ECOllaboration: a collection of eco-conscious formulations enabled by a sustainable approach to innovation

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Abstract

Since first gaining global notoriety in the early 2000s, natural beauty has evolved to become the most relevant trend in the beauty & personal care industry. As a consequence, consumers around the world are attracted to cosmetic formulations which rely on a holistic approach to sustainability, combining performance with minimal impacts to the environment.

Dow has developed a collection of cosmetic formulations covering both skin and hair applications by focusing on the three key pillars of natural beauty: ecology, economic development, and eco-conscious mindset. To highlight the formulations benefits, different methods have been used. For hair care products, curl retention test under high humidity conditions and combing test using Dia-Stron equipment on both wet and dry hair were conducted. Regarding skin care, sensory performance was evaluated by panelists with customization of the experimental procedure to fit product format. Finally, long lasting benefit for color cosmetics formulations was evaluated with in-vitro film durability test.

The ECOllaboration Concepts Collection features a total of 8 formulations designed to reach at least 90% of natural origin content. The idea is to both inspire and help brand owners to develop formulations fitting with natural cosmetic trends without compromises on performance. Innovative and eco-conscious formats have been developed, including a solid deodorant, a solid body moisturizer and a powder shampoo, which combine water-poor formulations with zero-waste packaging.

ECOllaboration brings together formulations where natural beauty and efficiency are in synergy. Dow ingredients are key products to consider when formulating natural cosmetics without comprise on performance.

Keywords: Natural Beauty; Ecology, Economic Development; Eco-conscious Mindset

Introduction.

The industry now faces the challenge to constantly develop formulations containing natural ingredients without any compromise on performance.

As the typical natural beauty consumer is constantly searching for formulations with few ingredients, each playing a clearly defined role, simplicity was a key target for the development of these formulations. Inclusive beauty, which is driving changes in the cosmetics industry, has also been a clear focus of this work.

The cosmetic industry has increased its interest in sustainability, environment protection and biodiversity. For this reason, Dow decided to launch a series of high performing ingredients aligned with natural beauty- four of them are highlighted in this ECOllaboration Concepts Collection.

Moreover, eco-conscious holistic approach was also an objective for the kit design itself, not only the formulation.

Materials and Methods.

To highlight the formulations benefits, different methods have been used including in-vitro and in-vivo testing.

For hair care products, curl retention test under high humidity conditions (80% relative humidity at 25°C) and hair stiffness test using Dia-Stron equipment were performed to showcase styling benefit of a new film forming agent. Combing test using Dia-Stron equipment on both wet and dry hair was conducted to study benefits of Dow ingredients in a powdered shampoo format. For shampoo formulations, in use sensory tests were also performed at home by panelists to be closer to real use conditions.

Regarding skin care, sensory performance was evaluated by panelists with customized procedure for the solid deodorant due to its innovative format. Rather than assessing the deo on the forearm, performances were evaluated under the armpits in an in-use test conducted at home. Skin imperfections evaluation was done using VisioFace equipment.

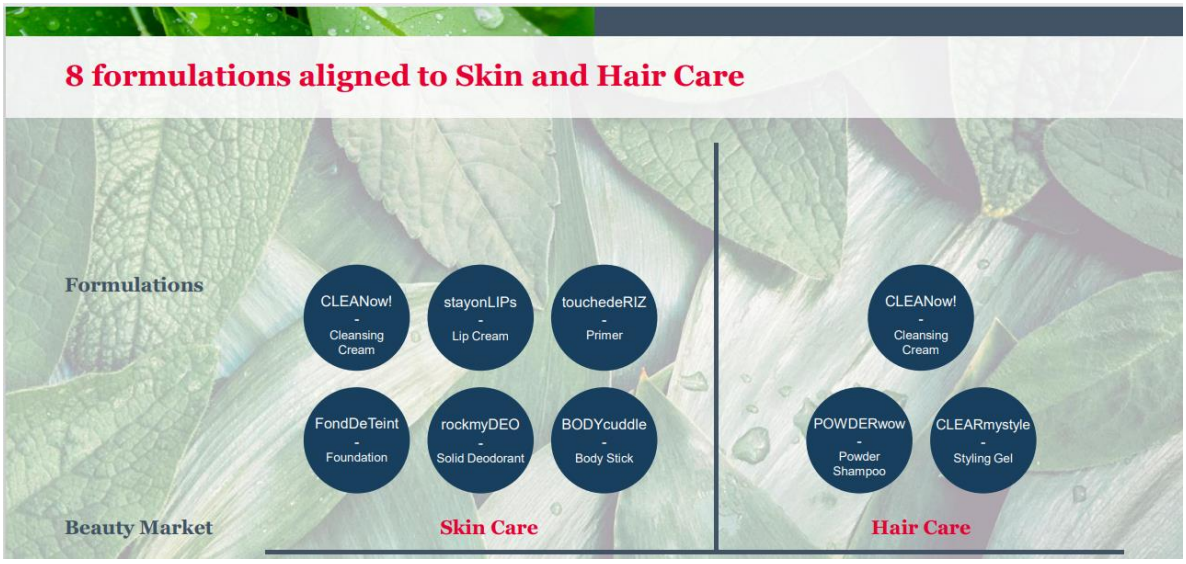
The long lasting benefit of color cosmetics formulations was evaluated measuring film durability in-vitro by casting films on a skin mimicking substrate. Resistance to rub off was measured on felt by colorimeter after friction cycles using a washability tester.

The challenges for performance testing have been to adapt the test methods to new formulation formats such as solid and powder formats.

Results and discussion

As mentioned above, ECOllaboration Concepts Collection features a total of 8 formulations designed to reach at least 90% of natural origin content ingredients as illustrated in figure 1. The following paragraphs will describe the main benefits and highlights of those 8 formulations.

Figure 1: ECOllaboration Concepts Collection – 8 formulations introduction



A multifunctional cleaning cream for both skin and hair has been developed: CLEANow! with 97% natural origin content. This mild cleaner which does not contain sulfates-based surfactants is providing good foam quality and quantity thanks to the combination of Dow surfactants: EcoSense™ 1200 Surfactant (inci name: Lauryl Glucoside) and EcoSense™ 3000 Surfactant (inci name: Decyl Glucoside). The sensory is improved with DOWSIL™ HMW 2220 Non-Ionic Emulsion (inci name: Divinyldimethicone/Dimethicone Copolymer (and) C12-13 Alketh-23 (and) C12-13 Alketh-3) which provides a smooth after feel and a nourishing perception on both skin and hair, resulting into a different sensory feel compared to a commercial natural benchmark.

Solid format is the rising trend in natural beauty. For this reason, a solid and anhydrous stick has been developed for body application named BODYcuddle with 92% natural origin content. This travel-friendly and water-less formulation is easy to apply and provides a smooth, after-feel sensory thanks to the combination of two silicone materials. DOWSIL™ 2503 Cosmetic Wax (inci name: Stearyl Dimethicone (and) Octadecene) is a silicone wax melting at the temperature of the skin and DOWSIL™ FZ-3196 Fluid (inci name: Caprylyl Methicone) is a silicone fluid with moderate volatility providing excellent spreadability. In this formulation, silicone materials are key to improve sensory and used at level enabling formulation containing 92% natural origin content.

Still in the solid format trends and going even further with zero waste approach, a solid deodorant named rockmyDEO has been designed with 96% natural origin content. Fluid AP low odor (inci name: PPG-14 Butyl Ether) from Dow is a key ingredient in this formulation to achieve skin moisturization and ease of application. Sensory performance was evaluated by panelists with a customized procedure. Rather than assessing the deo sensory performance on the forearm, it was evaluated under the armpits in a in use test conducted at home. Figure 2 summarized the outcomes of the test showing that Dow formulation rockmyDEO tends to provide similar sensory profile when compared to a commercial benchmark which contains 100% of ingredients from natural origin.

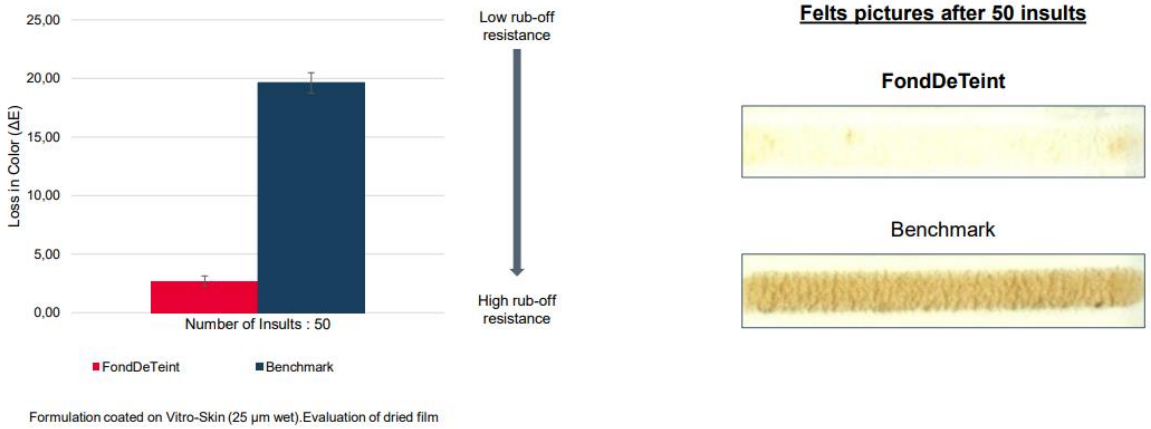
Figure 2: rockmyDEO / solid deodorant – performance data with in use test

Benefits were highlighted during in-use test for both products:

- Easy to apply
- Non tacky after absorption
- No film residue
- Low whitening effect

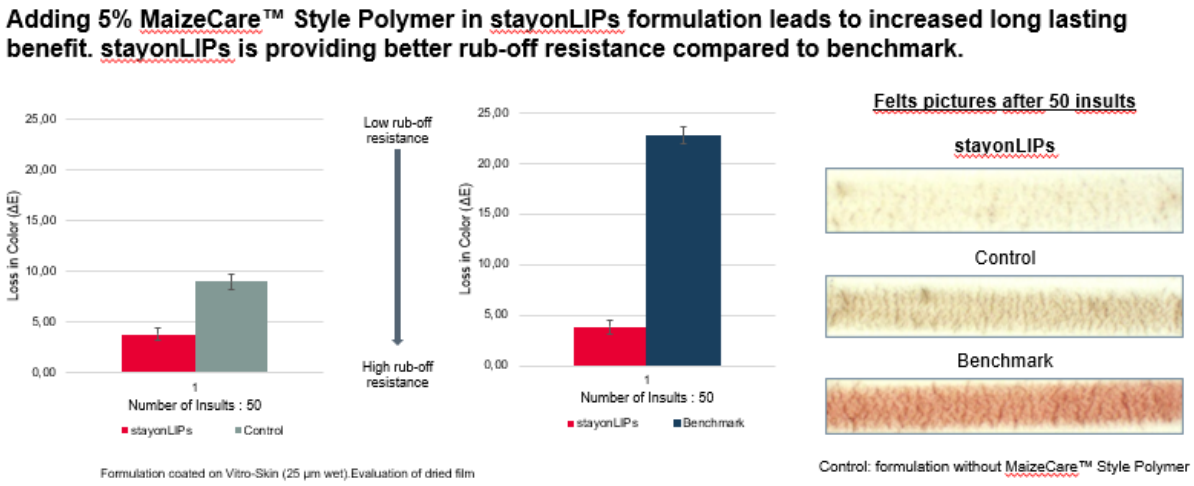
Relating to color cosmetics, 3 formulations have been developed. Firstly, FondDeTeint a foundation with 92% natural origin content has been designed and assessed using Dow long lasting procedure as shown in figure 3. FondDeTeint formulation leads to a better rub-off resistance compared to a commercial benchmark containing 99% of ingredients from natural origin. A reduced color loss can be noticed for FondDeTeint with colorimeter equipment as less product is transferred on the felt. The long lasting benefit is linked to the addition of Dow film former DOWSIL™ FA PEPS Silicone Acrylate (inci name: Undecane (and) Tridecane (and) Acrylates/ Polytrimethylsiloxymethacrylate Copolymer) which is a silicone acrylate in a bio-based carrier enabling a superior long lasting performance and suitable for natural formulation using a natural derived carrier. FondDeTeint provides a pleasant sensory feel thanks to the new ingredient from Dow, EcoSmooth™ Universal Fluid 1100 (inci name: Ethyl PG-Acetal Levunilate), a levulinic acid ketal derivative as an alternative to cyclopentasiloxane.

Figure 3: FondDeTeint / foundation – performance data on film durability and rub-off resistance



A lip water-based cream has been developed named stayonLIPs containing 99% of natural derived ingredients. Same long lasting performance testing was conducted. As noticed in figure 4, adding 5% of MaizeCare™ Style Polymer (inci name: Hydrolyzed Corn Starch), a corn-derived bio-polymer which acts as a film former, leads to increased long lasting benefit. Dow formulation stayonLIPs is providing better rub-off resistance compared to a commercial benchmark containing 100% ingredients from natural origin. The sensory of the lipcream is smooth and light thanks to the addition of DOWSIL™ EL-TIPS Silicone Elastomer (inci name: C13-15 Alkane (and) Dimethicone/Vinyl Dimethicone Crosspolymer), a high solid content silicone elastomer formulated in a renewable sourced carrier.

Figure 4: stayonLIPs / lip cream – performance data on film durability and rub-off resistance



The last formulation for color cosmetics is named touchedeRIZ and is a primer for the face with a total of 90% natural origin ingredients. EcoSmooth™ Rice Husk Cosmetic Powder (inci name: Silica) has been introduced to reduce skin imperfections. This new rice husk silica from Dow is a natural solution for wrinkles masking as shown in figures 5 and 6. touchedeRIZ exhibits skin smoothness, shine reduction, blurring effect as well as redness masking. Immediate and long-term pore masking is also demonstrated with touchedeRIZ formulation.

Figure 5: touchedeRIZ / primer – performance data using VisioFace / skin imperfections

Figure 6: touchedeRIZ / primer – performance data using VisioFace / pores masking

Timetable	Number of fine pores	Number of large pores
Naked Skin	172	78
Time 0	20	3
Time 15min	15	3
Time 1h	11	4
Time 3h	43	3
Time 6h	10	3
Average reduction vs. NS	**88%**	**95%**

Moving now to hair care application, a styling gel called CLEARmystyle has been designed to be crystal clear while showcasing a total of 97% natural origin ingredients. CLEARmystyle exhibits excellent curl retention and humidity resistance compared to untreated hair as illustrated in figure 7. Moreover, the formulation leads to a medium stiffness as shown in figure 8. Both curl retention and hair stiffness benefits are linked to MaizeCare™ Clarity Polymer (inci name: Hydrolyzed Corn Starch), a bio-based readily biodegradable hair styling polymer.

Figure 7: CLEARmystyle / clear styling gel – performance data using curl retention test at high humidity conditions (25°C/80%RH)

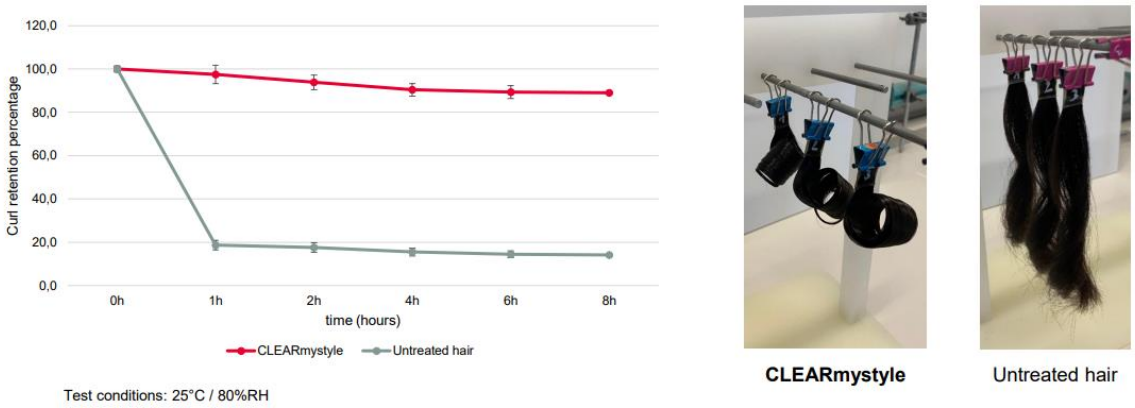
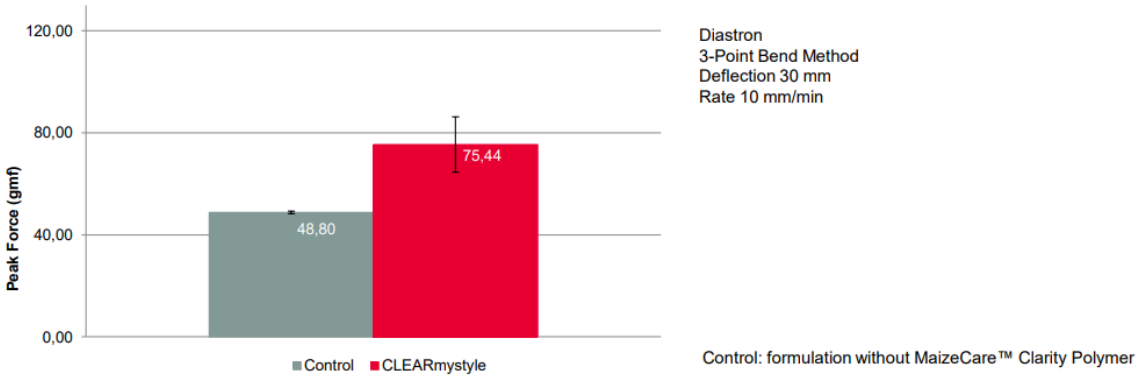
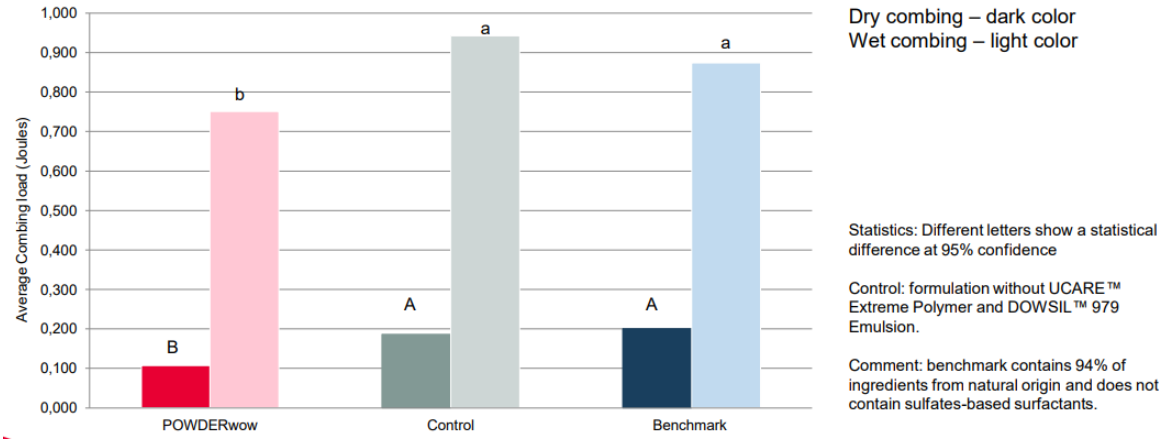


Figure 8: CLEARmystyle / clear styling gel – performance data on hair stiffness



Finally, an innovative powder shampoo format has been developed. an ultra-low water content formulation aligned with natural beauty trends. Using Dia-Stron equipment on both wet and dry hair, POWDERwow formulation demonstrates a significant reduction in combing force compared to a control and a commercial benchmark. This benefit is linked to the addition in the formulation of UCARE™ Extreme Polymer (inci name: Polyquaternium-10) at 0.5%, a bio-derived and biodegradable cationic cellulosic polymer, and DOWSIL™ 979 Emulsion at 2% (1% active) (inci name: Water (and) Amodimethicone (and) C11-15 Alketh-12 (and) C11-15 Alketh-7), a non-ionic aminosilicone emulsion. Both ingredients from Dow lead to a superior conditioning benefit in a 93% natural origin content formulation.

Figure 9: POWDERwow / powder shampoo – performance data on combing force reduction



As mentioned before and in line with the holistic eco-conscious approach of the kit design, sustainable approach went behind the formulations. Bags have been made locally in Belgium with an association enabling women and men social reintegration through sewing work. Bags are 100% handmade with fabric leftovers from the fashion industry. Packaging selection has been carefully done by prioritizing local suppliers and selecting materials such as those leveraging recycled plastics made from post-consumer recycled, sugar cane, wood and plant-based binders.

Figure 10: ECOllaboration Concepts Collection picture

Conclusion.
Dow has developed a collection of eco-conscious formulations using a sustainable approach to innovation covering both skin and hair applications. ECOllaboration Concepts Collection features a total of 8 formulations designed to contain at least 90% of natural or natural-derived ingredients. This concept can inspire and help brand owners to develop formulations fitting with natural cosmetic trends without compromises on performance. Innovative and eco-conscious formats have been developed, including a solid deodorant, a solid body moisturizer and a powder shampoo, which combine water-poor formulations with zero-waste packaging. ECOllaboration brings together formulations where natural beauty and efficiency are in synergy.

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Conflict of Interest Statement. NONE.
References. NONE.