3 June 2013 - A few weeks ago BASF announced that it had entered a non-exclusive worldwide research and license agreement with US biotech firm Dyadic International. On the same day BASF also said it would broaden its collaboration on enzymes for animal nutrition with existing partner Direvo Industrial Biotechnology GmbH of Germany by developing proteases.

Both these collaborations are expected to complement BASF’s feed enzyme portfolio and mark a further step in BASF’s plans to extend its position as a leader in animal nutrition.

Feedinfo News Service spoke to Dr. Alexandra Brand, who has been heading BASF’s global Animal Nutrition business unit since September 2012, to obtain a better understanding of BASF’s strengthened commitment to feed enzyme research and development and of the role feed enzymes will play in the firm’s overall animal nutrition portfolio moving forward.

[Feedinfo News Service] Dr. Brand, regarding the agreement with Dyadic, BASF will be able to use Dyadic’s patented and proprietary C1 platform technology to develop, produce, distribute and sell industrial enzymes in certain fields for a variety of applications, including animal and human nutrition. What opportunities have been identified for feed enzymes?

[Dr. Brand] Enzymes will be a focus of BASF’s animal nutrition business in the years ahead. As a global leader in animal nutrition, we take a broad view of the industry’s needs and evaluate possible solutions for optimizing feeding efficiency, the profitability of livestock production, and animal welfare. Of all feed additives, enzymes are unique in terms of the possibilities they provide. While BASF’s phytase was the pioneer helping improving phosphate utilization, several enzymes have recently evolved with promising additional benefits, such as carbohydrases and proteases. BASF is going to extend its range of enzyme products for animal nutrition in order to offer customers a package that optimizes the use of energy, protein, and minerals across the board. As always, the products we develop will deliver excellent quality, they will be based on sound science and they will have been thoroughly tested in animal feeding studies. Now that we have access to Dyadic’s C1 technology, we can widen our technological possibilities for feed enzymes. Several projects are planned that will enable us to get ready for the market with optimized production efficiencies.

[Feedinfo News Service] BASF and Direvo will jointly develop a highly efficient protease for pig and poultry.
What is your view of the protease market?

[Dr. Brand] Proteases allow increased utilization of protein from feed plants. Rising grain and soy prices will be more challenging for feed producers and animal growers. So anything that improves the nutritional value of feed—like adding proteases—will help maintain or even improve their profitability. Another challenge is that while only limited arable land is available for producing feed grains, there is a growing demand for livestock production to feed the world’s growing population and supply enough meat, milk, and eggs to emerging economies, where increasing spending power is enabling people to consume more of these products. This makes it essential to optimally utilize protein from feed plants. Proteases will be an important contribution to achieving sustainable feeding and securing an adequate supply of food for future generations. Adding proteases to feed will also be good for the environment, since it prevents excretion of ammonia. Currently only a few first generation proteases are available in the market and we see a lot of untapped market potential. Thanks to our BASF-wide enzyme technology and manufacturing platform and the expertise of our partner Direvo, we expect to become a leading player in feed proteases.

[Feedinfo News Service] BASF offers Natuphos (phytase) and Natugrain TS (glucanase, xylanase) enzymes, as well as Natuphos Combi (a combination of Natuphos and Natugrain TS products). Moreover, BASF acquired a mannanase technology package developed by Direvo in 2012; and now you are branching out into proteases. Which of these products hold the greatest promise for tomorrow?

[Dr. Brand] All of these enzymes are very promising and important. They have different functions in animal feeding, and their use depends on animal species, composition of feed, livestock management practices, as well as individual customer needs. In most common diets, each of these enzymes can make a difference. For example, mannanase is a NSP enzyme that positively impacts soy digestion mainly while glucanase and xylanase target wheat, barley, and corn. Besides digestion, mannanase improves other physiological processes that are closely related to the GIT and GALT. Natuphos Combi, a combination of three enzymes, is a highly successful product that was launched for customers who prefer facilitated regimens and a simplified supply chain. In the future, our customers will be able to choose from a wider range of enzymes to additionally optimize feeding according to their specific needs and feed compositions. Our customers can rely on our technical experts for in-depth consultation and support in feeding enzymes to animals.

[Feedinfo News Service] Why has BASF chosen to partner with companies such as Direvo and Dyadic given that you have been present in the feed enzyme market for many years? Are partnerships the best way to further strengthen BASF’s presence in the feed enzyme world?

[Dr. Brand] BASF already has an extensive in-house enzyme and white biotechnology R&D platform serving various industries, but in our rapidly changing world, we need to continuously reflect and reinvent ourselves. In order to meet the needs of the feed industry in 5, 10, and 20 years, we need to lay the groundwork in a broad approach now. This will only be possible by openly innovating with credible partners. It is of the utmost importance to bring together experts from all industries and functions and have a good sense of how the feed-to-meat industry will develop. Depending on the topics, we carefully select innovation partners for early development stages whose technologies complement BASF’s and enable faster times to market. This is the case with Direvo and Dyadic, our two expert partners.

[Feedinfo News Service] Looking ahead, how will developing new feed enzymes with outside parties affect the management and organization of BASF’s Natuphos, Natugrain TS, and Natuphos Combi product lines? Will these three products remain the core of your strategy?

[Dr. Brand] Natuphos pioneered phytase in the animal nutrition industry, and today it is our key feed enzyme. This is because phosphate prices are steadily rising and phytase use is well-established all over the world. There is no reason for us to believe that this will change. Our customers value the support of our technical experts and the extensive scientific studies we provide on how to use Natuphos most efficiently. Natugrain TS and Natuphos Combi, meanwhile, were successfully introduced to the market a few years ago, and their rollout is progressing fast...
in regions and for species that haven't been covered yet. Our new enzyme developments—
independently of whether they are developed in house or in cooperation with outside partners—
will further contribute to BASF's feed enzyme portfolio while enabling our customers to use BASF
sustainable enzyme solutions.

[Feedinfo News Service] Can you disclose any details on BASF's monitoring of new
enzyme candidates for future feed market needs using the latest techniques and
technology? What customer specifications are you noticing with regard to feed
enzymes?

[Dr. Brand] BASF’s team of animal nutrition specialists includes veterinarians, nutritionists,
biochemists, biotechnologists, and marketing experts, to name just a few disciplines. They are all
working together across regions to evaluate the market, customer needs, and future trends—
from societal megatrends to specific animal nutrition industry topics. In addition, our customers
as well as our external partners help us understand the market and give us further advice and
recommendations. As for the enzymes, we have identified the important substrates that have to
be targeted to improve digestibility and feeding efficiency and to improve animal welfare by
preventing the anti-nutritive or even toxic effects that some dietary components can have.
Individual animal species have to be considered, since their ability to digest certain substrates
and their sensitivity can vary significantly. Along with this technical expertise, it is BASF’s in-
depth knowledge of the markets that is behind decisions to pursue certain enzymes or
technologies. Our pipeline is well filled, and we expect to launch our first new candidate soon.

[Feedinfo News Service] How crucial will feed enzymes be to BASF's overall animal
nutrition portfolio moving forward?

[Dr. Brand] Enzymes are in our focus and at the top of our animal nutrition agenda. The new
enzyme developments will enable BASF to widen this focus. Beyond enzymes, we have also
other plans for moving ahead as a sustainable leader in the animal nutrition industry, but it is
too early to reveal more about the future now.