

# Health and Wellness

Discovering new relationships

The world's population is growing at an unprecedented rate. At the same time, people are living longer. The twin scourges of under-nutrition and over-nutrition affect people in developed and developing countries alike, triggering a range of damaging conditions with long-term consequences.



## Our strategy for Health and Wellness

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Our strategy is to focus on Life Sciences and Materials Sciences in response to a number of long-term societal trends. Health and Wellness represents an important trend.

Our goal in respect of Health and Wellness is to meet the nutritional needs in the 'nutritional pyramid'. Some of our specific objectives are to:

- Deliver the highest standards in this field by means of our Quality for Life™ promise.
- Anticipate and meet the changing needs of our customers and other stakeholders by means of innovative solutions.
- Serve the needs not only of the most privileged sectors of society but also of the poorest.

DSM's management approach to Health and Wellness is part of the DSM Life Sciences and Materials Sciences strategy. DSM's sites comply with global quality and safety standards. We seek cooperation on knowledge development, advocacy, and product and application development with universities, customers, NGOs and other stakeholders.

DSM additionally engages in the global coalition to raise awareness of the key role played by nutrition in fostering healthy individuals and societies. We achieve this by means of our humanitarian initiative SIGHT AND LIFE and our global partnership with the United Nations World Food Programme. The examples provided in this chapter offer insights into some of our stakeholder engagement activities and innovation areas as well as into developments with a general societal and economic relevance.



**“DSM’s unique expertise in enzyme production and application allows us to offer increasingly innovative and eco-effective solutions throughout the entire food chain.”**

**Stephan Tanda**  
**DSM Managing Board member**  
**Responsible for DSM’s Nutrition cluster**  
**With DSM since March 2007**

**The world’s population is growing at an unprecedented rate. At the same time, people are living longer. The twin scourges of under-nutrition and over-nutrition affect people in developed and developing countries alike, triggering a range of damaging conditions with long-term consequences. DSM has a range of initiatives that help people in situations as diverse as the refugee camp and the hospital operating theatre.**

850 million people in the world, of whom 350 million are children, currently suffer from under-nutrition. A far greater number – approximately two billion – suffer from ‘hidden hunger’, a condition whereby food intake is sufficient in caloric terms but lacking in micronutrients. A further approximately three billion have to spend some 50% of their entire income on staple food. Higher up the food pyramid, some one billion people are sufficiently well-off to support their lifestyle choices with functional foods and beverages. The top of the pyramid is occupied by about 500 million individuals whose basic needs are fully served and who can invest in personalized nutrition – foods and dietary supplements which precisely meet the requirements of their own physiology.

Drawing on our expertise in Life Sciences and Materials Sciences, we serve people at every level on this global pyramid of need. Our humanitarian initiative SIGHT AND LIFE, our Nutrition Improvement Program and our partnership with the World Food Programme help the poorest of the poor. Our commitment in this area was further underlined when our CEO Feike Sijbesma joined the Global Agenda Council on Chronic Diseases and Malnutrition of the 2008 World Economic Forum, contributing to global awareness of the risks and societal consequences of hidden hunger.

Our Base of the Pyramid activities seek to create sustainable solutions for people in the developing world whose economic circumstances are severely limited.

Meanwhile our expertise in nutritional science and pharma allows us to develop health-promoting applications for the global food and beverage and dietary supplement markets. We are also taking a leading role in the drive for quality and safety in the food chain ‘from farm to fork’. At the same time, rising healthcare costs are encouraging the development of new and more cost-effective treatments, and we are creating innovative new approaches using biopharmaceutical and biomedical solutions such as Dyneema Purity®.

### **New quality guarantee**

**A number of recent and widely-publicized cases of food contamination worldwide have reconfirmed the importance of safe food and feed. Manufacturers and consumers alike are paying heightened attention to this issue.**

There is increasing concern about the safety and ethical conditions under which products destined to enter the food chain are produced. In 2008 DSM responded to these concerns by launching a unique new quality seal: Quality for Life™. The Quality for Life™ seal underwrites our commitment to the highest standards of product safety. Standing for product quality, reliability and traceability, it shows that we are supplying the very best ingredients, produced in a sustainable and ethical manner which is fully compliant with the strictest regulations in food and feed process and product safety.

# Health and Wellness

## HEALTHIER EMPLOYEES

The concept of health and wellness plays an important role in the life of our people. Our Global Health Management initiative involves a health promotion program for DSM executives as well as a web-based tool for helping employees to assess their health risks and set themselves healthy lifestyle goals. This program is called DSM Vitality Checkpoint. Where DSM Vitality Checkpoint has been introduced, it has been combined with comprehensive health checkups and individual follow-up on any health issues identified.

Whereas the DSM Vitality Checkpoint is a tool for the self-monitoring of health by employees, the DPNS (DSM Personalized Nutrition System), which was launched in 2008, creates possibilities for active, self-managed change. DPNS is a scientifically-validated nutritional management system that attempts to achieve long-term sustainable improvement in overall wellness. Supported by web-based interfaces, electronic feedback devices and behavioral change interventions, DPNS enables users to manage their food choices and activity levels.

Health management is also included in our learning programs. For example, 'Health at Work' forms an integral part of SHE training programs for managers and engineers.

## Clinton Global Initiative meeting

**The 2008 Clinton Global Initiative annual meeting held in New York in September brought together prominent business and government leaders from around the world to examine and discuss the major global challenges of health, energy and climate change, education, and poverty alleviation, with the goal of working together to develop and implement sustainable solutions.**

Mauricio Adade, President of DSM Nutritional Products' Human Nutrition and Health division, participated in the panel discussion 'Ensuring a Healthy Start: Maternal and Child Nutrition', which examined and emphasized the profound impact that maternal health has on the health and development of children, as well as their greater risk of chronic disease as adults as a result of childhood undernutrition.

## Serving the ultra-poor

**SIGHT AND LIFE is a humanitarian initiative supported by DSM. It was founded in 1986 to help combat vitamin A deficiency in developing countries.**

The project nowadays also aims to address other essential micronutrient deficiencies including nutritional anemia. SIGHT AND LIFE has invested over USD 30 million to support humanitarian and scientific projects since its founding. In 2008 it launched a podcast series on the subject.

SIGHT AND LIFE hosted a groundbreaking round-table discussion entitled 'Hidden Hunger: Socioeconomic and Scientific Challenges' in March. Held in Santa Barbara, California, the event was attended by nearly 50 nutrition and economic thought leaders from 11 countries, including two Nobel Laureates and Medal of Science winners. In September, SIGHT AND LIFE achieved another first, co-organizing together with the German Society for Applied Vitamin Research (GVF) the 1st Dialogue on Nutrition and Politics in Berlin. SIGHT AND LIFE Secretary General Dr. Klaus Krämer gave a presentation on the social consequences of the quality of nutrition in developing countries.

“DSM's commitment to sustainability not only benefits our working environment but also opens up opportunities for 'green innovations'.”

**Inge Massen-Biemans**  
**Branding & Communications Manager DSM Innovation Center**  
**With DSM since November 1999**



## Nutrition Improvement Programme

**Our NIP (Nutrition Improvement Programme) deploys our expertise in nutrition to create practical ways of fortifying staple foods with the micronutrients which are essential for health (nutrients that cannot be synthesized in the body and are required only in minute quantities daily, such as vitamins, trace elements and most minerals).**

The combined skills of NIP and SIGHT AND LIFE play a central role in our partnership with the World Food Programme. NIP and SIGHT AND LIFE together developed MixMe™ micronutrient sachets. In 2008 MixMe™ sachets were distributed by WFP to over 250,000 victims of hunger in Bangladesh, Nepal and Kenya. These sachets can be sprinkled on cooked food or mixed into beverages to provide the daily dose of essential vitamins to people who lack access to a nutritionally balanced diet. A year's supply of 150 sachets for one person costs just a few dollars. Working in collaboration with WFP, DSM intends to significantly increase distribution in the coming years.

The year 2008 saw two further important developments for NIP: it applied for a new patent for its rice fortification technology NutriRice® and also received approval from the Chinese authorities for the addition of vitamin A to staple foods. Vitamin A plays an important role in helping children to grow and to develop a healthy immune system.

## Low-carbon manufacturing

**In June 2008, DSM's commitment to improving its environmental performance was recognized by the award of a Carbon Trust Standard certificate. Established and funded by the UK government in response to the threat of climate change, the Carbon Trust is a company whose mission is to accelerate the move to a low-carbon economy.**

The Carbon Trust Standard certificate is awarded to organizations which achieve reductions in CO<sub>2</sub> emissions via their own autonomous efforts rather than by off-setting or green tariffs.

DSM was one of 12 'Pathfinder' organizations to benefit from this first-ever issue of Carbon Trust Standard certificates, and was the only one in the fields of Life Sciences and Materials Sciences. The award was given in recognition of the CO<sub>2</sub> emission reductions achieved by DSM Nutritional Products' production site in Dalry, UK. This facility, which celebrated its 50<sup>th</sup> anniversary in 2008, is the only manufacturer of vitamin C in the Western world. It produces the vitamin under the brand name QUALI-C™. In September 2008, Carbon Trust Standard certification was further secured for the QUALI-C™ product carbon footprint. Carbon Trust certification is one example of DSM's wider efforts to seek business opportunities based on climate change and at the same time to offer carbon transparency to our customers in the value chain.

# Health and Wellness

## EMPLOYEES SUPPORT HEALTH AND WELLNESS IN LOCAL COMMUNITIES VIA 'TORCH' INITIATIVES

The 'Torch' campaign helps our employees to support their local communities. This initiative has been running since 2002. Employees propose initiatives for specific local interventions, and selected projects are sponsored by DSM. 2008 witnessed the implementation of a diverse range of 'Torch' projects around the globe. These included:

- Providing free meals for impoverished elderly people in Seoul, South Korea
- Funding a music therapy program at the 't Steyntyje childcare centre in Stein, the Netherlands
- Providing Internet access to handicapped children in Istanbul, Turkey, thus allowing them to connect with the outside world
- Helping to clean the seashore of garbage in Fukori, Japan
- Providing a school bus to take orphans to school in Bhopal, India

In 2008 DSM once more called on all employees to put forward proposals for 'Torch' projects to be carried out in 2009.

## Efficient antibody production reduces eco-footprint

**DSM Biologics and Crucell N.V. announced record levels of IgG antibody production yield during 2008. This accomplishment, which was achieved using standard bioreactor equipment and a readily available cell culture medium, provides the biotechnology industry with a reliable production platform for the economical manufacture of therapeutic proteins.**

The combination of Crucell's PER.C6® technology and DSM's XD™ (extreme density) technology made possible an unprecedented yield of over 27 grams per liter, creating a new paradigm for the effective manufacture of protein products. Higher yields help to reduce the eco-footprint of manufacturing facilities. They also lower the cost of developing new drugs.

## Decoding of penicillin genome

**In 2008 DSM published a breakthrough analysis of the DNA sequence of the fungus *Penicillium chrysogenum* in the renowned scientific journal *Nature Biotechnology*. Discovered by Sir Alexander Fleming in 1928, penicillin became arguably the most important drug of the 20<sup>th</sup> century. It continues to play a vital role in the treatment of many infectious diseases worldwide.**

DSM's findings will help DSM Anti-Infectives to improve current production methods for beta-lactam antibiotics, the most widely-used group of antibiotics available. It will also allow greater innovations in the development of production mechanisms from which our customers, and the patients in need of these products, will benefit.

DSM's paper on the genome of *Penicillium chrysogenum* is the result of a major research project initiated by DSM in 2004. It involved the participation of seven international research groups and resulted in a high-quality genome sequence of 32.2 million base pairs with 13,653 unique genes. The DNA sequence of this strain has never previously been mapped to this level. This 2008 breakthrough follows DSM's 2007 publication of the DNA sequence of the fungus *Aspergillus niger*, a micro-organism that DSM deploys for the production of enzymes and other compounds mainly used in food ingredients. This research resulted in numerous patent filings by DSM and a range of new DSM products, such as innovative applications for the bakery market.

## Rapid expansion in Biomedical

**DSM's growth in this field was accelerated in 2008 by the acquisition of The Polymer Technology Group (PTG) of Berkeley, California, USA, a pioneer in the field of biomaterials. PTG's materials portfolio includes some of the world's most extensively tested biomaterials in clinical use today, and gives DSM a leading position in the field of biomedical polymers.**

These are used to manufacture devices such as pacemakers, neural stimulation leads, contact lenses, catheters and implantable sensors. In the area of ophthalmic and vascular diseases, meanwhile, DSM Biomedical launched its drug delivery platform Trancerta™, which facilitates the design of drug delivery systems for these conditions. Drawing on DSM's expertise in both Life Sciences and Materials Sciences, DSM Biomedical is one of DSM's four EBAs (Emerging Business Areas) and has shown rapid development since its inception in 2006. DSM received funding for four R&D projects from the BMM (Biomedical Materials Programme), a Dutch public-private partnership, which will help to accelerate the development of new biomedical materials.

## Omega-3 products for heart and brain health

**Derived principally from oily fish, Omega-3 long-chain polyunsaturated fatty acids (LC-PUFA) are needed by the body from infancy into old age. They help to reduce blood pressure and maintain heart health, and their positive effects on brain functionality are becoming increasingly apparent. Consumption of oily fish has declined in many parts of the world, however.**

DSM addresses this gap by producing Omega-3 products of unique purity, designed for a broad range of applications in the food, beverage and dietary supplement sectors. In 2008 DSM Nutritional Products applied for a patent for an improved process for the production of its ROPUFA® product range. It also launched its purest and most stable Omega-3 fish-oil-based form to date – ROPUFA® '10' n-3 INF Powder S/SD. This new powder contains the ideal nutritional balance of polyunsaturated fatty acids for infant formulae and is ideally suited to meet the highly demanding standards set by the infant nutrition industry. Like all the ROPUFA® range, it delivers the benefits of Omega-3 in odorless and flavorless form.

## DSM EMPLOYEES WALK 3,500 KILOMETERS FOR WFP

On 1 June, 700 DSM employees in Egypt, India, the Netherlands, Switzerland and the USA together covered 3,500 kilometers as part of the World Food Programme's annual sponsored walk. Involving employees of DSM, TNT, Unilever and WFP plus other corporate partners, humanitarian institutions, and civil organizations, 'Walk the World' is now the world's largest annual global fundraising event. It attracts hundreds of thousands of people in more than 70 countries and involves a collective walk of five kilometers. This is the average distance a child in a developing country has to walk to school – frequently on an empty stomach. Our participation is part of the Employee Engagement pillar of our partnership with WFP.

In October, DSM's locations in Beijing, China, Capua, Italy, Kaiseraugst, Switzerland, Parsippany, USA, Toansa, India and Heerlen, Sittard-Geleen and Zwolle, the Netherlands held an awareness-raising 'Friends of WFP' day. 'Friends of WFP' is an internal initiative designed to create a group of ambassadors for WFP within our company. Their role is to foster awareness of our partnership program and to stimulate other employees to get involved in it.

# Health and Wellness

## EMPLOYEES SHOW THE DSM SPIRIT IN SUPPORT OF LOCAL COMMUNITY

Employees of DCNA (DSM Chemicals North America), based in Augusta, Georgia, gave further proof of their commitment to supporting education in the local community during 2008. DCNA provides two schools in Augusta – East Augusta Middle School and Hornsby Elementary School – with financial support, tutors, coaches and equipment. This assistance enabled the two schools to achieve Adequate Yearly Progress for the first time in 2007. This achievement was repeated in 2008. In 2008, DCNA employees additionally ran a career awareness program introducing 7th and 8th graders to technical trade positions, as well as participating in River Road CAP (a forum in which community leaders, residents and chemical companies address issues concerning communication, safety and the environment) and improving the facilities of United Way Safe Homes (a residence for abused women and their children). Using their free time for these initiatives, DCNA employees clearly demonstrated the spirit of good corporate citizenship which is one of DSM's key values.

## Sustainable Alpine cosmetics

**DSM draws on traditional Alpine herblore to create a range of products which protect the skin and hair from the negative effects of the environment. We collaborate with farmers from Valais in Switzerland to cultivate Alpine plants whose healing properties have been known since Ancient Roman times.**

These plants have a high resistance to UV (ultra-violet) radiation and large temperature variations on account of the extreme elevations at which they grow. Their natural protective characteristics have developed as a result of the extreme environmental conditions in which they grow such as strong UV radiation and large temperature variations. They are deployed in our ALPAFLOR® range of functional cosmetic ingredients, which have anti-inflammatory, anti-oxidant, calming and soothing properties. DSM's subsidiary Pentapharm operates sustainable cultures of these plants, applying our philosophy of supporting economic activity that is profitable to farmers and preserving natural sites and rare plants from wild harvesting. The plants are 100% organically cultured according to the Bio-Swiss standards and the resulting extracts are ECOCERT certified. All extracts are preserved with sodium benzoate and potassium sorbate, which are not only allowed by ECOCERT for natural cosmetics, but which are also used in the food industry.

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“Companies like DSM that are investing heavily in science need to be at the cutting edge – and if they remain there, they will be at the front of a large and growing need for products.”

**Dr Alfred Sommer**  
**Dean Emeritus Johns Hopkins University**  
**Baltimore, USA**

## Reduction in animals used for compulsory studies

**As an innovative company, DSM is continuously developing new products. By law we are required to assess the properties and safety profiles of these products. With the aim of reducing animal testing in our discovery process for nutritional compounds, we increasingly make use of *in silico* (computer modelling) and *in vitro* techniques (for instance cell arrays) to identify candidate substances.**

By comparison with earlier practices, this considerably reduces the use of animals for testing per new substance. For example, by applying NMR (nuclear magnetic resonance) computer tomography, the number of animals used can be reduced by 80-90% in the said test compared with the previous standard procedure.

Unfortunately, however, animal tests cannot yet be fully dispensed with for proving the efficacy and safety of products for use in the animal and human health and nutrition sectors, as well as for testing the safety of chemicals and materials. We seek to further reduce animal studies by articulating justifications for waiving safety tests in cases where we believe that the relevant information can be provided by alternative means. However, although the scientific community may accept certain concepts, their translation into practice is sometimes hindered by the relevant legislation and the procedures demanded by the respective authorities. Testing remains compulsory, although the elements tested are exactly the same as those used in products that have previously been tested.

DSM is committed to further reducing, refining and replacing animal tests, the so-called '3R' approach (Reduce, Refine, Replace). However, innovation as well as the implementation of REACH (a European Union regulatory framework for the registration, evaluation and authorization of chemicals) could result in more animal testing if the development and acceptance of alternative methods do not keep pace. DSM cooperates in external networks and with academic partners in developing and promoting alternative testing methods. Examples include the EPAA (European Partnership for Alternatives to Animal Testing) and the Long-range Research Initiative of the ICCA (International Council of Chemical Associations).

## A challenge for DSM

### Speeding up the commercialization of 'second-generation' biofuels



“The unsustainability of the fossil-fuel economy creates a pressing need for alternative fuel sources. One of these is biofuels – fuels produced from plants. The production of fuels from plants raises ethical questions, however. Considerable opposition exists to the use of land and water for the ultimate creation of fuel, and to the use of edible crops for this purpose. The current generation of biofuels is based on the use of sugar and starch derived from crops such as corn cobs. Extensive and long-term use of such crops for biofuels could lead to scarcity in the global food market. DSM does not endorse this approach. In its White Biotechnology program, DSM strives to develop 'second-generation' feedstocks for the biorefineries of the future. This involves finding ways of recovering sugars from vegetable material that is currently treated as agricultural waste. The enzymes which are needed to pre-treat this waste are still to be made commercially viable. While the use of yeasts which can access these sugars has been successfully trialed at lab scale, we estimate that it will take at least another five years before production on an industrial scale is practicable. Our challenge is to make second-generation biofuels available as quickly as possible.”

**Volkert Claassen**  
Vice President DSM White Biotechnology  
With DSM since March 2006