonds inclusions, producing their typical rich flavor and a perfect crunchy texture in one-shot applications. When it comes to inclusions the Barry Callebaut Group devotes great attention to the fit and stability of this application (fat-based or water-based), making a wide range of bake-stable products available.

“The engagement, drive and entrepreneurship of the colleagues I work with are unique. People at Barry Callebaut really stand behind the work they do; in every part of the business I can sense a passion for chocolate and cocoa. Hence, they build an enormous expertise and know-how about the job they are doing.”
Peter Boone, Chief Innovation & Quality Officer

Discover Area 3 – Authenticity & permissibility

To meet the growing demand for healthy and functional foods, the Barry Callebaut Group is continually developing reformulated chocolate and cocoa products that everyone can enjoy in a responsible and sustainable way.

Our focus on sugar, fat and calorie reduction results in products and applications that offer a better energy balance and an improved product composition, without compromising on taste and perceived indulgence. Below are a few examples of the Barry Callebaut Group's reformulated products in three key areas: Good-for-you, Better-for-you, and Free-from.

Good-for-you choices with less or no sugar, or fat

Many without added sugar or sugar-free products replace sugar with sweeteners like polyols which may have a laxative effect. The Barry Callebaut Group developed a whole range of products with no side effects, including sugar-reduced chocolate sweetened with stevia or fruit sugars.

Other products developed in the past few years include products with less fat or less saturated fat, fat-reduced and water-based fillings. Just recently the Barry Callebaut Group was granted a patent for a process to produce a fat-reduced milk chocolate.

Better-for-you choices starting from the natural goodness of products

Our focus is on preserving what is intrinsically healthy in the ingredients we use, such as the high content of flavanols from the cocoa bean, or by creating products containing ingredients such as fibers and proteins (veggie or dairy).

Free-from choices the entire family can enjoy

For a growing number of consumers experiencing food intolerances or allergies, the Barry Callebaut Group can offer a full range of products: lactose free, milk-free, nut-free and gluten-free products.

For consumers looking for a clean or clear label, the Barry Callebaut Group offers products without artificial additives (flavors, colors, sweeteners), without lecithin, palm-free.

Innovation Fact

- Based on over 20 human clinical studies, the Barry Callebaut Group obtained the right from the EU Commission to use the health claim on its ACTICOA[®] cocoa powders and dark chocolates that “cocoa flavanols support a healthy blood flow” – the first such health claim in the cocoa and chocolate industry.
- The company's ACTICOA[®] process preserves up to 80% of the naturally present cocoa flavanols, which are destroyed in conventional chocolate-making processes.

www.acticoa.com

Advice from the experts

Aside from basic and applied research, the Barry Callebaut Group offers its customers expert insights on topics like marketing and positioning, hands-on advice on how to comply regulation as well as technical advice for workability and handling of its innovative products.

Discover Area 4 – New process technology

Across the value chain, the Barry Callebaut Group is constantly looking for ways to improve existing processes or to create new processes and technologies to produce cocoa, chocolate and related products in a more efficient and cost-effective way.

Apart from its in-house innovation, the Barry Callebaut Group also conducts research in partnership with customers and suppliers. Through new process innovation, the Barry Callebaut Group is building deep, mutually beneficial relationships with important stakeholders.

Innovation facts

- The Barry Callebaut Group has 30 partnerships with universities, research institutes, labs and scientists around the world.
- The company filed over 35 patent families and 40 international patents.
- 72% of the Group's sales revenue comes from products developed in the last 5 years.
- 10% of the sales revenue in fiscal year 2014/15 came from new or renovated products

Material science

In this field the Barry Callebaut Group, together with its suppliers, develops knowledge of non-cocoa ingredients such as fats, sugar, emulsifiers, proteins and dairy. This multilateral and multidisciplinary approach provides benefits to all parties involved – the Barry Callebaut Group, its customers and its suppliers – by creating synergies through co-creation and by removing inefficiencies in the value chain.

Packaging

Packaging is an important part of the quality of the final product. Constant innovation is taking place at Barry Callebaut, together with its suppliers, on matters of shelf-life extension, re-usability, transportation and storage optimization, protection of the product and usage.

Process Innovation – Cocoa for chocolate

Better understanding the evolution and modification of cocoa flavor components during the process - from the bean up to the final chocolate product - allows Barry Callebaut to steer process parameters. By combining the results of the latest analytical techniques to findings of organoleptic evaluation of our products in the different process stages, the effects of specific process parameters can be identified and quantified. This research allows us to define optimal settings to eliminate, conserve, or enhance specific components to create a unique cocoa profile in chocolate.

About Barry Callebaut Group (www.barry-callebaut.com):

With annual sales of about CHF 6.2 billion (EUR 5.6 billion / USD 6.6 billion) in fiscal year 2014/15, the Zurich-based Barry Callebaut Group is the world's leading manufacturer of high-quality chocolate and cocoa products – from sourcing and processing cocoa beans to producing the finest chocolates, including chocolate fillings, decorations and compounds. The Group runs more than 50 production facilities worldwide and employs a diverse and dedicated global workforce of more than 9,000 people.

The Barry Callebaut Group serves the entire food industry, from industrial food manufacturers to artisanal and professional users of chocolate, such as chocolatiers, pastry chefs, bakers, hotels, restaurants or caterers. The two global brands catering to the specific needs of these Gourmet customers are Callebaut® and Cacao Barry®.

The Barry Callebaut Group is committed to sustainable cocoa production to help ensure future supplies of cocoa and improve farmer livelihoods. It supports the Cocoa Horizons Foundation in its goal to shape a sustainable cocoa and chocolate future.

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