

# Proven processing aids now also for biogas Enzymes by DSM

**Bright Science. Brighter Living.™ DSM is a global science-based company active in Life Sciences and Materials Sciences. We use our science and innovation in partnerships with our customers to create products and solutions that make a positive effect to people's lives. In this role DSM has discovered and developed enzymes that help to maximize biogas yield.**

Enzymes have been and will continue to be a part of our daily life. Enzymes are proteins and can be found in people, animals, plants and micro-organisms alike. These enzymes catalyze and regulate nearly all biochemical reactions that occur in the human body. For example, it is enzymes in our stomachs that break down food into a form that can be absorbed into our bodies and converted into energy.

Enzymes are commonly used in food and non food applications, e.g. in cheese, beer, detergents and textile. Biogas is an upcoming, exciting and challenging new application for enzymes. They can help you to optimize your process and improve your output.

## Why enzymes?

Enzymes bring a wide range of processing benefits and ensure cost savings by:

- improving processing efficiency
- reducing production time
- replacing physical and chemical treatments
- reducing energy needs
- using less raw materials

They also reduce environmental contamination by ensuring sustainability, decreasing waste and reducing chemical use.

Enzymes offer more than just processing advantages – they provide a cost-effective way to create exciting, new products and processes. For a clearer beer, a tastier, crustier loaf or low sugar, softer leather and cleaner laundry - enzymes help create products with universal appeal.

## Dedicated experience

From the discovery of Amylase in 1906 to the launch of enzymes in biogas applications, our 100 years of innovation have made us a world leader in the formulation, production and supply of enzymes. We apply fermentation and biotech processes to make our own products, enzymes, antibiotics and vitamins. We provide an extensive, innovative range of products for pharma, food and non food applications.

## Improving biogas output

In biogas plants of the future enzymes will be applied to adapt and accommodate the use of (cheap) raw materials.

Enzymes will process these raw materials such that a maximum energy (biogas) output is achieved. With more than 100 years' experience in enzymes and biotechnology, DSM is on hand to help you understand and optimize your biogas plant, giving you greater stability and a substantial increase in biogas yield and productivity.

## Enzymes by DSM benefit our customers in many industries around the world. Some examples:

### Feed

Feed enzymes have an important role to play in current farming systems. They can increase the digestibility of nutrients, leading to the best feed conversion rates in the production of animal products such as meat and eggs. At the same time they can play a role in minimizing the environmental impact of increased animal production.



### Dairy

DSM's breakthrough enzymes are used by dairies throughout the world, improving quality and efficiency throughout the manufacturing process. Enzyme processes are also incorporated into other applications such as low lactose yoghurt, fresh cheese, ice cream, spreads, cooking cream, desserts and butter.



### Cheese

The cheese maker has the availability of a broad range of coagulants, which allows him to select the ideal coagulant for every cheese type, and to meet consumer demands. DSM as a leading manufacturer of all three basic types of coagulant is able to offer the broadest portfolio in coagulants and can advise the cheese maker to choose the best coagulant for his application.



### Baking

Consumer demand for good tasting, healthy baked products with a long shelf life means that manufacturers are constantly looking for innovative baking ingredients to give them that extra competitive edge in the market place. For significant processing, cost and application benefits, our enzymes provide cost effective solutions to the baker's needs: Keep bread longer fresh; improve volume and texture, enhancing tolerance to processing variations and raw material quality, tailored solutions to specialty breads, such as whole grain and high fiber.



### Brewing

Employing state of the art processing equipment and technology, the brewing industry demands the highest standards of quality, safety and product consistency. We supply a complete and wide range of innovative



enzymes for virtually every phase of the brewing process. These products will help the brewer to optimize the brewing process, providing cost reduction opportunities, adapt processes to cater for lower quality raw materials and/or adjuncts as well as increase yield and improve filtration and improve beer stability, leading to enhanced shelf life.

### Fruit processing

DSM's world-leading fruit processing enzymes are known and respected globally for their reliability and performance. For juice concentrate processors, our enzymes play an essential role in optimizing processing capacity and downstream processing and in significantly increasing yield. We have an extensive array of enzymes for key fruit processing markets.



### Detergents

Enzymes are key in today's environmentally friendly processes for cleaning laundry. DSM has been a pioneer in the development of proteases for laundry detergents.



### Leather

The tanning of hides is an ancient process. With enzymes leather can be made softer in a much more environmentally friendly way. The range of available selective proteases and lipases allows the tannery to use more and various species of hides as raw material.



### And so on...

Other areas in which enzymes are widely used are textile softening, processing and depilling, wine production, toothpaste, contact lens cleaning, water treatment, digestive aids... and more...



### Biogas

DSM will apply the above array of knowledge, products and examples to service also the biogas industry, with the aim to make the process more effective and profitable. Enzyme (pre) treatment will allow the use of cheaper raw materials, as such optimizing the economics of energy production from biogas.



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